Varazdin Development and Entrepreneurship Agency and
Medimurje University of Applied Sciences in Cakovec, Croatia

In cooperation with:
Faculty of Management University of Warsaw, Poland
Faculty of Law, Economics and Social Sciences Sale - Mohammed V University in Rabat, Morocco
Ecole Nationale de Commerce et de Gestion de Tanger - Abdelmalek Essaadi University, Morocco
GOVCOPP - University of Aveiro, Portugal

Book of Proceedings

125th esd Cakovec 2025

Economic and Social Development - Building Society on the Foundations of Heritage and Culture

Editors:
Igor Klopotan, Ana Lorga, Abdelhamid Nechad

ISBN 978-953-6125-32-6

April, 2025

Varazdin Development and Entrepreneurship Agency and
Medimurje University of Applied Sciences in Cakovec, Croatia

In cooperation with:
Faculty of Management University of Warsaw, Poland
Faculty of Law, Economics and Social Sciences Sale - Mohammed V University in Rabat, Morocco
Ecole Nationale de Commerce et de Gestion de Tanger - Abdelmalek Essaadi University, Morocco
GOVCOPP - University of Aveiro, Portugal

Book of Proceedings

125th esd Cakovec 2025

Economic and Social Development - Building Society on the Foundations of Heritage and Culture

Editors:
Igor Klopotan, Medimurje University of Applied Sciences in Cakovec, Croatia
Ana Lorga, Lusofona University, Portugal
Abdelhamid Nechad, Abdelmalek Essaadi University, Morocco

April, 2025

Title ■ Economic and Social Development - Building Society on the Foundations of Heritage and Culture - (Book of Proceedings)

Editors ■ Igor Klopotan, Ana Lorga, Abdelhamid Nechad

Publishing Editor ■ Domagoj Cingula

Publisher ■ **Design** ■ Varazdin Development and Entrepreneurship Agency / Medimurje University of Applied Sciences in Cakovec, Croatia / Faculty of Management University of Warsaw, Poland / Faculty of Law, Economics and Social Sciences Sale - Mohammed V University in Rabat, Morocco / Ecole Nationale de Commerce et de Gestion de Tanger - Abdelmalek Essaadi University, Morocco / GOVCOPP - University of Aveiro, Portugal.

Printing ■ Online Edition

ISBN ISBN 978-953-6125-32-6

The Book is open access and double-blind peer reviewed.
Our Books are available for download in a PDF format from the Economic and Social Development Conference website: http://www.esd-conference.com

CONTENTS

HERITAGE INTERPRETATION IN THE CONTEMPORARY CONTEXT: THEORETICAL APPROACHES AND THE DEVELOPMENT OF HERITAGE LITERACY
Hrvoje Mesic 1

AN INNOVATIVE AND SUSTAINABLE APPROACH TO MEĐIMURJE TOURISM
Nevenka Breslauer, Nenad Breslauer, Ivana Bujan Katanec, Ivan Hegedus, Rudi Grula 13

LINGUISTIC CHALLENGES IN CONTENT CREATION AND TRANSCREATION IN TOURISM OF MEĐIMURJE COUNTY
Tina Smolkovic 24

SUSTAINABLE TOURISM DEVELOPMENT IN CROATIA
Morana Bolfek, Zdenko Bolfek, Ivan Hegedus 33

MANAGEMENT OF MINERAL RESOURCES IN VARAŽDIN COUNTY: ADAPTING TO GLOBAL CHALLENGES OF THE ENERGY TRANSITION IN A DYNAMIC ECONOMIC ENVIRONMENT
Melita Srpak, Darko Pavlovic, Igor Klopotan 42

INFORMED USE OF PBL IN FOSTERING SOFT SKILLS IN MOROCCO: CHALLENGES AND OPPORTUNITIES
Adil Benlabchir, Moulay Sadik Maliki 55

THE NECESSITY OF CHANGES IN VALUE ADDED TAX POLICY IN THE REPUBLIC OF CROATIA
Zdenko Bolfek 71

DIGITAL TRANSFORMATION AS A STARTING POINT FOR SOLVING THE CHALLENGES OF SOCIETY 5.0
Jarmila Vidova 78

IMPACT OF ENTREPRENEURSHIP ON REGIONAL DEVELOPMENT IN SLOVAKIA
Natalia Pozsonyiova 89

ENTREPRENEURSHIP IN EU PORT REGIONS: BUSINESS STRUCTURE ANALYSIS, ECONOMIC INDICATORS, AND INNOVATION POTENTIAL
Gorana Mudronja 96

ANALYSIS OF AGILE PROJECT MANAGEMENT IN THE IT INDUSTRY: LESSONS FROM SELECTED IT PROJECTS
Monika Krnjak, Martina Vukasina, Karlo Jurac 105

OVERCONSUMPTION AND CONSCIOUS SHOPPING IN TERMS OF SOCIO-DEMOGRAPHIC CHARACTERISTICS
Ivana Ondrijova, Martin Rigelsky, Simona Gejgusova 113

NEW PHENOMENA AND TERMINOLOGY IN INFLATION: SHRINKFLATION, SKIMPFLATION, EXCUSEFLATION, GREEDFLATION, STICKYFLATION AND THEIR COMPANIONS
Arpad Ferenc Papp-Vary 124

THE STRATEGIC ROLE OF CRITICAL MINERALS IN ELECTRIC VEHICLE PRODUCTION
Tomi Miuc, Matej Svigelj 135

THE IMMERSIVE TRUTH EFFECT: HOW VIRTUAL REALITY ENHANCES PERCEPTIONS OF ADVERTISEMENT TRUTHFULNESS
Filip Zivaljic..... 145

CHALLENGES OF INTERNATIONAL LAW IN BIPOLAR AND MULTIPOLAR GLOBAL REALITY: THE LEGAL FRAMEWORK FOR PREVENTING GENOCIDE AND THE RESPONSES OF JUSTICE SYSTEMS
Dasa Panjakovic Senjic..... 154

HERITAGE INTERPRETATION IN THE CONTEMPORARY CONTEXT: THEORETICAL APPROACHES AND THE DEVELOPMENT OF HERITAGE LITERACY

Hrvoje Mesic
J. J. Strossmayer University in Osijek, Croatia
The Academy of Arts and Culture
hrvoje.mesic35@gmail.com

ABSTRACT

Heritage interpretation is a crucial process in transmitting cultural values, enabling understanding, engagement, and community participation in the preservation of heritage sites. The fundamental principles of interpretation emphasize its role in education and the creation of emotional connections with heritage, while contemporary approaches critically reassess traditional methods and advocate for innovative models that enrich the visitor experience and ensure the sustainability of heritage. Contemporary discussions on heritage interpretation highlight its complexity and multilayered nature, particularly in the context of shaping collective memory and constructing identity. Traditional models often reflect an authoritative discourse, which may marginalize alternative narratives, whereas new approaches emphasize the importance of participation and emotional engagement of the audience. The perception of heritage by visitors also plays a key role in interpretive practices, with the motivation for visiting heritage sites often connected to individual experiences and cultural identity. The challenges of heritage interpretation are particularly pronounced in museums and heritage sites, where traditional methods face the need for participatory and interactive approaches. This shift enables a more democratic interpretation and strengthens heritage literacy, which includes critical analysis, understanding, and active participation in the creation and preservation of heritage. This paper analyzes the theoretical and methodological frameworks of heritage interpretation, emphasizing its role in shaping identity, community engagement, and the development of heritage literacy. Through an examination of key concepts, the paper highlights the need for more dynamic, inclusive, and digitally mediated approaches to heritage interpretation in contemporary society.

Keywords: *collective memory, digital humanities, digital technologies, heritage, heritage interpretation, heritage literacy, innovative approaches, mnemosophy, sustainability*

1. INTRODUCTION: HERITAGE AND SOCIAL DYNAMICS – FROM SELECTIVITY TO SUSTAINABLE INTERPRETATION

The interpretation of heritage in contemporary society is becoming an increasingly complex and dynamic process, shaped by diverse perspectives, ideological influences, and technological advancements. Traditional understandings of heritage, based on a static approach to preservation, are increasingly subjected to critical reassessment, particularly in light of globalization, decolonization, digitalization, and sustainable development. This reassessment challenges fundamental conceptions of heritage, raising key questions not only about what we inherit but also why and how certain values, narratives, and material remnants of the past become part of cultural memory (Mesić, 2019: 103). This process is neither simple nor linear; rather, it unfolds through a complex interaction between past, present, and future, shaping not only our understanding of heritage but also the ways in which we construct identities, values, and cultural practices within society.

In this context, contemporary approaches to heritage interpretation emphasize the need for critical reflection on heritage narratives, as heritage interpretation is no longer merely an educational tool but also a space for political and cultural reflection (Babić, 2023: 17). On one hand, digital technologies provide unprecedented opportunities for accessing, distributing, and presenting heritage, making it available to a global audience. The digitization of cultural assets, the development of virtual museums, interactive platforms, and applications expand the boundaries of traditional heritage approaches, offering insights into cultural artifacts and experiences that would otherwise be inaccessible or difficult to access. These technologies not only broaden audience reach but also introduce new forms of engagement, allowing visitors to interact with heritage content. Through digitization (digital humanities), heritage becomes accessible anytime and anywhere, facilitating its dissemination and access to a broader global community (Mesić, 2022: 51). However, digital approaches also bring significant challenges. The question of preserving authenticity becomes particularly important, as digitization can replace the physical experience of heritage with a virtual one. This directly impacts our perception of heritage, as the original context of heritage sites may be lost, opening the door to the manipulation of memory and the reshaping of historical narratives. Furthermore, technology enables the rapid and widespread distribution of information, which can lead to audience saturation and reduce the depth of engagement with heritage, as the fast consumption of cultural assets may weaken both emotional and intellectual connections to them (Sablić Tomić & Mesić, 2018: 107). On the other hand, the cultural and political conflicts that characterize contemporary society often result in selective preservation and reinterpretation of heritage. Heritage becomes a battleground of ideological struggles, where various political, social, and cultural groups attempt to shape dominant narratives that support their own interests and values. Such selectivity in heritage approaches can lead to the exclusion of certain communities, values, or historical experiences, creating an imbalanced and unequal representation of the past. In this context, heritage becomes a tool of political legitimization, often used to justify existing power structures or to construct new political identities (Atkinson, 2008: 190). These interpretations can deepen societal divisions, as they shape our perception of past events according to specific, contemporary social needs, fostering not only political but also cultural polarization. In such cases, heritage is not merely history – it is also an instrument for shaping the present.

In this context, contemporary approaches to heritage interpretation emphasize the need for inclusivity, critical reflection, and empowering local communities in the process of preserving and transmitting their own past. Heritage is no longer perceived as an objective reality that is unchangeable, but as a living process that must be actively engaged with and shaped according to the needs of the community and contemporary challenges. Including diverse narratives and perspectives becomes essential, as heritage interpretation cannot be neutral; it must incorporate different voices, histories, and identities to create a dialogue between the past and the present. The key goal is to enable all groups to recognize and value their own cultural identities and connections to past generations, in order to create a more sustainable, balanced, and long-term approach to heritage. Sustainable heritage interpretation involves aligning the preservation of cultural values with the needs and challenges of contemporary society, while maintaining the authenticity and integrity of heritage (Mavrin & Mesić & Pavin Banović, 2023: 291). Sustainable heritage management means not only conserving physical objects but also developing models that incorporate socially, ecologically, and economically sustainable practices, enabling community engagement and active contributions to heritage preservation. In this way, heritage becomes a key tool for building a shared identity based on dialogue, understanding, and respect for different perspectives. This inclusivity not only contributes to heritage preservation but also ensures social cohesion within the community.

Heritage, therefore, is not a static but a dynamic concept that is constantly evolving and requires continuous adaptation in line with changing social, cultural, and political conditions. In this sense, we can understand heritage as the contemporary use of the past, in which interpretations are not neutral but always arise from specific social, political, economic, and cultural frameworks in which we live. Each generation, by shaping its own interpretation of past events, essentially shapes its version of heritage, which is then integrated into the collective identity. The choice of what we consider worth preserving, the way we interpret heritage, and how we incorporate it into identity formation are not merely academic issues. They reflect fundamental social processes and directly influence our ability to face the challenges of the present and future. Heritage thus becomes a tool for strengthening cultural identities, developing tourism, education, or political legitimization, but also a key element in the process of social cohesion and community unification. In this process, the past is not simply an objective fact that is unique and irreversible, but a construct that we continuously shape according to our own criteria, values, and needs, often within the broader social dynamics that shape our future (Mesić & Mavrin, 2021: 365).

For all the reasons mentioned, heritage literacy becomes a crucial area that enables individuals and communities to recognize, understand, and actively engage in the process of heritage interpretation. Heritage literacy involves not only education about heritage values but also the development of critical thinking and engagement, empowering citizens to understand the complexity of cultural narratives, recognize their social significance, and contribute to the sustainability of cultural heritage. Increasing heritage literacy allows for a deeper connection with one's own history, strengthens collective identity, and facilitates active participation in the preservation of heritage for future generations (Borić Cvenić & Mesić, 2019: 258). Strengthening heritage literacy also contributes to the sustainability of heritage, as it enables the creation of a society that is aware of its cultural values and committed to their preservation in line with the needs of contemporary society.

2. HERITAGE INTERPRETATION: TRANSFORMATION FROM AUTHORIZED DISCOURSES TO PARTICIPATORY MEMORY

Heritage interpretation is not merely the transmission of information about the past but a crucial tool in shaping collective memory and identity. Through heritage, societies decide what will be remembered and how it will be interpreted, making it a central field in the process of constructing collective memory. In this context, it is important to mention the French historian Pierre Nora, who, in his work *Les Lieux de Mémoire* (1984–1992), explores how collective memory is shaped through "sites of memory" ("lieux de mémoire"). These sites, which include monuments, archival materials, and cultural objects, are not just symbols of the past but become key elements in reconstructing history according to contemporary societal needs. Nora argues that collective memory is not static but is continuously shaped through the interaction of narratives, social demands, and cultural needs. Similarly, Jan Assmann, in his work *Cultural Memory and Early Civilization* (2011), examines the distinction between "cultural memory" and "individual memory." He emphasizes that cultural memory enables societies to transmit information and values across generations, highlighting that it is not merely a passive recollection of the past but an active process of selection and interpretation that shapes social identities. According to Assmann, cultural memory is organized into "memory systems" developed through institutions such as religion, education, and media, which structure how the past is understood and how these memories are used to shape shared values and identities. In his article *Collective Memory and the Actual Past* (1989), Steven Knapp analyzes the political dimensions of collective memory, emphasizing how memory shapes identities and political narratives.

The past becomes a tool of political struggle, where different groups manipulate memories to shape their interests and legitimize their positions in the present. Knapp also points out that collective memory processes are susceptible to manipulation, as the selection of what is remembered and what is forgotten profoundly impacts social dynamics and the formation of political ideologies. This "politics of memory" is crucial for understanding heritage not as a passive legacy but as an active means of political mobilization. In his book *Commemorations: The Politics of National Identity* (1994), John R. Gillis explores the role of collective memory in shaping national identities, emphasizing how commemorations, monuments, and remembrance days help societies construct shared narratives about past events that define their identities. These memory practices often serve to consolidate political power, as different groups use the past to shape competing or cohesive narratives that support their political interests. According to Gillis, collective memory is inherently political, as its construction creates social boundaries and identity markers that define inclusion and exclusion. James E. Young, on the other hand, in *The Texture of Memory: Holocaust Memorials and Meaning* (1993), examines how monuments and memorials shape collective memory, particularly in the context of the Holocaust. He analyzes the tension between remembrance and forgetting, highlighting how monuments act as "intersections" of the past, ensuring that significant events are remembered while also raising questions about their reinterpretation in contemporary contexts. Monuments are not merely physical objects but powerful symbols that shape narratives of identity and trauma. Young introduces the concept of the "dialectics of memory," suggesting that remembrance is not fixed but constantly negotiated and reinterpreted through political and cultural processes. According to Young, monuments become sites where memory and forgetting intersect, with their meanings shifting in response to social, political, and cultural conditions. Thus, heritage interpretation plays a key role in shaping collective memory and identity, as it enables societies to choose what will be remembered and how it will be interpreted. The processes of selection, interpretation, and political manipulation in collective memory shape not only history but also social dynamics, boundaries, and identities.

Heritage, therefore, cannot be considered a passive legacy but rather a living process that reflects and shapes contemporary political, cultural, and social conditions. In today's context of heritage preservation and interpretation, we often face the question of who has the right to shape heritage narratives and how these narratives influence our perception of cultural heritage. Building on the previously mentioned ideas, Laurajane Smith, in her work *Uses of Heritage* (2006), introduces the concept of "authorized heritage discourse," highlighting how traditional models of interpretation often reflect an authoritative approach in which experts determine what is worth preserving and how it should be interpreted. Such an approach can lead to the marginalization of alternative perspectives and the exclusion of voices that do not align with the dominant narrative. Contemporary theories, therefore, lean towards participatory practices that involve various stakeholders – local communities, visitors, and cultural groups – in the process of heritage interpretation and preservation. ohn Urry, in his work *The Tourist Gaze* (2001), emphasizes that heritage interpretation not only shapes the perception of the past but also influences how visitors experience and emotionally connect with heritage. Urry highlights that visitors are active participants in interpretation rather than passive recipients of information. Contemporary methods, therefore, employ multisensory approaches, digital technologies, and interactive elements to foster emotional engagement and enable a deeper understanding of heritage. The use of virtual and augmented reality, for example, allows for new interpretative experiences that go beyond traditional textual and visual representations. From a museological perspective, Tomislav Šola (2003) criticizes the traditional museum approach to heritage interpretation, emphasizing that museums should not merely be guardians of the past but also active participants in the creation of meaning.

His concept of *mnemozophy* highlights the importance of heritage interpretation in education, as well as in fostering an emotional connection between the audience and cultural heritage. According to Šola, the sustainability of heritage depends on its relevance to contemporary society and the extent to which interpretation successfully encourages community engagement and participation. Critical discussions on heritage interpretation also include decolonial perspectives that challenge Eurocentric models of interpretation and advocate for more inclusive approaches. David Lowenthal, in his work *The Past is a Foreign Country* (2015), emphasizes that heritage is selective and subject to reinterpretation in response to social and political changes. Heritage is not merely a record of the past but also a means through which societies construct their identity and legitimize certain narratives. Therefore, contemporary interpretations strive to balance the need for authenticity with the dynamic processes of meaning-making in the present. In the field of new cultural geography, theorists such as Doreen Massey and Tim Cresswell offer further insights into heritage interpretation through the lens of space and place. Massey, in her work *Space, Place and Gender* (1994), explores how heritage is not only tied to specific geographic locations but also to the dynamics of social relationships and identities. According to Massey, place is not static but is constantly reconstructed through the interactions of people, societies, and cultures, allowing for the continuous reinterpretation of heritage in response to changing social and political conditions. Tim Cresswell, in his book *Place: A Short Introduction* (2004), also highlights the importance of space in understanding heritage. He examines how meanings associated with heritage are often tied to specific places, which, through memory and identity, are shaped by past experiences. Cresswell underscores that heritage interpretation involves complex connections between people, space, and culture, with space serving as a "stage" upon which narratives of past events and experiences are constructed.

In the context of developing approaches to heritage interpretation, Freeman Tilden laid the foundation that shaped how museums, parks, and other cultural institutions approach this process. In his work *Interpreting Our Heritage* (1967), Tilden emphasizes the importance of transforming interpretation into an experience that goes beyond simply conveying facts. He stresses that interpretation should be relevant and engaging, allowing visitors to form a personal connection with heritage. Tilden's principles of interpretation call for active public participation, linking the past with the present and enabling an emotional connection that deeply shapes the understanding of heritage and its role in everyday life. The participatory methods promoted by Smith, Urry, and Tilden not only enrich the experiences of visitors but also contribute to the sustainability of heritage. Involving local communities and other stakeholders ensures long-term engagement and responsibility for the preservation of cultural assets. David Atkinson, in his work *The Heritage of Mundane Places* (2008), examines the role of heritage in shaping collective identity and its connection to political and social processes. Atkinson emphasizes that heritage interpretation is not just about transmitting past events but a key element in creating and maintaining cultural narratives that define societies. According to Atkinson, heritage is a dynamic process that is continuously reinterpreted, depending on current social and political circumstances. He also links heritage to issues of power, noting how heritage interpretation often reflects social hierarchies and political interests, making heritage not only a cultural artifact but also a political tool in shaping collective narratives and defining community boundaries. The concept of heritage sustainability refers to the ability to preserve and manage cultural assets in a way that ensures their conservation for future generations, while also meeting the social, economic, and ecological needs of contemporary society. In the context of cultural heritage, sustainability is not only about the physical protection of objects or monuments, but includes a broader approach that links cultural, economic, and social aspects.

Sustainable heritage interpretation enables the integration of cultural resources into the broader context of sustainable development, where heritage becomes an active element in strengthening community identity, promoting tourism, education, as well as in social and economic revitalization. This approach does not treat heritage as a static entity but as a living, dynamic resource that must be aligned with the developmental needs and challenges of modern society. In this context, Bandarin and Oers, in their book *The Historic Urban Landscape: Managing Heritage in an Urban Century* (2012), provide a key shift in how we understand the relationship between cultural heritage and urban sustainability. They challenge the traditional division between heritage conservation and urban planning, advocating for an integrated approach that ensures the preservation of cultural values while promoting the sustainable development of urban environments. This work has had a significant impact on reshaping heritage management practices globally, promoting a holistic view of cities as living cultural landscapes that can thrive within a sustainable framework. Helaine Silverman, through her work, has facilitated a deep understanding of cultural heritage in the context of social and political issues, encouraging the inclusion of communities in heritage decision-making. Her work on cultural rights, heritage interpretation, and social mobilization is essential for understanding how heritage can be a bridge between the past and the present, as well as a tool for social change and sustainability. In her text *Contested Cultural Heritage: A Selective Historiography* (2011), the author analyzes how conflicts and political dynamics can threaten the sustainability of cultural heritage, and also discusses the ethics of making sustainable decisions regarding heritage policies. In conclusion, heritage interpretation is not a neutral or unambiguous process, but a complex practice that requires critical reflection and adaptation to contemporary challenges. Rather than being a passive transmission of information, interpretation today becomes a participatory, interactive, and interdisciplinary process that not only educates but also actively involves the audience in the creation and reinterpretation of heritage. Modern approaches to heritage interpretation, therefore, recognize emotions as a key element in creating a deeper and more lasting connection with cultural heritage. The use of multisensory approaches, digital technologies, and interactive methods enables the creation of new experiences that go beyond traditional, textual forms of interpretation. Heritage becomes not just a collection of past events, but a living process through which our identities, collective narratives, and emotional connections with the past are shaped. Heritage sustainability involves maintaining its social relevance, meaning that heritage interpretation must align with the needs and values of contemporary communities. Active participation in interpretation, along with the use of modern technologies, helps ensure that heritage does not become merely a museum exhibit but a living process that actively contributes to social and cultural needs.

3. HERITAGE LITERACY AS THE KEY TO THE INTERPRETATION AND PRESERVATION OF CULTURAL HERITAGE

Literacy and heritage are deeply interconnected concepts, as understanding, interpreting, and transmitting heritage require developed skills in reading, interpreting, and communicating meaning. UNESCO (2006) defines literacy as the ability to recognize, understand, interpret, create, and communicate written and other symbolic content in various contexts. Later UNESCO documents expand this definition to include terms related to digital literacy and multilingual skills, emphasizing the development of literacy in a globalized and digitized society. Specifically, UNESCO (2017) in the *Global Education Monitoring Report: Education for People and Planet* highlights the importance of "digital literacy", emphasizing the need to develop skills that enable people to navigate the information society. Digital literacy encompasses not only basic technical skills but also critical thinking, information analysis, and creative use of digital tools.

Furthermore, UNESCO (2021) in its report *Literacy and Lifelong Learning* expands literacy as a capability that extends within the context of lifelong learning, emphasizing that literacy today involves the continuous acquisition of new skills, particularly in the field of digital technologies, and the importance of access to education at all stages of life. These recent documents highlight the broader, dynamic nature of literacy, which includes various dimensions such as functional literacy, digital literacy, and literacy in the context of personal and social development, reflecting a comprehensive approach to education and social inclusion. In line with UNESCO's approach to literacy, heritage literacy is not just the passive reception of information about heritage, but active participation in its interpretation and the creation of new meanings. Here, literacy also includes the ability to use various media, technologies, and methods to connect with heritage, as well as the analysis of cultural traditions in the context of global and local challenges:

(1) Integration of digital literacy into heritage interpretation: Literacy, as defined in UNESCO reports, also includes digital literacy, which becomes crucial in the context of heritage literacy. Digital technologies enable innovative approaches to heritage interpretation – from virtual museums and digital reconstructions to interactive educational platforms. This not only expands access to heritage but also creates new, inclusive experiences that enrich the understanding of cultural resources. Literacy in this context becomes broader and deeper, as it encompasses the ability to use digital tools for exploring and interpreting heritage objects, traditions, and stories.

(2) Multilingual and cultural literacy in the context of heritage: Literacy in the broader sense, according to UNESCO's definition, also includes multilingual skills. Heritage literacy, in this context, involves understanding cultural specificities that are transmitted through different languages and narratives. Cultural heritage often includes multilingual aspects, and the ability to understand these languages and narratives contributes to a deeper respect for and interpretation of cultural values. This dimension of heritage literacy becomes especially relevant in a globalized society, where cultural identities, languages, and traditions are increasingly intertwined.

(3) According to UNESCO's 2021 report, literacy develops in the context of lifelong learning. The same applies to heritage literacy, which is not limited to academic studies or professional training, but involves continuous learning about heritage throughout different stages of life. Heritage practices and traditions are often passed down through generations via verbal, non-verbal, and interactive methods. Learning about heritage, whether through formal educational institutions or informal community activities, enables active participation in the preservation and interpretation of cultural heritage. Additionally, the use of digital tools for lifelong learning provides access to heritage information at various stages of life, thus contributing to the expansion of heritage literacy.

(4) Critical thinking in heritage interpretation: Digital literacy also includes critical thinking and information analysis, which is crucial for heritage literacy. The interpretation of heritage cannot be just the simple adoption of traditions; it must involve a critical approach to heritage resources. Through this lens, heritage literacy allows people to recognize the complexity and multiple perspectives in the interpretation of cultural objects, traditions, and narratives, which is essential for the preservation of cultural heritage and understanding its role in contemporary society. Ultimately, UNESCO's definitions of literacy, when connected with heritage, highlight the importance of incorporating various dimensions of literacy – from digital to cultural – into the process of interpretation, preservation, and transmission of heritage. Heritage literacy becomes key to developing a deeper awareness of cultural identity and strengthening communities through the preservation and sharing of cultural heritage.

Ultimately, heritage literacy involves not only the ability to recognize and understand cultural heritage but also critical reflection on its meanings, functions, and transformations over time. In this sense, heritage literacy is not static, but a dynamic process that allows individuals and communities to actively participate in shaping and reinterpreting their own cultural heritage. In line with the above, cultural heritage encompasses a wide range of interpretations and approaches, including both material and immaterial aspects. Howard (2003: 6) in his research analyzes the concept of "heritage" in the context of inheritance, emphasizing that the French word "heritage" means "legacy". According to him, heritage is what has been, or could be, inherited, meaning the circumstances or benefits passed down from previous generations. In his analysis, Howard questions how heritage, as a form of ownership – whether material or immaterial – can become a good, and thus inheritance becomes something positive. The author also considers heritage as an object of collection and conservation, raising key questions: what is heritage, who wants to preserve it, for whom, who will pay, and where is the best place for heritage. He also highlights the importance of considering the period in which heritage should be interpreted and presented (Howard, 2003: 9). This concept has significant implications for heritage literacy because it requires individuals and communities to critically reflect on the meaning, value, and management of heritage, thereby developing the skills necessary for active participation in its preservation and interpretation. Sousa (2023) recognizes the value of integrating digital technologies into the preservation of cultural heritage, both in research and education, but emphasizes the need for the development of strategies for preserving digital cultural content. This includes format migration, metadata protection, regular monitoring of digital format developments, and updating cultural heritage content. He also highlights the importance of transferring information and knowledge, as well as immersive learning experiences, through the use of platforms, digital repositories, and virtual libraries. Orphanidou, Efthymiou, and Panayiotou (2024) emphasize the development of digital literacy in the context of integrating heritage literacy into the teaching process with the aim of teaching critical thinking, experiential learning, intercultural collaborative learning, and creating quality learning experiences that foster awareness of cultural identity. Research conducted among students in three different European countries (Cyprus, Lithuania, Italy) confirmed that the digital transformation of education positively impacts the development of heritage literacy. They proposed the “digicult model” for a hybrid form of learning. Furthermore, Lee, Jung, Dieck, Garcia-Milon, and Kim (2024) in their research confirmed that digital media literacy positively influences the virtual experience of cultural heritage sites. The research results were obtained through a synthesis of virtual reality (VR) technology and digital media literacy, which positively impacted the cognitive, physical, and emotional experiences of users using VR devices. Thanks to the positive emotions achieved through the use of VR technology, users are likely to recommend cultural heritage and increase its value for tourism purposes. Smith (2006), through a case study, emphasizes that heritage is not just material objects but also the values of the community that are affirmed and validated through heritage. He develops the theory of cultural heritage through critical realism (Critical Realism – CR), the analytical-methodological framework of critical discourse analysis (Critical Discourse Analysis – CDA), and the concept of authorized heritage discourse (Authorized Heritage Discourse – AHD). These frameworks enable critical reflection on how heritage is interpreted and which discourses are used to transmit it, which is crucial for the development of heritage literacy. Heritage literacy here is manifested through the community’s ability to recognize, interpret, and value its own heritage, understanding how its meaning is shaped through various social and political processes. Joar and Herdis (2018) argue that Smith, since 2006, has significantly contributed to the development of the theory of heritage use, particularly through the concept of authorized heritage discourse, which has evolved over time. This concept has become a key unit of interpretation in which heritage is viewed as a dynamic process rather than just a static object.

The authors also emphasize that different concepts of heritage can coexist, allowing for a deeper understanding of cultural values (Joar and Herdis, 2018: 78). De Maaker (2024: 252) expands the understanding of heritage in the context of cosmopolitanism, which identifies, recognizes, and authorizes heritage through actual experiences and the perception of phenomena situated within the processes of meaning-making. His work emphasizes that heritage literacy is key to understanding heritage as a transnational and intercultural phenomenon. Recognizing the global and local aspects of heritage enables communities to develop critical awareness of the ways in which heritage is used in different contexts, thereby strengthening their ability to engage in heritage discourses. Babić (2015 and 2023) emphasizes the importance of a multidisciplinary approach in the interpretation and management of heritage, to ensure both material and immaterial benefits for the community and society as a whole. He highlights the importance of a participatory approach in heritage interpretation, which includes the development of heritage literacy as a key element for better understanding the heritage management process and building shared knowledge about heritage. Furthermore, Babić explains heritage literacy through Mayrand's model of the creative triangle of eco-museums. According to Babić, heritage literacy is interpreted through heritage management methods, or knowledge management, as the local community must understand the process of building and managing heritage for its own development. Heritage literacy enables communities to participate in decision-making about how to preserve and present their heritage, thereby contributing to its sustainability. In this context, Stuedahl, Skåtun, Lefkaditou, and Messenbrink (2019) explore how Nordic countries have actively involved museum visitors as participatory partners in the creation and shaping of exhibitions. This approach contributes to the development of heritage literacy and positions museums as places of public dialogue, social change, while strengthening democratic values, human and civil rights. Heritage literacy here is manifested through citizen participation in museum practices, allowing for the reinterpretation and contemporary valorization of heritage in line with the needs of the community. Contemporary digital tools and technologies further expand the possibilities of heritage literacy, enabling broader participation in the preservation and interpretation of cultural heritage. Digital platforms, interactive museum content, virtual reconstructions, and the digitization of archival materials allow users to access rich heritage resources and critically analyze them. Galani, Mason, and Rex (2019: 110) explore the value of digital tools, platforms, and their practical applications in the development of heritage literacy and communication of heritage in the European context. The authors argue that the use of digital technology positively influences the preservation of national identity within European museums, where the community actively participates, engages, and dialogues. Cultural heritage is viewed as a dynamic process in which theoretical frameworks and approaches allow for various interpretations and practices in heritage management. Involving the community in the process of preserving and interpreting cultural heritage, through participation, media technologies, and the development of heritage literacy, is crucial for the sustainability of heritage and its connection to local and national identities.

4. CONCLUSION: THE DYNAMIC PROCESS OF HERITAGE LITERACY – FOSTERING DIALOGUE, INCLUSION, AND IDENTITY

Heritage literacy should not be understood merely as a theoretical framework, but as a dynamic and participatory process that involves research, interpretation, and community engagement. Digital technologies and tools offer unprecedented opportunities to expand participation in the interpretation of cultural heritage, enabling individuals and communities to actively engage in its preservation and reinterpretation. Through digital platforms, virtual museums, mobile applications, and social media, heritage becomes accessible to a wider audience, creating space for the creation of new meanings that reflect contemporary social, political, and cultural processes.

For the effective development of heritage literacy, it is crucial to enable dialogue and collaboration among experts, artists, educational institutions, and communities. A participatory approach to heritage management, where the community actively engages in creating exhibitions, organizing events, and interpreting cultural objects, contributes to their heritage literacy. Interactive tools such as virtual reconstructions, 3D representations of cultural objects, and augmented reality (AR) applications provide a strong incentive for community engagement in the process of heritage interpretation. By using digital platforms, communities can build a deeper connection with their own heritage, fostering critical thinking and social inclusion. Heritage literacy thus becomes a tool for personal engagement and the development of cultural identity, while involving new generations enables a greater understanding of cultural resources through the lens of sustainability and identity. These approaches also allow for the integration of cultural diversity, creating space for dialogue between cultures and languages, and for the collective shaping of heritage interpretations. The inclusion of multilingual and intercultural elements in heritage literacy is crucial for preserving cultural specificities, while simultaneously contributing to the development of global cultural awareness. Heritage management in the context of lifelong learning presents challenges, as the process of interpreting heritage does not end within formal educational institutions but continues throughout life, ensuring a lasting connection to heritage and its active presence in daily life. In this way, heritage literacy becomes the foundation for the sustainability of cultural resources and their contribution to social and cultural development. As an integrated and dynamic process, heritage literacy opens new horizons for the development of cultural identity and social responsibility, enabling individuals to become not only passive recipients of heritage content but also active participants in the processes of preservation, interpretation, and creation of cultural values that will shape their future. In a global context, heritage literacy becomes crucial for building sustainable societies that respect cultural heritage as a fundamental component of social cohesion, international dialogue, and mutual understanding, thus shaping a better and more connected world for all.

LITERATURE:

1. Assmann, J. (2011). *Cultural memory and early civilization: writing, remembrance, and political imagination*. Cambridge, New York: Cambridge University Press.
2. Atkinson, D. (2008). Baština. In: D. Atkinson, P. Jackson, D. Sibley, N. Washbourne (Eds.), *Kulturna geografija: kritički rječnik ključnih pojmova* (pp. 189–199). Zagreb: Disput.
3. Atkinson, D. (2008). The Heritage of Mundane Places. In: P. Howard, B. Graham (Es.), *The Routledge Research Companion to Heritage and Identity* (pp. 381–396). London: Routledge.
4. Babić, D. (2015). Social responsible heritage management – empowering citizens to act as heritage managers. *Procedia Social and Behavioral Sciences,* 188, pp. 27–34. DOI: 10.1016/j.sbspro.2015.03.335
5. Babić, D. (2023). Prema baštinskoj pismenosti. In: M. Hrovatin, J. Nestić, M. Ožanić (Eds.), *Održivost kulturne baštine: zbornik radova znanstveno-stručnog skupa* (pp. 17–31). Velika Gorica: Grad Velika Gorica, Hrvatska akademija znanosti i umjetnosti.
6. Bandarin, F., Oers, R. (2012). *The Historic Urban Landscape: Managing Heritage in an Urban Century*. Chichester, Hoboken: Wiley Blackwell.
7. Borić Cvenić, M., Mesić, H. (2019). Uloga kreativnih industrija u brendiranju i oblikovanju slike grada. *Lingua Montenegrina: časopis za jezikoslovna književna i kulturna pitanja*, XII/1 (23), pp. 257–282.
8. Cresswell, T. (2004). *Place: A Short Introduction*. Oxford: Blackwell.

9. Galani, A., Mason, R., Rex, B. (2019). Dialogues and heritages in the digital public sphere. In: A. Galani, R. Mason, G. Arrigoni (Eds.). *European Heritage, Dialogue and Digital Practices* (pp. 109 – 121). London: Routledge. DOI: https://doi-org.ezproxy.nsk.hr/10.4324/9780429053511
10. Gillis, J. R. (1994). *Commemorations: The Politics of National Identity*. Princeton (N. J.), Chichester: Priceton University Press.
11. Howard, P. (2003). *Heritage: Management, Interpretation, Identity*. London, New York: Continuum.
12. Joar, S., Herdis, H. (2018). Uses of Heritage and Beyond: Heritage Studies viewed through the lens of Critical Discourse Analysis and Critical Realism. *Journal of Social Archaeology*, 18 (1), pp. 77–96. DOI: 10.1177/1469605317749290
13. Lee, J., Jung, T., Dieck, M. C. tom, Garcia-Milon, A., Kim, C. (2024). Affordance, digital media literacy, and emotions in virtual cultural heritage tourism experiences. *Journal of Vacation Marketing,* 0 (0), pp. 1–18. DOI: 10.1177/13567667241255383
14. Lowenthal, D. (2015). *The Past is a Foreign Country – Revisited*. Cambridge: Cambridge University Press.
15. Maaker, E. de (2024). Beyond the local and the global. In: L. W. Kruijer, M. J. Versluys, I. Lilley (Eds.), *Rooted Cosmopolitanism, Heritage and the Question of Belonging Archaeological and Anthropological perspectives* (pp. 249–255). London: Routledge. DOI: https://doi-org.ezproxy.nsk.hr/10.4324/9781003348740
16. Massey, D. B. (1994). *Space, Place and Gender*. Cambridge: Polity.
17. Mavrin, I., Mesić, H., Pavin Banović, A. (2023). Gamification and Immersive Experiences in Museums as Audience Development Strategy – The Case of Croatian Museums. *Collegium antropologicum*, 47 (4), pp. 287–296. DOI: https://doi.org/10.5671/ca.47.4.5
18. Mesić, H. (2022). *Baština, emocija, identitet*. Zagreb: Naklada Ljevak
19. Mesić, H. (2019). *Baštinska kultuira u pamćenju grada*. Zagreb: Naklada Ljevak.
20. Mesić, H., Mavrin, I. (2021). Management of Cultural Heritage in Earthquake Induced Crises – Republic of Croatia Perspectives and Policies. *Lingua Montenegrina: časopis za jezikoslovna književna i kulturna pitanja*, XIV/1 (27), pp. 353–368.
21. Knapp, S. (1989). Collective Memory and the Actual Past. *Representations*, 26, pp. 123–149.
22. Nora, P. (2006). Između pamćenja i historije. Problematika mjestâ. In: M. Brkljačić, S. Prlenda (Eds..), *Kultura pamćenja i historija* (pp. 21–43). Zagreb: Golden marketing-Tehnička knjiga.
23. Orphanidou, Y., Efthymiou, L., Panayiotou, G. (2024). Cultural Heritage for Sustainable Education Amidst Digitalisation. *Sustainability,* 16, 1540, pp. 1–15. DOI: https://doi.org/10.3390/ su16041540
24. Sablić Tomić, H., Mesić, H. (2018). Digitalni surogati tiskarstva osječkoga Nutarnjeg grada kao primarni baštinski izvor. *Hum: časopis Filozofskog fakulteta Sveučilišta u Mostaru*, 13 (20), pp. 106–123.
25. Silverman, H. (2011). Contested Cultural Heritage: A Selective Historiography. In: H. Silverman (ed.), *Contested Cultural Heritage: Religion, Nationalism, Erasure, and Exclusion in a Global World* (pp. 1–49). New York: Springer.
26. Smith, L. (2006). *Uses of Heritage*. London, New York: Taylor & Francis Group.
27. Sousa, R. R. A. de (2023). The Preservation of Historical Memory in The Digital Age: Challenges, Opportunities and Interactive Technologies in Teaching and Research. *Revista Inter-Ação*, 48 (3), pp. 894–915.

28. Stuedahl, D., Skåtun, T., Lefkaditou, A., Messenbrink, T. (2019). Participation and dialogue: Curatorial reflexivity in participatory processes. In: A. Galani, R. Mason, G. Arrigoni (Eds.). *European Heritage, Dialogue and Digital Practices* (pp. 62–83). London: Routledge. DOI: https://doi-org.ezproxy.nsk.hr/10.4324/9780429053511
29. Šola, T. (2003). *Eseji o muzejima i njihovoj teoriji: prema kibernetičkom muzeju*. Zagreb: Hrvatski nacionalni komitet ICOM.
30. Tilden, E. (1967). *Interpreting Our Heritage* (rev. ed.). [S. l.]: University of North Carolina Press.
31. UNESCO (2006). *Education for All Global Monitoring Report: Literacy for Life*. Retrieved 14. 3. 2025. from https://unesdoc.unesco.org/ark:/48223/pf0000144270
32. UNESCO (2017). *Global Education Monitoring Report: Education for People and Planet*.
33. Retrieved 14. 3. 2025. from https://uis.unesco.org/sites/default/files/documents/educatio n-for-people-and-planet-creating-sustainable-futures-for-all-gemr-2016-en.pdf
34. UNESCO (2021). *Literacy and Lifelong Learning*. Retrieved 14. 3. 2025. from https://www.unesco.org/en/articles/literacy-empowerment-and-transformation-new-report-unsg-outlines-progress-and-ways-forward
35. Urry, J. (2001). *The Tourist Gaze* (2nd ed.). London: SAGE.
36. Young, J. E. (1993). *The Texture of Memory: Holocaust Memorials and Meaning*. New Haven, London: Yale University Press.

AN INNOVATIVE AND SUSTAINABLE APPROACH TO MEĐIMURJE TOURISM

Nevenka Breslauer
Međimurje University of Applied Sciences in Čakovec
Bana Josipa Jelačića 22a, Čakovec, Croatia
nbreslauer@mev.hr

Nenad Breslauer
Međimurje University of Applied Sciences in Čakovec
Bana Josipa Jelačića 22a, Čakovec, Croatia
nbreslauer1@mev.hr

Ivana Bujan Katanec
Međimurje University of Applied Sciences in Čakovec
Bana Josipa Jelačića 22a, Čakovec, Croatia
ibujan@mev.hr

Ivan Hegedus
Međimurje University of Applied Sciences in Čakovec
Bana Josipa Jelačića 22a, Čakovec, Croatia
ihegeduš@mev.hr

Rudi Grula
Tourist Board of Međimurje County
Bana Josipa Jelačića 22e, Čakovec, Croatia
rudi.grula@gmail.com

ABSTRACT

Međimurje, nestled between the Mura and Drava rivers, boasts excellent connectivity with neighboring regions. Known as the "Međimurje Flower Garden," it preserves its natural landscape through sustainable waste management and renewable energy use. As one of the first four destinations globally to earn "Green Destination" certification, it embraces innovation and sustainability in tourism. Sustainable tourism in Međimurje prioritizes responsible resource management, benefiting the community while preserving the environment and traditions. Maintaining its green status requires collaboration among stakeholders and alignment with rural tourism strategies. The rise in tourist arrivals is supported by categorized holiday rentals with added amenities. This research highlights best practices in Međimurje's sustainable tourism, emphasizing sports activities that promote environmental conservation while enhancing the visitor experience.

Keywords: *innovative tourism, Međimurje County, heritage*

1. INTRODUCTION

Međimurje is set to be awarded Green Destination status in 2023 at the World Tourism Fair in Berlin (ITB), positioning it as the fourth Green destination worldwide. This certification marks a significant milestone and serves as a well-deserved validation of the region's years of dedicated efforts in tourism, underpinned by the implementation of a robust sustainable development strategy for Međimurje County. As the first Croatian county to be invited to join the global association for the promotion of sustainable agriculture and sustainability - Bio District, Međimurje further solidifies its commitment to sustainable practices on a global scale.

Notably, Međimurje has garnered three EDEN (European Destinations of Excellence) awards from the European Commission for its endeavors in sustainable tourism: in rural tourism in 2007, for tourism and local gastronomy in 2016, and for wellness and health tourism in 2019. In 2022, Međimurje was honored as the most successful destination for sustainable, smart, and innovative tourism at the Days of Croatian Tourism. The guiding principle for Međimurje tourism and its practitioners is the prioritization of domestic tourism over mass tourism, with a steadfast focus on sustainability and responsibility. This commitment primarily encompasses the preservation of the environment, cultural heritage, and the enhancement of the local community's quality of life. Sustainable tourism in Međimurje revolves around maintaining a delicate balance between economic prosperity, environmental conservation, efficient waste management, utilization of renewable energy sources (Breslauer et al., 2015), and the promotion of local culture. All three dimensions must be accorded equal importance in this endeavor. Međimurje has the distinction of being the first region or county in Croatia and the fourth globally to receive a silver Green Destinations certificate. However, ensuring the sustainability of a green destination poses significant challenges, particularly in meeting the evolving expectations of visitors seeking novelty, often for shorter weekend getaways, necessitating robust and responsible business organization.

2. INDICATORS OF PROGRESS AND DEVELOPMENT OF TOURISM IN MEĐIMURJE COUNTY

In Međimurje, six tourist boards representing municipalities and cities are operational: TB Sveti Martin na Muri, TB Štrigova, TB Nedelišće, TB Mura and Vineyards (formerly TB Mursko Središće), TB Prelog, TB Čakovec, and TB Međimurje County. In 2022, a total of 208,871 overnight stays were recorded in Međimurje, with 106,901 of those attributed to foreign guests. A comparison with pre-pandemic figures from 2019, when 200,928 overnight stays were registered, reveals an increase of nearly eight thousand overnight stays in 2022. This trend continued in 2023, with 221,103 overnight stays recorded, indicating a continued rise in guest arrivals in Međimurje (see Table 1). As expected, during the pandemic years of 2020 and 2021, overnight stays experienced a decline, mirroring trends observed in other regions of Croatia.

Tourist Board (TB)	Arrivals 2022	Overnight stays 2022	Arrivals 2023	Overnight stays 2023	Annual index arrivals	Annual index overnight stays
TB Međimurje County	6.821	17.602	6.608	14.741	96.88 %	83.75%
TB Čakovec	14.149	28.757	16.110	31.578	113.86%	109.81%
TB Prelog	5.132	10.984	6.371	13.902	124.14%	126.57%
TB Mursko Središće*	277	456	13	16	4.69%	3.51%
TB Nedelišće	2.235	4.705	2.595	5.611	116.11%	119.26%
TB Sveti Marin na Muri	57.856	141.189	61.108	147.266	105.62%	104.30%
TB Štrigova	1.745	5.183	1.979	5.958	113.41%	114.95%
TB Mura and Vineyards*	-	-	870	2.031	-	-
Total	**88.215**	**208.876**	**95,654**	**221.103**	**108.43%**	**105.85%**

Table 1: Arrivals and overnight stays per tourist bord in Međimurje County
(Source: eVisitor)

* TB Mursko Središće and TZP Mura and Vineyards have joined in 2023 to operate as TB Mura and Vineyards furtheron

Analyzing the data presented in Table 1, it is evident that TB Sveti Martin records the highest number of tourist arrivals and overnight stays, followed by TB Čakovec and TB Prelog, which exhibits the highest indices for arrivals and overnight stays, surpassing 125%. Additionally, TB Nedelišće demonstrates indices exceeding 115%.

In 2022, the largest influx of tourists originated from Croatia, Slovenia, Poland, Germany, and Austria, with an average length of stay of 2.37 days, as depicted in Table 2. Further analysis reveals that domestic guests accounted for 54% of the total, comprising 51,553 individuals who generated 48% of the overnight stays, amounting to 107,437 nights. Conversely, foreign guests constituted 46% of the total, comprising 44,101 individuals, contributing to 52% of the overnight stays, totaling 113,666 nights.

Arrivals 2022	Overnight stays 2022	Arrivals 2023	Overnight stays 2023	Annual index arrivals	Annual index overnight stays
Croatia (48576)	Croatia (101970)	Croatia (51553)	Croatia (107437)	Croatia (106.13%)	Croatia (105.36%)
Slovenia (11522)	Slovenia (28501)	Slovenia (13749)	Slovenia (34006)	Slovenia (119.33%)	Slovenia (119.32%)
Poland (5410)	Poland (13318)	Poland (5.366)	Germany (14.115)	Poland (99.19%)	Germany (110.37%)
Germany (3695)	Germany (17789)	Germany (3904)	Poland (13055)	Germany (105.63%)	Poland (98.04%)
Austria (3487)	Austria (7208)	Austria (3899)	Austria (8441)	Austria (111.82%)	Austria (1117.11%)
Czechia (2359)	Czechia (4735)	Slovakia (2567)	Czechia (6145)	Slovakia (125.04)	Czechia (129.185%)
Slovakia (2053)	Serbia (4404)	Czechia (2564)	Slovakia (4482)	Czechia (108.69%)	Slovakia (1115.04%)
Italy (1276)	Slovakia (3895)	Hungary (1789)	Italy (1363)	Hungary (140.76%)	Italy (118.1%)
Hungary (1271)	Italy (3630)	Italy (1363)	Hungary (3591)	Italy (106.82%)	Hungary (121.72%)
Serbia (1239)	Hungary (2891)	Ukraine (1334)	Bosnia and Herzegovina (2994)	Ukraine (147.08 %)	Bosnia and Herzegovina (108.95%)
Other (7335)	Other (25538)	Other (7566)	Other (22621)	Other (103.15%)	Other (88.58%)

Table 2: Guests structure
(Source: eVisitor)

Examining the composition of guests in Međimurje, the majority originate from Croatia, followed by Slovenia, Poland, and Germany. Notably, Hungary demonstrates the highest increase in arrivals with an index of 140%, while the Czech Republic shows a significant rise in overnight stays with an index of 129%. These figures serve as strong indicators of heightened interest among guests in the tourism facilities offered in Međimurje (MIKRO) locations or destinations. To further augment the number of guests and indirectly increase overnight stays, the region requires high-quality and engaging programs alongside suitable accommodation facilities. The proliferation of accommodation facilities, primarily comprising private weekend houses and bungalows across Međimurje, has surged by 77%. This growth is actively encouraged by Međimurje County through non-reimbursable grants provided under the "Grants in Tourism of Međimurje County" program. Međimurje remains committed to fostering sustainable tourism, as evidenced by research conducted by TB Međimurje, which underscores residents' confidence in the direction and strategy of tourism development implemented by the county. This sentiment is echoed in respondents' evaluations of the statement "The development of tourism in the county should definitely be supported," which garnered an average score of 6.3 out of a maximum of seven (Evistor https://tzm.hr/statistika/ist/ 2023). Research conducted by TB Međimurje to inform future tourism development and strategic planning has identified various types of tourism with significant potential (see Chart 1).

Respondents identified rural tourism, particularly the variant combining agriculture and the provision of tourist services, as the most promising at 24%, followed by gastronomic tourism at 21%, recreation and sports at 19%, traditional rural tourism at 11%, cultural tourism at 8%, and business tourism at 4%.

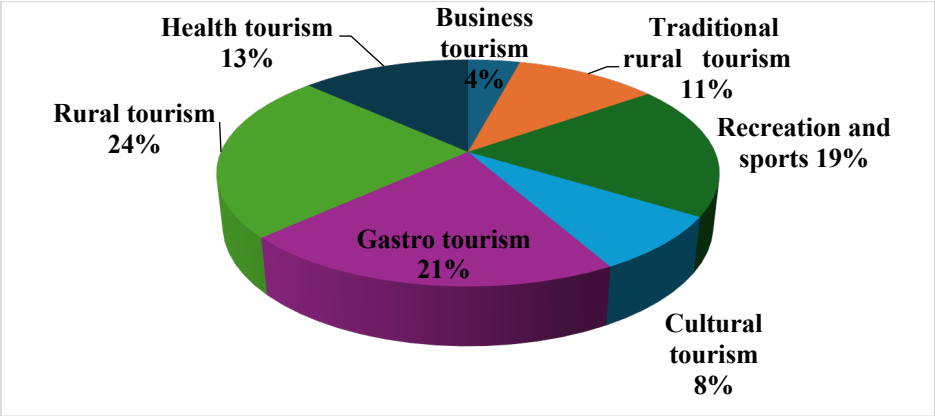


Chart 1: The most perspective types of tourism in Međimurje County (Source: Evistor https://tzm.hr/statistika/ist/)

Considering the abundance of family farms in Međimurje, which not only engage in production but also offer accommodations and often local gastronomic experiences to tourists, it's evident that this sector holds significant promise. However, one should also recognize the potential in sports and recreation in Međimurje, as noted by 19% of respondents. The development of sports and recreational tourism must prioritize the sustainability of the destination and environmental preservation. Therefore, it should encompass activities such as cycling, walking, running, hiking, golf, disc golf, fishing, and both indoor and outdoor sports. Međimurje is increasingly attracting sports teams for training, competitions, and recreational pursuits, with recreational and leisure activities becoming primary motives for tourist visits (Gartner & Lime, 2000). According to research by the North American Convention of Tourism Bureaus, sports contribute to 25% of total tourism revenues (Petrović et al., 2017). The proliferation of sports and recreational activities, albeit with varying significance, necessitates increasingly sophisticated organizational and managerial skills, requiring trained personnel in both tourism and sports (Breslauer, 2010). While the sports infrastructure in Međimurje largely meets the demands of recreation and sports, there's always room for enhancement, as echoed by respondents' scores (5.88 out of a maximum of seven) regarding the statement "Tourism, recreational, cultural, and similar facilities important for the area will be developed more rapidly" in research conducted by TZ Međimurje County (https://tzm.hr/statistika/ist/). It's imperative to encourage the fair utilization of local resources, products, and services through greater collaboration with the local community, aiming to enhance the quality of life for residents (Petričević, 2014). Responsible business practices in tourism positively impact nature and cultural heritage preservation, facilitating pleasant experiences for tourists alongside the local population. Responsible tourism contributes to fostering local pride and establishing sustainable, socially responsible tourist destinations that acknowledge and respect the broader interests of all stakeholders (Buzan, 2015). Research conducted by TZ Međimurje corroborates these theories, with Međimurje's tourism outcomes serving as validation. However, the effective operation of these principles necessitates a focus on human resources adequately trained to tackle the challenges inherent in responsible and sustainable tourism management.

3. EXAMPLES OF GOOD SUSTAINABLE TOURISM PRACTICES IN MEDJIMURJE COUNTY

3.1. Ecomuseum

The Ecomuseum, overseen by the Međimurje County Tourist Board, encompasses 14 localities across the County, including TB Sveti Martin na Muri, TB Štrigova, City of Mursko Središće, Public Institution Međimurje Nature Križovec, TB Nedelišće, Museum of Međimurje Čakovec, Public Institution Dr. Rudolf Steiner Center Donji Kraljevec, Municipality Donji Vidovec, Municipality Goričan, and the Šardi families from Selnica and Trstenjak from Marof.

Picture 1: Fourteen localities of the Ecomuseum in Međimurje County (Source: https://ekomuzej-medimurje.info)

The Ecomuseum visitor center is situated within the Međimurje Palace of Tourism in Čakovec. Here, visitors can explore a multimedia display that provides an interactive introduction to the various contents of the fourteen original sites comprising the Ecomuseum.

3.2. Mill on the Mura river

The large floating mill, dating back to the early 20th century, stands as a unique example of rural architectural heritage. Adjacent to it, visitors can explore the multimedia ethnographic exhibition titled "One Day in the Life of Miller Franc Žalar," which offers insights into the miller's craft through immersive experiences, including a 3D representation from the miller's perspective and interactive displays. Additionally, the site features the ethno collection of the Trstenjak family and two river scaffoldings. The scaffolder's house, showcasing the art of scaffolding, a fishing path, a pedestrian-cycling and educational promenade, a labyrinth of love, a stable housing Međimurje horses, a bird observatory, and a bistro further enrich the offerings of this destination along the Mura River. The floating mill, complete with its characteristic wheel (see Picture 2), remains a remarkable testament to the region's cultural heritage, while the accompanying exhibition provides a vivid portrayal of the miller's way of life.

Picture 2. Mill on the Mura river (Source: https://ekomuzej-medimurje.info/centri/mlin-na-muri/)

3.3. CHURCH OF ST. JEROME

Through research into historical documents such as Pope Nicholas' bull from the 15th century and Josip Bedeković's Pauline book "Natale solum" from the 18th century, it has been posited that the esteemed Christian saint St. Jerome, known for translating the Bible into Latin, was born in what is now Štrigova, formerly known as the Roman Stridon. The Church of St. Jerome in Štrigova serves as the focal point for this historical inquiry, featuring remarkable frescoes by the baroque painter Ivan Ranger (see Picture 3) within its walls. Originally constructed before the 15th century, the church acquired its present appearance, complete with two towers, in the 18th century. Situated atop a hill overlooking Štrigova, the church lies along the Međimurska wine road and the bicycle path that traverses the area. The preservation of digital cultural heritage utilizing augmented reality technology holds paramount importance in safeguarding documents and artifacts for future generations (Kukec et al., 2019).

Picture 3: Frescoes in the church of St. Jerome
(Source: https://ekomuzej-medimurje.info/centri/sveti-jeronim)

3.4. MEMORIAL OIL PARK IN PEKLENICA

In the town of Peklenica lies the Peklenica Petroleum Memorial Park, named after the dark liquid referred to by locals as "hell." This liquid, identified as oil, naturally emerged on the earth's surface in the area, where it was utilized throughout the region to lubricate cart wheels, tools, and various implements. In 1856, Peklenica saw the world's first organized oil extraction, which also served as a source for lamp fuel and other products. Multiple oil wells were operational (see Picture 4), sustaining production until the 1950s. The memorial park now features a reconstructed oil well, an oil museum, interactive exhibitions, and educational activities tailored for children. Adjacent to the park, a cycling route provides a distinctive tourist experience, offering insights into the history and significance of oil exploration in Croatia and its global impact.

Picture 4: Oil wells in Peklenica
(Source: https://ekomuzej-medimurje.info/centri/spomen-park-naftastva)

3.5. RUDOLF STEINER CENTER

Dr. Rudolf Steiner (see Picture 5), one of the most renowned figures born in Međimurje, is credited as the founder of anthroposophy, Waldorf pedagogy, eurythmy, anthroposophic medicine, organic architecture, anthroposophic speech formation, painting and sculpture, and biodynamic agriculture. The center in Donji Kraljevac resides within a building designed in accordance with the principles of organic architecture, situated adjacent to Steiner's birthplace. This center serves as a hub for exploring Steiner's life journey, hosting lectures and practical workshops on his teachings, with particular emphasis on biodynamic agriculture

Picture 5: Doctor Rudolfa Steinera portrait
(Source: https://ekomuzej-medimurje.info/centri/centar-dr-rudolfa-steinera/)

3.6 THE *"BETWEEN TWO RIVERS"* CENTER

The *"Between two rivers"* visitor center is dedicated to preserving Međimurje's natural heritage. Situated in the quaint village of Križovec in Međimurje, the center occupies a prominent location on the town square, which stands as the sole and inaugural Croatian square dedicated to nature. Adjacent to the center lies the headquarters of Međimurska Prirode - the Public Institution for Nature Protection, responsible for safeguarding the region's flora and fauna. In close proximity to the center, visitors can explore the interpretation log cabin "Moj hrast Adam" and the children's playground "Rječica." The center serves as an educational hub, addressing questions such as the significance of codfish, whether Međimurje possesses its own cod, the importance of codfish preservation, the identity of the marls, the legend of the Drava kingfisher, the role of floijars, the presence of tropical-like birds flying over Međimurje, and the reasons behind the endangered status of scaly and blackish species. Various activities are offered, including volunteering in springtime frog protectionn efforts, bird counting initiatives, and the protection and documentation of snowdrop localities.

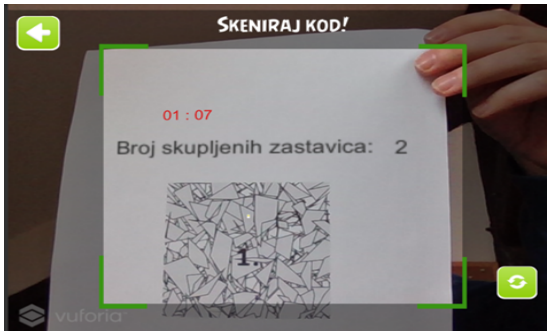
4. SUSTAINABLE SPORT TOURISM IN MEĐIMURJE COUNTY

Sports activities that minimize ecological impact and can be enjoyed year-round include hiking, orienteering, races, cross-country running, cyclotourism, and disc golf. Among these, cycling holds significant potential (Breslauer, 2012). Međimurje boasts the densest network of organized cycling routes in Croatia, covering approximately 888 km within the county's 750 km^2 area (see Picture 6). This extensive network includes international cycling routes such as EuroVelo 13, the Amazon of Europe bike trail, the Drava route, the Mura route, Cycle in a network, and Hapy bike.

Picture 6: Cycling routes in Međimurje County
(Source: http://195.29.89.149/bike/pix/bike-all.jpg)

4.1. ORIENTATION RUNNING

Over the past decade, orienteering has witnessed a surge in popularity among individuals of various age groups, participating in races outlined by annual calendars. Orienteering offers families the opportunity to immerse themselves in nature, spending active days or weekends in new locations with diverse challenges and tasks, all while promoting health and sustainability (Breslauer et al., 2021). Augmented reality (AR) technologies have introduced added value to these competitions. By scanning markers, participants can access real-time information about the route or receive relevant updates. These markers (see Picture 7) also offer the potential to include extended content tailored to the race's requirements, such as collecting points at control points through an AR application and displaying race times.



Picture 7: Presentation of scanned code
(Source: authors)

By developing a smartphone application, augmented reality becomes mobile, enabling users to engage in AR experiences anytime, provided they have the application and a marker. This flexibility makes it well-suited for orienteering and other related activities, allowing participants to utilize AR functionality wherever they are.

4.2. DISC GOLF

Disc golf is an inclusive sport suitable for all age groups, making it accessible even to the youngest participants on specially designed courses. Its year-round playability renders it ideal for destinations like Međimurje. Unlike traditional sports, disc golf doesn't require a stadium or a specifically arranged field (see Picture 8); it can be played in various natural settings such as forests, grassy areas, rocky terrains, sandy beaches, or open fields, requiring only two flying discs and a few baskets.

The competitive aspect of the sport has gained popularity among Croatia's younger athletes, a trend further boosted by events like the 12th European Championship held in Međimurje at Terme St. Martin na Mura in August 2018 (Breslauer, 2022), which saw the participation of 200 top disc golf players from 27 European countries. In the realm of tourism product innovation, there is a growing need to prioritize the development of sports tourism. This entails expanding the range of lesser-known sports activities to cater to diverse interests. Activities such as horse riding, cycling, orienteering, Nordic walking, trekking, e-cycle tours, forest walks, disc golf, and other niche sports should receive particular attention in order to enrich the tourism offerings.

Picture 8: Disc- golf in Spa St. Martin na Muri
(Source: www.termesvetimartin.com/hr/aktivnosti/rekreacija-i-zabava/golf-i-disc-golf)

4.3. PEDESTRIAN PATHS

One of the recent tourism initiatives in Međimurje involves the marking of hiking trails. Presently, ten trails spanning a total length of 115 km have been marked, with approximately 34 hours of walking required to complete them. In Međimurje, the term "cipelcug" is widely used to refer to hiking, reflecting the local enthusiasm for this activity. These trails traverse the diverse landscape of Međimurje, offering routes ranging from easy to more challenging, suitable for recreational walkers of all ages and varying levels of physical ability. The routes have been meticulously planned and arranged by local hiking enthusiasts who regularly explore them, aiming to make them accessible to both residents of Međimurje and visitors. Throughout Međimurje, numerous local asphalt roads with minimal traffic, as well as field and forest paths, provide excellent opportunities for year-round hiking. The region benefits from wireless telephone and internet coverage, and in Čakovec, there is a branch of the Croatian Mountain Rescue Service, ensuring swift intervention if necessary. Ensuring the safety of hiking participants, including appropriate equipment (such as sturdy footwear, suitable clothing, and walking sticks), and a realistic awareness of one's physical capabilities, is of paramount importance. One of the most renowned hiking events in Međimurje is the "Vincekov Pohod," organized by mountaineering association Bundek from Mursko Središče. Held annually at the end of January, this event attracts thousands of participants.

5. CONCLUSION

The sustainability and innovation of tourism in Međimurje are evident across all sectors, as outlined in the objectives set by TZ Međimurja in collaboration with other tourism organizations. The Međimurje County has committed to green, sustainable tourism through its Tourism Development Strategy, resulting in the region receiving several prestigious awards. Despite the challenges posed by the COVID-19 pandemic, the number of arrivals and overnight stays has increased, bolstered by high-quality projects such as "Ekomuzej Međimurje" which encompasses 14 localities throughout Međimurje. Accommodation capacities are expanding, primarily through private ownership, with numerous OPGs (family agricultural holdings) offering lodging to tourists.

These accommodations often align with Međimurje's events, sports activities, and the growing demand from tourists seeking privacy and tranquility during their stay. In addition to lodging, they offer various amenities such as recreation, gastronomic experiences, and tastings. Međimurje boasts an extensive 888 km cycle route for exploring the region, promoting sustainable travel practices. The county prioritizes sustainability and responsible business practices in tourism, primarily through energy consumption, which largely comes from hydropower plants and solar collectors. Mass tourism is not pursued; instead, the focus is on catering to individuals and smaller groups, fostering a more intimate and authentic experience. The rural areas play a crucial role in sustaining Međimurje's tourism, serving as the primary source of food production and supplying essential resources such as drinking water, energy, forests, metals, and minerals. Međimurje's abundance of water resources, intact natural landscapes, and rich cultural heritage, including living traditions, position it as a desirable green destination with significant potential for sustainable tourism. It is imperative for the tourism strategy to prioritize and uphold the principles of sustainable and responsible tourism, ensuring the improvement and preservation of all tourism segments, including accommodation facilities, waste management, sports activities, culinary offerings, and local community involvement. Through ongoing research and understanding guest needs and preferences, Međimurje can enhance its offerings without compromising the sustainability of the destination or its unique identity as a green destination.

LITERATURE:

1. Breslauer, N. (2010). *Edukacija kadrova za potrebe turizma i sporta u Hrvatskoj s osvrtom na Međimursku županiju*. *Hrvatski znanstveno-stručni skup o menadžmentu u turizmu i sportu*, 1(1), 20-30.
2. Breslauer, N. (2012). *Stanje i mogućnosti zdravstvenog i sportsko-rekreacijskog turizma* (Research report no. XX). Sv. Martin na Muri: Međunarodna konferencija o menadžmentu u turizmu i sportu.
3. Breslauer, N. (2022). *Sport i rekreacija u turizmu* (Research report no. XX). Čakovec & Gospić: Međimursko veleučilište u Čakovcu, Veleučilište "Nikole Tesle" Gospić.
4. Breslauer, N., Gregorić, M., & Hegeduš, I. (2015). *Održivi razvoj turizma u Međimurskoj županiji*. *Obrazovanje za poduzetništvo - E4E*, 5(1), 99-109.
5. Breslauer, N., Horvat, D. M., & Jovanovska, D. (2019). *Prijedlozi implementacije elemenata proširene stvarnosti s ciljem proširenja turističke ponude grada Čakovca*. *Zbornik radova Međimurskog veleučilišta u Čakovcu*, 10(2), 15-19.
6. Breslauer, N., Hublin, T., Breslauer, N., & Zeljko, I. (2020). *Augmented reality augmentation opportunities in orienteering*. *53rd International Scientific Conference on Economic and Social Development – Sveti Martin na Muri*, 250-254.
7. Breslauer, N., Hublin, T., Breslauer, N., & Zeljko, I. (2021). *Participants' attitudes about augmented reality augmentation opportunities in orienteering*. *7th ITEM Conference - "Innovation, Technology, Education and Management" and 67th International Scientific Conference on Economic and Social Development – Sveti Martin na Muri*, 186-193.
8. Buzar, S. (2015). *Analiza globalnog etičkog kodeksa za turizam u kontekstu društveno odgovornog poslovanja*. *Acta Economica Et Turistica*, 1(1), 41-59.
9. Evistor. Retrieved 22.03.2025 from https://tzm.hr/statistika/ist/
10. Gartner, W., & Lime, D. (2000). *Trendovi u rekreaciji na otvorenom, slobodnom vremenu i turizmu*. Retrieved 22.03.2025 from info:aX60we6ndoUJ:scholar.google.com
11. Istraživanje TZ Međimurske županije (2023). Retrieved 22.03.2025 from https://tzm.hr/statistika/ist/

12. Kukec, M., Breslauer, N., Jovanovska, D., & Škrlec, J. (2019). *Očuvanje digitalne kulturne baštine primjenom tehnologije proširene stvarnosti*. *Tiskarstvo i dizajn 2019*, Zagreb, 48-56.
13. Petričević, T. (2014). *Društveno odgovorno poslovanje i društvenopoduzetnički pothvati u turizmu* (edition). Zagreb: British Council Croatia. Retrieved 22.03.2025 from http://www.example.si/example
14. Petrović, M., Knezović, D., & Todorović, M. (2017). *Sportski turizam kao komponenta razvoja održivog poduzetništva*. *Obrazovanje za poduzetništvo*, 7(1), 81-89.
15. Pješačke staze (2024). Retrieved 22.03.2025 from https://www.medimurje-walk.com/
16. Razvojni planovi TZ Međimurske županije. Retrieved 22.03.2025 from https://tzm.hr/dokumenti/razvojni-planovi
17. Strategija ruralnog razvoja Međimurja. Retrieved 22.03.2025 from https://Dokumenti/Strategija_ruralnog_razvoja_Medim.zup.pdf

LINGUISTIC CHALLENGES IN CONTENT CREATION AND TRANSCREATION IN TOURISM OF MEĐIMURJE COUNTY

Tina Smolkovic
Međimursko veleučilište u Čakovcu, Croatia
tina.smolkovic@mev.hr

ABSTRACT

Situated in the northwestern part of Croatia, Međimurje County is an example of a success story in continental tourism. With an increasing number of visitors each year, the region seeks to preserve the trend while enriching its tourist offer. It is a destination which highlights its preserved nature, cultural heritage and gastronomy, and continues to expand facilities and infrastructure for wellness, recreation and unique tourist content celebrating authentic local tradition and history. In terms of visitor profile, the region welcomes mostly national visitors, as well as guests from Slovenia, Germany, Austria, Poland, etc. Not surprisingly, the majority of marketing materials available to potential visitors who seek online information regarding destination is given in the Croatian language. Admittedly, the primary sources of information, i.e. the official website for promoting tourism in Međimurje County as well as the website of the flagship tourist destination, Terme Sveti Martin resort, also offer content in other languages. In order to be able to showcase the culture, nature and language used in the region, and engage the tourist audience, content creation becomes an important tool in tourism communication. The paper looks into the complexities of creating content as well as the necessity of transcreation rather than translation. The tourism marketing materials on the relevant websites are subject to content analysis. The aim is to identify key linguistic challenges featuring dialect, cultural nuances and the preservation of local identity in transcreated content. The paper contributes to a broader discourse on language, culture and tourism marketing in the context of a small region.
Keywords: *content creation, language in tourism, tourism marketing, transcreation*

1. INTRODUCTION

In a globalized world, tourism begins at home. In other words, even before they set off on a journey, tourists look up destinations, explore attractions and available activities, make bookings etc. in order to prepare for the trip, and most of their research and pre-travel actions are done online (Statista Research Department, 2025), and increasingly more so. Therefore, digital marketing has become an indispensable tool in the tourism industry, since it allows destinations to conveniently present what they have to offer to their target audiences, be it the world or to more localized interested parties. When working on a digital marketing strategy, it is useful to bear in mind the 7Ds (digital goals, digital audiences, digital devices, digital platforms, digital media, digital data, digital technology) as proposed by Chaffey (2022), in order to find the perfect fit for particular purposes such as tourism. After all, '[t]he tourist mind is in constant change and demands new tourism products that are reshaping the tourism trends that have to be identified and redefined' (Gómez et al., 2016:420). Accordingly, tourism marketing needs to adapt to change, and digital tools are flexible and versatile to allow immediate response to new conditions.

They allow establishments in tourism to engage potential customers and maintain relationships, share useful and relevant information, and create a driving force behind customers' interest (Afren, 2023). While Chaffey (2023) identifies six pillars of digital marketing, the focus of the paper is on one of them, namely the content, and, more precisely, content creation.

2. CONTENT CREATION

Ali (2025) defines content creation as 'the process of developing and sharing media in various formats to reach and engage [the] target audience', and identifies its aim as finding a solution to customers' needs, providing information and entertaining them. Furthermore, Hall (2023) sees content creation as vital for business and emphasizes the importance of its usefulness for the customers. Similarly, Chaffey (2019) points out that '[i]t is the quality and type of content that is essential to the success of different digital media, messaging and experiences'. In order to be able to provide relevant content, it is necessary to understand the target audience, their interests and needs. In other words, it should be customer centric (Forrest, 2019). Specifically, content for tourism should be visually appealing, engaging, inspiring and informative (CBI, 2024). It should also offer authentic insights and provide unique information showing expertise in the destination.

2.1. Language in tourism

While content creation generally goes beyond the mere written word to include e.g. imagery and videos, the primary interest here is of linguistic nature. After all, language in tourism serves to 'persuade, attract, encourage and seduce the potential tourists to be actual tourists' (Bin Salim et al., 2012:136). The choice of wording can be crucial to inform potential tourists about a destination worth visiting, to entice their imagination and, consequently, to persuade them to plan their trip. Apart from being inspirational, it should be authentic, practical and aligned with the destination brand. While choosing a language of the target audience for communicating a destination's message reflects awareness and respect of the origin of potential visitors, it also raises questions of adapting the content to various cultural and linguistic groups. After all, the study of the user language preferences online (The Gallup Organization, 2011) carried out across the EU member states showed that while English might be the preferred choice for browsing when the content is not available in one's native language, almost half of respondents (44%) felt 'they missed interesting information because websites were not available in a language they understood' (The Gallup Organization, 2011:6) and roughly three quarters 'agreed that they always visited a website in their own language when they had a choice (The Gallup Organization, 2011:29)'.

As noted by LanguageWire (2025),

> [o]ne of the keys to being a successful business is to be where your consumers are. This requires speaking the right language: their language. However, over the years we have become increasingly dependent on English. It's the fix-all solution that enables communication; especially between travellers and locals. But as our insatiable desire for smartphones, the internet and new technology grows, so does our desire to communicate in our own language.

2.2. Translation and transcreation

Oxford English Dictionary (2025) defines translation as '[t]he action or process of translating a word, a work, etc., from one language into another'. However, in order to avoid the possibility of the meaning getting lost in translation, language in marketing requires thoughtful consideration, particularly in tourism contexts.

In order to represent the cultural and linguistic nuances and customs as well as considering the native language and culture of the target audience, transforming the message from one language to another needs to go beyond the basic translation. Transcreation, a term coined as a combination of 'translation' and 'creation', is certainly a necessary option for that purpose. Díaz-Millón and Olvera- Lobo (2021:358) have proposed the following definition of transcreation:

> Transcreation is a type of translation characterized by the intra-/interlingual adaptation or re-interpretation of a message intended to suit a target audience, while conveying the same message, style, tone, images and emotions from the source language to the target language, paying special attention to the cultural characteristics of the target audience. This re-interpretation of the message may imply adaptations that move away from the original text to a greater or lesser extent to fit the original purpose, transmit the original message and overcome cultural barriers. For such reasons, it is present in persuasive and communicative contexts.

In other words, in order to get the original meaning across, the marketing text in the target language needs to be creative even at the expense of absolute accuracy. When aiming for an impact and inspiration rather than just transmitting information, transcreation allows for the message to be expressed in a way that considers the specific context, cultural references, tone and style.

3. CONTENT CREATION FOR TOURISM OF MEĐIMURJE COUNTY

Međimurje County is situated in the northwestern part of Croatia, bordering Hungary and Slovenia. The development plan of Međimurje County until 2027 identifies the potential for its tourism development with the focus on natural and cultural heritage, eno-gastronomy, wellness, sports tourism on the basis of sustainable development in accordance with the contemporary green standards (Međimurska županija, 2022).

The region has seen a steady growth in the number of visitors in recent years. For example, there has been an increase of arrivals by 8% in 2023 when compared to 2022. Roughly half of the visitors are domestic tourists (54%), followed by visitors from Slovenia, Poland, Germany, Austria, Slovakia, Czech Republic, Hungary, Italy, and more than half of nights spent (66%) have been recorded in Sveti Martin na Muri owing to its spa resort Terme Sveti Martin (Turistička zajednica Međimurske županije, 2024). Međimurje County aims to be branded as a green destination offering a wealth of activities for leisure and well-being, in combination with rich cultural heritage and eno-gastronomy.

The main sources of information about the region have been identified as the official website of the Tourist Board of Međimurje County (https://visitmedimurje.com/), the official website of Terme Sveti Martin spa resort (https://www.termesvetimartin.com/hr/), the official website of Ecomuseum of Međimurje (https://ekomuzej-medimurje.info/), which offer their content in various languages, as given in the following Table 1.

Website:	Content available in the following languages:
https://visitmedimurje.com/	Croatian, English, German, Slovenian
https://www.termesvetimartin.com	Croatian, English, German, Slovenian, Italian
https://ekomuzej-medimurje.info/	Croatian, English, German, Slovenian, Italian, Polish

Table 1: Available languages of content on websites of primary stakeholders in tourism of Međimurje County in March 2025 (Source: respective websites)

For the purpose of the paper, only certain features of the content available in Croatian, English, German and Slovenian on the aforementioned websites will be touched upon.

3.1. Unique linguistic content on the website VisitMeđimurje

Upon opening the page of the Tourist Board of Međimurje County, one is visually struck by the colour green, which corresponds to the new branding with the focus on the green experience (Turistička zajednica Međimurske županije, 2024), as expressed in the Croatian language as 'doŽIVI zeleno' - which invites visitors to both experience the green nature around them and live an environmentally friendly life.

Picture 1: Call-to-action button reflecting the brand 'doŽIVI zeleno' in Croatian (Source: https://visitmedimurje.com/otkrij/priroda/)

While the call-to-action button reflecting the brand (Picture 1) quite conveniently uses the wordplay *doživi* (Cro. 'experience') and the capitalized *živi* (Cro.'live') combining it with *zeleno* (Cro.'green; environmentally friendly'), it does pose a certain challenge when it comes to transferring its meaning into English. In other words, in order to preserve the message in its full depth, two verbs need to be used to transcreate the message - 'live (& feel) green' work in that respect particularly if one bears in mind that the call-to-action button should be kept short yet enticing. The issue does not arise in the Slovenian language - the call-to-action is practically

the same owing to the similarity of the two Slavic languages, Slovenian and Croatian. Similarly, the German verb '*erleben*' can be interpreted in both ways, so it makes a great fit in this case. Another issue that emerges is the question of addressing the reader, i.e. potential visitor. Namely, the imperative form is used in the main menu of the website VisitMeđimurje. While the English imperative forms for the 2. person singular and for the 2. person plural are conveniently the same (here: 'discover M', 'visit', 'experience', 'taste'), in other languages there are two options respectively and the choice between them may be culturally predetermined. For example, in recent years we have witnessed a switch to using the 2. person singular instead of the more formal 2. person plural previously used to express politeness in communication. The main idea in marketing is to create closeness and establish a relationship with a customer. Therefore, the website VisitMeđimurje uses the 2. person singular in the main menu both in Croatian ('otkrij M', 'posjeti, 'doživi', 'okusi') and Slovenian ('odkrij M', 'obišči', 'doživi', 'okusi'). However, it does not do so for the German language, where the more formal wording is still preferred ('Entdecken Sie M', 'Besuchen Sie', 'Erleben Sie', ' Probieren Sie'), as suggested in the study by Hensel-Börner and Kords (2021). A further complex issue is that of a dialect. Namely, people in Međimurje use a regional Kajkavian dialect, which is deeply rooted in the culture of the area. For example, the traditional song *popevka* is sung in the dialect. It is protected as intangible cultural heritage along with regional speech in Štrigova, Kotoriba and toponymy in Sveta Marija. Visitors to the region from Croatia would likely be curious to learn about specific expressions and could figure out the meaning from the context. For example, a verse from a traditional *popevka* is presented in the section about heritage. By transcreating a single short message like that (Eng. 'you have a special place in my heart'), visitors from other countries can grasp the depth of the meaning and its relevance to the heritage presented (Picture 2).

Picture 2: A verse in Kajkavian dialect presented alongside UNESCO cultural heritage (Source: https://visitmedimurje.com/otkrij/bastina/)

Similarly, the headings in the 'Experience' section of the main menu use local dialect as a show of authenticity and a charming way to spur the visitors to action. The examples feature 'stisni po pedali' (Eng. 'hit the pedal') and 'kreni cipelcugom' (Eng.'set off on foot'). While translation does get the meaning across, certain dialectal expressions need to be explained to be able to fully understand their connotations and, in this case, comical tone.

Namely, ‘cipelcug’ is a word that combines the words meaning ‘shoes’ and ‘train’ to coin a word that essentially refers to walking.

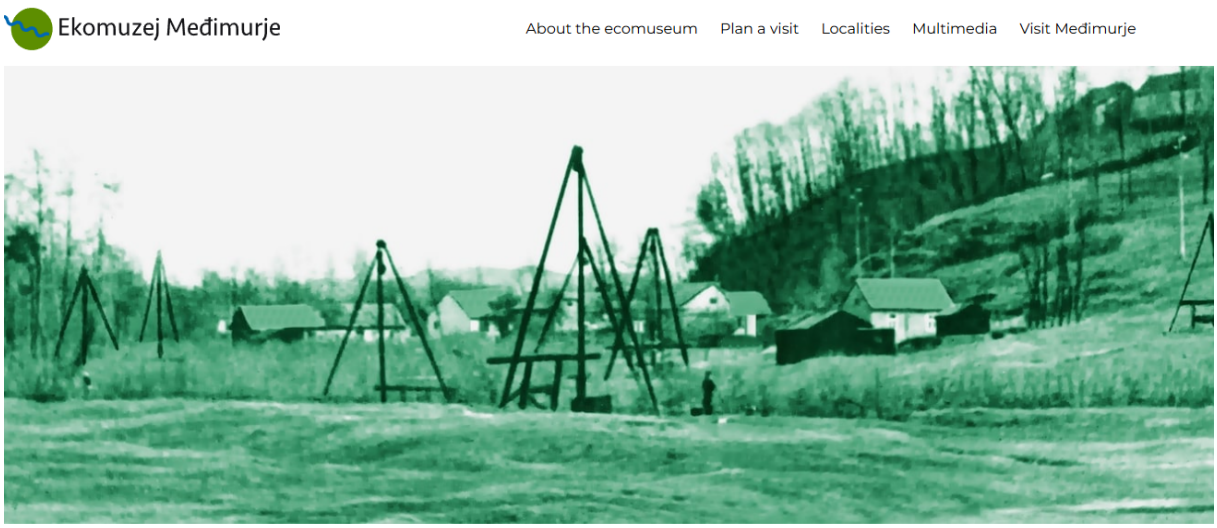
3.2. Unique linguistic content on the website Terme Sveti Martin

The homepage of the website Terme Sveti Martin immediately immerses the visitor into the world of healthy wellbeing, showcasing the resort's uniqueness, beauty of nature and healthy living. What is more, it uses a distinctive expression ‘healthness’, not to be confused with ‘healthiness’. ‘Healthness’ has been coined using ‘health’ and ‘wellness’, and the resort has been a pioneer in promoting not only the expression, but also its basic meaning. In essence, it refers to ‘a combination of active rest, wellness experience, and raising awareness of one’s own health with the aim of bringing the body, mind, and soul back into balance’ (Terme Sveti Martin, 2025). Thus, it very clearly articulates what both the resort and the destination wish to communicate with the target audience. Furthermore, the resort cleverly uses the onomatopoeic expression ‘mmm’ to indicate consuming something delicious in connection with Međimurje. By saying ‘Mmmmeđimurje’, it is suggested that the local cuisine is worth trying. By adding three simple words (‘Healthy. Local. Delicious.’) it is further clarified what the main elements of gastronomy in Međimurje are. Linguistically, the onomatopoeic expression works in all available languages and, thus, effectively transmits the main message regardless of the cultural background of the reader.

Picture 3: Onomatopoeic expression for transmitting a universal message (Source: https://www.termesvetimartin.com/en/vital-gourmet-home-en/)

3.3. Unique linguistic content on the website Ecomuseum of Međimurje

The website has taken into consideration the statistical information about countries of origin of visitors to Međimurje, since it is available in multiple language versions. That being said, certain issues have been noticed in the main menu under ‘locality’. Namely, several place names have been literally translated, which can be misleading. For example, when presenting the Oil Industry Memorial Park in Peklenica, the village is introduced as ‘mjesto Peklenica’ in the Croatian version. This has then been unnecessarily translated into ‘kraj Peklenica’ (Slo.), ‘place Peklenica’ (Eng.) (Picture 4) and ‘Ort Peklenica’ (Ger.), even though it suffices to use solely the toponym.



Picture 4: Mistranslation in presentation of localities (Source: https://ekomuzej-medimurje.info/centri/spomen-park-naftastva/)

Furthermore, the visitor centre Med dvemi vodami also raises a question of mistranslation and the need (not) to translate names of institutions. Firstly, the site is located in the village of Križovec, which has also been needlessly translated as '*Razpotja*' (Slo.), 'Crossroads' (Eng.) and '*Kreuzung*' (Ger.). Secondly, the name of the centre is expressed in the Kajkavian dialect which reflects a deeper meaning. Literally, *'med dvemi vodami'* translates into English as 'between two waters'. However, it completely misses the cultural and historical implications of the phrase. The 'two waters' refer to the rivers of Drava and Mura, between which Međimurje is situated. Therefore, translating it as 'between two rivers' would be more accurate. What is more, the phrase could be used as an opportunity to inform visitors what such geographical location has meant for the people of Međimurje historically and nowadays.

4. CONCLUSION

Knowing one's target audience and being in tune with their needs can result in competitive advantage. In the ever-changing tourism market, culturally sensitive communication is essential, and one aspect of it is definitely language used to communicate the brand's message. The websites of the Tourist Board of Međimurje County, Terme Sveti Martin spa resort and Ecomuseum of Međimurje have been identified as most valuable information providers for potential visitors to Međimurje. Their multilingual websites mostly correspond to the tourist demand, i.e. take into consideration the structure of visitors to the region. Furthermore, the importance of content creation for digital marketing in tourism, particularly linguistic content, has been considered on the basis of the content created for the websites in question. Several mistranslations, examples of successful transcreations, specific linguistic features such as dialect and unique content have been briefly analyzed, albeit in a limited scope. Finally, transcreation has been identified as an important means of transmitting powerful, informative and inspirational messages in the tourism marketing communication.

LITERATURE:

1. Afren, S. (2024). The role of digital marketing promoting tourism business: A study of the use of social media in promoting travel. World Journal of Advanced Research and Reviews, 2024, 21(01), 272–287. Retrieved 8.3.2025 from https://clok.uclan.ac.uk/50416/1/WJARR-2023-2668.pdf
2. Ali, A. (2025). What Is Content Creation? An Overview & How to Do It Right. Retrieved 9.3.2025 from https://www.semrush.com/blog/content-creation/
3. Bin Salim, M.A., Binti Ibrahim, N.A & Hassan, H. (2012). Language for Tourism: A Review of Literature. Procedia - Social and Behavioral Sciences 66, 136 – 143. Retrieved 10.3.2025 from https://www.researchgate.net/publication/257717958_Language_for_Tourism_A_Review_of_Literature
4. Chaffey, D. (2019). Content marketing. Retrieved 7.3.2025 from https://www.davechaffey.com/digital-marketing-glossary/content-marketing/
5. Chaffey, D. (2022). What is digital marketing?. Retrieved 7.3.2025 from https://www.davechaffey.com/digital-marketing-definitions/what-is-digital-marketing/
6. Chaffey, D. (2023). Digital marketing: a simple explanation - the six pillars of effective digital marketing. Retrieved 7.3.2025 from https://www.davechaffey.com/digital-marketing-definitions/digital-marketing-a-simple-explanation/
7. Díaz-Millón, M., & Olvera-Lobo, M. D. (2021). Towards a definition of transcreation: a systematic literature review. Perspectives, 31(2), 347–364. Retrieved 10.3.2025 from https://doi.org/10.1080/0907676X.2021.2004177
8. Distribution of sales channels in the travel and tourism market worldwide 2019-2029. (2025). Statista Research Department. Retrieved 8.3.2025 from https://www.statista.com/forecasts/1239068/sales-channels-travel-tourism-worldwide.
9. Forrest, Pj. (2019). Content Marketing Today. Journal of Business and Economics 10(2), 407-415. Retrieved 9.3.2025 from https://www.researchgate.net/publication/331345065_Content_Marketing_Today
10. Gómez, M.; Medina, F. & Puyuelo, J. (2016). New Trends in Tourism? From Globalization to Postmodernism. International Journal of Scientific Management and Tourism, 2(3), 417-433. Retrieved 8.3.2025 from https://ojs.scientificmanagementjournal.com/ojs/index.php/smj/article/view/200
11. Hall, J. (2023). Why Content Creation Is Essential For Your Business And How You Can Improve Your Approach. Retrieved 9.3.2025 from https://www.forbes.com/sites/johnhall/2023/05/07/why-content-creation-is-essential-for-your-business-and-how-you-can-improve-your-approach/
12. Hensel-Börner, S. & Kords, U. (2021). Kundenansprache im persönlichen Verkauf. Duzen bringt keine Vorteile. Marketing Review St. Gallen, 6, 56-63. Retrieved 10.3.2025 from https://www.hsba.de/fileadmin/user_upload/bereiche/_dokumente/6-forschung/profs-publikationen/MRSG_6_2021_Kundenansprache_im_Verkauf.pdf
13. How to be a successful tourism company online (2024). CBI. Retrieved 8.3.2025 from https://www.cbi.eu/market-information/tourism/how-be-successful-company-online#produce-good-content-for-your-digital-channels
14. Međimurska županija (2022). Plan razvoja Međimurske županije do 2027. godine. Međimurska županija.
15. Oxford English Dictionary. (2025). Retrieved 10.3.2025 from https://www.oed.com/dictionary/translation_n?tab=meaning_and_use&tl=true#17956299

16. Terme Sveti Martin (2025). What is Healthness?. Sveti Martin na Muri. Retrieved 11.3.2025 from https://www.termesvetimartin.com/en/healthness-3/

17. The Gallup Organization. (2011). User language preference online. Analytical report. Retrieved 10.3.2025 from https://op.europa.eu/en/publication-detail/-/publication/7e48e109-2809-4616-b0e5-666a4884af11

18. The language of tourism – more than translation. (2025). LanguageWire. Retrieved 10.3.2025 from https://www.languagewire.com/en/blog/tourism-and-translation

19. Turistička zajednica Međimurske županije (2024). Izvješće o izvršenju programa rada Turističke zajednice za 2023. godinu. Čakovec. Retrieved 10.3.2025 from https://tzm.hr/wp-content/uploads/2024/05/Izvjesce-o-radu_TZMZ-2023_compressed.pdf

SUSTAINABLE TOURISM DEVELOPMENT IN CROATIA

Morana Bolfek
Marine Air d.o.o., Zagreb, Trg kralja Tomislava 2, Hrvatska
morana.bolfek@gmail.com

Zdenko Bolfek
University of Applied Sciences Hrvatsko zagorje Krapina,
Krapina, Šetalište hrvatskog narodnog preporoda 6, Hrvatska
zdenko.bolfek@gmail.com

Ivan Hegedus
Međimurje University of Applied Sciences in Čakovec,
Čakovec, Ulica bana Josipa Jelačića 22a, Hrvatska
ivan.hegedus@mev.hr

ABSTRACT

Sustainable development is development aimed at meeting current needs without compromising the ability of future generations to meet their needs. Tourism and sustainable development are closely related because tourism can have significant economic, social, and environmental impacts on the area in which it develops. These impacts can be both positive and negative. Since 1987, when sustainable development emerged as a new concept, numerous conferences have been held and significant acts have been passed to raise awareness about the importance of sustainable development and encourage national legislation to create a regulatory framework aimed at achieving sustainable development. Tourism has economic, environmental, and social impacts on the environment, and if managed responsibly, benefits can be achieved. However, negative effects are also possible. Among the positive impacts, tourism is one of the largest global sectors and a key source of income for many countries. The share of tourism in the GDP of certain countries exceeds 40%. Tourism also employs a significant volume of labour, often in locations with no other employment alternatives. It stimulates other sectors of the economy, such as transport, trade, etc. Tourism revenue can be used to fund the protection of natural areas, maintain national parks, or develop ecological initiatives, and it is also interesting for testing various ecological innovations. It stimulates infrastructure development, which is then used by the local community. Among the negative repercussions of tourism are excessive infrastructure burden, decreased quality of life for the local population, pollution and ecological impacts, as well as social problems and gentrification. To avoid the negative consequences of tourism, the solution is to promote the development of sustainable tourism models such as ecotourism, local tourism, and responsible travel. It is crucial to create incentive conditions through the development of appropriate strategies and policies to preserve resources so that tourism can be sustainably maintained in the long term. Croatia, where tourism is an important economic sector, has adhered to generally accepted guidelines on sustainable development since its inception and, in order to resolve negative effects, works on creating a strategic and regulatory framework for their implementation.

Keywords: *Gentrification, Overtourism, Seasonality, Sustainable tourism, Tourism*

1. INTRODUCTION

Sustainable development is development aimed at meeting current needs without compromising the ability of future generations to meet their needs. Tourism is closely linked to sustainable development as it can greatly affect the economic, social, and environmental aspects of a destination. Depending on how tourism is managed, its role can be either positive or negative.

Sustainable tourism development represents a concept that seeks to balance economic growth, the preservation of natural resources, and the protection of cultural heritage, ensuring long-term benefits for local communities and visitors. Croatia has been experiencing a growing number of visitors for an extended period and is emerging as one of the top destinations for summer holidays. Cities like Dubrovnik, Split, Zadar, Pula, as well as smaller ones on the islands such as Hvar, Korčula, and Krk, are often on the lists of the most visited destinations. In addition to sun, sea, and beaches, Croatia offers numerous cultural, historical, and natural landmarks, many of which are UNESCO World Heritage Sites, such as the historic centre of Dubrovnik, Diocletian's Palace in Split, Euphrasian Basilica in Poreč, Plitvice Lakes National Park, etc. As one of the most attractive tourist destinations in the Mediterranean, Croatia faces numerous challenges regarding the sustainability of tourism. To address these challenges, it is necessary to focus on the development of responsible tourism, promote ecological initiatives, diversify the offering, and promote tourism practices that respect the country's natural and cultural resources.

2. SUSTAINABLE DEVELOPMENT AND THE ROLE OF TOURISM IN SUSTAINABLE DEVELOPMENT

In 1987, the World Commission on Environment and Development, or the Brundtland Commission, introduced a new concept in its report—sustainable development. Sustainable development was then defined as development aimed at meeting present needs without compromising the ability of future generations to meet their needs (United Nations, 1987). Since then, with the United Nations as the main body for creating guidelines for sustainable development, numerous conferences have been held and significant declarations made to raise global awareness of the importance of sustainable development and encourage the creation of legal frameworks for its achievement. A key moment in shaping global sustainable development policy was the United Nations Conference on Sustainable Development (UNCSD) held in 2012 in Rio de Janeiro (United Nations, 2012). One of the most significant decisions of this Conference was the definition of future sustainable development goals, which would include three dimensions of sustainable development—economic, social, and environmental. Tourism and sustainable development are closely related because tourism can have a significant economic, social, and environmental impact on destinations. There is a clear positive correlation between tourism and its impact on the environment—the more successful tourism is, the stronger its impact, whether positive or negative. In the Sustainable Development Goals (SDGs) under the 2030 Agenda for the United Nations, tourism is specifically highlighted (United Nations, 2015). Among the 17 defined Sustainable Development Goals in the 2030 Agenda, tourism is mentioned as crucial for 3 out of 17 goals:

- SDG 8 – Decent Work and Economic Growth
- SDG 12 – Responsible Consumption and Production
- SDG 14 – Life Below Water (Conservation of Oceans and Seas)

When managed responsibly, tourism brings economic, ecological, and social benefits. Economically, tourism is one of the largest global sectors and a key source of income for many countries. In countries like the Maldives, Seychelles, or Caribbean nations, the share of tourism in national GDP can reach up to 40% or more. Tourism is also extremely important for Croatia's overall economy. In 2023, tourism revenues amounted to 14.6 billion euros, or nearly 20% of GDP, according to the Croatian National Bank (2024). Tourism also employs a large number of workers and generally stimulates the local economy, especially in rural and less developed regions. In addition to a significant portion of the workforce being employed in tourism, its importance is even greater because it often serves as a key source of employment in smaller and rural areas where other employment opportunities are limited.

Tourism also stimulates businesses in secondary sectors that support the tourism sector (such as trade, transport, souvenir production, etc.). In terms of environmental protection, sustainable tourism promotes the preservation of natural resources. Revenue from tourism can be used to fund the protection of natural areas, maintain national parks, or develop ecological initiatives. Tourism has a huge potential to promote the use of renewable energy sources and ecological materials, both through direct investments in sustainable practices and through education and promotion of a sustainable lifestyle. This not only contributes to environmental conservation but also creates a positive image for the destination, attracting tourists who value sustainability, innovation, or simply creativity. For this reason, tourist destinations often become testing grounds for new technologies in renewable energy and ecological materials. In terms of social benefits, tourism facilitates intercultural exchange and global understanding. It provides opportunities for rural and less developed areas to preserve and promote their traditions and possibly a unique way of life. Tourism also encourages infrastructure development. Better roads, water supply, internet, and other benefits that develop due to tourism also benefit the local community. One country with some of the best solutions for sustainability in tourist destinations is Sweden. In Sweden, hotels and vacation homes adhere to strict ecological standards, such as using renewable energy and reducing waste. A developed network of electric trains and buses reduces greenhouse gas emissions, while national parks and reserves are strictly regulated to preserve ecosystems. Local products and crafts are actively promoted to ensure that tourism benefits local residents. On the other hand, there are also negative impacts of tourism on sustainable development, such as:

- Overtourism
- Pollution and ecological impact
- Social problems and gentrification

Although infrastructure is often built or expanded due to tourism, overcrowding in tourist destinations leads to increased pressure on that infrastructure, making it inadequate, and in some cases, damaging the tourist destination itself. There are frequent cases of reduced quality of life, especially in smaller communities. The infrastructure in smaller places often cannot handle large increases in the number of users due to increased tourism traffic. Examples of this can be seen on the roads and streets of Dubrovnik and its surroundings, or in Split, near the ferry terminal. In seasonal tourist destinations, such as the Croatian Adriatic, water and electricity supply during the summer months can be strained due to the high number of users. Additionally, high tourist traffic results in large CO_2 emissions and excessive waste generation. Over-reliance on tourism can lead to the vulnerability of national economies and threaten the financial stability of the local population. Since tourism is a sensitive industry, any societal disruption can cause a drop in tourist traffic, whether due to economic, geopolitical, weather, health, or other factors. The COVID-19 pandemic demonstrated how quickly and strongly tourist numbers can drop and how economies overly dependent on tourism can be jeopardized. The example of Dubrovnik shows how tourism can raise the cost of living for local residents. Housing prices have increased beyond the affordability of the local population, leading to the displacement of locals from their homes, while traditional neighbourhoods are being transformed into tourist zones, a process known as gentrification. Additionally, seasonal tourism results in unstable income and insecure jobs, and local customs are often commercialized and lose their authenticity, among other issues. Spain, for example, as one of the most visited tourist destinations in Europe, faces a number of challenges regarding the sustainable development of tourism. In 2024, protests were organized across the country due to the negative impact of tourism on local life. In April 2024, a group of activists in Tenerife went on a hunger strike for three weeks to protest the construction of new mega-tourism projects.

Intensive tourism on the Balearic and Canary Islands is leading to excessive consumption of natural resources, water issues, and increased waste generation. A large number of tourists places excessive pressure on infrastructure, increases the cost of living for the local population, and contributes to gentrification. Due to private accommodation capacities for tourists, the cost of living rises, making it harder for local residents to afford housing. Intense visitation of historical sites such as the Alhambra and Sagrada Familia can cause damage and reduce the authenticity of cultural landmarks.

3. TOOLS FOR ESTABLISHING SUSTAINABILITY IN TOURIST DESTINATIONS

Sustainable tourism development aims to maximize the benefits for local communities and minimize the negative environmental and cultural impacts in the long run. The World Tourism Organization has defined 12 sustainability goals in tourism: economic sustainability, local prosperity, job quality, social equality, visitor satisfaction, local control, community well-being, cultural richness, integrity, biodiversity, resource efficiency, and environmental cleanliness (UNEP, World tourism organization, 2005). The solution lies in the development of sustainable tourism models such as ecotourism, local tourism, and responsible travel. It is crucial to implement policies that promote responsible travel and resource conservation to ensure long-term sustainability. The ecological aspect of sustainable tourism involves the rational use of natural resources, waste reduction, the use of renewable energy sources, and pollution reduction. The application of ecological standards in tourism, such as energy-efficient hotels, contributes to the preservation of the natural environment. The social aspect of sustainable tourism is reflected in the inclusion of local populations in tourism activities, the preservation of traditional crafts and culture, as well as providing economic benefits to the community. Sustainable tourism also involves responsible behaviour from tourists, who should respect the local customs, natural resources, and cultural heritage of the destination they visit. Economic sustainability in tourism is reflected in the development of business models that encourage long-term growth and employment without the exploitation of resources or dependence on seasonal tourism. Developing local businesses, supporting small producers, and promoting authentic products contribute to the economic empowerment of destinations. To successfully implement sustainable tourism, cooperation between the government, tourism organizations, the private sector, and local communities is essential. Through planning strategies, education, and regulations, destinations can be created that remain attractive for future generations of tourists while preserving their natural and cultural identity.

Key tools for sustainable tourism:

1. Planning and regulation – Spatial plans and legal regulations that limit the number of tourists, control construction, and protect natural resources.
2. Ecological certifications and standards – Implementation of certification systems (e.g., Travelife Sustainability Certification) for tourism operators and accommodation providers. Subsidies and incentives for businesses adopting sustainable practices.
3. Education and awareness – Educational programs that promote eco-friendly behaviour and raise awareness of the importance of resource conservation among both locals and tourists.
4. Sustainable mobility – Development of bicycle paths, public transport systems powered by electricity, and encouraging the use of public transport instead of cars to reduce traffic congestion and greenhouse gas emissions.
5. Smart tourism – The use of digital technologies to monitor tourist flow, optimize resources, and reduce the ecological footprint.
6. Waste and resource management – Recycling programs, waste reduction, and optimization of water and energy use in tourism.

7. Promoting the local economy – Promotion of local products, traditional crafts, and indigenous gastronomy as part of the tourist offer.
8. Diversification of the tourist offer – Promotion of rural, ecological, and cultural tourism to reduce excessive visitor concentration in specific areas.
9. Protection of cultural and natural heritage – Revitalization projects for historical sites and the protection of natural parks, along with sustainable visitor management.

However, despite these tools, a paradox exists: even in sustainable tourism forms such as ecotourism, rural tourism, and responsible tourism, there is a risk that once large numbers of tourists are reached, it no longer remains sustainable. Mass tourism can negate the benefits that these tourism types, by their nature, should bring. Thus, it is crucial to identify the responsible stakeholders and their duties. The responsibility for the sustainability of tourist destinations is shared by the following stakeholders:

1. Governments and local authorities – The creation of laws, regulations, and strategies that promote sustainable development and control the negative impacts of tourism.
2. The tourism industry – Hotels, restaurants, transport providers, travel agencies, and other entities should adopt ecological standards and sustainable practices.
3. Tourists – Responsible behaviour, respecting local customs and the environment, and supporting local products and services.
4. Non-governmental organizations and the academic community – Researching and promoting best practices and educating the public about sustainable tourism.

4. TOURISM AND SUSTAINABLE DEVELOPMENT IN CROATIA

4.1. Challenges of Croatian Tourism and the Regulatory Framework

Since the very beginning of its independence, the Republic of Croatia has supported the UN guidelines on sustainable development. One of the first documents adopted by the Croatian Parliament, which emphasizes the importance of sustainable development, is the *Declaration on the Protection of the Environment of the Republic of Croatia*, adopted in 1992 (Narodne novine, 1992). Based on international obligations, and in accordance with the *Environmental Protection Act*, the *Sustainable Development Strategy of the Republic of Croatia* was adopted in 2009. This strategy aims to direct Croatia's economic and social development, along with environmental protection, toward sustainable development (Narodne novine, 2009). In 2021, the *National Development Strategy of the Republic of Croatia until 2030* was adopted. The established development directions and strategic goals aim to help Croatia make better use of its potential, eliminate the economic and social damages caused by the global crisis, and accelerate Croatia’s recovery. Among the strategic goals is the development of sustainable, innovative, and resilient tourism. Croatia, as one of the most attractive tourist destinations on the Mediterranean, faces numerous challenges in terms of tourism sustainability.

1. Overtourism – A high number of tourists in a short period leads to overburdened infrastructure, increased resource consumption, and a reduced quality of life for the local population. Existing human resources are insufficient in both quantity and quality, and the structure and quality of accommodation capacities are inadequate.
2. Environmental Impact – Increased consumption of water and energy, waste production, and the destruction of natural habitats threaten ecosystems and the long-term sustainability of destinations. The relationship between tourism and climate change is also a key concern.
3. Tourism Seasonality – Tourism in Croatia is largely concentrated during the summer months, which results in uneven revenue distribution and seasonal employment, making economic stability more difficult.

4. Insufficient Diversification of Tourist Products – The majority of the tourist offer is focused on coastal tourism, while rural and continental areas are less developed, limiting opportunities for sustainable growth.
5. Traffic and Infrastructure Challenges – The large number of tourists during the season causes traffic congestion and increases greenhouse gas emissions.

To address these challenges, Croatia needs to focus on developing responsible tourism, encourage ecological initiatives, diversify the offer, and promote tourism practices that respect the country's natural and cultural resources. In July 2022, the Ministry of Tourism of the Republic of Croatia adopted the *Sustainable Tourism Development Strategy until 2030* (Ministry of Tourism, 2022). This strategy is a strategic planning document for Croatian tourism, aligned with the *National Development Strategy of the Republic of Croatia until 2030* and fundamental documents and policies of the European Union and the Republic of Croatia, including the *National Recovery and Resilience Plan*. The strategy outlines that the development of sustainable tourism in Croatia aims to improve the quality of life and work for the local population and the economic and social advancement of Croatian society as a whole. To protect and better present resources, it is necessary to halt negative trends such as overburdening spaces and seasonality and to initiate a sustainable development paradigm in line with best global practices.
Four key strategic goals of sustainable tourism development were identified in the strategy:

1. Year-round and regionally balanced tourism
2. Tourism with preserved environment, space, and climate
3. Competitive and innovative tourism
4. Resilient tourism

These four goals are interrelated and mutually dependent. Seasonality is one of the most noticeable characteristics of tourist activity, regardless of the destination or tourist attraction (Kožić, 2013).

The dynamics of tourism are highly elastic to changes in various natural and institutional factors. Therefore, seasonality can be said to be one of the most obvious consequences of the relationship between tourism activity and factors like weather conditions or holiday schedules that influence it exogenously. Based on all of this, it can be concluded that seasonality in tourism is an inevitable phenomenon.However, seasonality is linked to individual tourist products, not to a destination as a whole. Weather conditions suitable for summer vacation tourism do not necessarily align with those for sports or conference tourism. For example, conferences are unlikely to be held during the summer months due to high temperatures, the fact that participants often take vacations during this time, and the difficulty in organizing appropriate accommodation. From this, it follows that by diversifying the offer within a destination and combining tourist products with different seasonal dynamics, a continuous demand can be achieved throughout the year. During peak season, in Croatian coastal tourist destinations, both infrastructure and labour force capacities are overstretched. If efforts are made to extend the season, it must be kept in mind that such extensive pressure on destinations, infrastructure and labour can endure only for a couple of months. In the case of plans to extend the season and increase the pressure on destinations, it is crucial to manage the impact of tourism on the space, environment, and nature simultaneously, ensuring the well-being of the community in the future. In this way, stable and continuous community development is achieved, creating better living and working conditions, which helps stop the outflow of labour and population in general.

Thanks to better living and working conditions, higher-quality human resources can be attracted, and stable development ensures a favourable business and investment environment, enabling the improvement of the structure and quality of accommodation capacities. All of the above are prerequisites for competitive and innovative tourism. Finally, for all stakeholders to follow common development guidelines, Croatia must improve its legislative, managerial, and control framework. The tourism board system must provide expertise to local communities, which then participate in decision-making processes regarding the development of sustainable tourism and are responsible for implementing guidelines in their area. Ineffective enforcement of legally prescribed provisions and unimplemented measures and activities outlined in strategic documents can lead to sporadic environmental degradation. Since Croatia is primarily recognized as a summer seaside destination, strong marketing efforts are needed to reposition Croatia as a year-round, authentic sustainable tourism destination. Additionally, considering demographic trends, particularly the aging population, it is necessary to develop specialized forms of tourism adapted to the needs of different demographic segments, with a special focus on health tourism, for which Croatia has available resources. Strategic tourism goals in Croatia must be aligned with the overall economic strategy. For example, while one of Croatia's strategic goals is to extend the tourist season, the *Trade Act* (Narodne novine, 2023) limits the operation of retail stores on Sundays and holidays. The law allows trading on 16 Sundays per year, with the explanation that this is to support tourism by meeting tourists' needs during the tourist season. This, despite the strategic plan to extend the tourist season, effectively limits the season to these 16 weeks. A significant step toward full implementation of sustainable tourism in Croatia was made with the adoption of the new *Tourism Act*, which came into force on January 1, 2024 (Narodne novine, 2023). The operationalization of tourism development reform began with the adoption of three accompanying regulations in September 2024. Along with the regulations, guidelines for the development of management plans were published to further facilitate implementation by cities, municipalities, and tourist boards. The new regulations guide Croatia toward diversification and the development of year-round tourism. However, the new regulations have faced criticism, primarily concerning restrictions on the expansion of tourism capacities through the conversion of residential apartments into tourist accommodations. Property owners have objected, as they had invested in a business segment that may not be sustainable in the long term due to legal restrictions. This example illustrates the nature of sustainable tourism. Sustainable tourism requires sacrifices to ensure a higher, more sustainable quality of life and work for society as a whole. Unfortunately, if Croatia wants to avoid gentrification, regulating tourist accommodation was necessary and should have been implemented earlier, thus reducing the negative impact on property owners.

4.2. Regional Specificities of Sustainable Tourism in Croatia

Croatian tourism is regionally unbalanced. Both the positive and negative aspects of tourism manifest differently in individual regions.

4.2.1. Istria

Istria, for example, has stood out as a region that actively works on sustainable tourism. Istria balances tourist development with ecological and social responsibility, which can serve as a model for other parts of Croatia. In line with the need to diversify the offer, tourism in the inland areas of Istria is consistently encouraged through agrotourism, wine routes, and cycling trails, which reduces pressure on coastal areas and extends the season. By promoting active tourism in the form of hiking and cycling routes, dependence on cars is reduced, and a healthy lifestyle is encouraged. Waste separation, the use of renewable energy sources, and the reduction of plastic waste are promoted. Hotels, and even private accommodations, are increasingly applying ecological standards, including energy-efficient systems and ecological certificates.

In agriculture, environmentally friendly methods are often used in the cultivation of vineyards or olive trees without the use of pesticides, artificial fertilizers, and other chemicals. By promoting local gastronomy, indigenous products, and events that reflect cultural heritage, Istria helps preserve the identity of the region. Significant investments have been made in cleaning the sea, protecting underwater habitats, and regulating maritime traffic, contributing to the protection of the coast and marine ecosystems.

4.2.2. Dalmatia

Dalmatia, on the other hand, faces the negative consequences of excessive seasonal tourism. The summer season brings an intense influx of tourists, which causes congestion, increased pollution, and resource depletion, while during other parts of the year, there is economic slowdown. Increased boat traffic and nautical tourism contribute to marine pollution and ecosystem disruption. Mass tourism and commercialization reduce cultural authenticity and the quality of life for local residents. Insufficient transport and communal infrastructure cannot withstand the seasonal influx of large numbers of tourists, and excessive urbanization of coastal areas leads to the destruction of natural landscapes. To solve these problems, an integrated approach is necessary through sustainable development planning, investment in infrastructure, promoting ecotourism, and better resource management. The Dalmatian hinterland offers potential for sustainable tourism development through agrotourism, hiking, cultural routes, and wine and gastronomy, and such diversification of the offer could reduce the pressure on the coastal area.

4.2.3. Continental Croatia

The continental part of Croatia has great potential for the development of sustainable tourism based on the preservation of natural resources, cultural heritage, and the promotion of the local economy. Sustainable tourism in this part of the country offers authentic experiences, reduces seasonality, and encourages the development of rural communities. The popular regions of Slavonia, Hrvatsko Zagorje, Međimurje, and Gorski kotar, with their natural beauty, cultural heritage, and traditional wine and gastronomic products, provide an inexhaustible source of inspiration and an authentic basis for creating sustainable tourism products that break seasonality. The challenges faced by these areas need to be addressed at multiple levels with strategic planning. Continental destinations are not sufficiently promoted in relation to the coast. Croatia is mainly presented as a coastal destination in tourism marketing. Due to depopulation in these areas, there is a shortage of both quantity and quality of the workforce. The lack of quality accommodation in many locations reduces their competitiveness compared to more developed tourist regions. Many tourist offerings do not have sufficient digital promotion, making them harder for visitors to find. With smart investments, better promotion, and stronger connections with other parts of Croatia, the continental region can become a significant tourist area with an emphasis on nature, tradition, and authentic experiences.

4. CONCLUSION

Sustainable development is a concept that emerged in the late 1980s and, due to its importance, efforts have been made since then to raise public awareness and implement regulations to achieve it. Sustainable development is closely linked to tourism, as tourism has a significant economic, social, and ecological impact on its surroundings. Along with positive effects such as significant tourism revenue and GDP growth, job creation, development of transport and communal infrastructure, revitalization of rural and less-developed areas, etc., it inevitably has a negative side. If tourism is not properly managed, it leads to excessive strain on infrastructure, a reduction in the quality of life for local populations, pollution, ecological impact, gentrification, and other similar effects.

The negative effects of tourism can be avoided by developing sustainable tourism models such as ecotourism, local tourism, and responsible travel. This requires the cooperation of multiple stakeholders, the state which must enact appropriate legislation and strategies to promote sustainable development, the tourism industry which must implement ecological standards and sustainable practices, and tourists and the general public who must behave responsibly and encourage responsible behaviour. Croatia, for which tourism is an important economic sector, has followed UN guidelines on sustainable development from the very beginning, as well as other positive practices with the same goal. Croatia has not been spared from challenges such as over-tourism, negative environmental impacts, seasonality, insufficient diversification of offerings, and transport and infrastructure challenges. To address these challenges, the *Sustainable Tourism Development Strategy until 2030* has been adopted, which outlines four key goals: year-round and regionally balanced tourism, tourism with preserved environment, space, and climate, competitive and innovative tourism, and resilient tourism. The *Tourism Act* (Narodne novine, 2023), effective from 2024, represents one of the key steps toward implementing sustainable tourism in Croatia.

LITERATURE:

1. Croatian National Bank (2024). *Revenues from tourism increased by 11.4%.* Retrieved 25.02.2025. from https://www.hnb.hr/en/-/prihodi-od-turizma-u-2023-veci-za-11-4-posto?.
2. Kožić, I. (2013). *Kolika je sezonalnost turizma u Hrvatskoj?*. Retrieved 25.02.2025 from chrome-xtension://efaidnbmnnnibpcajpcglclefindmkaj/https://hrcak.srce.hr/file/ 172034.
3. *Making Tourism More Sustainable: A Guide for Policy Makers*. (2005). Madrid: United Nations Enivironment Programme, World Tourism Organization.
4. Ministarstvo turizma. (2022). *Strategija razvoja održivog turizma do 2030. godine*. Retrieved 23.02.2025. from chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj /https://mint.gov.hr/UserDocsImages/2022_dokumenti/003_220721_Strategija_ROT_nacrt.pdf.
5. Narodne novine. (1992). Deklaracija o zaštiti okoliša u Republici Hrvatskoj. Retrieved 21.02.2025. from https://narodne-novine.nn.hr/clanci/sluzbeni/1992_06_34_865.html.
6. Narodne Novine. (2009). *Strategija održivog razvitka Republike Hrvatske*, Retrieved 21.02.2025. from https://narodne-novine.nn.hr/clanci/sluzbeni/2009_03_30_658.html.
7. Narodne novine. (2023). *Zakon o turizmu*. Retrieved 25.02.2025 from https://narodne - novine.nn.hr/clanci/sluzbeni/2023_12_156_2382.html.
8. United Nations. (2015). *Agenda 2030*. Retrieved 22.02.2025 from https://commission. europa.eu/strategy-and-policy/sustainable-development-goals_en?prefLang=hr.
9. United Nations. (1987). *Our Common Future*. Retrieved 21.02.2025 from chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://ambiente.wordpress.com/wp-content/uploads/2011/03/brundtland-report-our-common-future.pdf.
10. United Nations. (2012). *Rio + 20*; Retrieved 22.02.2025 from https://www.unwto.org /archive/global/event/rio20-united-nations-conference-sustainable-development-uncsd.

MANAGEMENT OF MINERAL RESOURCES IN VARAŽDIN COUNTY: ADAPTING TO GLOBAL CHALLENGES OF THE ENERGY TRANSITION IN A DYNAMIC ECONOMIC ENVIRONMENT

Melita Srpak
Varazdin County - Department of Physical Planning, Croatia
melita.srpak@gmail.com

Darko Pavlovic
Polytechnic of Međimurje in Čakovec, Croatia
darko.pavlovic@plinacro.hr

Igor Klopotan
Polytechnic of Međimurje in Čakovec, Croatia
igor.klopotan@mev.hr

ABSTRACT

The mining sector is often mistakenly perceived as an opponent of the green transition due to its association with environmental degradation and the exploitation of natural resources. However, in the context of global and regional needs, the mining sector is not only compatible with the goals of the green transition but also plays a crucial role in its implementation. Varaždin County, with its rich natural resources and tradition of mineral resource management, can play an important role in this process. The aim of this study is to explore sustainable management of mineral resources in Varaždin County, with a particular focus on their role in the energy transition and the green agenda. Mineral resources are the foundation for developing technologies needed for a low-carbon economy, including renewable energy production, batteries, electric vehicles, and energy storage infrastructure. Without adequate management and availability of critical raw materials such as lithium, cobalt, copper, and rare earth elements, achieving global decarbonization and sustainable development goals would be unattainable. At the same time, the mining sector faces challenges in adapting to stricter environmental protection standards, sustainable resource use, and increased social responsibility. Modernization of mining processes, implementation of circular economy models, and the use of innovative technologies, such as digitalization, enable significant reductions in environmental impacts and improve resource utilization efficiency. The results of this research indicate that Varaždin County has significant potential for sustainable management of mineral resources, but it also faces challenges such as limited resources, the need for modernization of mining processes, and compliance with European regulations. In conclusion, the mining sector and the green transition are not adversaries but interlinked processes that jointly shape the path toward a sustainable future. The key challenge remains balancing the growing demand for mineral resources with ecosystem preservation, requiring an interdisciplinary approach, strong collaboration between industry, science, and policy, and the inclusion of local communities.

Keywords: *economy, low-carbon future, mineral resources, mining sector, Varaždin County*

1. INTRODUCTION

Mineral resources, as non-renewable natural resources, are of essential importance for economic development and technological advancement while simultaneously posing challenges in the context of sustainable management.

In the Republic of Croatia, given the wealth of natural resources, particular attention must be paid to the proper exploration and exploitation of mineral resources in compliance with national legislation, which clearly defines the conditions and procedures for their utilization. The Mining Act (Official Gazette No. 56/13, 14/14, 52/18, 115/18, 98/19, 83/23) and the Act on Exploration and Exploitation of Hydrocarbons (Official Gazette No. 52/18, 52/19, 30/21) provide the foundation for proper regulation of this sector through regulations (Official Gazette No. 84/2024, 138/2022, 52/2019).

However, challenges arising from the alignment of mining activities with ecological, social, and cultural norms require additional strategic approaches at the regional level (Zelenika et al.2021). Varaždin County, located in the central part of Croatia, is known for its wealth of mineral resources, which form the basis for the development of several industrial sectors. The Mining-Geological Study of Varaždin County (RGS) serves as a key document for planning sustainable management of mineral resources, taking into account specific ecological, cultural, and social conditions (Srpak, 2022). In line with this, the goals of this paper are focused on analyzing the potential of mineral resources in Varaždin County, their energy and industrial applications, and evaluating existing legal and spatial planning frameworks that enable the sustainable exploitation of these resources. Furthermore, the paper addresses the challenges of integrating environmental protection, cultural heritage preservation, and sustainable development of local communities, with a particular emphasis on the role of mineral resources in the energy transition (Srpak & Pavlović, 2023., Pavlović et al., 2024).

Additionally, considering the growing global demand for energy and non-energy mineral resources, it is crucial to ensure that mining activities in Varaždin County are conducted in accordance with the highest environmental and social standards to ensure their long-term contribution to the sustainable development of the region and the country (Pavlović et al., 2024). The paper will also explore opportunities to improve existing strategies for managing mineral resources, with a special focus on integrating the green transition into the mining sector.

2. ANALYSIS OF EXPLOITATION RESERVES AND UTILIZATION OF NON-ENERGY MINERAL RESOURCES IN VARAŽDIN COUNTY AND THEIR CONTRIBUTION TO THE GREEN TRANSITION

In Varaždin County, various types of non-energy mineral resources are exploited, including construction sand and gravel, technical-construction stone, brick clay, quartz sand, bentonite clay, tuff, as well as carbonate and silicate mineral resources. These materials are used for the production of construction materials and industrial processing, forming a critical foundation for the development of the construction industry, ecological construction materials, and infrastructure essential for supporting the green transition. Given the global focus on sustainable development and the green transition—encompassing the reduction of carbon dioxide emissions and the adoption of environmentally friendly technologies - it is important to emphasize the significant role of mineral resources exploited in Varaždin County in this process (Srpak & Zeman, 2020.).

Construction sand, gravel, and technical-construction stone are commonly used in infrastructure projects that enable the construction of sustainable and energy-efficient buildings, green roofs, and eco-friendly residential and commercial spaces that meet energy efficiency standards (Crnić & Šinkovec, 1993., Krasnić et al., 2005). Moreover, mineral resources such as quartz sand, bentonite clay, tuff, limestone, and dolomite, used for industrial processing, are essential for producing technologies that facilitate the green transition (Mudd, 2021., Pavlović et al., 2024.)

For instance, silicate mineral resources, combined with advanced processing technologies, can be utilized to manufacture eco-friendly construction materials that reduce environmental impacts. Carbonate materials, such as limestone, are critical for cement production. Innovations in the cement industry have the potential to reduce CO_2 emissions associated with its production, thereby lowering the carbon footprint of the construction sector (Bôas et al., 2005, Banovac et al. 2021.)

The green transition also promotes circular economy principles, where previously utilized mineral resources are reintegrated into new production cycles. This reduces the need for the exploitation of new resources and minimizes negative environmental impacts. Therefore, sustainable management of mineral resources in Varaždin County becomes crucial in aligning mining activities with the goals of the green transition, reducing environmental footprints, and enhancing energy efficiency (Dekanić, et al.2008., Bradić, 2018). According to data from the Ministry of Economy, Mining Sector, Table 1 presents the total exploitation reserves of mineral resources for the period from 2019 to 2023, along with the quantities of mineral resources excavated during that time in Varaždin County. These figures highlight the need for careful resource management and the application of best practices in the mining sector to ensure long-term sustainable development. Such development must not jeopardize the environment but should continue to provide the necessary supply of resources for the green transition. While mineral resources remain vital for infrastructural and industrial development, it is crucial to emphasize that a sustainable exploitation model - one that considers environmental protection and promotes the green transition—is essential for achieving environmentally friendly economic growth in Varaždin County.

MINERAL RESOURCE TYPE		**2019.**	**2020.**	**2021.**	**2022.**
CONSTRUCTION SAND AND GRAVEL	**Number of exploitation fields**	**8**	**9**	**9**	**9**
	Exploitation reserves	46 908,728	51 029,264	51 598,373	50 864,179
	Excavated quantities (	842,485	885,465	914,616	990,655
TECHNICAL CONSTRUCTION STONE	**Number of exploitation fields**	**5**	**5**	**5**	**5**
	Exploitation reserves	32 020,502	31 154,242	40 601,920	44 298,194
	Excavated quantities	761,019	877,932	958,216	1 095,906
BRICK CLAY	**Number of exploitation fields**	**2**	**2**	**2**	**2**
	Exploitation reserves	2 917,437	2 790,206	5 967,286	5 206,609
	Excavated quantities	86,422	127,232	88,278	138,318
CARBONATE MINERAL RESOURCES FOR INDUSTRIAL PROCESSING	**Number of exploitation fields**	**1**	**1**	**1**	**1**
	Exploitation reserves	249,764	223,690	216,953	213,102
	Excavated quantities	6,650	6,333	6,737	3,850

Table 1: Status of Total Mineral Resource Reserves in Varaždin County (in 1,000 m³) (Source: Author's analysis based on Ministry of Economy, Mining Sector, 2025.)

The use of mineral resources in Varaždin County primarily relates to the construction industry and industrial processing. This includes the extraction of technical construction stone, construction sand, gravel, brick clay, as well as carbonate and silicate mineral resources. Each of these materials has specific applications in construction, highlighting the importance of accurate assessment of natural resources and their optimization based on market demands.

In the context of the green transition, mineral resources in the construction industry can contribute to reducing the carbon footprint of building processes. For example, the modernization of construction materials and the use of environmentally friendly alternatives reduce the need for the exploitation of new resources (Agenda 21., 1992., Aldakhil et al., 2020.). Carbonate resources, such as limestone, are essential for producing cement with lower CO_2 emissions, supporting the more sustainable development of the construction industry. The authority responsible for mineral resources, including those for construction materials, is the Ministry of Economy, Mining Sector. Sustainable exploitation of these resources in line with the principles of the green transition can reduce the negative ecological impacts of mining, promote the use of circular economy and recycling practices, and foster the production of more environmentally friendly construction materials (Perišić & Wagner 2015., Srpak & Pavlović, 2023.).

3. SUSTAINABLE MANAGEMENT OF MINERAL RESOURCES IN VARAŽDIN COUNTY IN A DYNAMIC ECONOMIC ENVIRONMENT

According to data based on information obtained from the Ministry of Economy, Energy Directorate, various types of mineral resources are being researched and exploited in Varaždin County. These activities are essential for the sustainable development of the region, especially in the context of the need for strategic resources required for energy and industrial processes linked to the transition to a green economy (Petrie et al. 2007., Pavlović et al. 2024.). Data on exploration areas and exploitation fields of mineral resources in Varaždin County are detailed in tabular data covering active, inactive, and removed exploration areas and exploitation fields. Based on available data, Varaždin County has: 6 active exploitation fields for technical construction stone, 1 exploration area for technical construction stone, 9 active exploitation fields for building sand and gravel (one of which has an invalid concession), 5 exploration areas for building sand and gravel, 2 exploitation fields for brick clay, 1 exploration area for brick clay, and 1 exploitation field for carbonate mineral resources. While these mineral resources are primarily used for the construction industry and industrial processing, they have the potential to significantly contribute to the green transition.

Materials such as technical construction stone, building sand, gravel, and carbonate minerals are crucial for building infrastructure that enables the implementation of renewable energy sources, such as wind turbines and solar panels. Given the increased demand for sustainable urban development and infrastructure projects that include energy-efficient buildings, sustainable management of these mineral resources is crucial for achieving the goals of the green transition. It is important to emphasize that the exploration and exploitation of mineral resources in Varaždin County must be carried out in accordance with strict ecological standards, which include minimizing environmental impacts (bradić, 2018., Srpak et al. 2021.) This involves applying sustainable extraction methods and mandatory rehabilitation of abandoned exploitation fields, contributing to the preservation of biodiversity and ecosystem health. Since mineral resources are a fundamental component in the development of energy-efficient technologies and infrastructure, aligning mining activities with the goals of the green transition enables synergy between industrial development and environmental protection. The following analyzes data on mineral resources for the production of construction materials (technical construction stone, construction sand and gravel, brick clay, carbonate mineral raw materials) from inactive and deleted extraction sites in the Varaždin County area. In Table 2, data on active exploitation fields of technical construction stone in Varaždin County are shown.

ACTIVE EXPLOITATION FIELDS OF VARAŽDIN COUNTY						
EP TECHNICAL CONSTRUCTION STONE						
No.	**Field Name**	**Concession Holder**	**City/Municipality**	**Field Area (ha)**	**Validity Period**	**Concession**
1.	**EP LOVNO-LOVNO 2**	GOLUBOVEČKI KAMENOLOM I d.o.o.	City of Lepoglava, Municipality of N. Golubovec (Krapina-Zagorje))	0,74	13.11.1987.-31.12.2036.	16.08.2022.-31.12.2036.
2.	**EP OČURA II**	HOLCIM HRVATSKA d.o.o.	City of Lepoglava	29,93	10.05.2000.-31.12.2043.	11.09.2018.-31.12.2023.
3.	**EP PODEVČEVO**	GRADITELJ vl. Vlado Puškadija	City of Novi Marof	6,09	10.05.1995.-31.12.2038.	18.05.2015.-20.10.2036.
4.	**EP ČRLENA ZEMLJA**	MEŽNAR d.o.o.	Municipality of Breznički Hum	1,22	12.12.2001.-31.12.2024.	15.10.2019.-31.12.2024.
5.	**EP ŠPICA**	KAMING d.d.	Municipality of Ljubešćica	46	09.01.1993.-31.12.2043.	08.09.2023.-31.12.2043.
6.	**EP HRUŠKOVEC**	KAMING d.d.	Municipality of Ljubešćica	54,27	28.02.1989.-31.12.2029.	27.02.2023 - 24.08.2029.

Table 2: Active exploitation fields of technical construction stone in Varaždin County (Source: Author's analysis based on Ministry of Economy, Mining Sector, 2025.)

In Table 3, the data for the active exploration area of technical construction stone in the Varaždin County area are presented.

EXPLORATION AREAS IN VARAŽDIN COUNTY					
IP TECHNICAL-BUILDING STONE					
No.	**Field Name**	**Concession Holder**	**City/ Municipality**	**Field Area (ha)**	**Validity Period**
1.	HRUŠKOVEC 1	KAMING d.d.	Municipality of Ljubešćica	**45,44**	05.06.2019. - 31.12.2024.

Table 3: Active Exploration Area for Technical Construction Stone in Varaždin County (Source: Author's analysis based on Ministry of Economy, Mining Sector, 2025.)

Table 4 shows data on active extraction fields of building sand and gravel in Varaždin County (ends on the next page).

ACTIVE EXTRACTION FIELDS OF VARAŽDIN COUNTY						
EP CONSTRUCTION SAND AND GRAVEL						
No.	**Field Name**	**Concession Holder**	**City/ Municipality**	**FieldArea (ha)**	**Validity Period**	**Concession**
1.	**EP MOLVE**	NISKOGRADNJA HUĐEK vl. Tomica Huđek	Municipality of Petrijanec	**24,08**	04.02.2005. - 31.12.2056.	02.11.2020. - 31.12.2056.
2.	**EP TURNIŠĆE**	GALDI MINERAL d.o.o.	Municipality of Sračinec	**8,61**	12.12.2001. - 31.12.2035.	27.09.2022. - 31.12.2034.
3.	**EP HRASTOVLJAN**	COLAS MINERAL d.o.o.	Municipality of Donji Martijanec	**69,73**	31.08.1981. - 31.12.2040.	13.09.2021. - 31.12.2027.
4.	**EP JAMIČAK**	BAGERKOP-ROBERTO d.o.o.	Municipality of Sveti Đurđ	**42,93**	27.03.2001. - 27.03.2041.	01.03.2002. - 01.03.2040.

5.	**EP DOLENŠČAK**	SMONTARA d.o.o.	Municipality of Sveti Đurđ	**46,88**	30.08.2017. - 31.12.2060.	23.08.2022. - 31.12.2028.
6.	**EP ŠKAREŠKI LUG**	LTK d.o.o.	Municipality of Veliki Bukovec	**15,88**	09.03.2007. - 31.12.2051.	20.07.2023. - 31.12.2050.
7.	**EP TRSTIKA**	ŠLJUNČARA-TRANSPORTI SMONTARA d.o.o.	Municipality of Veliki Bukovec	**32,89**	27.10.2000. - 31.12.2048.	10.02.2020. - 31.12.2048.
8.	**EP PRUDNICA**	PRUDNICA d.o.o.	Municipality of Mali Bukovec	**14,99**	19.07.2004. - 31.12.2034.	17.07.2019. - 31.12.2025.
9.	**EP KRTINJE**	KAMENOLOM ŽAKANJE d.o.o.	Municipality of Mali Bukovec	**9,5**	14.05.2008. - 31.12.2022.	Invalid concession

Table 4: Active Extraction Fields of Building Sand and Gravel in Varaždin County (Source: Author's analysis based on Ministry of Economy, Mining Sector, 2025.)

In Table 5, the data on active exploration areas of construction sand and gravel in Varaždin County are shown.

EXPLORATION AREAS IN VARAŽDIN COUNTY					
EXPLORATION AREAS FOR CONSTRUCTION SAND AND GRAVEL					
No.	**Field Name**	**Concession Holder**	**City/Municipality**	**Field Area (ha)**	**Validity Period**
1.	**IP PESKI GORNJI**	SIRIK-BETON j.d.o.o.	Municipality of Cestica	**10,39**	26.09.2022. - 31.10.2027.
2.	**IP TURNIŠĆE 1**	GALDI MINERAL d.o.o.	Municipality of Sračinec	**4,082**	27.09.2022. - 31.08.2027.
3	**IP ČERNJAK**	TRGOGRAD d.o.o.	Municipality of Sveti Đurđ	**38,32**	07.11.2022. - 29.02.2028.
4.	**IP TRSTIKA**	ŠLJUNČARA-TRANSPORTI SMONTARA d.o.o.	Municipality of Veliki Bukovec	**11,89**	31.05.2023. - 31.08.2028.
5.	**IP KRTINJE I**	KAMENOLOM ŽAKANJE d.o.o.	Municipality of Mali Bukovec	**17,05**	11.07.2019. - 31.12.2022.

Table 5: Active Exploration Areas of Construction Sand and Gravel in Varaždin County (Source: Author's analysis based on Ministry of Economy, Mining Sector, 2025.)

In Table 6, the number of extraction fields for brick clay in Varaždin County is shown.

ACTIVE EXTRACTION FIELDS OF BRICK CLAY IN VARAŽDIN COUNTY						
EP BRICK CLAY						
No.	**Field Name**	**Concession Holder**	**City/ Municipality**	**Field Area (ha)**	**Validity Period**	**Concession**
1.	**EP CERJE TUŽNO**	CIGLANA CERJE TUŽNO d.o.o.	Municipality of Marušević	**41,27**	04.05.198. - 31.12.2045.	05.07.202. - 31.12.204.
2.	**EP CUKAVEC II**	LEIER-LEITL d.o.o.	Municipality of Gornji Kneginec	**7,4**	19.09.2002. - 31.12.2035.	13.07.2020. - 31.12.2035.

Table 6: Active Extraction Fields of Brick Clay in Varaždin County (Source: Author's analysis based on Ministry of Economy, Mining Sector, 2025.)

In Table 7, data on the active exploration area for brick clay in Varaždin County are presented.

EXPLORATION AREAS IN VARAŽDIN COUNTY					
BRICK CLAY					
No.	**Field Name**	**Concession Holder**	**City/ Municipality**	**Field Area(ha)**	**Validity Period**
1.	**CERJE TUŽNO 1**	CIGLANA CERJE TUŽNO d.o.o.	Municipality of Maruševec	36,49	03.02.2021. - 30.06.2025.

Table 7: Active Exploration Area for Brick Clay in Varaždin County
(Source: Author's analysis based on Ministry of Economy, Mining Sector, 2025.)

Table 8 shows data on the active exploitation field of carbonate mineral raw material in the area of Varaždin County.

ACTIVE EXPLOITATION FIELDS OF VARAŽDIN COUNTY						
EP CARBONATE MINERAL RAW MATERIAL						
No.	**Field Name**	**License Holder**	**City/ Municipality**	**Field Area (ha)**	**Validity Period**	**Concession**
1.	**EP MARČAN**	ZAGORJE-KAMEN d.o.o.	Municipality of Vinica	**2,25**	30.10.1995. - 31.12.2055.	13.07.2021 - 31.12.2054.

Table 8: Active exploitation fields of carbonate mineral raw material in the area of Varaždin County
(Source: Author's analysis based on Ministry of Economy, Mining Sector, 2025.)

Inactive exploitation fields of mineral raw materials in the area of Varaždin County are designated as such due to the permanent cessation of mining activities, without the implementation of protective measures for people and the environment. Although suspended, these fields have not been removed from the register, which requires further monitoring and remediation in accordance with environmental protection regulations. In the context of the green transition, it is crucial to undertake remediation measures to reduce negative environmental impacts and ensure the sustainability of the mining industry. Table 9 shows data on inactive exploitation fields of mineral raw materials (quartz sand and brick clay) in the area of Varaždin County.

INACTIVE EXPLOITATION FIELDS OF MINERAL RAW MATERIALS IN THE AREA OF VARAŽDIN COUNTY					
QUARTZ SAND					
No.	**Field Name**	**License Holder**	**City/ Municipality**	**Field Area (ha)**	**Validity Period**
1.	TIGLIN-HORVACKA	REPUBLIC OF CROATIA	City of Ivanec	**19,75**	17.11.1975. - 15.02.2018.
BRICK CLAY					
No.	**Field Name**	**License Holder**	**City/ Municipality**	**Field Area (ha)**	**Validity Period**
1.	CUKAVEC	REPUBLIC OF CROATIA	Municipality of Gornji Kneginec	**12,95**	25.08.1988. - 29.01.2014.

Table 9: Inactive exploitation fields of mineral raw materials (quartz sand and brick clay) in the area of Varaždin County
(Source: Author's analysis based on Ministry of Economy, Mining Sector, 2025.)

Deleted exploitation fields of mineral raw materials refer to those fields that have been removed from the Register of exploitation fields based on the decision of the competent mining authority. Table 10 shows the deleted fields in Varaždin County.

DELETED EXPLOITATION FIELDS OF MINERAL RAW MATERIALS IN THE AREA OF VARAŽDIN COUNTY							
No.	**Field Name**	**License Holder**	**City/ Municipality**	**Status**	**Type of Mineral Raw Material**	**Field Area (ha)**	**Validity Period**
1.	EP ŠAPRUN	METAN KEMIJSKA INDUSTRIJA, Kutina	Municipality of Bednja	Deleted	Bentonite clay	19,58	23.07.1963.-16.02.1967.
2.	EP BEDNJA	INA-PETROKEMIJA d.d. Kutina	Municipality of Bednja	Deleted	Bentonite clay	7,5	15.07.1971.-02.02.1998.
3.	EP OČURA	REPUBLIKA HRVATSKA	City of Lepoglava	Deleted	Technical construction stone	20,34	19.10.2017.-10.05.2018.
4.	EP PUTKOVCI	KRAPINSKI UGLJENOKOPI Krapina	City of Lepoglava, Municipality of Lobor	Deleted	Coal	175,49	08.10.1960.-11.06.1966.
5.	EP TIGLIN-HORVATSKA	IGM INDUSTRIJA GRAĐEVNOG MATERIJALA, Lepoglava	City of Ivanec, Municipality of Klenovnik	Deleted	Quartz sand	420	14.07.1965.-15.06.1977.
6.	EP KULJEVČICA 2	IVANEČKO-LADANJSKI UGLJENOKOPI, Ivanec	City of Ivanec	Deleted	Coal	106,02	14.06.1965 - 30.12.1971.
7.	EP KULJEVČICA	IVANEČKO-LADANJSKI UGLJENOKOPI, Ivanec	City of Ivanec	Deleted	Coal	78,96	18.04.1961.-31.12.1971.
8.	EP BRODAROVEC	IVANEČKO-LADANJSKI UGLJENOKOPI, Ivanec	Municipality of Maruševec, Municipality of Donja Voća, Municipality of Klenovnik	Deleted	Coal	439,3	18.04.1961.-16.06.1977.
9.	EP LADANJE	IVANEČKO-LADANJSKI UGLJENOKOPI, Ivanec	Municipality of Maruševec	Deleted	Coal	563,38	18.04.1961.-29.05.1967.
10.	EP VINICA	REPUBLIC OF CROATIA	Municipality of Vinica	Deleted	Architectural construction stone (blocks)	22,605	08.06.1977.-16.07.2018.
11.	EP LUKAVEC	REPUBLIC OF CROATIA	City of Ivanec	Deleted	Brick clay	32,89	28.02.2002.-06.09.2017.
12.	EP BELSKI DOL	REPUBLIC OF CROATIA	City of Novi Marof	Deleted	Technical construction stone	3,23	19.10.2017.-20.10.2017.
13.	EP LOJNICA	REPUBLIC OF CROATIA	City of Novi Marof	Deleted	Tuff	2,93	07.11.1964.-14.06.2018.
14.	EP ČANJEVO	REPUBLIC OF CROATIA	Municipality of Visoko	Deleted	Technical construction stone	7	19.10.2017.-20.10.2017.
15.	EP HRUŠKOVEC IV	REPUBLIC OF CROATIA	Municipality of Ljubešćica, Municipality of Kalnik	Deleted	Technical construction stone	15,7	19.10.2017.-20.10.2017.

16.	EP LEŠĆE	REPUBLIC OF CROATIA	Municipality of Sveti Đurđ	Deleted	Construction sand and gravel	19,78	20.10.2017.-22.12.2017.
17.	EP LUDBREŠKI VINOGRADI-SJEVER i LUDBREŠKI VINOGRADI-JUG	REPUBLIC OF CROATIA	City of Ludbreg	Deleted	Brick clay	8,81	10.09.1999.-20.10.2017.
18.	EP BREZINA	REPUBLIC OF CROATIA	Municipality of Cestica	Deleted	Construction sand and gravel	4,22	19.10.2017.-20.10.2017.

Table 10: Deleted exploitation fields of mineral raw materials in the area of Varaždin County (Source: Author's analysis based on Ministry of Economy, Mining Sector, 2025.)

4. CHALLENGES AND OPPORTUNITIES FOR SUSTAINABLE MANAGEMENT OF MINERAL RAW MATERIALS IN VARAŽDIN COUNTY IN THE CONTEXT OF GREEN TRANSITION IN A DYNAMIC ECONOMIC ENVIRONMENT

Global demand for certain metals and minerals, such as lithium, cobalt, copper, and rare earth elements, is significantly increasing to support energy technologies related to renewable energy sources and the energy transition. Varaždin County, as a region rich in mineral resources, can leverage its resources to engage in the production of key materials that support the green transition. For example, minerals such as silicate materials and carbonates can be used in the renewable energy industry, as well as in the production of batteries for electric vehicles, which form the basis of sustainable energy infrastructure. The challenges and opportunities of sustainable management of mineral raw materials in Varaždin County in the context of the green transition are complex and encompass various aspects. Given the global increase in demand for batteries, wind turbines, and solar panels, there is a need for the expansion of supply chains for raw materials such as lithium, cobalt, copper, and silicon. Although Varaždin County does not possess all of these raw materials in large quantities, its existing resources (such as silicate and carbonate raw materials) can play a key role in supplying essential building materials for the infrastructure needed for renewable energy sources.

Sustainable management of mineral raw materials in the county would allow local resources to be used in a way that does not harm the environment and supports the green transition (Pavloivić, et al. 2024.). In Varaždin County, as in many other regions, there is a need to modernize mining processes, increase energy efficiency, and reduce negative ecological impacts. Traditional exploitation of mineral resources, without proper environmental protection and long-term planning, can have a significant impact on local ecosystems. This creates the need for the implementation of innovative technologies in mining, including the digitalization of processes, the application of circular economy principles, as well as better waste and renewable resource management. To achieve its sustainable development goals, it is important for Varaždin County to align its local strategies for managing mineral raw materials with global and European goals for reducing CO_2 emissions and reaching net zero emissions by 2050.

In this context, the development of strategies that include increasing energy efficiency, reducing carbon footprints in mining, and increasing the production of green energy is crucial for enabling the green transition at the regional level (Calas, 2017., Srpak, 2022.). The challenge of sustainable management of mineral raw materials in Varaždin County in the context of the green transition lies in aligning ecological, social, and economic goals, while simultaneously meeting the growing global demand for key minerals needed for renewable energy production and electric vehicles.

This challenge includes several key aspects:

- *Ecological impacts:* Exploitation of mineral raw materials can have negative ecological consequences, including soil degradation, water source pollution, and loss of biodiversity.
- *Economic challenges:* Implementing sustainable practices may require high initial costs, which can be a challenge for local companies and communities.
- *Regulatory framework:* Existing legal and regulatory barriers may hinder the introduction of innovative sustainable technologies and practices.
- *Social aspects:* Exploitation of mineral raw materials can have social consequences, including loss of homes and jobs for the local population (Figure 1).

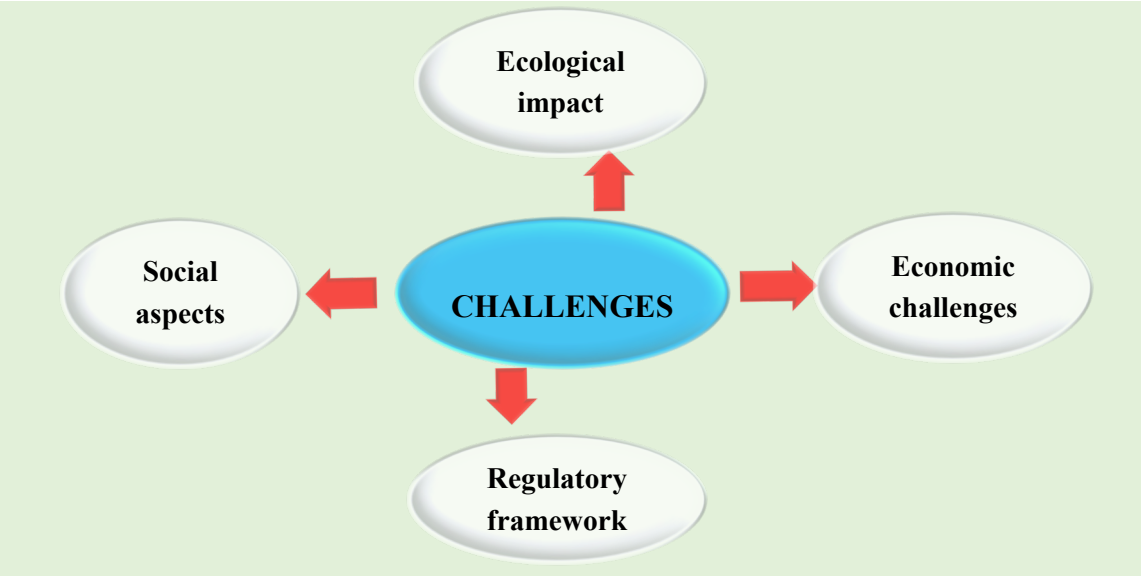


Figure 1: Challenges for sustainable management of Varaždin county in the context of the green transition (Source: Authors' work, 2025.)

Opportunities for sustainable management are evident in the implementation of innovative technologies, the application of circular economy principles, and the modernization of mining processes. This can reduce the negative environmental impact, while ensuring the necessary resources for the energy transition and preserving local ecosystems through:

1. *Innovative technologies:* The application of advanced technologies for the extraction and processing of mineral raw materials can reduce negative ecological impacts.
2. *Environmental protection:* Implementing sustainable practices, such as the restoration of degraded areas, can help protect the environment.
3. *Economic development:* Developing sustainable industries and products can create new jobs and improve the economic situation of the local community.
4. *Education and training:* Educating and training the local population in sustainable practices can help transform the industry and encourage sustainable development (Figure 2) (Pavlović et al., 2024).

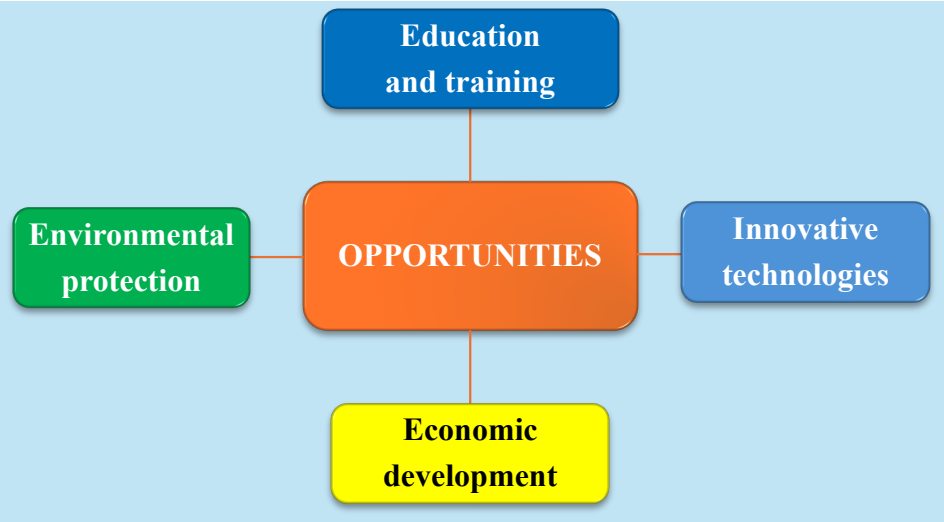


Figure 2: Opportunities for sustainable management of Varaždin County in the context of the green transition (Source: Authors' work, 2025.)

Based on the analysis of the challenges and opportunities of sustainable management of mineral resources in Varaždin County within the context of the green transition, we conclude that the County has significant potential for active participation in global efforts for a sustainable energy future. However, in order to achieve sustainable development, it is necessary to focus on the modernization of mining processes, the implementation of innovative technologies, reducing the negative environmental impact, and aligning local strategies with global and European goals for CO2 emissions reduction. Considering the ecological, economic, and social challenges, it is crucial to invest in energy-efficient technologies and increase the production of green energy, while simultaneously preserving ecological balance and social interests. For a successful transition to a sustainable economy, Varaždin County must ensure long-term planning, strategic investments, and cooperation between the public and private sectors. Only by doing so, with proper regulation and innovations in mining, the County can meet its ecological and economic goals, contribute to the green transition, and ultimately be a key player in the global energy transformation.

5. CONCLUSION

For successful management of mineral resources in Varaždin County and their integration into the green transition, it is crucial to achieve synergy between industry, the scientific community, and local authorities. In the context of global goals to reduce CO_2 emissions and achieve net-zero by 2050, this collaboration becomes the fundamental framework for ensuring sustainable management of mineral resources, which is essential for driving the energy transition. Varaždin County, rich in natural resources, has significant potential to become a key player in the global energy transition, particularly through the integration of innovations in mining technologies and the application of environmental standards. The use of recycled materials, the improvement of technologies in the production of ecological building materials, and the expansion of capacity for renewable energy infrastructure development represent key directions through which the county can contribute to reducing carbon footprints and achieving low-carbon future goals. Given the growing demand for minerals that form the foundation of technologies needed for the energy transition, such as batteries for electric vehicles and renewable energy sources, Varaždin County must focus its efforts on sustainable management of mineral resources, reducing negative environmental impacts, and supporting ecological industrial transformation.

This will not only ensure a long-term contribution to the energy transition but also enable the region's competitiveness in the global green technology market. A focus on sustainable resource management and the development of renewable energy infrastructure positions Varaždin County as a leader in sustainable management of mineral resources, while also providing a foundation for achieving global decarbonization goals. In this context, the importance of collaboration between industry, the scientific community, and policymakers becomes evident, as only through an integrated approach and multidisciplinary collaboration can sustainable development, CO_2 emission reductions, and support for the green transition be achieved. This paper thus emphasizes the need for strategic approaches to mineral resource management, innovation in industry, and the involvement of local communities, contributing not only to ecological sustainability but also to the economic resilience of the region in the context of global energy transition challenges.

LITERATURE:

1. Aldakhil, A.M., Nassani, A.A., Zaman, K. (2020). The role of technical cooperation grants in mineral resource extraction: evidence from a panel of 12 abundant resource economies. *Resources Policy*, 69, pp. 1-11.
2. Agenda 21, (1992). *United Nations Conference on Environment & Development, Rio de Janeiro, Brazil*. [online] Available at: https://sustainabledevelopment.un.org/content/documents/Agenda21 [Accessed 30 November 2024].
3. Banovac, E., Pavlović, D., Pudić, D. (2021). Implementing regulation towards the creation of a well-functioning energy market. *Proceedings of the Institution of Civil Engineers - Energy*, 174(1), pp. 1–12.
4. Bôas, R.V., Shields, D., Šolar, S., Anciaux, P., Önal, G. (2005). A review on indicators of sustainability for the mineral extraction industries. Rio de Janeiro: Arta Cover, Editing and Coordination.
5. Bradić, D. (2018). Zaštita životne sredine kao komponenta održivog razvoja sa osvrtom na značaj ekoloških indikatora. *Zbornik radova MES*, 4, pp. 293-304.
6. Calas, G. (2017). Mineral Resources and Sustainable Development*, Elements*, 13(5), pp. 301-306. doi: 10.2138/gselements.13.5.301
7. Crnić, J., Šinkovec, B. (1993). Nemetalne mineralne sirovine Hrvatske. *Rudarsko-geološko-naftni zbornik*, 5(1), pp. 21-37.
8. Dekanić, I., Golub, M., Nuić, J., Rajković, D., Saftić, B., Sečen, J., Velić, J., Vrkljan, D., Galić, I., Karasalihović Sedlar, D., Bohanek, V., Kurevija, T., Marković, S., Maros, M., Hrnčević, L., Pećina, D., Strahovnik, T., Svrtan, M., Vidić, D., Kotur, V., Kirin, D., Globan, M. (2008). Strategija gospodarenja mineralnim sirovinama Republike Hrvatske. Zagreb: Sveučilište u Zagrebu, Rudarsko naftno-geološki fakultet.
9. Krasić, D., Vidić, D., Mikulić, A. (2005). Rudarska djelatnost u Republici Hrvatskoj. *Klesarstvo i graditeljstvo*, (1-2), pp. 6-15.
10. Mudd, M.G. (2021). The Resources Cycle: Key Sustainability Issues for the Mining of Metals and Minerals. *Encyclopedia of Geology* (Second Edition), pp. 607-620. [online] Available at: https://doi.org/10.1016/B978-0-08-102908-4.00035-7 [Accessed 30 November 2024].
11. Petrie, J., Cohen, B., Stewart, M. (2007). Decision support frameworks and metrics for sustainable development of minerals and metals. *Clean Techn Environ Policy*, 9(2), pp. 133-145. [online] Available at: https://doi.org/10.1007/s10098-006-0074-3 [Accessed 21 April 2022].

12. Perišić, A., Wagner, V. (2015). Development index: analysis of the basic instrument of Croatian regional Policy. *Financial Theory and Practice*, 39(2), pp. 205-236. [online] Available at: https://doi.org/10.3326/fintp.39.2.4 [Accessed 30 November 2024].
13. Pavlović, D., Srpak, M., Klopotan, I., (2024). Energetska tranzicija – vodikova paradigma. Čakovec: Međimursko veleučilište u Čakovcu.
14. Pavlović, D., Gilja, M., Srpak, M. (2024). Energetska tranzicija i održiva energetika - na putu prema vodikovoj energetici. *EGE: energetika, gospodarstvo, ekologija, etika*, XXXII, 2, pp. 80-85.
15. Srpak, M. (2022). Nova metodologija izračuna modela agregiranoga kompozitnoga indeksa za održivo gospodarenje mineralnim sirovinama na primjeru Varaždinske županije. Doktorski rad, Varaždin: Sveučilište u Varaždinu.
16. Srpak, M., Zeman, S., Knok, Ž. (2021). Chronological Overview of Management of Raw Minerals in Varaždin County. *Tehnički vjesnik: znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku*, 28(3), pp. 1060-1066. doi: 10.17559/TV-20200601165001.
17. Srpak, M., Zeman, S. (2020). Exploitation of mineral resources and protection of drinking water reservoirs in Varaždin county. In: D. Barković, K. Dernoscheg, A. Erceg, et al., eds. *Interdisciplinary management research XVI*. Osijek: Studio HS internet d.o.o., pp. 1707-1729.
18. Srpak, M., Pavlović, D. (2023). Mineralne sirovine Varaždinske županije – potencijal održivog gospodarskog razvoja i prosperiteta u vremenu energetske tranzicije. *Nafta i Plin: stručni časopis Hrvatske udruge naftnih inženjera i geologa*, 43, pp. 66-76.
19. Zakon o rudarstvu (2013). NN 56/13, 14/14, 52/18, 115/18, 98/19, 83/23
20. Zakon o istraživanju i eksploataciji ugljikovodika (2018). NN 52/18, 52/19 i 30/21.
21. Pravilnik o rudarskim projektima (2024). NN 84/2024.
22. Pravilnik o istraživanju i eksploataciji mineralnih sirovina (2022). NN 138/2022.
23. Pravilnik o jedinstvenom informacijskom sustavu mineralnih sirovina i registrima (2019). NN 52/2019.
24. Zelenika, I., Pavlović, D., Rajić, P., Kovačić, T., Srpak, M. (2021). Hydrogen Underground Storage as a Critical Factor in the Energy Transition Period. *Tehnički vjesnik: znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku*, 28(5), pp. 1480-1487. doi: 10.17559/TV-20200605130232.

INFORMED USE OF PBL IN FOSTERING SOFT SKILLS IN MOROCCO: CHALLENGES AND OPPORTUNITIES

Adil Benlabchir
Faculty of Letters & Humanities, Ain Chock, Hassan II University of Casablanca, Morocco
abenlabchir@gmail.com

Moulay Sadik Maliki
Faculty of Letters & Humanities, Ain Chock, Hassan II University of Casablanca, Morocco
sadikmaliki@yahoo.fr

ABSTRACT

The ultimate goal of education is to equip learners with knowledge, language skills, and essential soft skills for the 21st century. Many fields, including education, are evolving, and it is necessary to explore new approaches to address learners' challenges. Incorporating the PBL approach into the educational system is crucial to engaging skilled and talented learners while making learning appealing to all. Soft skills are emphasized in the ministerial paradigm shift, which states that learners should master these lifelong skills through PBL. These skills are vital in both personal and professional lives. With PBL, English becomes a tool rather than an end goal, allowing learners to improve critical thinking, creativity, teamwork, leadership, communication, and problem-solving. When students engage in classroom projects, they become more involved in their learning. This paper aims to promote PBL to enhance soft skills in the EFL classroom in Morocco. It focuses on two objectives: (i) to explore the challenges that teachers face in incorporating PBL and (ii) to identify the opportunities that PBL provides.
Keywords: *Project-based learning, problem-based learning, soft skills, challenges, opportunities*

1. INTRODUCTION

The major goals of education lie in the enhancement of learners' character and abilities, the development and polishing of their skills, the identification of their physical, spiritual, and intellectual assets, and their empowerment as future human resources. In general, human capital is characterized mainly by three main precepts: knowledge, personal, and social constructs. The school has to ensure learning that fosters these constructs for all learners. Different educational reforms called for reconsidering teaching and learning practices in Morocco. Today's educational reform in Morocco, namely the Strategic Vision for Reform 2015–2030, implemented by the Higher Council for Education, Training, and Scientific Research (CSEFRS), emphasizes competency-based approaches, including project-based learning (PjBL) as a pedagogical method in teaching and learning. Problem-based learning (henceforth PmBL), another learner-centered approach, is deeply rooted in the philosophies of Confucius, Aristotle, and Socrates, who emphasized that true learning arises through questioning, critical thinking, and applying personal experience to the world and social interactions. These ideas resonate with Dewey's (1938) educational philosophy, which insists on active engagement with life rather than passive absorption of information (pp. 25-26). Throughout this article, the acronym PBL will be used to collectively refer to both project-based learning (PtBL) and problem-based learning (PmBL). However, when discussing each approach separately, PtBL and PmBL will be used to avoid ambiguity. While PmBL initially emerged in vocational and secondary education and with the influence of constructivist theories from Piaget, Vygotsky, and Bruner, its application expanded to broader real-world challenges (Korkmaz & Kalayci, 2009).

Constructivism emphasizes that learners build new knowledge by integrating prior knowledge with newly acquired information, and stresses the collaborative, social nature of learning (Barak, 2020). The origins of PmBL as a structured learning approach date back to the 1960s when medical educators at McMaster University in Canada introduced it as an alternative to traditional curricula, which heavily relied on rote memorization rather than practical application of knowledge and skills in medical training**.** Over time, many other fields, including education, business, architecture, engineering, and law, adopted PmBL as a pedagogical approach, although each of these disciplines laid emphasis one of its different aspects (Mergendoller, Markham, Ravitz, & Larmer, 2006). Unlike traditional approaches, which emphasize teacher-centeredness and make learners passive participants, several modern pedagogical approaches including PtBL and PmBL position learners as active agents engaged in constructing knowledge. To attain this goal, these approaches insist that active learning be considered as a prerequisite. According to Bonwell and Eison (1991), active learning is ‘‘anything that involves students in doing things and thinking about the things they are doing’’ (p. 2), and for Felder and Brent (2009), active learning is ‘‘anything course-related that all students in a class session are called upon to do other than simply watching, listening, and taking notes’’ (p. 2). In other words, active learning consists of instructional strategies that actively engage students during class time, rather than having them passively receive knowledge. The ultimate goal of active learning is to give learners opportunities to call on their critical thinking when dealing with activities and tasks in the classroom and, ultimately, get them ready to face potential real-life challenges and difficulties. The shift from teacher-centered instruction to learner-centered education is essential in moving away from traditional teaching formats—where teachers are the only source of knowledge—toward interactive learning environments that encourage student engagement. Learning, therefore, has to be meaningful to learners. PmBL, in particular, equips middle school, high school, and higher education learners with the skills to excel both academically and professionally. The implementation of PmBL in an EFL classroom requires the development of life skills, also known as soft skills. Soft skills are gaining ground in almost all fields. Thus, it is crucial for educators and policymakers to incorporate soft skills development into the Moroccan EFL classroom, drawing on students’ prior experiences and knowledge. According to Mohd-Yusof et al. (2011) PmBL is a learner-centered approach in which learners apply prior knowledge to a project or a problem through independent reflection, investigation, and problem-solving practice (p.12). By equipping learners with essential soft skills, they become more independent, competent, and better prepared for the job market. As a matter of fact, those who possess soft skills are more likely to get the job and even excel at it (Beagon & Niall, 2015; Hamidah, Yuriani & Palupi, 2016; Othman et al., 2017). Krajcik and Blumenfeld (2006) state that project-based learning (henceforth PtBL), a type of contextual learning, aligns with the constructivist principle that learners develop a deeper understanding when they actively engage with and apply concepts. Both PtBL and PmBL foster "deep learning" by immersing learners in real-world challenges that require critical thinking, decision-making, and problem-solving, which are key elements in developing soft skills.

The goal of the present article is threefold:

1. To examine the use of the PBL in Moroccan EFL classrooms, particularly in middle and high schools,
2. To distinguish the similarities and differences between Project-Based Learning (PtBL) and Problem-Based Learning (PmBL) while exploring their impact on soft skills development.
3. To identify the major challenges teachers face in implementing PBL and the benefits it offers to learners including soft skills.

2. DISAMBIGUATING PROJECT-BASED LEARNING AND PROBLEM-BASED LEARNING

Project-based learning (PtBL) and problem-based learning (PmBL) are very often used interchangeably. Both PtBL and PmBL start with and revolve around real-world problems. PBL is, also interdisciplinary, as it incorporates concepts from various fields into a single learning experience. PtBL and PmBL are also both influential tools for improving lifelong skills such as problem-solving, critical thinking, creativity, empathy, and information literacy, among others. However, the process of exploring the problem and solutions is where the two strategies vary.
PmBL involves pointing out and finding solutions to real-world problems. Learners investigate the issue, diverse perspectives, explore solutions from multiple angles and formulate a comprehensive plan to solve the problem. Moreover, PmBL requires learners to first analyze the root cause of the problem, which is often complex and multi-dimensional, like most real-world issues. Once learners gather information about the problem at hand, they research solutions. The aim is to get learners to develop critical thinking skills, see a problem from different angles, and benefit from content knowledge across a wide range of disciplines. The final product is an inclusive plan to solve a complicated problem. The plan remains theoretical, meaning that learners are not required to implement or follow up on it. Like PmBL, PtBL starts with a real problem, but the process and outcomes differentiate the two approaches. A key feature of PtBL is authenticity, as learners engage in solving real problems by actively participating in the solution process. In other words, learners solve real problems by being part of the solution. So, instead of studying the problem, learners focus on finding solutions and then move forward. In PtBL, learners are directly involved. PtBL is a more time-consuming version of PmBL that allows for more opportunities for skill development. Teamwork, collaboration, communication, and self-direction are just a few examples among others. PtBL and PmBL share both similarities and differences, as noted by Hmelo-Silver, Duncan, and Chinn (2007); both approaches fall under the same category of educational strategies. Despite having similar conceptual definitions, their simplification in some literature can lead to confusion. Here, the authors list the similarities and differences between PtBL and PmBL as follows:

Similarities:

- Both PtBL and PmBL are used in the field of education
- Both PtBL and PmBL address real-world problems
- Both PtBL and PmBL serve as teaching strategies
- Both PtBL and PmBL engage learners actively
- Both PtBL and PmBL are effective learning methods
- Both PtBL and PmBL incorporate real-life tasks to enhance learning outcomes
- Both PtBL and PmBL are learner-centered approaches
- In both PtBL and PmBL, the instructor acts as a guide
- In both PtBL and PmBL, learners work cooperatively in groups and research various sources of information
- Both PtBL and PmBL involve group work or competition
- PtBL and PmBL complement each other.

Differences :

Project-based learning (PtBL)	**Problem-based learning** (PmBL)
The teacher sets up goals and objectives.	Teachers and learners collaborate to set goals and outcomes.
Concerned with the field of education.	Primarily used in higher education, training, and internships.
Focuses on skills and the learning outcome.	Focuses on skills and the learning process.
Requires a longer time frame.	Can be completed in a shorter time frame.
Leads to a few refined solutions.	Concentrates on all possible solutions.
Requires community collaboration.	Does not necessarily involve community collaboration.
Learners participate in the solutions.	learners do not use solutions that are provided to them.
Learners figure out different problems and try to solve them through discussion.	Problems are clearly identified, and learners must reach a definitive conclusion.

PBL, in both forms, aligns with the development of soft skills and provides learners with opportunities to build their learning in a meaningful and authentic context. Therefore, it is important to explore the role of soft skills in PBL-based methodologies.

3. SOFT SKILLS

In the US, the military first introduced the term 'soft skills' in the 1960s to describe non-technical abilities that did not involve mechanical assistance. It became evident that such skills, including the ability to influence and inspire others, were crucial for the soldiers on active duty. Today, the term 'soft skills' has gained widespread recognition across various fields. To better define the term, major dictionaries were consulted. The *Cambridge Dictionary* defines 'soft skills' as the abilities people use when interacting with others. The *Collins Dictionary* describes them as qualities that are more desirable than necessary for certain positions that do not require formal education, such as interpersonal communication and attitudes toward others. Similarly, the MacMillan dictionary identifies 'soft skills' as capabilities that empower a person to interact with others positively to facilitate communication, collaboration, and leadership. Hence, the attributes believed to cut across all the definitions given are 'soft skills' is employed broadly with an assumption that they are personal skills or qualities that help one relate to others within a given social context. These skills include time management, cognitive and emotional empathy, language, communication, relationship-building, cooperation, leadership, and trust, among many others.

4. RESEARCH QUESTIONS

The purpose of this study is to enhance the use of PBL in teaching English as a foreign language (EFL) in Morocco. The study aims to address the issue of whether or not to use PBL in EFL instruction by analyzing various factors and tendencies that may influence this decision. The study pays special attention to the soft skills enhanced through PBL and how it can best be utilized in instruction. Additionally, the study compares problem-based learning (PmBL) and project-based learning (PtBL), and highlights the challenges EFL teachers face in implementing both approaches, and examines both its benefits and the soft skills.

In order to achieve these goals, the study finds it necessary to address the following questions: a) How is PBL effectively practiced in the EFL classroom in Morocco? b) What are the major differences and similarities between PtBL and PmBL? c) What are the primary challenges EFL teachers in Morocco face in implementing PBL? d) What are the opportunities does PBL offer in EFL teaching? e) Which soft skills can be fostered through PBL?

5. SIGNIFICANCE OF THE STUDY

Although there have been many studies all over the world focused on PBL in both language teaching and language learning, the question of investigating PBL in relationship with soft skills has not yet been tackled in the context of Morocco, to the best of my knowledge. Therefore, I attempt to delve into this **underexplored topic**. To do so, the findings of earlier investigations will make a significant contribution to the field; however, they all focus on the implementation of PBL or explore the issue from learners' perspective. In this paper, we approach the issue of PBL in the EFL classroom from a different perspective as we aim to find out more about the beliefs of the English teachers in Morocco. The importance of this study lies in demystifying the similarities and differences between PtBL and PmBL; identifying the challenges teachers face in incorporating the PBL approach in the EFL classroom; examining the opportunities PBL offers; and figuring out soft skills enhanced through PBL.

6. METHODOLOGY

To ascertain the views of those at the front line, so to speak, the study reports the views of 115 Moroccan EFL teachers on the use of PBL to enhance learners' soft skills. To this end, a questionnaire was distributed to English language teachers teaching different levels in public schools, private institutions, and language centers in Morocco. Teachers were invited to respond to the questionnaire on a voluntary basis and then submit their responses electronically. The teachers were asked to share their experiences on the use of PBL as a teaching tool in the teaching of English to Moroccan learners and to share the main challenges they faced in incorporating PBL in their classrooms. The questionnaire is divided into four parts: Part 1 focuses on general information about the respondents (including area of work, age, gender, educational achievement, grade(s) taught, teaching experience, etc.); part 2 addresses challenges in implementing PBL (school-related factors, teacher-related factors, learner-related factors, curriculum-related factors, and other factors); part 3: benefits of PBL, allowing respondents to provide insights into its advantages.

7. PARTICIPANTS AND CONTEXT

In eight different regions of Morocco, namely Marrakech-Safi, Casablanca-Settat, Tanger-Tetouan-Al Houceima, Rabat-Salé-Kenitra, Fes-Meknes, Drâa-Tafilalet, Guelmim-Oued Noun, and Souss Massa, the study focused on EFL teachers working in middle and high schools. A total of 115 EFL teachers were assigned different grades ranging from 9th grade to 2nd-year baccalaureate. According to the respondents' gender breakdown, there were more male teachers (61.7%) than female teachers (38.3%). In terms of educational qualifications, the majority of the respondents (67%) held a BA degree, while 17% held a Master's degree and 1.7% held a Ph.D. This information indicates that most of the EFL teachers who participated in the study had completed their undergraduate studies. The respondents' teaching experience varied, with 29.6% of the teachers having taught English for 16 to 20 years, 20.9% with 6 to 10 years of experience, 20% with 11 to 15 years of experience, 18.3% with 1 to 5 years of experience, and only 11.3% of the respondents are more experienced with more than 21 years of teaching. This demographic diversity provides valuable insights into the use of PBL in EFL classrooms across different regions of Morocco in terms of gender, qualifications, and teaching experience.

Both educational qualifications and teaching experience play significant roles in implementing PBL successfully. Teachers with higher education levels may have a deeper understanding of instructional strategies and content knowledge, which enables them to effectively implement PBL. Likewise, experienced teachers may be more adept at using PBL; they can draw on a repertoire of teaching strategies and instructional practices to guide their learners' inquiries and create a supportive learning environment that meets their needs. Whereas novice teachers often find it challenging to implement the PBL approach due to a lack of training, they may struggle with managing classroom activities, structuring group work, and supporting student collaboration.

The questionnaire examined Moroccan EFL teachers' perceptions of using PBL, the factors influencing their decision, the soft skills developed through PBL, and its perceived benefits. Additionally, it explored the approaches and methods employed by teachers, as well as their awareness of the importance of soft skills in learners' development.

8. RESULTS AND FINDINGS

This section is divided into four parts: a) the implementation of PBL, b) challenges in implementing PBL, c) the enhancement of soft skills through PBL, and d) the benefits of PBL.

8.1 PBL implementation

This part addressed the use of PBL in the EFL classrooms. The questionnaire included questions on both traditional and modern teaching methods and approaches, with a focus on PBL. The analysis of the data revealed that a vast majority of the teachers (97.4%) use PBL in their EFL classroom. This indicates that PBL is commonly accepted as a valuable teaching approach. However, the frequency of PBL implementation varies among the responding teachers. Approximately 60% of the respondents reported their implementation of PBL 'sometimes', while 17.4% of the teachers 'usually' implement PBL in the classroom. Furthermore, a sizable portion of educators (18.3%) "rarely" used PBL. This demonstrates that teachers are either unfamiliar with PBL or insecure in using it. Just 4.3% of the teachers said they "never" used PBL in the classroom. Lack of resources and time restrictions are two potential excuses for avoiding PBL use. PBL is a popular teaching strategy among EFL teachers, according to the survey's overall results, albeit different EFL teachers use it at different rates. To better assist teachers in successfully adopting PBL in their classrooms, it is important to take into account the factors that contribute to variations in PBL implementation.

Fig.1. Incorporation of PBL

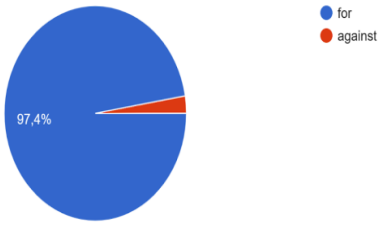
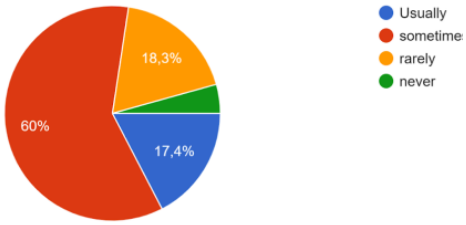


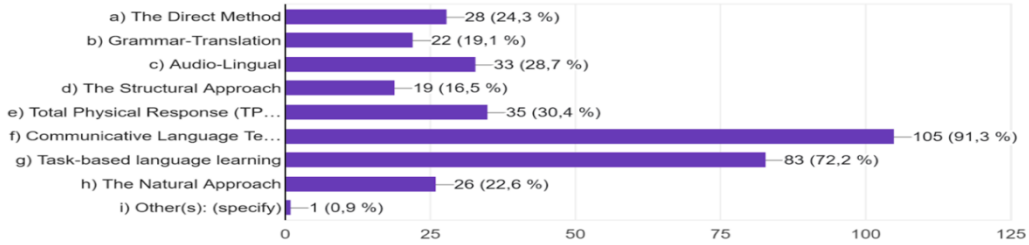
Fig.2. Frequency of PBL



The prevailing majority (91.3%) of the teachers employed Communicative Language Teaching (CLT), which emphasizes the use of language in a communicative manner to resemble real-life situations, at the expense of the traditional approaches that focus on grammar rules memorization. This entails that teachers are more into learner-centered approaches, which enable learners to use language effectively and communicatively.

Task-based Language Learning (TBLL) is another popular approach among teachers. About 72.2% of the teachers employed it. This approach emphasizes the use of language to meet real-life tasks and engage learners in a meaningful learning environment. Both CLT and TBLL are learner-centered approaches that aim to develop the learner's ability to use the language in practical situations. With a lesser degree few respondents used other methodologies respectively. 30.4% opted for Total Physical Response (TPR), 28.7% used Audio-lingual (AL), 24.3% used Direct Methods (DM), 22.6% opted for Natural Approach (NA), and only 19.1 % used Grammar Translation Method (GTM). These methodologies are generally considered more teacher-centered and focus more on memorization and repetition rather than on communicative abilities. The fact that the majority of the respondents preferred CLT and TBLL suggests that they align with the main principle of PBL; it involves engaging learners in real-life problems or situations to help them develop time management, teamwork, critical thinking and problem-solving skills. PBL is a learner-centered approach that focuses on the learner's ability to apply their knowledge in practical situations, rather than simply memorizing information. Overall, the questionnaire results suggest that the respondents are more inclined towards learner-centered approaches that emphasize the practical use of language in real-life situations. This aligns with the principles of PBL, which focus on engaging learners in practical problem-solving activities to develop their skills and abilities.

Fig.3. Approaches employed



8.2 Challenges in implementing PBL

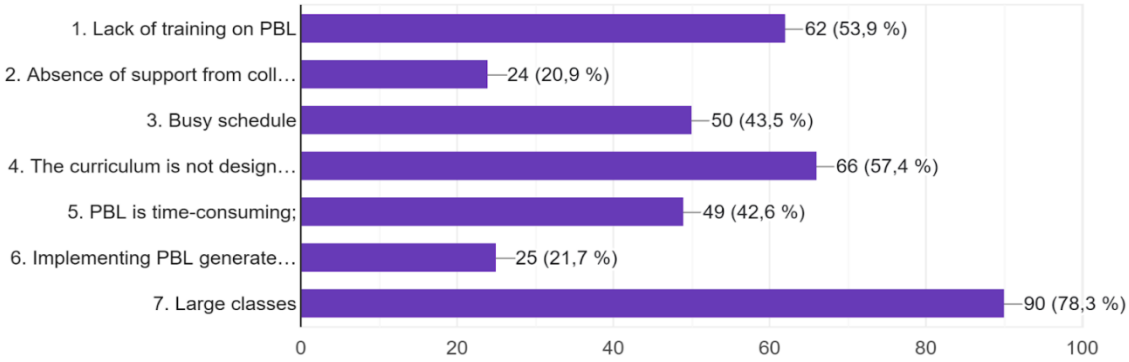
According to the results obtained, the main challenges are split into 4 sets of factors:

Teacher-related factors

Based on the findings there are several teacher-related factors responsible for the non-implementation of PBL in the EFL classroom. Large class size is the most cited factor by over 78.3% of respondents. This suggests that the current educational context may not be suitable to be designed to accommodate PBL effectively in classrooms with all related issues to large classes. 57.4% of respondents believed the curriculum does not have a room for PBL, which indicates that the current educational framework does not prioritize active learning and PBL approaches. Therefore, a change in the curriculum is necessary to facilitate effective PBL implementation. 53.9% of teachers reported lack of training on PBL, indicating that they have never received training to effectively implement PBL in the classroom. To this end, teachers are in need of professional development opportunities and training programs tailored to adopt PBL approaches. 43.5% of teachers reported that busy schedule is another factor which deprives teachers from taking the lead in implementing PBL in class. Time constraints can make it even difficult to implement PBL effectively. This could be related to the current educational structure, which is characterized by an inflexible schedule to accommodate PBL activities.

42.6% of surveyed teachers confirmed that PBL is time-consuming, which calls teachers for devoting more additional planning and preparation to incorporate PBL activities compared to traditional teaching methods. One of the challenges reported by teachers is the generation of noise, which can be a problem for classrooms with limited space or resources. PBL is highly interactive and collaborative approaches that require learners to work in groups and engage in discussions, which can create a noisy classroom environment. This can be especially challenging for teachers who are not used to this type of classroom dynamic. Another challenge reported by teachers is the lack of support from colleagues and administrative staff. According to the results, 20.9% of teachers reported that they did not receive support from their peers or school leaders. This lack of support can make it difficult for teachers to implement PBL effectively, as they may not have access to the resources or training needed to incorporate this approach into their teaching practice. This lack of collaboration and coordination among educators and school leaders could be addressed by promoting more professional development opportunities and peer mentoring programs. Furthermore, the findings suggest that there are several teacher-related factors that may contribute to the non-implementation of PBL. These factors may include a lack of knowledge about PBL, a lack of confidence in implementing PBL, or a lack of time and resources to plan and implement PBL activities. Addressing these issues may require changes to the educational system, including increased support and training for teachers, as well as changes in the school culture to promote a more collaborative and innovative learning environment. In summary, the challenges identified by teachers when implementing PBL highlight the need for greater collaboration and coordination among educators and school leaders, as well as increased support and training for teachers. By addressing these issues, it may be possible to overcome the barriers to effective PBL implementation and promote a more innovative and collaborative approach to teaching and learning in schools.

Fig.4. Teacher-related factors



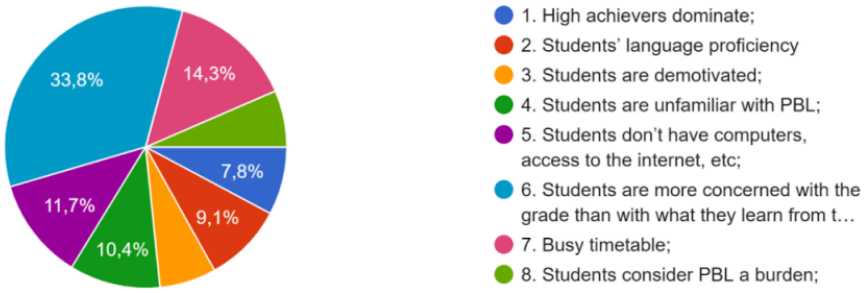
Learner-related factors

The findings presented indicate that there are various reasons why PBL is not being implemented effectively in certain settings. The most significant factor, according to the responses of the surveyed teachers, is that their learners prioritize grades over learning from the project. This attitude may be due to the educational system's emphasis on grades and standardized written tests. The second most common reason cited by respondents is the busy timetable for learners. The fact that learners have classes from Monday to Saturday puts a lot of pressure on them and it is not easy to get them involved in PBL activities. Another factor that was mentioned is the lack of access to computers, the internet, and other facilities needed for PBL.

This issue may be more prevalent in low-income areas, where schools and learners may not have the necessary materials. A few teachers also noted that their learners are unfamiliar with PBL. This could suggest that more training and professional development may be needed to help teachers effectively implement PBL in their classrooms. Language proficiency was also cited as an obstacle, which may be particularly relevant in diverse classrooms where learners may not all speak the same language. Some teachers reported that high achievers tend to dominate in PBL activities, which may create inequitable learning opportunities for learners who may struggle with the projects.

Finally, a few teachers noted that their learners are demotivated. This issue may be related to a lack of engagement with the subject matter or frustration with the learning process. Overall, the findings suggest that there are multiple barriers to implementing PBL effectively, and addressing these issues may require changes to the educational system and increased support for both teachers and learners.

Fig.5. Learner -related factors



Curriculum-related factors

The findings revealed that there are different opinions among teachers regarding the curriculum's suitability for PBL implementation. 44.7% of the teachers blamed the curriculum for not giving room for PBL. This suggests that some teachers feel that the curriculum is too rigid and does not allow for innovative teaching approaches like PBL. Another significant curriculum-related factor identified by the study is that 36.8% of the teachers believe that the curriculum is artificial and not authentic. This implies that some teachers feel that the curriculum does not reflect real-world problems and challenges that PBL seeks to address. It is interesting to note that only 18.4% of the respondents did not consider any of the two factors mentioned above as an obstacle in implementing PBL.

This suggests that a majority of the teachers feel that the curriculum can pose a challenge to PBL implementation. The study highlights that the curriculum can be a significant hindrance to the implementation of PBL in EFL classrooms. To address this, curriculum developers and policymakers need to consider how they can create more flexible and authentic curricula that allow for innovative teaching approaches like PBL. Teachers also need to be provided with the necessary support and resources to help them integrate PBL into the existing curriculum effectively.

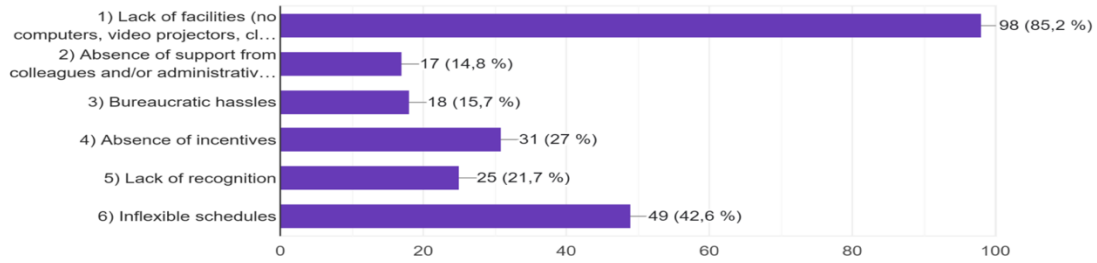
Fig.6. Curriculum-related factors

School-related factors

According to the collected data, the lack of facilities was identified as the main factor hindering PBL implementation, with 85.2% of respondents citing this as a challenge. This lack of facilities includes things like computers, video projectors, internet access, extra rooms, flipcharts, and markers, among others. Without these resources, teachers may find it difficult to plan and implement PBL activities effectively, which could lead to reluctance to adopt this teaching approach. The inflexible schedule was also identified as a school-related factor that may hinder PBL implementation, with 42.6% of respondents citing this as a challenge. This inflexibility may be due to factors such as limited class time, standardized testing requirements, or a rigid curriculum, which can make it difficult for teachers to incorporate PBL activities into their teaching practice.

Other factors identified by the questionnaire include a lack of incentives (27%), lack of recognition (21.7%), bureaucratic hassles (15.7%), and absence of support from colleagues and/or administrative staff (14.8%). These factors can make it challenging for teachers to feel motivated to implement PBL or to navigate the administrative requirements of incorporating this teaching approach into their classroom practice. In conclusion, the school-related factors identified by the questionnaire highlight the need for schools to provide the necessary resources, incentives, and recognition to support PBL implementation. Additionally, schools may need to address administrative barriers and provide teachers with more flexible schedules to accommodate this innovative approach to teaching and learning. By addressing these school-related factors, it may be possible to overcome the barriers to effective PBL implementation and promote a more collaborative and learner-centered approach to teaching and learning.

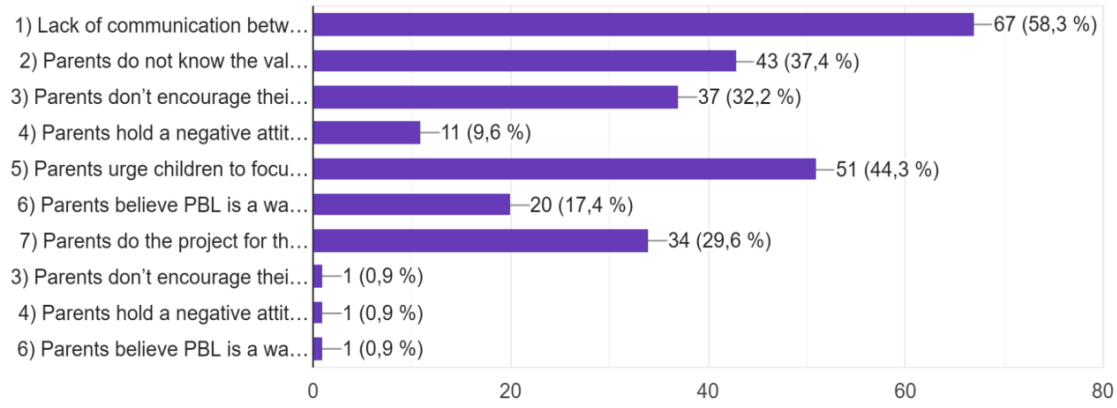
Fig.7. School-related factors



Other factors

The collected data in this last section on other factors responsible for the non-implementation of PBL is as follows: According to the data collected, 58.3% of teachers reported a lack of communication between teachers and parents as a major factor that hinders the implementation of PBL. This lack of communication can make it difficult for teachers to explain the value of PBL to parents, which could lead to a lack of support for this teaching approach. The second major factor reported by the teachers is the pressure from parents on their children to focus more on their lessons, which was noted by 44.3% of respondents. This pressure from parents can create a culture where PBL is viewed as a distraction from traditional academic learning, and learners may feel discouraged from participating in PBL activities. The third major factor reported by teachers is that parents may be unaware of the value of PBL, which was noted by 37.4% of respondents. Without understanding the benefits of PBL, parents may be less likely to support this teaching approach and may instead prioritize more traditional forms of instruction. Other factors noted include a lack of parental encouragement for extracurricular activities (32.2%), parents doing the project for their children (29.6%), and negative attitudes towards PBL from parents (9.6%). These factors can all contribute to a lack of support for PBL among parents, which may make it more challenging for teachers to implement this teaching approach effectively.

Fig.8. Other factors



The overview of the four sets of factors highlights the key challenges faced by teachers in implementing PBL in their classrooms. The first major hindrance is the absence of facilities, such as computers, video projectors, and internet access, which can limit the ability of teachers to effectively implement PBL activities. This was identified as the primary factor by 98 teachers, highlighting the need for schools and educational authorities to invest in the necessary resources and infrastructure to support PBL implementation. The second major factor identified by 90 teachers is large class sizes, which can make it difficult for teachers to effectively manage and engage all learners in PBL activities. This underscores the need for officials to address class size concerns and provide teachers with the support they need to work with large groups of learners in case the challenge persists. The third major factor identified by 66 teachers is the lack of flexibility in the curriculum, which can limit the ability of teachers to incorporate PBL activities into their lessons. This highlights the need for curriculum reform and the development of frameworks that provide teachers with the flexibility and autonomy they need to effectively implement PBL.

The fourth major factor identified by 67 teachers is the lack of communication between teachers and parents, which can lead to misunderstandings and misconceptions about the value of PBL. This underscores the need for greater collaboration and coordination between teachers, parents, and school administrators to promote a shared understanding of the benefits of PBL and how it can be effectively implemented. The fifth major factor identified by 62 teachers is the lack of training on PBL, which can limit the ability of teachers to effectively implement PBL activities in their classrooms. This highlights the need for professional development opportunities and training programs that provide teachers with the knowledge, skills, and resources they need to effectively implement PBL.

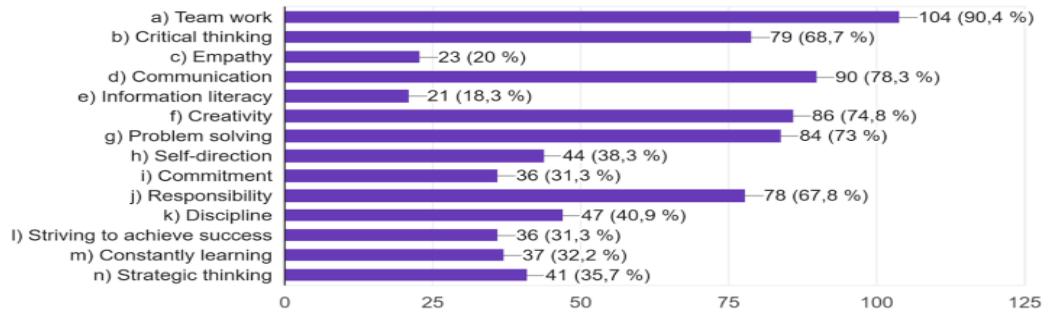
8.3 Soft skills through PBL

To better ensure the reliability of the questionnaire, different soft skills enhanced by both PtBL and PmBL are intentionally mixed and repeated in two questions to assess teachers' consistency.

8.3.1. Soft skills targeted

Given the targeted soft skills, PtBL appears to be the more prominently targeted approach among teachers. The emphasis on teamwork (90.4%), communication (78.3%), creativity (74.8%), and problem-solving (73%) aligns closely with the core objectives of PtBL, which focuses on collaborative, real-world projects that require students to work together, communicate effectively, and innovate solutions. Furthermore, the significant emphasis on critical thinking (68.7%), responsibility (67.8%), and discipline (40.9%) also supports the idea that PtBL is being prioritized. These skills are essential for managing the complexities of projects and ensuring that students can take ownership of their learning processes. While some skills, such as self-direction (38.3%), strategic thinking (36.7%), and commitment (31.3%), are also targeted, the overall data suggests a stronger inclination towards targeting the soft skills associated with PtBL. Therefore, PtBL is the more targeted approach in this context, as it effectively develops a wide range of essential soft skills among learners.

Fig.9. Skills targeted in PBL



8.3.2. Soft skills enhancement

Shared soft skills in both PmBL and PtBL

Both PmBL and PtBL share a common emphasis on developing several essential soft skills. Teamwork stands out as a key skill, with around 87.7% of teachers reporting it as a focus, highlighting the importance of collaboration in both approaches. Whether working together on problem-solving tasks in PmBL or managing group projects in PtBL, learners are required to collaborate effectively. Communication skills (74.6%) also play a vital role, as learners must articulate their ideas, findings, and solutions within their teams, making this a shared target in both methods.

Additionally, problem-solving (58.8%) and critical thinking (66.7%) are highly valued in both PmBL and PtBL, as they encourage learners to analyze complex issues and apply their reasoning to find solutions. Responsibility (65.8%) is another shared skill, with both approaches pushing learners to take accountability for their work, whether in managing projects or solving problems independently. Finally, self-direction (32.5%) is crucial in both approaches, as learners are often required to take the initiative and lead their own learning process.

Soft skills shared with PtBL

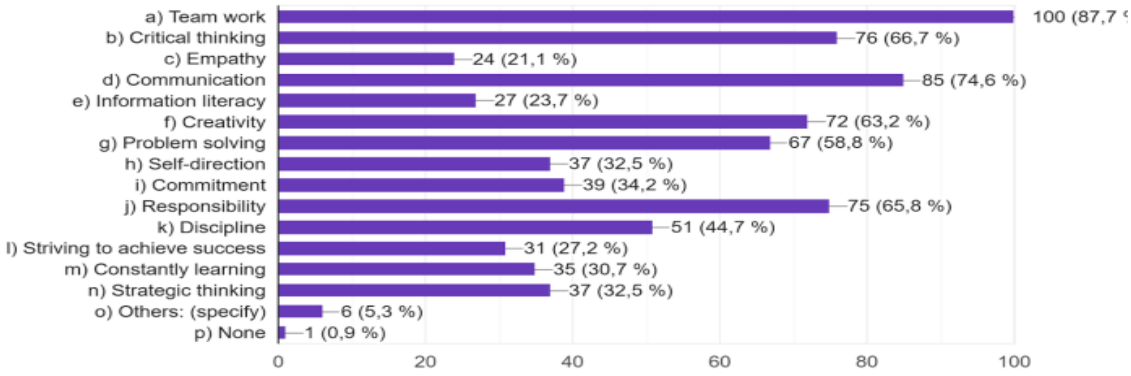
PtBL, in particular, is noted for fostering creativity, with 63.2% of teachers targeting this skill. The project-based nature of PtBL encourages learners to think innovatively as they develop original outputs and solutions. Strategic thinking (32.5%) is another skill more strongly associated with PtBL, as learners must effectively plan, prioritize tasks, and manage the various stages of a project. This focus on long-term planning sets PtBL apart. Moreover, PtBL emphasizes discipline (44.7%), especially self-discipline, as learners manage project timelines and deadlines, taking greater control of their work schedules. The project-driven nature of PtBL fosters an environment where commitment (34.2%) and responsibility (65.8%) are reinforced, driving learners to strive for success while constantly learning through their experiences.

Soft skills shared with PmBL

PmBL is particularly effective in enhancing learners' problem-solving (58.8%) abilities, given that it revolves around real-world problems that learners must tackle. This hands-on, problem-focused approach pushes learners to engage deeply with issues and develop practical solutions. Additionally, PmBL strongly fosters empathy (21.1%), as learners often work on socially relevant problems, leading them to consider the perspectives and needs of others. Creativity (63.2%) is also important in PmBL, but it is more tied to the inventive processes involved in problem-solving rather than tangible project outputs. Finally, critical thinking (66.7%) is highly emphasized, as learners must apply analytical skills to diagnose and address the challenges that they encounter in PmBL. Constant learning (30.7%) and adaptability are also hallmarks of PmBL, encouraging learners to embrace continuous growth and the application of knowledge to solve evolving problems. Based on the analysis, PtBL seems to be the approach that teachers tend to incorporate more to enhance soft skills. This is evident from the highly targeted soft skills such as teamwork (87.7%), communication skills (74.6%), creativity (63.2%), discipline (44.7%), and strategic thinking (32.5%), which are crucial in project settings. While problem-solving (58.8%) and critical thinking (66.7%) are skills shared between both approaches, they are also prominent in PtBL.

10. W
114 répons

Fig.10. Soft skills enhanced in PBL



8.4. The benefits of PBL

The following section examines the opportunities PBL offers. Although the benefits of PBL are limitless, a summary of the teachers' responses is essential. The benefits of PBL reported by the teachers can be categorized into different areas. First, PBL allows teachers to gain a better understanding of their learners and uncover their hidden skills. Since PBL requires teachers to work closely with their learners, it enables them to identify each learner's strengths and weaknesses and provide personalized learning opportunities. Second, PBL offers the opportunity for teachers to adapt their teaching strategies to accommodate various learning styles. By employing diverse teaching methods suited to different learners, teachers can enhance learning outcomes. Third, PBL helps learners develop key soft skills, such as self-sufficiency, decision-making, critical thinking, self-assurance, and problem-solving. These skills are essential for learners' success in the real-world contexts and future careers. Fourth, PBL motivates learners to engage with real-world problems and encourages them to apply prior knowledge to shape their learning. This makes learning more meaningful and relevant to learners. Fifth, PBL gives teachers an opportunity to make up for limited class time and serves as an effective alternative for covering certain activities. Since PBL integrates various subjects and topics, it allows teachers to cover more content within a shorter time frame. Sixth, PBL enables learners to connect theoretical knowledge with real-world applications, helping them identify inconsistencies and address them effectively. This prepares learners to become competent individuals who can apply their knowledge in practical settings. Seventh, PBL encourages pair and group work, helping learners develop physical, emotional, and social skills. Working together to solve problems fosters teamwork and communication skills. Eighth, PBL allows both teachers and learners to see how interesting, meaningful, and appealing it is compared to traditional methods. This helps learners become more engaged in and outside classroom activities. Finally, PBL encourages learners to enjoy self-learning and knowledge sharing in pairs and/or groups, which expands their knowledge and helps them learn from one another.

9. CONCLUSION

This study investigated the main obstacles Moroccan EFL teachers face when applying the PBL approach, distinguishing between PmBL and PtBL and identifying the soft skills developed and the opportunities provided by each. Both PmBL and PtBL offer a range of benefits, such as greater learner engagement and motivation, improved problem-solving skills, and the development of transferable skills valued in real-life situations. Furthermore, these approaches can create a more equitable and inclusive learning environment by giving all learners the opportunity to develop and display their skills and knowledge. PmBL, with its problem-centered approach, enhances learners' analytical and critical thinking skills, while PtBL fosters teamwork, communication, and creativity through structured projects. As a consequence, both PmBL and PtBL contribute to a comprehensive education that prepares learners not only for language proficiency and academic success but also for personal and professional growth. While PmBL and PtBL are proven to enhance learners' soft skills, their implementation poses specific challenges, requiring significant adjustments to traditional teaching methods and a shift in the teacher's role. PmBL demands higher levels of problem-solving autonomy, whereas PtBL necessitates structured project planning and collaboration. To effectively integrate both approaches in Moroccan EFL classrooms, it is essential to address these challenges through teacher training, adequate facilities, effective communication between teachers and parents, collaboration between teaching and administrative staff, and external partnerships. Despite these challenges, the potential for PmBL and PtBL to enhance learners' soft skills makes them invaluable methodologies for educators to consider, offering meaningful and engaging learning experiences that extend beyond traditional classroom practices.

The following recommendations aim to support educators, educational institutions, and decision-makers in adopting PBL as a successful teaching and learning method: a) Provide PBL training for teachers in Morocco, b) integrate PBL into the curriculum, c) educate parents and learners about the advantages of PBL, d) administrative staff and officials should support teachers in implementing PBL, e) introduce the PBL culture in primary, middle, and high schools, f) recognize, celebrate and use successful projects as a model, g) ensure that projects cover different school subjects, h) foster collaboration among teachers during project implementation, i) and schools should seek out partners to finance projects.

In terms of future research, there are various perspectives from which PBL can be explored. These include: 1) Replicating the study with a more extensive sample size of educators; 2) Investigating the use of PBL in higher education; 3) Identifying the specific soft skills that are enhanced through PBL; 4) Examining PBL from the learners' perspective; 5) Investigating the correlation between learners' language proficiency and their use of PBL; 6) Assessing the impact of PBL on learners' language abilities; 7) Evaluating and assessing PBL projects; 8) Integrating technology into PBL; and 9) Exploring cross-disciplinary PBL approaches.

LITERATURE:

1. Barak, M. (2020). Problem-project-and design-based learning: Their relationship to science, technology, and engineering in school. *Journal of Problem-Based Learning, 7*(2), 94-97. https://doi.org/10.24313/jProblem.2020.00227
2. Barrows, H. S. (1996). Problem-based learning in medicine and beyond: A brief overview. *New Directions for Teaching and Learning, 1996*(68), 3-12.
3. Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. *The Clearing House, 83*(2), 39-43. https://doi.org/10.1080/00098650903505415
4. Blumenfeld, P., Soloway, E., Marx, R., Krajcik, J., Guzdial, M., & Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational Psychologist, 26*(3-4), 369-398. https://doi.org/10.1080/00461520.1991.9653139
5. Bonwell, C. C., & Eison, J. A. (1991). *Active learning: Creating excitement in the classroom* (ASHE-ERIC Higher Education Report No. 1). The George Washington University, School of Education and Human Development.
6. Boud, D., Keogh, R., & Walker, D. (1985). *Reflection: Turning experience into learning.* Kogan Page Publishers.
7. Dewey, J. (1916). *Democracy and Education: An Introduction to the Philosophy of Education*. Macmillan. (pp.25-32)
8. Felder, R. M., & Brent, R. (2009). Active learning: An introduction. *ASQ Higher Education Brief, 2*(4), 1-5.
9. Habok, A., & Nagy, J. (2016). In-service teachers' perceptions of project-based learning. *Institute of Education, University of Szeged,* Petőfi S. Sgt. 30-34, Szeged 6722, Hungary.
10. Haines, S. (1989). *Projects for the EFL classroom: Resource material for teachers.* Nelson House.
11. Harmer, J. (1991). *The practice of English language teaching.* Longman.
12. Harmer, N., & Stokes, A. (2014). The benefits and challenges of project-based learning. *School of Geography, Earth and Environmental Sciences, Plymouth University.*
13. Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based and inquiry learning: A response to Kirschner, Sweller, and Clark (2006). *Educational Psychologist, 42*(2), 99-107. https://doi.org/10.1080/00461520701263368

14. Korkmaz, G., & Kalayci, N. (2019). Theoretical foundations of project-based curricula in higher education. *Cukurova University Faculty of Education Journal, 48*(1), 236-274. https://doi.org/10.14812/cufej.479322
15. Krajcik, S., & Blumenfeld, P. C. (2006). Project-based learning. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (pp. 317-334). Cambridge University Press.
16. Lee, I. (2007). Project work in EFL classrooms: A review of the literature. *ELT Journal, 61*(2), 140-148. https://doi.org/10.1093/elt/ccm022
17. Marwan, A. (2015). Empowering English through project-based learning with ICT. *TOJET: The Turkish Online Journal of Educational Technology, 14*(4), 28-37.
18. Mergendoller, J. R., Markham, T., Ravitz, J., & Larmer, J. (2006). Pervasive management of project-based learning: Teachers as guides and leaders. In C. M. Evertson & C. S. Weinstein (Eds.), *Handbook of classroom management: Research, practice, and contemporary issues* (pp. 583-615). Lawrence Erlbaum Associates.
19. Mohd-Yusof, K., Syed Ahmad Helmi, S. H., Jamaludin, M. Z., & Harun, N. F. (2011). Cooperative problem-based learning (CPBL): A practical PBL model for a typical course. International Journal of Emerging Technologies in Learning, 6(3), 12–20. https://doi.org/10.3991/ijet.v6i3.1696
20. Phillips, D., Burwood, S., & Dunford, H. (1999). *Projects with young learners.* Oxford University Press.
21. Piaget, J., & Inhelder, B. (1969). *The psychology of the child.* Basic Books.
22. Tally, T. (2015). *The challenges of implementing project-based learning in the 21st century classroom* (Master's Thesis). University of Victoria.
23. Thomas, J. W. (2000). *A review of research on project-based learning.* http://www.bobpearlman.org/BestPratices/PBL.Research.pdf
24. Richards, J. C., & Rodgers, T. S. (2001). *Approaches and methods in language teaching* (2nd ed.). Cambridge University Press.
25. Willis, J., & Willis, D. (2007). *Doing task-based teaching.* Oxford University Press.
26. Webliography:
27. Macmillan Dictionary. https://www.macmillandictionary.com/dictionary/british/soft-skills
28. Collins Dictionary. https://www.collinsdictionary.com/dictionary/english/people-skills
29. Cambridge Dictionary. https://dictionary.cambridge.org/dictionary/english/people-s-abilities-to-communicate-with-each-other-and-work-well-together

THE NECESSITY OF CHANGES IN VALUE ADDED TAX POLICY IN THE REPUBLIC OF CROATIA

Zdenko Bolfek
University of Applied Sciences Hrvatsko zagorje Krapina,
Krapina, Šetalište hrvatskog narodnog preporoda 6, Croatia
zdenko.bolfek@gmail.com

ABSTRACT

Value Added Tax (VAT) is one of the key indirect taxes applied in most countries worldwide, including the European Union and Croatia. All Croatian governments have recognized the profitability and simplicity of this tax, and since its introduction, it has been the foundation of the Croatian tax system. A balanced and efficient tax system is one of the essential preconditions for the development of entrepreneurship. Convenience, low collection costs, and ultimately, excellent volumes of tax revenues are the reasons why this tax is generally the first choice for the tax systems of less developed countries. Although Croatia, due to the challenges it has faced since gaining independence and transitioning to a market economy, had to rely on a generous and efficient tax like VAT, the environment is changing, and fiscal reforms are necessary. The preconditions have been created for Croatia to reduce the basic VAT rate while simultaneously strengthening the importance of direct taxes. The reasons for the changes are found in the favourable macroeconomic environment for adjusting the fiscal system, the fact that VAT has become one of the drivers of inflation, reduced fiscal competitiveness, and the need to reduce tax evasion and the informal economy. These changes are necessary to ensure a stable environment for entrepreneurial activity and the development of the entrepreneurial climate.

Keywords: *Entrepreneurship, Fiscal system, Tax, Tax system, Value Added Tax*

1. INTRODUCTION

Value Added Tax (VAT) is one of the key indirect taxes applied in most countries around the world, including all countries of European Union and Croatia. The main characteristic of VAT is the taxation of the value added to a product or service at each stage of production and distribution. Introduced to ensure transparency and fairness in the tax system, VAT is collected from the final consumer, while entrepreneurs have the right to deduct the VAT they have paid on the purchase of goods and services. This tax represents a significant source of revenue for the state budget in all countries that apply it, and in Croatia, it is by far the most lucrative tax, that collects the largest share of tax revenues. VAT in Croatia has been applied since 1998. Its introduction was part of tax system reforms implemented after the separation from the Socialist Federal Republic of Yugoslavia and gaining independence in 1991, as a result of the transition from a predominantly planned economy to a market economy. VAT replaced the previous Tax on the Sale of Goods and Services, which was collected only from final consumers, and its major drawback was the possibility of tax evasion. The introduction of VAT, with collection at each stage of production and distribution, enabled greater transparency and significantly made tax evasion more difficult. The standard VAT rate upon its introduction was 22%, and later, due to the spillover of the Global Financial Crisis into Croatia and the onset of a multi-year recession, the rate was increased to reduce the budget deficit and stabilize public finances. First, it was raised to 23% in 2012, and then to the current 25% in 2013. In addition to the standard VAT rate, Croatia applies two reduced rates of 5% and 13%.

2. THE IMPORTANCE OF VALUE ADDED TAX IN THE CROATIAN TAX SYSTEM

Value Added Tax is a key source of funding for the Croatian State Budget. In 2023, out of the total revenue of 27.37 billion euros, 10.27 billion euros, or 37.5%, was collected through VAT (Ministry of Finance, 2024). As total of 15.50 billion euros was collected in taxes, meaning that for every three euros of tax in the State Budget, two come from Value Added Tax.

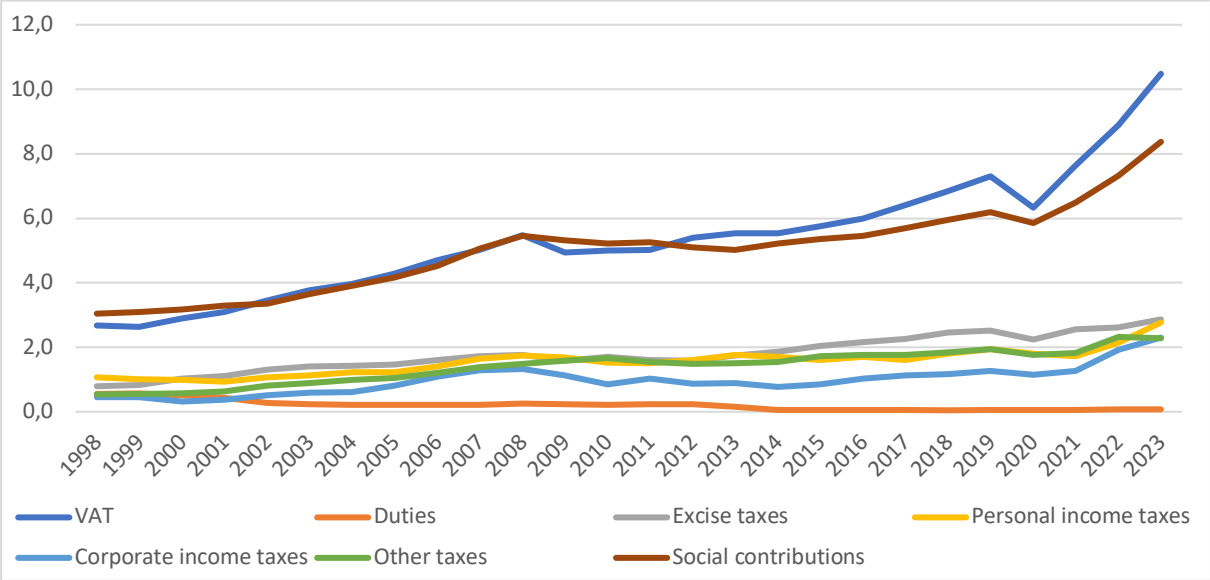


Figure 1. Tax revenues in Croatia from 1998 to 2023 in billions of euros (Source: author's analysis based on Eurostat data, 2025)

Since its introduction in 1998, VAT revenues have continuously increased, with the exception of two instances. The first decline in VAT revenues occurred in 2009 as a result of the 2007 Global Financial Crisis, whose effects, with a slight delay, spilled over into Croatia. During the recessionary period from 2009, VAT revenues stagnated, only surpassing the previously record-breaking year of 2008 in 2013. The second disruption occurred in 2020 due to the Covid-19 pandemic and the subsequent shutdown of the global economy, after which revenue growth accelerated further.

For 2024, VAT revenue growth of 6.9% is planned compared to 2023. However, with the mid-year revision in the second half of 2024, the VAT revenue plan has been further increased to a total of 11.37 billion euros, which is 10.8% higher compared to the previous year (Ministry of Finance, 2024).

Of all 27 European Union countries, Croatia is the most dependent on VAT. According to Eurostat data (2025), in 2023, 36.0% of all tax revenues, including social contributions, were generated from VAT.

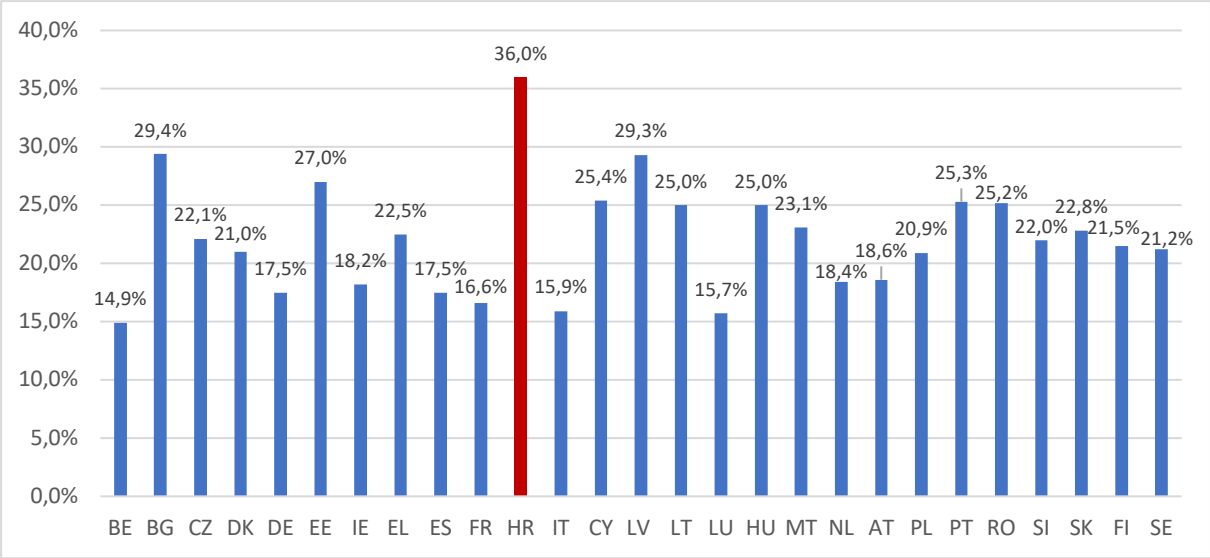


Figure 2. Share of VAT revenues in total tax revenues in 2023 by EU member states (Source: author's analysis based on Eurostat data, 2025).

Although VAT has been a key tax in Croatia since its introduction, the continuity in the growth of its share is visible, with 2023 being a record year as the latest year for which official data is available. According to the Tax Administration (2024), based on the European Commission's calculation, Croatia's VAT revenues are the highest in the European Union, both in total and as a share of GDP. While VAT revenues in Croatia account for 13.1% of GDP, the EU average is significantly lower at 7.5%. The first country behind Croatia is Hungary, with a share of 10.1%.

Given the importance of VAT in the Croatian tax system, it is no surprise that Croatia applies one of the highest standard VAT rates. In the European Union, only Hungary has a higher standard VAT rate, at 27%. Croatia, Denmark, and Sweden share second place with a standard rate of 25%, followed by Finland and Greece with 24%. Three countries apply a rate of 23%, four use 22%, five use 21%, four use 20%, and three countries use 19%, with one country each applying 18% and 17%. The average rate is 21.6%. Croatia also applies two reduced rates: one at 13% for accommodation services, food service, water, electricity, natural gas, waste collection, children's car seats and diapers, etc., and the second at 5% for bread, milk, books, medical products, and similar items.

3. THE IMPACT OF VALUE ADDED TAX ON THE CROATIAN ECONOMY

Since its introduction in 1998, VAT has proven to be a very effective source of revenue for the State Budget, which has been recognized by all Croatian governments. VAT has assumed a central role in the Croatian tax system, and there are no signs that this will change in the near future. However, in economic literature, it is generally accepted that poorer countries have a higher share of tax revenues from indirect taxes such as VAT, while more developed countries rely more on direct taxes like income and corporate tax. Direct taxes, when taxing, can take into account the personal characteristics of the taxpayer, which ultimately allows for a fairer taxation system. Some reasons why less developed countries rely more on indirect taxes are limited capacity to collect direct taxes, simplicity, generosity, and the low cost of collecting indirect taxes.

Given all the challenges Croatia has faced in the last 35 years, from transitioning from a planned to a market economy, war, privatization, banking crises, and recessions, it is understandable that Croatia has relied on VAT for a long period of its independence. However, the circumstances have significantly changed in recent years. The change in the macroeconomic environment should result in adjustments to both fiscal and monetary policies, as logically different policies should be followed during periods of recession and expansion.

For illustration, some macroeconomic indicators can be mentioned. The Gross Domestic Product (GDP), according to the data from the Croatian National Bank (2025), in 2023 amounted to 78.04 billion euros, marking a growth of 73.2% over the past ten years. GDP per capita stood at 20,257 euros, which is a 91.3% increase compared to ten years ago. However, in addition to GDP itself, the improvement of this indicator was also influenced by a decline in population.

Unemployment, which has historically troubled Croatian authorities, in 2023 amounted to 6.1%, which is the best indicator since Croatia's independence. For comparison, ten years earlier, unemployment was 17.3%. Foreign debt in 2023 amounted to 60.89 billion euros, or 78% of GDP. Ten years earlier, it was 108%, and not long before, it stood at 111% of GDP, which is above the 100% threshold considered a very high level of debt and a serious risk to the economy. Public debt was also reduced from a dangerous zone to a relatively acceptable 68.5% in 2023, and it is projected to be 58.9% in 2024, which for the first time is below the Maastricht criterion's upper limit of 60%.

The average salary at the end of 2023 was 1,191 euros net, with further growth expected in 2024, while at the end of 2014, it amounted to 712 euros, meaning that in a ten-year period, salaries grew by 67%. Finally, the improvement of Croatia's economy was recognized by all three leading global rating agencies, upgrading Croatia's rating from the so-called speculative ratings to investment grade. While the rating in 2013 (Croatian National Bank, 2025) was BB+ according to Standard & Poor's, Ba1 according to Moody's, and BB+ according to Fitch, after several adjustments, in 2024 it stands at A- (S&P), A3 (Moody's), and A- (Fitch), which are historically the best ratings for Croatia.

Given the favourable macroeconomic situation and relatively stable budget, considering the acceptable deficit of 2.6% of the general government’s consolidated budget, Croatia should use this opportunity to reduce VAT rates instead of increasing the expenditure side of the State Budget, for example, through a significant increase in public sector wages. Given the planned 10.8% increase in VAT revenue in 2024, if the standard rate were reduced from 25% to 24%, VAT revenue would be reduced by a maximum of 4%, and even with a reduction to 23%, the reduction in revenue would not exceed 8%. This reduction could be even smaller since some VAT is collected at rates of 5% and 13%, and one should also consider the consequent reduction in both legal and illegal tax evasion. For example, Croatian customers who purchase cars in Germany currently pay VAT at a rate of 19%, and by choosing Croatia as the country to pay VAT, they would face a significantly worse situation due to the 25% rate. By aligning Croatia’s VAT rate with those of neighbouring countries, Croatia would become more tax-competitive – the number of cases where taxpayers would choose Croatia as a country to settle VAT obligations would increase. Regarding illegal tax evasion, it is enough to refer to the statements of some of the greatest economists in history, such as Adam Smith (2007) and Milton Friedman (1992), who emphasized that higher taxes lead to greater tax evasion.

Furthermore, along with reducing the VAT rate, Croatia should strengthen the importance of other taxes, particularly direct taxes, which would further reduce the significance of VAT. For example, Croatia currently applies two income tax rates, with data available for 2022 (Tax Administration, 2025) showing that 1,279,208 or 99.2% of citizens pay income tax at the lower rate, while only 10,747 or 0.8% pay at the higher rate. This means that Croatia barely utilizes the possibility of progressive taxation, which is necessary for fairness, and the result is also evident when compared to other European Union countries, where Croatia, according to 2022 data (Tax Administration, 2025), is the worst country in terms of the share of labour tax revenue in total tax revenue. In the previous year, 2021, Croatia was literally last, behind second-to-last Bulgaria.

For corporate tax, Croatia applies two rates – a lower rate of 10% for businesses with an annual revenue of up to 1 million euros and a higher rate of 18% for businesses with annual revenue exceeding 1 million euros. A significantly larger portion of businesses pay corporate tax at the 10% rate, which is one of the lowest corporate tax rates in the European Union. Although it is a low rate, it should not be changed considering the double taxation of profits when distributing profits to owners, as both the corporate tax of 10% and income tax of 12% are applied. If an increase in the rate or the introduction of an additional rate is needed, it should be targeted at large businesses that generate high profit margins, such as banks, telecommunications, and other companies.

One reason to reduce the VAT rate is also the fact that VAT becomes a generator of inflation and high prices in at least two ways. First, a higher VAT incorporated into the price means a higher final price of the product, and reducing the VAT rate would reduce the product's price. Critics of reducing VAT often argue that reducing VAT would not lead to a reduction in product prices because merchants could keep the same prices and convert the VAT reduction into their own profit. While this is possible, with proper planning and monitoring of the process, such behaviour can be avoided. For example, it would be possible to introduce a rule of dual price display in stores, showing prices both with and without VAT. Some retail chains, such as Metro Cash & Carry, already use this practice, so introducing this obligation should not be a problem.

The second, indirect way of generating inflation is through the collection of significant revenues and exceeding the budget plan. A good budget situation was undoubtedly one of the reasons for the significant increase in the expenditure side of the Croatian State Budget. Total expenses of the State Budget from 2022 to 2024 increased by a high 44.6%, and employee costs rose even more, by 69.3%. In absolute terms, employee costs increased from 3.38 billion euros in 2022 to 5.72 billion euros according to the 2024 budget revision. Employee costs increased by 2.34 billion euros, while VAT collected in the same period was 2.59 billion euros more. With smaller revenue growth, such a high increase in expenditures would not be possible, and this excess expenditure leads to increased consumption in the market and puts pressure on price growth.

Regarding tax competitiveness, Croatia takes tourism into account as a strategic economic sector and applies a reduced VAT rate of 13% for accommodation services and catering. Besides tourism, export is also important, but in its case, VAT is neutral, meaning it is not charged on exports. In addition to the few cases where reduced VAT rates of 5% or 13% are applied, the entire economy operates with almost the highest VAT rate in the European Union. Since neighbouring Slovenia has a VAT rate of 22% and Bosnia and Herzegovina has 17%, prices in their stores can and are lower than in Croatian stores.

Of course, given that price differences between Croatia and neighbouring countries have recently deviated significantly to the detriment of Croatia, the price differences cannot be explained solely by VAT rate differences, but VAT is undeniably one of the causes. Considering the layout of Croatian territory and the relative proximity of all parts of Croatia to neighbouring countries, it is possible to purchase products in neighbouring countries. In this regard, Croatia is also competing with Austria (20%) and Italy (22%), which are not immediate neighbours. For more expensive products, such as cars, it is cost-effective to travel to more distant countries such as Germany with a VAT rate of 19% or further. Due to the high VAT rate in Croatia, it is likely that the Laffer curve concept would apply, meaning that reducing the tax rate could lead to an increase in tax revenue.

4. CONCLUSION

Value Added Tax (VAT) is the "gem in the crown" of the Croatian tax system. The revenue generated from it not only constitutes the largest portion of tax income in Croatia but also makes VAT the most significant tax in relation to all fiscal systems within the European Union. With a share of 36% of total tax revenue in Croatia, or 13.1% of GDP, Croatia ranks first in the EU in terms of the importance of VAT revenue. Following the stabilization of the economy after exiting years of recession, particularly post-COVID-19 pandemic, VAT revenues began to grow significantly, giving VAT even greater importance. Since Croatia applies one of the highest standard VAT rates in the European Union, it is essential to reduce the significance of VAT by lowering the standard tax rate, while simultaneously strengthening other taxes, particularly direct taxes such as income tax and corporate tax. The reasons justifying the need to reduce the significance of VAT are as follows:

- Stable economic conditions and the need for fiscal policy adjustment
- VAT indirectly becomes one of the generators of inflation
- Reduced fiscal competitiveness due to high VAT rates
- Decreasing tax evasion and the shadow economy.

With these fiscal adjustments, Croatia would increase the resilience and fairness of its tax system and align more closely with the characteristics of tax systems in developed countries. A balanced tax system is one of the key prerequisites for creating a conducive environment for entrepreneurship development.

LITERATURE:

1. Croatian National Bank. (2025). *Main macroeconomic indicators*. Retrieved 22.02.2025 from https://www.hnb.hr/statistika/glavni-makroekonomski-indikatori>.
2. Croatian National Bank. (2025). *Credit rating of the Republic of Croatia*. Retrieved 22.02.2025 from https://www.hnb.hr/-/rejting-rh.
3. Eurostat. (2025). *Questionnaire NTL - Detailed list of taxes and social contributions according to national classification.* Retrieved 21.02.2025 from https://ec.europa .eu/eurostat/web/main/search/-/search/estatsearchportlet_WAR_estatsearchportlet_IN STANCE_bHVzuvn1SZ8J?p_auth=ckTtapTz&_estatsearchportlet_WAR_estatsearchportl et_INSTANCE_bHVzuvn1SZ8J_text=Tax+revenue+statistics.
4. Friedman, M.. (1992). *Kapitalizam i Sloboda (Capitalism and Freedom)*. Zagreb: Globus, Školska knjiga.

5. Ministry of Finance, Republic of Croatia. (2024). *State Budget 2023, Annual Report on the Execution of the State Budget of the Republic of Croatia for 2023, Revenues and Expenditures According to the Economic Classification*. Retrieved 22.02.2025 from https://mfin.gov. hr/proracun-86/drzavni-proracun-2023-godina/3369.
6. Ministry of Finance, Republic of Croatia. (2024). *Amendments and Supplements to the State Budget for 2024*. Retrieved 22.02.2025 from https://mfin.gov.hr/UserDocsImages//dokumenti/Informacije_za_gradane//Vodi%C4%8D%20za%20gra%C4%91ane%20-%20Rebalans%20 2024.pdf?.
7. Smith, A. (2007). *Bogatstvo Naroda (Wealth of nations), Istraživanje prirode i uzroka bogatstva Naroda*. Zagreb: Poslovni dnevnik, Masmedia.
8. Tax Administration. (2025). *Overview of the number of income tax taxpayers categorized by tax brackets from 2017 to 2022 according to local government units*. Retrieved 21.02.2025 from https://www.porezna-uprava.hr/porezna_konkurentnost_bi/Stranice/Godi%c5%a1nji-obra%c4%8dun-poreza-na-dohodak.aspx.
9. Tax Administration. (2025). *Tax revenues*. Retrieved 21.02.2025 from https://www.porezna-uprava.hr/porezna_konkurentnost_bi/Stranice/Udio-poreznih-prihoda-u-BDP-u.aspx.
10. Tax Administration. (2024). *Taxation of consumption*. Retrieved 22.02.2025 from https://www.porezna-uprava.hr/porezna_konkurentnost_bi/Stranice/oporezivanje_potrosnje.aspx.

DIGITAL TRANSFORMATION AS A STARTING POINT FOR SOLVING THE CHALLENGES OF SOCIETY 5.0

Jarmila Vidova
University of Economics in Bratislava,
Dolnozemská cesta 1, Bratislava, Slovakia
jarmila.vidova@euba.sk

ABSTRACT
Understanding the processes of evolution of human civilization is an important key to understanding where the current civilization is headed. An important element in the development of society is innovation and the ability of society to adapt to it. The changing nature of society brings new and broader possibilities for using innovations. One area that has been the focus of attention for a long time is the ICT sector, on which the further development of society also depends, since other sectors are also dependent on it. The ICT sector contributes to economic growth. In connection with digitalization, even employees in traditional industries or agriculture are forced to use information and almost all areas of work are interconnected with information. New job opportunities are being created, the number of less qualified jobs is decreasing and a larger number of jobs dependent on information processing are being created. Society is no longer national, but global in nature, and the result is the creation of a global information society. The demand for IT specialists is closely linked to the development of ICT. To keep up with this demand, it is crucial to ensure quality ICT education, to support people in developing digital skills and to be able to adapt to rapidly changing labour market conditions. In this section, we focus on innovation, Industry 4.0, and innovation in education systems to respond to current and future societal challenges. However, around 42% of Europeans lack basic digital skills, including 37% of those in employment. That is why the EU is investing in training programmes for Europeans and in broadening the talent pool in Europe.
Keywords: *Digitalization, Industry 4.0., Society 5.0*

1. INTRODUCTION

The development of society is influenced by various new innovations, which are either accepted or rejected. However, innovations should be perceived as a factor whose purpose is in most cases to make work easier, help with competitiveness and currently solve more serious problems related to saving resources. Schumpeter considers innovations to be the most significant factor that has influenced economic development and business activities. According to Joseph Schumpeter, innovations are the core of competition and offer the opportunity to change not only technology and products, but also affect the structure of demand, the conditions for cost formation, and prices. (Śledzik, 2013, Vidová, 2015). Innovations change the character of society, bringing new and broader possibilities for their use in real life. They affect employment in traditional sectors of industry or agriculture, where, thanks to innovations and digital technologies, work is being transferred to the area of working with information.

2.TECHNOLOGIES, DIGITAL TRANSFORMATION AND EXPANDING INNOVATION POTENTIAL

In the broadest sense, the word digitalization is associated with the introduction of new digital technologies into life. It is focused on the implementation of digital technologies into business processes. From a business perspective, it means the digitization of a specific area, process, or the creation of a digital workplace. The effort to create such a workplace also includes the support of new technologies for employees, which include mobile devices, social collaboration, various communication and management platforms.

Digitalization tracks and stores information and data about tasks and activities, creating a record that can be analyzed and that provides opportunities for improving processes, work organization, and predictions about the future (Agrawal et al., 2018). The ability to digitally model the analog world has unleashed a wave of innovation. Digital technologies include the Internet of Things, blockchains, additive manufacturing, big data, artificial intelligence (AI), cloud computing, and augmented and virtual reality (Ciarli, T., et. al., 2021, Vidová, 2019, Islam, 2018). The rise of Industry 4.0 has led to a greater focus on digitalization, data collection, and system connectivity. Industry 4.0 is about changing technological and economic processes through the use of cyber-physical and multi-agent systems, artificial intelligence, and the Internet of Things. Posada et al. (2015) and Roblek et al. (2016) identified five elements of Industry 4.0: digitalization, optimization, and personalization of production; automation and adoption; human-machine collaboration; value-added services; and storage and automatic exchange of data and communication. Zezulka et al. (2016) identified three interrelated factors of Industry 4.0, namely digitalization and network integration, digitalization of products and services, and new market models. In digitalization, traditional products are replaced by digital products, or at least digital functions are added (Prem 2015). Digitalization thus goes beyond products, affecting the business model, the organization of the company, management systems, and entire value chain processes (Bleicher – Stanley 2018). According to Vial (2019), digitalization refers to the use of digital technologies, such as computing, communication, and connectivity technologies, to support organizational change.

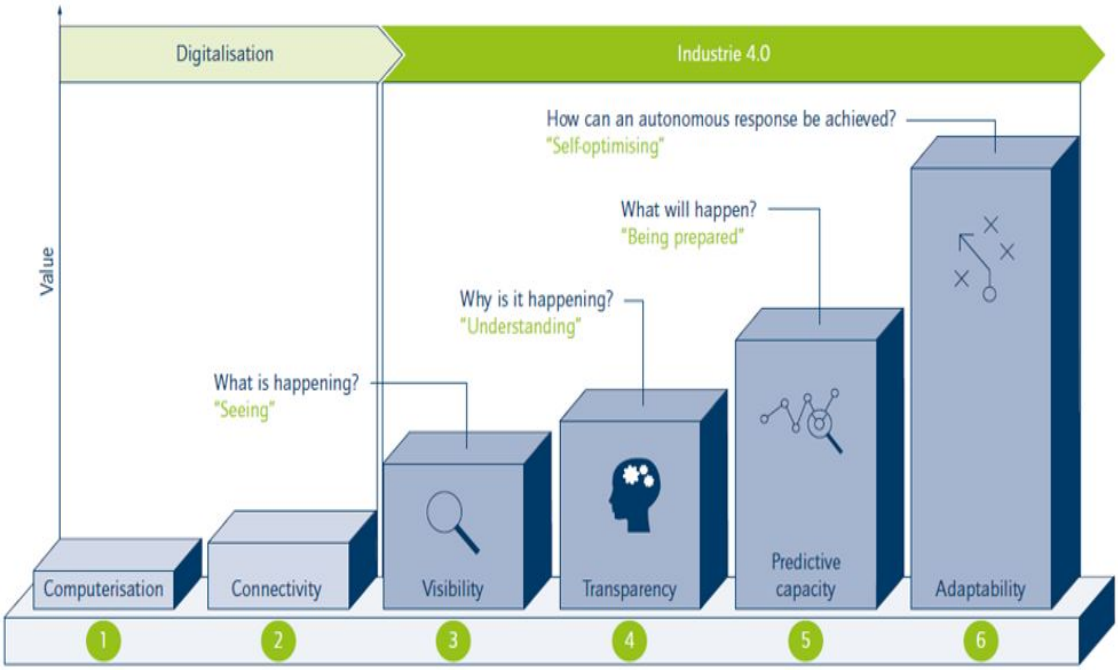


Figure 1: Industry-Maturity-Index: Stage in the Industry 4.0. development path (Source: Ignatov – Korolev (2019)

Digital technologies are penetrating and restructuring all aspects of economic and social activities. In some areas, they disrupt existing activities, in others, they have a greater impact and complement existing activities. In some cases, they replace existing technologies and tasks, but in others they complement each other. Sometimes they lead to the creation of new services, innovations, or business opportunities. They also have a significant impact on the labor market.

The impact of digitalization has extensive interaction with other areas, an example of which is that innovations are gradually moving from industrial sectors to areas of everyday life, which is the meaning of Society 5.0. Society 5.0 as a new concept is focused on people, satisfying their needs and affects almost all industrial sectors, entities of society that use the innovations of Industry 4.0 and other innovative technologies. The goal is to support economic development, respond to new socio-economic challenges, support education, and create new jobs. Expanding innovation potential is essentially the foundation of digital transformation. Digital transformation is a complex and extensive process in which existing or even new business processes are either digitally modified or created to effectively meet changing business and market requirements. It requires significant reengineering of processes to become digital and redesigning customer experiences to match the digital environment. Digital transformation also refers to the use of digital technologies to increase productivity and social well-being. Digital transformation offers people new opportunities by creating entirely new jobs (Bloomberg, 2018) and we can use new product innovations in real life.

If economic entities want to be competitive, they must respond effectively and quickly to the changes brought by the advent of digital technologies (Lindqvist - Pettersson, 2019, Parviainen, et. al., 2017, Vidová, 2023, OECD, 2018). As we have mentioned, Industry 4.0 consists of changes in technological and economic processes in connection with the use of cyber-physical and multi-agent systems, artificial intelligence and the Internet of Things. The high degree of convergence between virtual and physical space can be used in addition to industry gradually in everyday life, by using innovative human-centered technologies, which is the essence of Society 5.0. Optimization of interactions in the human-machine relationship will benefit from the added value that people bring to production processes.

Industry 4.0 complements and extends Industry 5.0, which highlights aspects, not only economic or technological, that will be decisive for the place of industry in the future European society, but also environmental and social. Industry 5.0 is an ideology of future industrial development aimed at harnessing the creativity of human beings in combination with efficient, intelligent and precise systems. These changes at the industrial level and in relation to technological innovation require a reassessment of the role of industries and their position and role in society (Xu, et. al., 2021). In order for industry to continue to bring prosperity to Europe, it must now become an accelerator and agent of change and innovation (European Commission, 2022). All these facts make it necessary to expand investments in information and communication technologies (ICT).

This is associated with a strong dependence on IT elements, changing values of human lifestyle, overload and dependence on information. Investment in ICT leads to increased labour productivity and has a positive impact on economic growth. The ICT sector is the fastest growing in the last decade. According to the R&D Investment Assessment Report, in 2023, €141 billion more was invested in the development of new products and technologies in the European Union than in 2021. Investments were mainly directed to four sectors: ICT manufacturers, ICT services, healthcare and the automotive industry, which account for more than three quarters of total R&D investment (R&D Investment Assessment Report). The European Commission has been monitoring the progress and level of development of digital competitiveness in individual member states since 2014 using the Digital Economy and Society Index (DESI). It uses a combination of 33 indicators in the main dimensions/areas of measurement. Compared to previous years, when the European Commission measured the level of development of digitalization in five areas, the EC made changes to the index regarding individual indicators, but also reduced the number of areas for the monitored indicators.

These are now structured into four main areas of the Digital Compass, human capital, connectivity, digital integration and digital public services. In the area of digital integration, around 43% of Slovak SMEs have at least a basic level of digital intensity, which is below the EU average of 55%.

Slovakia is just below the EU average in terms of the use of artificial intelligence in enterprises (5% compared to 8%) and the use of cloud services at a medium and demanding level reaches 31% (EU 34%). The share of enterprises using big data analysis is at 6% (EU average 14%). In 2021, 76% of Slovak enterprises used information and communication technologies for more environmentally friendly measures (EU average 66%). In graph no. we show the share of SMEs in the European Union with at least a basic level of digital intensity.

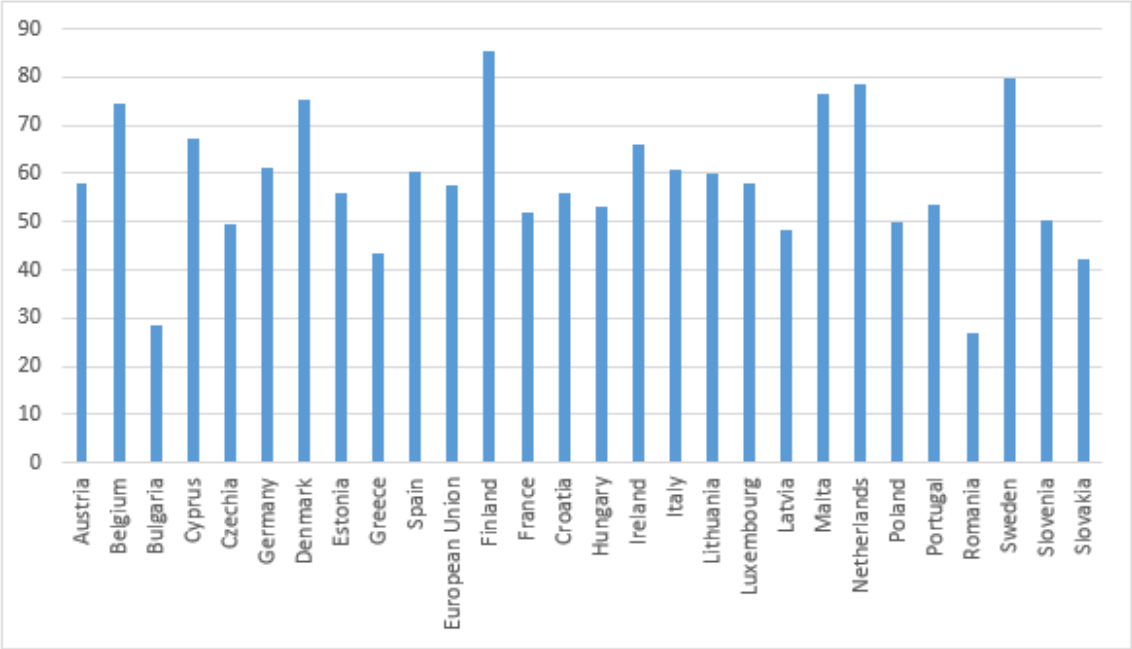


Figure 2: SMEs with at least a basic level of digital intensity (DII v3, available years: 2021 and 2023) %. (Source: Processed on data DESI. 2024.)

The information and communication technology (ICT) sector is also one of the most stable pillars of the national economy in Slovakia. It contributes significantly to the state budget, not only through income taxes, but also through contributions and high added value. In 2023, it accounted for up to 4.5% of Slovakia's gross domestic product, and it is essential that this share continues to increase.

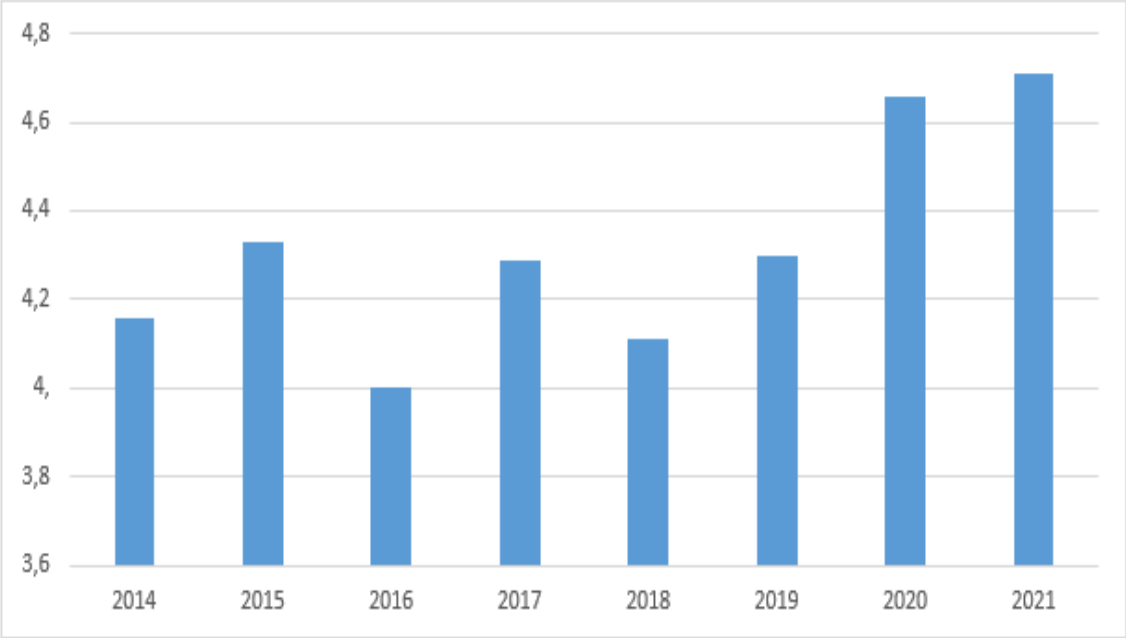


Figure 3: Percentage of the ICT sector in Gross value added in Slovakia. (Source: Processed on data DESI. 2024.)

3.DIGITAL SKILLS AND LEVEL OF DEVELOPMENT OF DIGITAL COMPETITIVENESS

The development of ICT is closely linked to the demand for IT specialists, especially in areas such as artificial intelligence, cloud, cybersecurity and data processing. To keep up with this demand, it is crucial to ensure high-quality ICT education, support people in developing digital skills and also in their ability to adapt to rapidly changing labour market conditions. On current trends, the number of ICT professionals in the EU will be around 12 million in 2030, with a persistent gender imbalance. To achieve the goals, Member States should apply a multifaceted approach to promoting digital skills at all levels of education and to motivate young people, especially girls, to take an interest in science, technology, engineering and mathematics (STEM) disciplines.

The ICT sector in Slovakia employs around 60,000 people, representing 3% of all employees. However, the problem is the lack of qualified workers and the stagnation of the digitalization of public administration, because when introducing automation systems, IT specialists for the management of communication or computing technology, specialists in the field of database systems and computer networks, or software developers are needed in corporate departments, which allows for development and work in positions with higher added value, while machines take over simpler repetitive tasks. There is currently a shortage of up to 17,000 IT professionals on the labor market. It is expected that the demand for these workers will increase by another 22% by 2035. However, we need new skills in the field of digital literacy for these new positions.

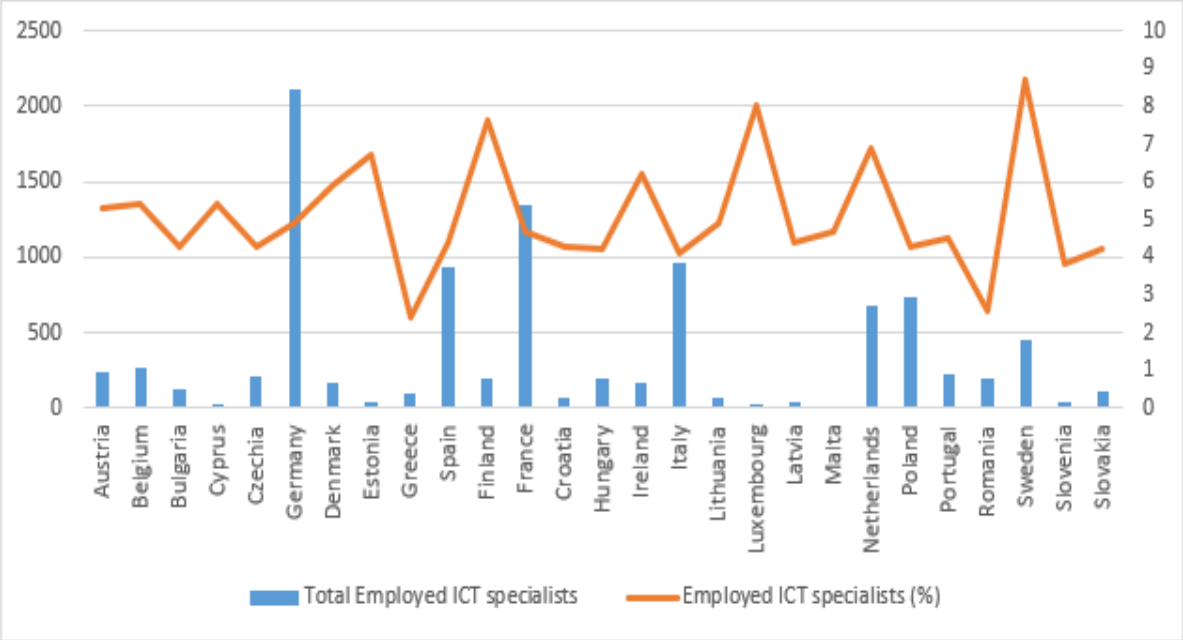


Figure 4: ICT specialists in European Union - Total DESI 2024 4MEs with at least a basic level of digital intensity (DII v3, available years: 2021 and 2023) %. (Source: Degital Decade Strategy. https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/

Note: ICT specialists: Employed ICT specialists. Broad definition based on the ISCO-08 classification and including jobs like ICT service managers, ICT professionals, ICT technicians, ICT installers and servicers.

Digital skills are a necessity for all of us in the 21st century. Without sufficient orientation in the digital world, it is very difficult to succeed. Currently, the digital skills targets set in the Digital Decade are far from being achieved, with only 55.6% of the EU population having at least basic digital skills. In Europe, more than 90% of jobs require a basic level of digital knowledge, as well as basic reading and numeracy skills. Digital technologies enable the creation of new value through the sophisticated use of data. The transition to a "super-intelligent society" is accelerating. An important component is an information literate individual who is ready to use information resources at work and uses a wide range of information techniques and tools to solve problems. An essential component of information literacy is the cognitive aspect, i. e. understanding information; intellectual processing of information; intellectual integration of information into one's cognitive structure and active use of information (Bawden, 2001). The DESI 2022 report finds that all EU Member States have improved their digital performance, but there are still significant gaps between the EU's top-performing Member States and those with lower DESI scores. Denmark, Finland, Sweden and the Netherlands achieved the highest scores and are among the global leaders in digitalization. Slovakia ranked 22nd in DESI 2021 and 23rd in 2022. In its DESI 2021 report on Slovakia, the EC notes that while Slovakia is making progress, progress is not fast enough compared to other EU Member States. Slovakia is just below or around the EU average in human capital indicators. 55% of Slovaks have basic digital skills, slightly above the EU average (54%). However, only 21% of Slovaks have advanced digital skills, below the EU average of 26%. Even a large part of the EU population still lacks basic digital skills, even though most jobs require such skills.

In this context, it is also necessary to focus on educational policy, especially IT education, because in this segment the need for new workers will increase by up to 50%. It is therefore important to adapt the knowledge and skills of young people aged around 15 to the new conditions, because the jobs they can go to after school will already be automated. Human power will generally be "saved" for more qualified work with higher added value (Prognóza vývoja trhu práce v SR (do roku 2030) – v čom sa oplatí podnikať? 2023). As we have seen, the use of digital technologies is expanding in all sectors from business to transport and even agriculture. To increase digital skills, the EU is investing in training programs for Europeans and to broaden the talent pool in Europe so that we can confidently shape our future in the digital world. The Skills Agenda for Europe aims to help individuals and businesses develop skills and use them to strengthen sustainable competitiveness. The Digital Education Action Plan (2021-2027) is a renewed policy initiative of the European Union (EU) aimed at supporting the sustainable and effective adaptation of EU Member States' education and training systems to the digital age. The Digital Education Action Plan offers a long-term strategic vision for inclusive, accessible and high-quality European digital education. To achieve the objectives of the Action Plan, two priority areas are set out: supporting the development of a high-performance digital education ecosystem and strengthening digital skills and competences relevant for the digital transformation.

	Slovakia			EU	EU
	DESI 2021	DESI 2022	DESI 2023	DESI 2023	2030 target
1a1 Internet use	**88%**	**87%**	**88%**	**89%**	
% individuals	2020	2021	2022	2022	
1a2 At least basic digital skills	**NA**	**55%**	**55%**	**54%**	**80%**
% individuals		2021	2021	2021	
1a3 Above basic digital skills	**NA**	**21%**	**21%**	**26%**	
% individuals		2021	2021	2021	
1a4 At least basic digital content creation skills	**NA**	**72%**	**72%**	**66%**	
% individuals		2021	2021	2021	
1a5 Enterprises providing ICT training	**16%**	**16%**	**15%**	**22%**	
% enterprises	2020	2020	2022	2022	
1b1 ICT specialists	**4.2%**	**4.3%**	**4.3%**	**4.6%**	**20 million**
% individuals in employment aged 15-74	2020	2021	2022	2022	~10%
1b2 ICT graduates	**3.9%**	**4.4%**	**4.4%**	**4.2%**	
% graduates	2019	2020	2021	2021	

Figure 5: Digital skills Slovakia – EU. (Source: DESI.2024)

The share of enterprises providing ICT training to their employees is 16%, compared to the EU average of 20%. The share of information and communication technology (ICT) professionals in the total number of employees is 4.2%, which is just below the EU average (4.3%). Sixteen percent of ICT professionals are women, the EU average is 19%. Slovakia's e-commerce score has decreased: 13% of small and medium-sized enterprises (SMEs) sell online, compared to 17% in 2020. In 2020, 16% of Slovak enterprises used e-invoices, compared to 32% in the EU. Slovakia is below the EU average in digital public services indicators. The share of e-government users among internet users has decreased to 62%, below the EU average of 64%. In the European Union as a whole, 87% of people (aged 16-74) used the internet regularly in 2021. The path is for at least 80% of citizens to have basic digital skills by 2030.

Individuals with ‘basic’ or ‘above basic’ digital skills are monitored in five competences.1. Information and data literacy: Finding information about goods or services; Seeking health-related information; Reading online news sites, newspapers or news magazines; Activities related to fact-checking online information and its sources. 2. Communication and collaboration: Sending/receiving emails; Telephoning/video calls over the internet; Instant messaging; Participating in social networks; Expressing opinions on civic or political issues on websites or in social media; Taking part in online consultations or voting to define civic or political issues. 3. Digital content creation: Using word processing or spreadsheet software; Editing photos, video or audio files; Copying or moving files (such as documents, data, images, video) between folders, devices (via e-mail, instant messaging, USB, cable) or on the cloud; Creating files incorporating several elements such as text, picture, table, chart, animation or sound; Using advanced features of spreadsheet software (functions, formulas, macros and other developer functions) to organize, analyse, structure or modify data; Writing code in a programming language. 4. Safety: Managing access to own personal data by checking that the website where the respondent provided personal data was secure, reading privacy statements before providing personal data, restricting or refusing access to own geographical location, limiting access to profile or content on social networking sites or shared online storage, refusing allowing use of personal data for advertising purposes, changing settings in own internet browser to prevent or limit cookies on any of the respondent devices. 5. Problem solving: Downloading or installing software or apps; Changing settings of software, app or device; Online purchases; Selling online; Used online learning resources; Internet banking; Looking for a job or sending a job application.

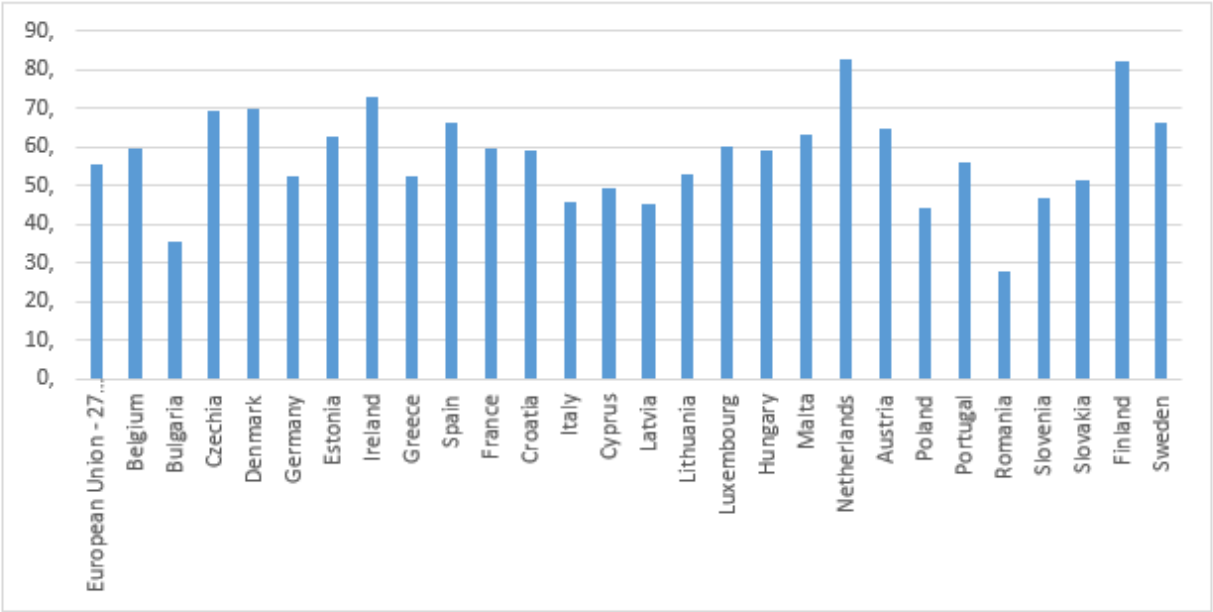


Figure 6: Individuals with basic or above basic overall digital skills 2023 (all five component indicators are at basic or above basic level). (Source: Degital (Source: Processed on data DESI. 2024.)

In addition to the DESI Index, the level of digital skills in Slovakia has been measured since 2009 through the IT Fitness Test. It was created in 2009 as part of the European Commission's initiative "eSkills Week". Slovak residents and primary and secondary school students from all over Slovakia participated in the testing.

The testing is part of the European Commission's campaign "Digital Skills and Jobs Coalition". The 2020 testing measured students' interest in studying information technology. 50.92% of primary school students and 51.12% of secondary school students responded positively. The Figure 7 shows the success of testing respondents by age category.

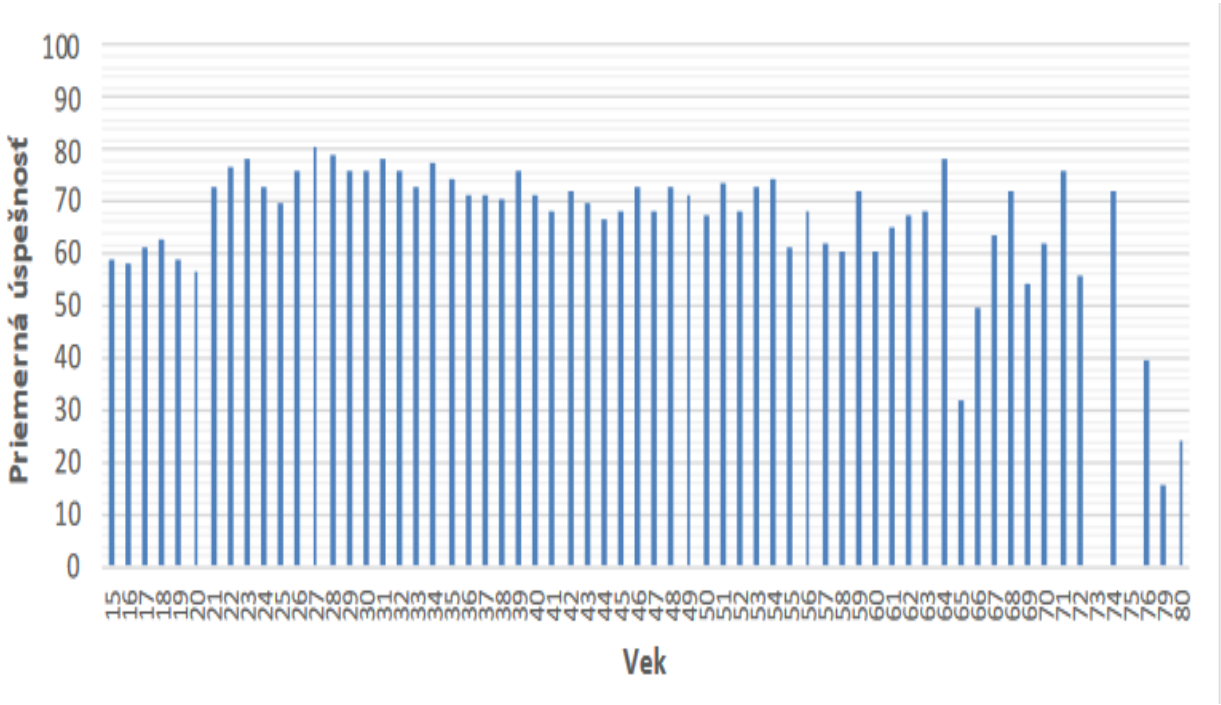


Figure 7: Respondents' success rate by age category. (Source: Záverečná správa IT Fitness test 2020. ITAS.

Based on the results of the last year of testing, the National Coalition for Digital Skills and Occupations of the Slovak Republic concluded that in Slovakia, but also in neighboring countries, students are significantly lagging behind in the area of working with office tools, understanding tables, graphs, and reading comprehension.

4. CONCLUSION

However, there are still many challenges with the digital transformation. The digital world should be based on European values, freedom, protection, and justice. The digital society and digital technologies bring with them new ways of learning, having fun, working, exploring, and fulfilling ambitions. They also bring new freedoms and rights and give EU citizens the opportunity to reach out beyond physical communities, geographic locations, and social positions. Technology must become part of our lives without interfering with our quality of life. A human-centered approach means that we must rethink the way we design technology, focusing on human support, use, and benefit. No one knows for sure what new technologies will emerge, what new industries will materialize, and what skills will be in high demand. What we do know is that the future will be radically different from today's work environment and the pace of change will be faster than anyone expects. Increasing the level of digital skills of the population and mitigating the negative impacts of technology and digitalization on society is a prerequisite for managing the specific challenges of Society 5.0. Employers will have to prepare for this situation in particular, as they will have to focus on innovating their products and services tailored to individual needs, which is in line with the concept of Society 5.0.

Programmers for artificial intelligence and software development, statisticians and data analysts, for data analysis, or workers for creative tasks that can be partially automated will therefore be increasingly sought after. To build the EU's strategic and digital capacities and facilitate the broad deployment of digital technologies, the European Commission, under the Digital Europe Program, supports investments in cloud, data, artificial intelligence, advanced digital skills and in accelerating the best use of technologies. Digitalization has been at the heart of recent government reforms and is also planned in the Slovak Republic. In addition to the Digital Transformation Action Plan of Slovakia for 2023-2026, the National Digital Skills Strategy of the Slovak Republic and the Action Plan 2023-2026, Slovakia has published the Smart Cities and Regions Plan 2023-2026 and the National Research & Development and Innovation Strategy 2030 for a better quality of life. The implementation of these strategies should support Slovakia's digital transformation, as it still lags behind the EU average in all key performance indicators of the Digital Decade. Education, innovation and collaboration are key pillars for building a digital ecosystem and a competitive one. In this era of rapid technological change, the development of digital skills is essential, which will allow us not only to respond to current challenges, but also to fully exploit the potential of digital technologies.

ACKNOWLEDGEMENT: *The contribution is the output of the VEGA research grant no. 1/0226/23 "Socio-economic challenges and opportunities related to aging policy to ensure sustainable economic growth and innovation."*

LITERATURE:

1. Agrawal. A. et al. (2018). Prediction Machines: The Simple Economics of Artificial Intelligence. Harvard Business Review Press, p. 250.
2. Bawden, D. 2001. Information and digital literacies: a review of concepts. In Journal of Documentation, 57 (2001), č. 2 Retrieved from: <http://arizona.openrepository.com/arizona/bitstream/10150/105803/1/bawden.pdf>.
3. Bleicher, J. – Stanley, H. (2018): Digitization as a Catalyst for Business Model Innovation A Three-Step Approach to Facilitating Economic Success. Journal of Business Management 4(2): 62–71.
4. Bharadwaj, A.; El Sawy, O.A.; Pavlou, P.A.; Venkatraman, N. Digital Business Strategy: Toward a next generation of insights. MIS Q. 2013, 37, 471–482.
5. Bloomberg, J. Digitization, Digitalization, And Digital Transformation: Confuse Them at Your Peril. 2018. Retrieved from: https://moniquebabin.com/wp-content/uploads/articulate_uploads/Going-Digital4/story_content/external_files/Digitization%20Digitalization%20and%20Digital%20Transformation%20Confusion.pdf
6. Ciarli, T., & Kenney, M., & Massini, S., & Piscitello, S. (2021). Digital technologies, innovation, and skills: Emerging trajectories and challenges. *Research Policy*, vol. 50, iss. 7. [online]. Retrieved from: https://doi.org/10.1016/j.respol.2021.
7. Ignatov, A. – Korolev, P. (2019). The Global Energy Association and the perspectives of future development of the energy sector within the Fourth Industrial Revolution. IOP Conference Series Earth and Environmental Science 390(1):012052. DOI:10.1088/1755-1315/390/1/012052
8. Islam, I. (2018). Automation and the Future of Employment: Implications for India. South Asian Journal of Human Resources Management, 5 (2), pp. 234–243. [online].. Retrieved from: https://doi.org/10.1177/2322093718802972
9. Lindqvist, M.H.; Pettersson, F. Digitalization and school leadership: On the complexity of leading for digitalization in school. Int. J. Inf. Learn. Technol. 2019, 36, 218–230.

10. Parviainen, P.; Tihinen, M.; Kääriäinen, J.; Teppola, S. Tackling the digitalization challenge: How to benefit from digitalization in practice. Int. J. Inf. Syst. Proj. Manag. 2017, 5, 63–77.
11. Posada, J. – Toro, C. – Barandiaran, I. – Oyarzun, D. – Stricker, D. – de Amicis R, V. I. (2015). Visual Computing as a Key Enabling Technology for Industry 4.0 and Industrial Internet. IEEE Computer Graphics and Applications 35(2): 26–40.
12. Prem, E. (2015): A Digital Transformation Business Model for Innovation. ISPIM Innovation Summit. Brisbane.
13. Roblek, V. – Mesko, M. – Krapez, A. (2016): A Complex View of Industry 4.0. SAGE Open 6(2).
14. Śledzik K., (2013), Schumpeter's view on innovation and entrepreneurship (in:) Management Trends in Theory and Practice, (ed.) Stefan Hittmar, Faculty of Management Science and Informatics, University of Zilina & Institute of Management by University of Zilina.
15. Vial, G. (2019): Understanding Digital Transformation: A Review and a Research Agenda. Journal of Strategic Information Systems 28(2): 118–144.
16. Vidová, J. (2015. Investície a inovácie v ekonomike: vybrané problémy. 1. vyd. Bratislava: Vydavateľstvo EKONÓM, 2015. 275 s. ISBN 978-80-225-4091-9.
17. Vidová, J. (2019). Digital Revolution and Labor Market. Vplyv Industry 4.0 na tvorbu pracovných miest 2019. In: Proceedings of Scientific Papers from the International Scientific Conference. Trenčín: Trenčianska univerzita Alexandra Dubčeka v Trenčíne, 2020, , 440 – 447. ISBN 978–80–8075–903–2.
18. Vidová, J. 2023. Digital technologies and energy efficiency. Medzinárodná vedecká konferencia „VÝZVY, TRENDY A INŠPIRÁCIE NA TRHU PRÁCE 2022". ISBN: 978-80-8075-985-8. Retrieved from: https://fsev.tnuni.sk/konferencia2022/Zbornik.pdf.
19. Zezulka, F. – Marcon, P. – Vesely, I. – Sajdl, O. (2016): Industry 4.0 – An Introduction in the Phenomenon. IFAC-PapersOnLine 49(25): 8–12.
20. Akčný plán digitálneho vzdelávania. Retrieved from: https://education.ec.europa.eu/sk/focus-topics/digital-education/action-plan.
21. Európsky program v oblasti zručností. Retrieved from: https://ec.europa.eu/social/main.jsp?catId=1223&langId=sk.
22. Druhá správa o stave digitálneho desaťročia. 2024.
23. Industry 5.0, a transformative vision for Europe. 2022. ISBN 978-92-76-43352-1.
24. Hodnotiaca správa investícií do výskumu a vývoja**.** 2023.
25. OECD. (2018). Good Jobs for All in a Changing World of Work: The OECD Jobs Strategy; OECD Publishing: Paris, France, 2018; p. 391.
26. Koalícia pre digitálne zručnosti a pracovné miesta. Retrieved from: https://digital-strategy.ec.europa.eu/sk/policies/digital-skills-coalition.
27. MIRRI. Retrieved from: https://www.mirri.gov.sk/sekcie/informatizacia/jednotny-digitalny-trh/index-digitalnej-ekonomiky-a-spolocnosti/index.html.
28. Prognózy vývoja trhu práce v SR (do roku 2030) – v čom sa oplatí podnikať?

IMPACT OF ENTREPRENEURSHIP ON REGIONAL DEVELOPMENT IN SLOVAKIA

Natalia Pozsonyiova
University of Economics in Bratislava, Dolnozemská cesta 1, Bratislava, Slovakia
natalia.pozsonyiova@euba.sk

ABSTRACT

Entrepreneurship in regional development has gained considerable significance in recent years. There has been a significant shift during last years in regional and economic development strategies, moving the focus from large corporations to smaller start-ups. These start-ups have become integral to many nations' economies, particularly as their prevalence has surged globally, including in Slovakia. Consequently, evaluating the impact of entrepreneurship on regional development and overall economic growth has become increasingly relevant. Slovakia has historically exhibited uneven regional development, with the western region, particularly around the capital, being more advanced than the eastern regions. Entrepreneurship, by influencing employment rates and GDP, can play a crucial role in bridging this developmental gap. Thus, assessing the impact of entrepreneurship on regional development in Slovakia is of primary importance. We have introduced two models: the first assesses the impact of entrepreneurship on real GDP, and the second examines its effect on the unemployment rate. The evaluation was conducted at the NUTS 3 classification level, considering factors such as the number of new businesses, self-employment rates, population density and the proportion of tertiary-educated individuals, given that R&D can significantly influence entrepreneurial emergence. We have evaluated the two models using data from the Statistical Office and Finstat, covering the period from 2012 to 2022. The results indicate that entrepreneurship positively affects both GDP and the unemployment rate in Slovakia. Therefore, devising strategies to support emerging businesses can substantially influence the country's future development and mitigate the difference between the developed western region and other parts of Slovakia.

Keywords: *entrepreneurship, real GDP, regional development, unemployment rate*

1. INTRODUCTION

The impact of entrepreneurship on regional development has been studied by many authors. In the past, there was not usually a connection between small enterprises or start-ups and regional development. Older regional theories connected development in a region with larger companies and did not assign the smaller companies any significant impact. Nowadays the importance and influence of entrepreneurs seem to have grown in a large number on importance. Many authors have been studying the impact of entrepreneurs on development and we shall mention some of them. Kasseah (2016) has studied the impact of entrepreneurship based on data from the World Bank Group Entrepreneurship survey and World development indicators while controlling for other factors that can have an impact on economic development. He found out that entrepreneurship positively impacts economic development at the regional level, even after accounting for other factors. Sternberg (2009) has used empirical analysis of regional variations in entrepreneurial activity and used regional or local-level data to examine the geographic nature of entrepreneurship. Based on the spatial analysis techniques he used to examine the clustering of entrepreneurial activity and its economic impacts he found out that entrepreneurship is a regional phenomenon that has become increasingly important for regional growth and development. Baumgartner (2014) has identified types of entrepreneurship that improve regional activity through innovation, social capital, and institutional change.

According to the study regional policies also influence entrepreneurial activities to influence regional development but the approach should be more territorial. Zygmunt (2015) has focused on regional development in Poland and based on the rate of new enterprises formation proxied by the number of newly registered entities by the National Business Register he stated that entrepreneurship is a factor that can foster regional development. What is the influence on starting the entrepreneurship? Based on authors like Audretsch et. al (2013), has introduced a „Knowledge Spillover theory of entrepreneurship“ which states that new enterprises emerge with the influence of the existence of R&D centres. As they stated a high level of R&D activity increases opportunities to start new knowledge-based start-ups. Some authors like Dvouletý et al. (2018) who have estimated the impact of entrepreneurial activity on regional development in developing countries stated that it has a negative impact. The reason is that there are two types of entrepreneurs in a country: replicative and innovative entrepreneurs and if there is a high number of replicative entrepreneurs, like in the case of developing countries, the effect on a country´s growth cannot be positive.

2. METHODOLOGY

2.1. Research aim

Based on the methodology used by Dvouletý (2017) who has examined the impact of entrepreneurship on the economic development of Czech regions, we shall apply this methodology to evaluate the entrepreneurship influence on regional development in Slovakia. We shall examine the impact of the emergence of new entrepreneurs on regional development in Slovakia based on factors like GDP per capita and unemployment rate (dependent variables) the independent variables would be newly established business companies and partnerships per capita. The other factor would be the rate of newly established self-employed per capita. The other variables would be regional activity measured by population density and share of economically active population aged 15-64 years. We shall also examine the factors that could influence the emergence of new start-ups and if R&D centres, we shall measure them by the number of tertiary educated people in each of these regions in Slovakia and if there is a coincidence between them. This variable would be measured by the percantage share of tertiary educated people per capita. We shall compare the rate of newfound entrepreneurs with the regional activity. We shall compare the 8 NUTS 3 regions in Slovakia and based on this we should see the difference in unemployment rate and GDP and the factors that influence this difference.

The two models we have introduced are based on the study by Dvouletý (2017) and have this from:

1st model

$$\log real\_GDP\_percapita_{i,t} = unemployment\_rate_{it} + population\_density_{it} + share\_econ\_act\_pop_{it} + share\_terciary\_educ\_pop_{it} + share\_newselfemployed\_percapita_{it} + share\_newcompany\_percapita_{it} + \mathcal{E}_{it}$$

2nd model

$$unemployment\_rate_{i,t} = population\_density_{it} + share\_econ\_active\_pop_{it} + share\_newselfemployed\_percapita_{it} + share\_newcompany\_percapita_{it} + \log real\_GDP\_percapita_{it} + \varepsilon_{it}$$

The aim is to estimate the impact of entrepreneurship on economic development in the form of either newly established businesses or new self-employed people. Both variables are calculated based on yearly increments and divided by the regional population as share per capita. The share of tertiary people is in % of the whole regional population of people who have achieved tertiary education and the same logic we have applied to the share of the economically active population in the % of the regional population that is economically active.

2.1.1. Data

The data for real GDP, unemployment rate, population density, share of economic active population and terciary educated population was used from the Statistical office of Slovakia for years 2012 till 2022. The data for new self-employed and new companies was retrieved from Finstat also for the years 2012 till 2022.

The overview of the summary statistics is in Table 1 below

Variable	Obs	Mean	Std. Dev	Min	Max
Real_GDP_percapita	88	16926,34	8833,72	8650,10	41273,68
Unemployment_rate	88	8,50	4,79	2,31	20,81
New_selfemployed_percap	88	0,007	0,002	0,004	0,168
New_company_percap	88	0,004	0,003	0,001	0,015
Population_density	88	133,82	73,50	65,52	353,71
Share_econ_active_pop	88	50,10	2,96	45	64
Share_terciary_educ_percap	88	11,48	4,81	6	31

Table 1: Summary statistics
(Source: elaboration in STATA)

3. RESULTS

Based on the data from the Statistical Office we have created two charts to see the situation of the regional development and compare the GDP in each of these regions. The real GDP is calculated based on constant 2015 prices in EUR and also per capita. The overview of the real GDP based on regions is in Figure 1. As we can see in the Figure 1 the Bratislavský region (BA - around the capital Bratislava) is well above the rest of Slovakia. It is evident that the western region around the capital being more developed than the eastern and the rest of Slovakia. The least developed region in terms of GDP per capita is the Prešovský region (PO) with an average annual GDP per capita of around 10000 EUR in comparison with the BA region of around 40000 EUR.

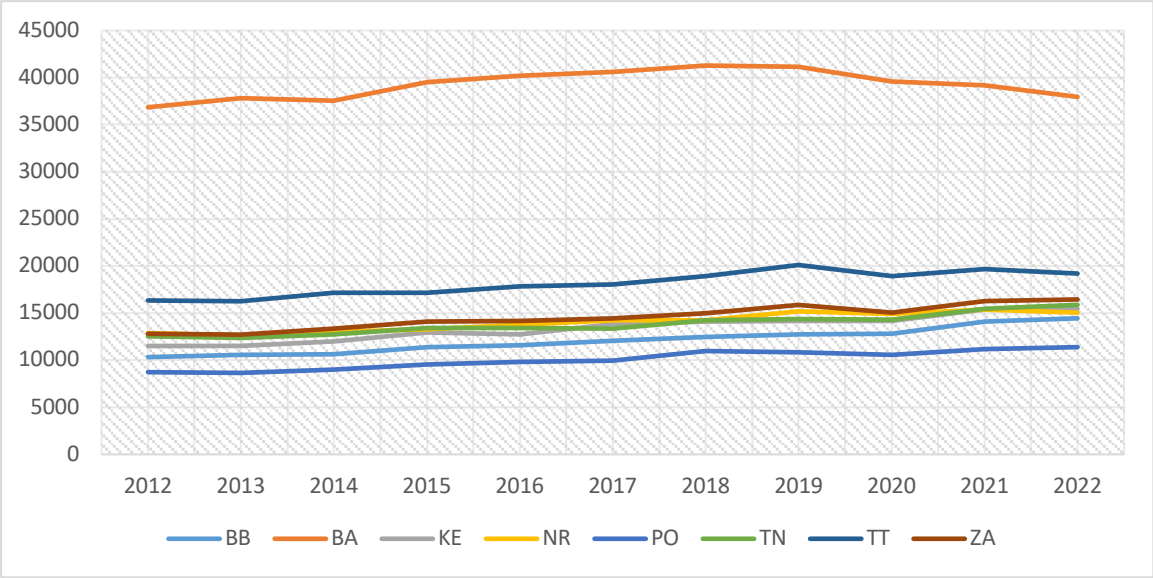


Figure 1: GDP per capita per NUTS3 region in Slovakia
(Source: based on data from the Statistical office SR)

In the next Figure 2 we have compared the unemployment rate in each region and in this case we can see two groups of unemployment rate clusters. Traditionally the eastern region has higher unemployment rates in the regions of BB (middle of Slovakia around the city of Banská Bystrica) and PO and KE (or Košický region), which is the region in the east around the second biggest city of Slovakia - Košice. The unemployment rate in the east was in year 2022 around 10% while the rest of Slovakia or the western part is around 5%.

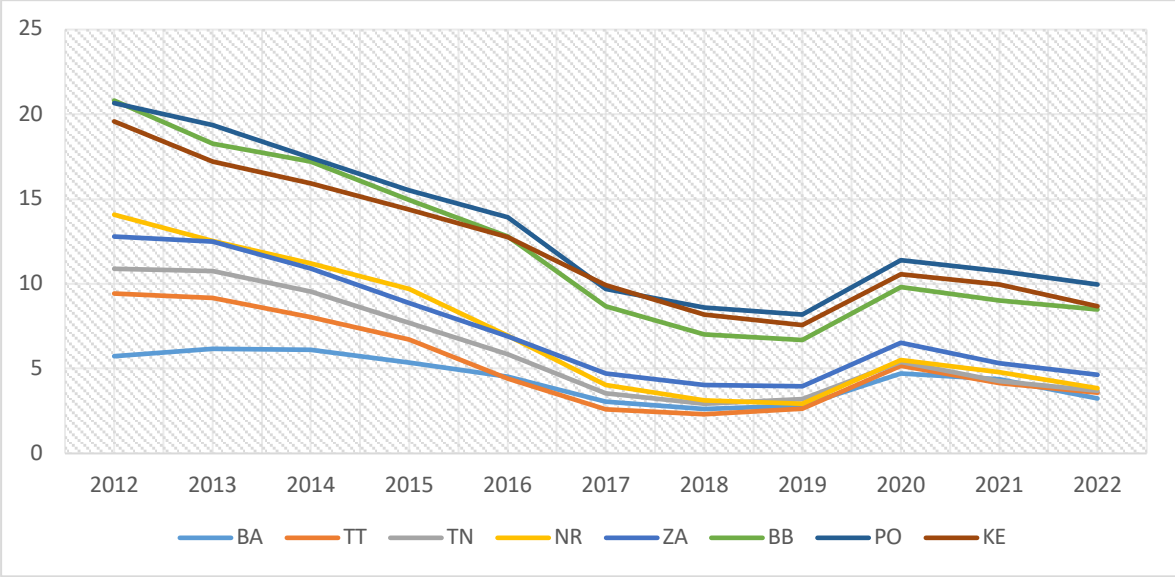


Figure 2: unemployment rate in % per NUTS3 region in Slovakia
(Source: based on data from the Statistical office SR)

To estimate the two models we have used panel data and compared both random effects and fixed effects models. Based on Hausman tests the fixed effects approach was used in both of the models. To evaluate more precisely the impact of either the new self-employed and new companies two separate versions were used. The overview of the results is in Table 2.

	Log_real_gdp_percapita		Unemployment_rate	
Dependent variable	**Ver. 1**	**Ver.2**	**Ver.1**	**Ver.2**
Population_density	0.0009(0,25)	-0,0001(0,83)	0,119(0,01)	0,023((0,58)
Unemployment_rate	0,003(0,16)	0,006(0,03)	-	-
Share_econ_active_pop	0,018(0,00)	0,023(0,00)	-0,58(0,00)	-0,656(0,00)
Share_terciary_educ_pop	-0,021(0,00)	-0,027(0,00)	-	-
Share_newselfemployed_percapita	15,95(0,00)	-	929,42(0,00)	-
Share_new companies_percapita	-	-2,83(0,58)	-	589,85(0,31)
Log_real_gdp_percapita	-	-	13,28(0,01)	29,35(0,00)
R^2	0,83	0,80	0,66	0,61
Observations	88	88	88	88

Table 2: Results of the estimations
Notes : Standard errors are in parenthesis
(Source: elaboration in STATA)

Based on the results we can see in the case of the first model that new self-employed per capita have indeed a positive impact on real GDP. All of the variables except population density are statistically significant in the model. What is however interesting is that the variable share of tertiary educated people seems to hurt economic development. The reason could be as found by research by EPALE[1] (2019) that in Slovakia tertiary educated people have a lower chance of finding a job than secondary educated people. As stated in the research it is shown in the labour market that 80% of secondary educated people have found faster a position in comparison with 63% of people with tertiary education. In Slovakia, there is also a higher share of people with a master's degree 29% compared to the OECD average which is 14%. This result seems to hurt economic development in contradiction to the assumptions presented in literature reviews.

Interestingly is also in the second version of the 1st model that the variable of share new companies is statistically not significant. In the second model with the unemployment rate as the dependent variable also just the variable of new self-employed per capita is statistically significant and the variable representing new companies is statistically insignificant.
What is also important to mention is that the unemployment rate is in positive relation to real GDP, even though the coefficient is not high (0,3%). Based on Okun's law the economic growth in a country should decrease the level of unemployment. The reason for this could be however the small number of overall observations.

As we can see in Figure 1 the BA region is in development terms above all the other regions. That is the reason why it would be worth estimating the same models without the BA region to see and compare the results. The results of the estimation without the BA region are in Table 3.

[1] EPALE- Electronic Platform for Adult Learning in Europe

	Log_real_gdp_percapita		Unemployment_rate	
Dependent variable	**Ver. 1**	**Ver.2**	**Ver.1**	**Ver.2**
Population_density	0,125(0,02)	0,006(0,33)	-0,077(0,10)	-0,035(0,91)
Unemployment_rate	0,002(0,35)	0,007(0,00)	-	-
Share_econ_act_pop	0,016(0,00)	0,024(0,00)	-0,585(0,00)	-0,669(0,00)
Share_terciary_educ_ pop	-0,015(0,00)	-0,025(0,00)	-	-
Share_newselfemployed_percapita	23,696(0,00)	-	1499,76(0,00)	-
Share_newcompanies_percapita	-	-7,744(0,42)	-	1604,96(0,00)
Log_real_gdp_percapita	-	-	3,70(0,12)	30,22(0,00)
R^2	0,82	0,77	0,69	0,66
Observations	77	77	77	77

Table 2: Results of the estimations,
Notes : Standard errors are in parenthesis
(Source: elaboration in STATA)

We have again estimated all of the models with fixed and random effects and tested using the Hausman test which model is better. With the exception of 1st version of the unemployment rate model where we used random effects, we were using fixed effects. In these models, the variable new self-employed per capita was statistically significant in both of the models. New companies seem to have a negative impact on the economy, and the reason why is it is probably due to a high number of new companies having just one employee, it is basically a transition from being self-employed to founding a new company. Based on the Business demography Eurostat data the newly established companies in Slovakia in the years 2021 and 2022 had an average rate of employees of around 1,45 per newly established company. So in the case of Slovakia, only new self-employed have a positive impact on economic development. Based on the second model of the unemployment rate as a dependent variable, we could not establish that new self-employed or new businesses have a positive impact on the unemployment rate in the sense of decreasing the unemployment rate. The reason could be that the people who became self-employed were not unemployed just switched from full-time employment to being self-employed, that is why the new numbers of self-employed do not decrease the unemployment level. And as we can see the same is true for the new companies as they do not impact the unemployment rate when they are switching from self-employment to one-person companies.

4. CONCLUSION

In the case of Slovakia, we have evaluated the impact of entrepreneurship via two models impact of entrepreneurial activity on real GDP and unemployment rate. We have estimated it based on data from 8 Slovak regions in the time frame of 2012 to 2022.

Based on our results we can conclude that entrepreneurship has indeed a positive impact on economic growth and it increases the real GDP. This was true for the new self-employed people but not in the case of newly founded companies. Comparison to other studies for example by Dvouletý who has found out based on data from the Czech Republic that new self-employed have a negative or no impact on economic development. The impact of R&D centres in our model represented by the share of tertiary educated people the impact on economic development had a negative outcome. In fact, in the case of Slovakia, it seems that people with secondary education seem to find employment faster than people with tertiary education. That is why we could conclude that a high share of tertiary-educated people has a negative impact in the case where the majority of available positions are more suited for secondary-educated people than tertiary. For the future it would be beneficial if the education system could take these information into consideration and should react more to the demands to the labor market. Also the education system should respond more to the needs of the economy and the result could be better with closer cooperation of R&D centres and the business sector.

LITERATURE:

1. Audretsch et al. (2013) The Knowledge Spillover Theory of Entrepreneurship. Small Business Economics 41(4):757-774. January 2013. DOI:10.1093/acprof:oso/9780195183511.003.0003
2. Baumgartner, D. & Mayer, H., (2014). The Role of Entrepreneurship and Innovation in Peripheral Regions. disP - The Planning Review, 50(1), 16–23. https://doi.org/10.1080/02513625.2014.926720
3. Dvouletý, O. (2017) Can Policy Makers Count with Positive Impact of Entrepreneurship on Economic Development of the Czech Regions? Journal of Entreprenurship in Emerging Economies. July 2017. DOI: 10.1108/JEEE-11-2016-0052
4. Dvouletý et al. (2018) Investigating the relationship between entrepreneurship and regional development: case of developing countries. Journal of Global Entrepreneurship Research. https://doi.org/10.1186/s40497-018-0103-9
5. Epale (2019). Vzdelávanie v Slovenskej republike podľa Education at a Glance 2019. [online]. Retrieved 5.3.2025. Available at: https://epale.ec.europa.eu/sk/blog/vzdelavanie-v-slovenskej-republike-podla-education-glance-2019
6. Kasseah, H. (2016). Investigating the impact of entrepreneurship on economic development: a regional analysis. Journal of Small Business and Enterprise Development. August 2016. DOI:10.1108/JSBED-09-2015-0130
7. Sternberg, R. (2009). Regional Dimensions of Entrepreneurship. Foundations and Trends in Entrepreneurship. June 2010. DOI:10.1561/0300000024
8. Zygmunt, J. 2015. Entrepreneurship as a Factor of Regional Development. In Barometr Regionalny. Analizy i Prognozy. DOI:10.56583/br.713

ENTREPRENEURSHIP IN EU PORT REGIONS: BUSINESS STRUCTURE ANALYSIS, ECONOMIC INDICATORS, AND INNOVATION POTENTIAL

Gorana Mudronja
University of Rijeka, Faculty of Maritime Studies, Croatia
gorana.mudronja@uniri.hr

ABSTRACT

Entrepreneurship in port regions is one of the main drivers of their economic activity, shaping the development of logistics, transportation and related industries. These regions represent a dynamic business environment where entrepreneurship contributes to regional competitiveness, innovation and economic diversification. The aim of this paper is to examine the impact of entrepreneurial activities on the economic processes of port regions in the European Union (EU), focusing on business structure, key economic indicators and innovation potential. In this paper, 8 EU port regions of different size and success are analyzed, providing diversity in the sample and allowing for comparative analysis. The results show a relatively high share of port-related enterprises in all port regions analyzed, with differences between regions related to the degree of economic diversification. In the port regions, employment rates are higher or comparable to the national average, reflecting a strong entrepreneurial ecosystem linked to port activities and supporting industries. There are significant differences in research and development (R&D) investments between regions, which affects the ability of port regions to adopt innovations such as digitalization, automation and sustainable technologies that are essential to their competitiveness and development. To promote the long-term development of port regions, it is important to invest in startup ecosystems in logistics and green technologies, strengthen education and research centers and develop digitalized and sustainable infrastructure. Collaboration between ports, entrepreneurs and scientific institutions can further accelerate innovations and increase the competitiveness of port regions.
Keywords: *Economic Indicators, Entrepreneurship, EU Port Regions, Innovations*

1. INTRODUCTION

Entrepreneurship in the European Union (EU) port regions is important for economic development, promoting innovation and sustainability. Ports are hubs for international trade and logistics and are an indispensable part of supply chains and distribution networks linked to global trade, thus contributing significantly to economic development. In synergy with the port regions, they act as logistical hubs that enable the world market to function efficiently. Due to their strategic importance, EU port regions face several challenges, including the necessary modernization of infrastructure, the digitalization of business processes and the transition to more sustainable business models.

Implementing innovations influences the competitiveness and sustainable development of port regions and enables entrepreneurs to adapt to dynamic market conditions and global challenges. As ports are at the centers of international trade and logistics, the application of new technologies and innovative solutions is essential to increase operational efficiency, reduce environmental impact and improve business models. Digitalization, automation and the implementation of smart logistics systems enable the optimization of port operations, while the use of renewable energy sources and environmentally friendly technologies contributes to sustainability and the green transition.

This paper analyzes entrepreneurial activities in EU port regions, focusing on three key aspects: (1) business structure, which includes sectoral diversity, (2) economic indicators, including GDP per capita and employment, and (3) innovation potential, with a particular focus on digitalization and sustainable technologies. The aim of this paper is to examine the impact of entrepreneurial activities on the economic processes of EU port regions, focusing on business structure, key economic indicators and innovation potential. The rest of the paper is organized as follows: Section 2 provides the theoretical framework, Section 3 describes entrepreneurship and regional economic dynamics, Section 4 analyzes entrepreneurial activities in EU port regions, and Section 5 provides concluding remarks.

2. THEORETICAL FRAMEWORK

Port regions are geographical areas surrounded and influenced by seaports and characterized by their economic, logistical and functional relationships with port activities. Port activities significantly influence the economy of these regions and generate direct and indirect effects. In addition, port regions include areas in which logistical integration between sea and land transportation is achieved (Ducruet, 2009; Notteboom and Rodrigue, 2022). They are becoming increasingly important due to dynamic development, which is reflected in several key processes. The regionalization of ports is creating strong links between ports and their neighboring areas, overcoming local constraints and achieving their integration into global supply chains. In parallel, the emergence of economic clusters in these regions attracts related businesses and services, further boosting local and regional economic growth. In addition, port regions act as strategic hubs connecting sea and land transportation systems, confirming their important role in international logistics networks (Notteboom and Rodrigue, 2022; Rodrigue and Notteboom, 2024).

Entrepreneurship and regional development are closely related to several economic theories that explain how innovation, competitiveness and local resources influence economic growth. Among the most influential theories are Schumpeter's innovation theory, Porter's cluster theory and endogenous growth theory, which offer different perspectives on how entrepreneurship stimulates the development of regions. Schumpeter’s innovation theory emphasizes that innovation and entrepreneurship are the main drivers of economic development, and its concept of creative destruction states that innovation replaces obsolete technologies, products and business models (Schumpeter, 1942; Karol, 2013). One example of this process is the port of Hamburg, which is introducing 5G technology and digital systems to optimize traffic and reduce congestion. The port of Hamburg is introducing autonomous vehicles and drones for port surveillance in its operations. The above-mentioned modernization leads to the disappearance of classic logistics models and creates the need for specific workers’ skills, which is an example of creative destruction (*Port of Hamburg*, 2025).

Porter's cluster theory states that clusters, defined as a critical mass of related industries and institutions, influence competition by increasing the productivity of enterprises located in the area, stimulating innovation and encouraging the creation of new enterprises within the cluster (Porter, 1998). One example of such a dynamic environment is the port of Rotterdam, which forms Europe's largest port cluster. Rotterdam brings together transport enterprises, logistics centers, energy enterprises and highly developed technological institutes, creating good conditions for cooperation and development. The port region is characterized by the digitalization of port operations and the implementation of sustainable energy solutions. One example of cooperation within the cluster is the “Port of Rotterdam Authority”, which develops digital solutions and green technologies together with private enterprises and research centers (*Port of Rotterdam*, 2025).

Endogenous growth theory describes long-term growth as the result of internal factors and emphasizes the importance of innovation and human capital as drivers of sustained expansion. The theory advocates the importance of investment in R&D, which promotes technological progress, as well as the importance of investment in the development of human capital. Moreover, it emphasizes the importance of government investment in innovation, education and infrastructure, which can consequently have a positive impact on economic growth (Romer, 1990, 1994; Aghion and Howitt, 1992). The previously mentioned ports of Rotterdam and Hamburg can also serve as examples of the practical implementation of endogenous growth theory. The port of Rotterdam continuously invests in R&D, using automation, digital technologies and artificial intelligence to improve operations. The digital platform "PortXchange", which optimizes the arrival and departure of ships and thus reduces waiting times and CO_2 emissions, as well as investments in hydrogen and renewable energy, are examples of innovations that impact the competitive advantage of the port region and thus long-term economic growth, and are in line with the endogenous growth theory. The port of Hamburg invests in digitalization and green technologies through the "Smart Port" strategy, which combines IoT, AI and automation in logistics. The development of smart infrastructure that uses data analytics to optimize traffic and the introduction of hybrid and electric ships to reduce pollution also show that investment in technology strengthens the long-term competitive advantage of the port region in which the port of Hamburg is located and confirms the endogenous growth model (*Port of Rotterdam*, 2025; *Port of Hamburg*, 2025; Hamburg Port Authority, 2025).

3. ENTREPRENEURSHIP AND REGIONAL ECONOMIC DYNAMICS

The impact of entrepreneurial activities on the economy can be described as the entry of start-ups or established enterprises into the market and the expansion of their activities, reorientation or reduction of business processes, depending on the market selection process. New enterprises have a direct impact on economic activity by creating new jobs and increasing market share, while indirectly creating new competition for existing enterprises and stimulating innovation (Dan and Goia, 2018). Entrepreneurship plays an important role in regional development, but the extent of activity varies from region to region. Entrepreneurs operating in more prosperous regions with higher incomes are more likely to innovate and create new products and services, while in less developed regions entrepreneurship tends to be initiated out of necessity. Government policies are important in creating an environment that encourages entrepreneurship. A major obstacle to the growth of entrepreneurship is often high tax burdens and complex bureaucratic procedures (Global Entrepreneurship Monitor, 2025).

According to Dan & Goia (Dan and Goia, 2018), entrepreneurship is influenced by various factors that are closely linked to local conditions. The most important aspects include R&D activities that lead to innovation that open up new markets, increase productivity and strengthen competitive advantage. The implementation of innovations and new technologies can greatly improve business processes by reducing costs and bottlenecks, harmonizing processes and enabling better transparency (Mudronja, Aksentijević and Jugović, 2022). However, R&D needs to be linked to quality human capital since innovations and new technology have to be accepted and implemented. The innovative potential of regions and highly qualified human capital are assumed to be a prerequisite for sustaining competitiveness and fostering a favorable business trend (Mudronja, Jugović and Škalamera-Alilović, 2020). Economic growth and structural changes also contribute significantly in shaping the business environment. Demographic trends, particularly in regions with lower birth rates and higher life expectancy, are increasing the demand for social services.

On the other hand, political reforms that facilitate access to markets and local resources can further stimulate entrepreneurial initiatives. Climate change is forcing individuals and organizations to look for sustainable alternatives for energy and fuel. In addition, improved access to finance, such as government and European grants, offers entrepreneurs more favorable options than traditional bank loans (Dan and Goia, 2018).

As previously stated, entrepreneurship is a driver of innovation that directly creates new jobs and increases the competitiveness of the regional economy. Regions that create and foster a favorable entrepreneurial environment that includes effective regulation, education and access to finance can achieve better economic growth. Moreover, social and educational factors are also important, creating different conditions for the implementation of innovation and the willingness to take risks, which is one of the main characteristics of entrepreneurs. Some of these conditions are demographic and educational levels, unemployment and the economic structure of the region, which have different effects, positive or negative, on the development and implementation of innovations (Rodríguez-Pose, 1999). For an entrepreneurial system to be effective, it is essential to have a synergy between a culture that encourages innovation and risk-taking, supportive governance structures and institutions that create a favorable environment for entrepreneurial activity (Stough, 2016). Knowledge is a key resource for entrepreneurs, especially those focused on innovation and technology (Malerba and McKelvey, 2020). Therefore, the region needs to create a supportive environment for entrepreneurship, with strong institutional support that encourages business development and knowledge growth (Kang *et al.*, 2022).

In the context of the EU, early entrepreneurship with higher rates of business start-ups can be observed in the Eastern European regions, while well-established enterprises tend to predominate in the Western regions. Moreover, there are significant differences in entrepreneurial activity between EU regions, largely related to population density. Greater entrepreneurial activity is more common in urban regions, while it is less pronounced in rural regions (Global Entrepreneurship Monitor, 2023). The above challenges could be reduced by place-based policies that could decrease spatial inequalities. Particularly important are place-based innovation policies, which are strategies to promote innovation and economic development in specific geographical areas. Place-based innovation policies are based on the fact that the characteristics of regions and their dynamics differ, which is why it is necessary to apply adapted approaches. They can support innovation through the formation of clusters that link related businesses within specific sectors, which encourages collaboration between businesses, academic institutions and government institutions (Solé-Ollé, 2023; European Commission, 2024).

4. ENTREPRENEURIAL ACTIVITIES IN EU PORT REGIONS

The sample of this study consists of data from EU port regions belonging to the NUTS 2 classification level (Nomenclature of Territorial Units for Statistics), a hierarchical system for subdividing the economic territory of the EU and the UK for official statistics. The analysis includes eight port regions of different sizes and varying degrees of success, which ensures diversity in the sample and enables a comparative assessment. The analysis was carried out for the year 2020, as this is the last year for which data on the number of enterprises in the port regions is available. All data used in this study were taken from the Eurostat database (*Eurostat Database*, 2025). Table 1 shows the list of analyzed port regions, the most important port in the respective region as well as the freight traffic and the GDP per capita of the observed region.

Port region	The main port	Freight traffic (thousand tonnes)	GDP per capita (PPS)
Zuid-Holland	Rotterdam	419.331	38.900
Provincie Antwerpen	Antwerp	206.319	42.500
Hamburg	Hamburg	109.175	60.000
Attiki	Piraeus	84.584	26.200
Cataluña	Barcelona	74.607	29.300
Pomorskie	Gdansk	61.615	22.300
Jadranska Hrvatska	Rijeka	19.081	18.000
Zahodna Slovenija	Koper	18.313	32.100

Table 1: Key characteristics of the analyzed port regions (2020.)
(Source: Eurostat Database, 2025)

The Dutch region of Zuid-Holland, to which the main port of Rotterdam belongs, has the highest freight traffic of all the regions observed, which confirms the role of the port of Rotterdam as an important European logistics and trade center. On the other hand, the GDP per capita is not the highest compared to the other regions observed, indicating that high traffic volumes in the ports do not necessarily lead to the highest economic productivity per capita. The German region of Hamburg has the highest GDP per capita, while freight traffic is lower than in the ports of Rotterdam and Antwerp. This indicates that the economic growth of the Hamburg region is the result of a diversified economic structure and is not exclusively related to port activities. The Belgian region of Provincie Antwerpen has the second largest freight traffic and a high GDP per capita, which implies a strong influence of port activities on the economic productivity of the region. The southern European port regions, the Greek region of Attiki and the Spanish region of Cataluña, have lower freight traffic compared to the northern European port regions, but also a lower GDP per capita, which might suggest lower productivity or value added in the enterprises associated with port activities. The Polish region of Pomorskie, the Croatian region of Jadranska Hrvatska and the Slovenian region of Zahodna Slovenija have the lowest freight traffic in seaports, and their GDP per capita is also among the lowest. Jadranska Hrvatska has the lowest GDP per capita, which could indicate a less developed industry compared to other regions and insufficient utilization of the potential associated with port activities.

For the analysis of port-related enterprises, businesses from five key sectors that play an important role in port regions were selected. Logistics and transportation are core activities that ensure the connection of ports to land and sea transport. Wholesale and distribution are key to the flow of goods between ports and end markets and enable an efficient supply chain. Industry and energy include enterprises that support industrial development and energy projects in port areas. Professional, technical and scientific activities include services such as port infrastructure design, innovation in shipbuilding, development of smart ports, digitalization of transport and management of large logistics and shipping enterprises. Finally, administrative and support services include the rental of warehouses and port equipment, employment services for port workers and seafarers, and port security services such as freight insurance and passenger and freight control. This diversity of sectors allows for a more comprehensive analysis of the role of entrepreneurship in port regions and its contribution to economic development. An analysis of the enterprises, employment rates and R&D investments in the regions observed is shown in Table 2.

Port region	Number of enterprises			Employment rate (%)		Investment in R&D (% of GDP)
	Total	Port-related	Share of port-related enterprises (%)	Regional	National	
Zuid-Holland	338.256	98.576	29	76,3	77,8	N/A
Provincie Antwerpen	125.766	31.261	25	67,7	64,7	4,18
Hamburg	81.256	22.708	28	75,5	75,4	2,19
Attiki	283.188	96.741	34	59,0	56,3	1,87
Cataluña	546.205	121.085	22	65,8	60,9	1,70
Pomorskie	143.548	31.535	22	70,4	68,8	1,74
Jadranska Hrvatska	87.041	20.795	24	60,3	62,2	0,62
Zahodna Slovenija	89.231	25.355	28	72,1	70,9	2,57

Table 2: Port regions' main economic and business indicators (2020.)
(Source: Eurostat Database, 2025)

The Greek region of Attiki has the highest share of port-related enterprises in the total number of enterprises (34%), which indicates the region's strong dependence on port activities. In the Dutch region of Zuid-Holland and the German region of Hamburg, the share of port-related enterprises is 29% and 28% respectively, proving that the ports of Rotterdam and Hamburg are important logistics and transportation hubs in the EU with a large number of enterprises related to port operations, trade and industry. The Slovenian region of Zahodna Slovenija has a 28% share of port-related enterprises, suggesting that the port of Koper significantly impacts entrepreneurship in the port region. In the Belgian region of Provincie Antwerpen, 25% of enterprises are related to port activities, indicating the region's strong dependence on port activities, but also reflecting the diversity and development of other economic sectors. The Croatian region of Jadranska Hrvatska has a moderate share of port-related enterprises of 24%. Although the port of Rijeka is important for the development of entrepreneurship in this region, the region is not exclusively associated with port activities. The Spanish region of Cataluña (22%) and the Polish region of Pomorskie (22%) have the lowest share of port-related enterprises, suggesting that these regions have a more diversified economic structure in which ports play an important, but not entirely dominant role in the economy. The employment rates in the observed port regions are higher than the national average, except in the Dutch region of Zuid-Holland and the Croatian region of Jadranska Hrvatska, but even in these regions the employment rates are very close to the national average. This suggests that entrepreneurship has a significant impact in these areas, especially in sectors related to logistics, transportation, trade and other support activities. In Zuid-Holland, the employment rate is below the national average (76.3%), probably due to a higher proportion of workers in the non-industrial sector and the effects of automation and digitization, which may reduce the need for workers in certain parts of industry. A similar trend can be observed in Jadranska Hrvatska, where the employment rate is also below the national average (60.3%). This could be due to the seasonal economy and lower industrial diversification compared to other port regions, which consequently reduces employment opportunities. Investment in R&D is highest in the Belgian port region of Provincie Antwerpen (4.18%) and in Slovenian port region of Zahodna Slovenija (2.57%). Both the port of Antwerp and the port of Koper are investing in smart technologies and digitalization, with Antwerp establishing itself as a strong logistics and industrial center, while Koper focuses on the development of smart logistics solutions in the maritime sector (*Port of Antwerp Bruges*, 2025; *Port of Koper*, 2025).

The Hamburg region has a moderate R&D investment of 2.19%; however, it is investing in the digitalization of port operations and green technologies (*Port of Hamburg*, 2025). The Attiki region has an average investment level in R&D of 1.87%, which is less than expected given its important role in maritime trade. This can be justified by the assumption that part of the investment comes from the private sector. The regions of Pomorskie (1.74%) and Cataluña (1.70%) also show a moderate level of investment in R&D. The region with the lowest level of investment in R&D is Jadranska Hrvatska (0.62%), indicating a lower presence of innovation in port activities such as digitalization, smart logistics and environmentally sustainable technologies. The port of Rijeka has not yet exploited the innovation potential of modern trends in the maritime industry and needs greater investment in innovation, especially in the area of modernization of port technologies and the development of new business models related to maritime operations.

Recommendations for stimulating the economic development of port regions could focus on investing in infrastructure modernization and the digitalization of logistics processes. Furthermore, it is necessary to promote cooperation between ports, entrepreneurs and scientific institutions to strengthen innovations and increase the competitiveness of port regions. Their cooperation contributes to the exchange of knowledge, resources and technology, which creates new business opportunities. In addition, it is necessary to strengthen the entrepreneurial ecosystem through the creation of business networks and clusters that can better connect small and medium-sized enterprises to larger industrial and port systems. Particular attention should be paid to targeted investments in less developed port regions to reduce entrepreneurial and economic disparities (Solé-Ollé, 2023; European Commission, 2024). The establishment of technology incubators and accelerators is important for creating new opportunities in less developed port regions. The growth and development of entrepreneurship can be encouraged by ensuring access to financial resources through EU funding, private investment and tax breaks. By implementing these measures, port regions, especially the less developed ones, can become stronger economic centers, contributing to innovation, job growth and strengthening international trade, while reducing regional disparities and ensuring more balanced economic progress.

4. CONCLUSION

This paper explores the impact of entrepreneurship on the development of port regions, with a particular focus on economic indicators, business structures, and the role of innovations as key drivers of entrepreneurship and sustainable development. EU port regions have significant potential for entrepreneurial development due to their geostrategic location, economic connectivity and availability of resources. The synergy between traditional port activities and new technologies makes these regions centers of economic development and international trade. Entrepreneurship in EU port regions shows a positive trend, but is unevenly distributed across countries. Key contributors to success are the implementation of innovations, the availability of infrastructure, logistical connectivity and incentive policies. Regions with higher investment in innovation and digitalization show higher growth, while regions with administrative barriers and lack of capital lag behind. The empirical results of this study show that port-related enterprises account for a significant but uneven share of the total number of enterprises in the different EU port regions. Their presence is more pronounced in regions with developed port infrastructure and highly interconnected sectors such as logistics, transportation and trade. Employment in port-related enterprises usually exceeds national employment rates, especially in regions where ports are important economic drivers. These enterprises often provide stable employment due to the continuous demand for logistics and transportation services.

However, in some regions, employment rates in these enterprises are below the national average due to the automation and digitalization of port operations or due to less industrial diversification. Although port regions are investing in R&D, there are significant differences between regions. Regions that actively promote innovation through collaboration between enterprises, universities and research institutions are experiencing faster technological progress. Of particular note are investments in automation, digitalization and green technologies, which enable greater operational efficiency and reduce negative environmental impacts. These conclusions point to the importance of further investments in infrastructure, innovation and human capital for port-related enterprises to remain competitive in a global context. The potential for further development lies in strengthening cooperation between the public and private sectors, increasing financial support, implementing place-based measures, particularly the ones related to innovations, and sustainable practices that comply with EU environmental legislation. With appropriate strategies and support mechanisms, port regions can take a leading role in the EU's blue economy and green transition. Limitations of this study relate to the availability of statistical data on port-related businesses and possible differences in data collection methods between EU member states. Rapid changes in technology and regulations may affect the relevance of some conclusions within a short period. National policies and incentives for R&D may change, which may affect the relevance of the analysis in the future. Also, a quantitative analysis can give a clear overview of trends, but the lack of qualitative factors, such as the enterprise's innovation culture or the influence of management on the business, can affect the conclusions. Recommendations for future research include an econometric analysis of the impact of entrepreneurship on the economic growth of port regions. It can also be investigated how national and regional policies support entrepreneurship in different port regions and how effective measures such as subsidies, incentives and support from EU funds are. Future research could investigate the relationship between the education system, research institutions and entrepreneurship and how educational institutions can support the development of entrepreneurial skills and innovation in port regions.

ACKNOWLEDGEMENT: *This paper was supported under the project line ZIP UNIRI of the University of Rijeka, for the project [UNIRI-ZIP-2103-5-22] and under the project line ZIP UNIRI of the University of Rijeka, for the project [ZIP-UNIRI-2023-2].*

LITERATURE:

1. Aghion, P. and Howitt, P. (1992) ‘A Model of Growth Through Creative Destruction’, *Society*, 60(2), pp. 323–351.
2. Dan, M.-C. and Goia, S. I. (2018) ‘Entrepreneurship and regional development. A bibliometric analysis’, *Proceedings of the International Conference on Business Excellence*, 12(1), pp. 276–287. doi: 10.2478/picbe-2018-0025.
3. Ducruet, C. (2009) ‘Port Regions and Globalization’, in Notteboom, T. E., Ducruet, C., and de Langen, P. W. (eds) *Ports in Proximity, Competition and Coordination among Adjacent Seaports*. Farnham i Burlington: Ashgate Publishing Company, pp. 41–53.
4. European Commission (2024) *Innovation for place-based transformations*. Retrieved 28.02.2025. from https://place-based-innovation.ec.europa.eu/projects-0/preparatory-action-2024-2026_en.
5. *Eurostat Database* (2025). Retrieved 19.02.2025. from https://ec.europa.eu/eurostat/web/regions/database.
6. Global Entrepreneurship Monitor (2023) *Global Entrepreneurship Monitor 2021/22 European Regional Report*. London, UK.
7. Global Entrepreneurship Monitor (2025) *Global Entrepreneurship Monitor 2024/2025 Global Report: Entrepreneurship Reality Check*. London, UK.
8. Hamburg Port Authority (2025) *Smart-Port – The Intelligent Port*. Retrieved 25.02.2025. from

https://www.hamburg-port-authority.de/en/hpa-360/smartport.
9. Kang, T., Maliphol, S., Kogler, D. F., Kim, K. (2022) 'Regional Knowledge Capabilities, Entrepreneurial Activity, and Productivity Growth: Evidence from Italian NUTS-3 Regions', *International Regional Science Review*, 45(3), pp. 293–320. doi: 10.1177/01600176211034134.
10. Karol, S. (2013) 'Schumpeter's View on Innovation and Entrepreneurship', *SSRN Electronic Journal*, pp. 89–95.
11. Malerba, F. and McKelvey, M. (2020) 'Knowledge-intensive innovative entrepreneurship integrating Schumpeter, evolutionary economics, and innovation systems', *Small Business Economics*. Small Business Economics, 54, pp. 503–522. doi: 10.1007/s11187-018-0060-2.
12. Mudronja, G., Aksentijević, D. and Jugović, A. (2022) 'An Overview of Innovations and Technology for Sustainable Development of Seaports', in Martínez de Osés, F. X. and Castells-Sanabra, M. (eds) *Proceedings of 9th International Conference on Maritime Transport*. Barcelona, Spain: Universidad Politecnica de Catalunya, pp. 1–15. doi: 10.5821/mt.10928.
13. Mudronja, G., Jugović, A. and Škalamera-Alilović, D. (2020) 'Seaports and Economic Growth: Panel Data Analysis of EU Port Regions', *Journal of Marine Science and Engineering*, 8(12), pp. 1–17. doi: 10.3390/jmse8121017.
14. Notteboom, T. and Rodrigue, J.-P. (2022) 'Port Hinterlands, Regionalization and Corridors', in *Port Economics, Management and Policy*. New York: Routledge. Retrieved 20.02.2025. from https://porteconomicsmanagement.org/pemp/contents/part2/port-hinterlands-regionalization/.
15. *Port of Antwerp Bruges* (2025). Retrieved 25.02.2025. from https://www.portofantwerpbruges.com/en.
16. *Port of Hamburg* (2025). Retrieved 25.02.2025. from https://www.hafen-hamburg.de/en/.
17. *Port of Koper* (2025). Retrieved 26.02.2025. from https://www.luka-kp.si/en/.
18. *Port of Rotterdam* (2025). Retrieved 25.02.2025. from https://www.portofrotterdam.com/en.
19. Porter, M. E. (1998) 'Clusters and the New Economics of Competition', *Harvard Business Review*, 76(6), pp. 77–90.
20. Rodrigue, J.-P. and Notteboom, T. (2024) 'Port Terminals', in *The Geography of Transport Systems*. Retrieved 19.02.2025. from https://transportgeography.org/contents/chapter6/port-terminals/.
21. Rodríguez-Pose, A. (1999) 'Innovation Prone and Innovation Averse Societies: Economic Performance in Europe', *Growth and Change*, 30(1), pp. 75–105. doi: 10.1111/0017-4815.00105.
22. Romer, P. M. (1990) 'Endogenous technological change', *Journal of Political Economy*, 98(5), pp. 71–102. doi: 10.1093/acprof:osobl/9780199663897.003.0004.
23. Romer, P. M. (1994) 'The Origins of Endogenous Growth', *Journal of Economic Perspectives*, 8(1), pp. 3–22. doi: 10.4324/9780203443965.ch26.
24. Schumpeter, J. (1942) *Capitalism, Socialism, and Democracy*. New York: Harper & Brothers.
25. Solé-Ollé, A. (2023) 'When should be place-based policies used, and how should they be articulated with other policy instruments?', *Background paper for the OECD-EC High-Level Expert Workshop Series on "Place-Based Policies for the Future", Workshop 2, 12 May 2023*. Retrieved 24.02.2025. from https://www.oecd.org/cfe/regionaldevelopment/place-based-policies-for-the-future.htm.
26. Stough, R. R. (2016) 'Entrepreneurship and Regional Economic Development: Some reflections', *Investigaciones Regionales – Journal of Regional Research*, (36), pp. 129–150.

ANALYSIS OF AGILE PROJECT MANAGEMENT IN THE IT INDUSTRY: LESSONS FROM SELECTED IT PROJECTS

Monika Krnjak
Student, University of Applied Sciences Baltazar Zaprešić, Croatia
monikakrnjak@gmail.com

Martina Vukasina
Lecturer, University of Applied Sciences Baltazar Zaprešić, Croatia
mvukasina@bak.hr

Karlo Jurac
Senior Lecturer, University of Applied Sciences Baltazar Zaprešić, Croatia
University of Novo Mesto Faculty of Business and Management Sciences, Slovenia
kjurac@bak.hr

ABSTRACT

Agile methodologies have revolutionized project management, particularly in the dynamic IT industry, by enabling organizations to deliver products more efficiently while fostering user-centered innovation. Their key advantage lies in adaptability, allowing teams to swiftly respond to market changes and customer demands without compromising quality or deadlines. Continuous user involvement ensures that the final product meets expectations. Unlike traditional methodologies such as Waterfall, which follows a rigid and sequential structure, Agile emphasizes flexibility, ongoing collaboration, and iterative improvements, making it ideal for unpredictable and evolving projects. This study explores the most commonly used Agile approaches in IT project management by conducting interviews with project managers from selected Croatian IT companies: KING ICT d.o.o., Infobip d.o.o., SPAN d.d., and Collective Mind Development d.o.o. To gain insights into applied methodologies, tools, and required skills, ten research questions were designed, covering aspects such as project lifecycle, organizational structure, and key challenges. The findings indicate that Agile approaches, particularly Scrum and Kanban, dominate IT project management, while digital tools such as Jira and Trello support Agile workflows.Despite its benefits, Agile implementation presents certain challenges, including the need for strong team discipline and continuous communication. Many organizations adopt hybrid models that integrate Agile with traditional approaches, leveraging Agile's flexibility in early project stages and structured methodologies in later phases. Ultimately, the choice of project management methodology depends on project complexity, client needs, and team adaptability. Hybrid models that combine the strengths of both approaches are increasingly popular in today's fast-paced business environment.

Keywords: *Agile methodologies, hybrid methodologies, IT industry, Kanban, project management, Scrum*

1. INTRODUCTION

The rise of Agile methodologies has fundamentally reshaped project management, particularly in the rapidly evolving IT industry. As businesses strive for greater adaptability and responsiveness, Agile frameworks have become the dominant approach, offering iterative development, continuous feedback loops, and a user-centric focus (Denning, 2022). Unlike traditional Waterfall methodologies, which rely on rigid, sequential planning, Agile promotes collaboration, incremental progress, and flexibility, making it well-suited for managing uncertainty in complex digital projects (PMI, 2021).

In an era where speed to market and customer expectations dictate business success, Agile methodologies enable IT teams to rapidly pivot in response to shifting requirements, technological advancements, and competitive pressures (Rigby, Sutherland & Takeuchi, 2016). With the widespread adoption of cloud computing, AI-driven automation, and DevOp practices, Agile has extended beyond software development into diverse business functions such as product management, marketing, and organizational strategy (Digital.ai, 2022). This study examines the implementation of Agile methodologies in IT project management by analyzing their adoption in selected Croatian IT companies. Through interviews with project managers from KING ICT d.o.o., Infobip d.o.o., SPAN d.d., and Collective Mind Development d.o.o., this research seeks to uncover the most frequently used Agile frameworks, key tools that facilitate Agile workflows, and the critical skills required for successful Agile execution. Furthermore, it explores the growing trend of hybrid project management models, which combine Agile adaptability with the structured planning of traditional approaches, reflecting the evolving nature of project delivery in modern IT environments (Conforto & Amaral, 2016). By shedding light on Agile's real-world application, this research aims to provide practical insights into its benefits, challenges, and future potential in IT project management. As businesses continue to embrace digital transformation, understanding the strategic role of Agile will be essential for navigating the complexities of today's technology-driven landscape.

2. THEORETICAL BACKGROUND AND RESEARCH QUESTION

Agile project management has emerged as a response to the limitations of traditional project management methodologies, particularly in industries where flexibility, speed, and innovation are crucial. The IT industry, characterized by rapid technological advancements and evolving customer demands, has become one of the primary domains where Agile methodologies thrive. Unlike traditional Waterfall approaches, which rely on a rigid, sequential workflow, Agile enables teams to work in short, iterative cycles, ensuring continuous feedback and faster adaptability to changes (Schwalbe, 2015). The Agile Manifesto, introduced in 2001, laid the foundation for modern Agile practices by emphasizing four key values:

- Individuals and interactions over processes and tools,
- Working software over comprehensive documentation,
- Customer collaboration over contract negotiation,
- Responding to the changeover following a plan (Beck et al., 2001).

Over time, Agile methodologies have expanded beyond software development and are now widely used in diverse business functions, including marketing, finance, and HR (PMI, 2021). Agile frameworks such as Scrum, Kanban, and hybrid approaches have become essential tools for managing IT projects efficiently. In the IT sector, Agile methodologies offer significant benefits, including enhanced efficiency, continuous delivery, and improved collaboration among cross-functional teams. Based on an analysis of Agile implementations in Croatian IT companies, particularly KING ICT d.o.o., Infobip d.o.o., SPAN d.d., and Collective Mind Development d.o.o., it is evident that Agile adoption varies depending on organizational needs and project complexity. The most commonly used Agile frameworks in the IT industry include:

- Scrum: A structured yet flexible framework that divides work into short cycles called sprints, typically lasting 1-4 weeks. Scrum emphasizes daily stand-up meetings, backlog prioritization, and iterative improvements. It is particularly effective for complex projects requiring frequent adjustments (Schwaber & Sutherland, 2017).
- Kanban: A visual workflow management method that focuses on optimizing task flow by limiting work in progress (WIP). It is widely used in IT operations and software maintenance projects where continuous delivery is a priority (Anderson, 2010).

- Extreme Programming (XP): A software development methodology that enhances software quality through frequent releases, automated testing, and close collaboration with end-users (Beck, 1999).

Agile methodologies are predominantly used in software development, while hybrid models that combine Agile with traditional project management techniques are becoming increasingly common. Tools such as Jira, Trello, and Asana play a crucial role in managing Agile workflows, providing transparency, backlog tracking, and sprint planning. While Agile offers numerous benefits, some organizations find it challenging to fully transition away from traditional project management methods. Hybrid project management models, which combine Agile's adaptability with the structured approach of methodologies like Waterfall, are frequently used in IT firms (Conforto & Amaral, 2016). In practice, hybrid approaches allow teams to:

- Use Agile in early development phases where rapid iterations and frequent feedback are essential.
- Incorporate Waterfall elements in later project phases, particularly when managing regulatory compliance, budgeting, or final product deployment.
- Leverage tools like Jira and Microsoft Project to integrate Agile sprints with long-term planning and structured reporting.

Research Question

This study seeks to explore the potential of Agile project management in IT by addressing the following research questions: What are the challenges of Agile methodologies in IT project management? To answer this question, the study will analyze:

- The most commonly used Agile frameworks in Croatian IT companies.
- The effectiveness of Agile tools and techniques.
- The circumstances under which hybrid approaches are preferred over pure Agile methodologies.

By addressing these aspects, this research aims to provide practical insights into Agile project management in the IT industry and its evolving role in modern project execution.

3. METHODOLOGY, ANALYSIS, AND RESULTS

To examine Agile practices in real-world IT projects, a qualitative research study was conducted through interviews with project managers from selected Croatian IT companies:

- KING ICT d.o.o.
- Infobip d.o.o.
- SPAN d.d.
- Collective Mind Development d.o.o.

A structured interview approach was applied, consisting of ten research questions aimed at understanding the methodologies, tools, and skills required for IT project management. These questions covered topics such as project lifecycle, organizational structure, key challenges, and the selection of Agile or hybrid approaches in project execution. This research employed semi-structured interviews as the primary research method, allowing flexibility in responses while maintaining consistency across participants.

The interviews were conducted in person and online, depending on the availability of participants. The key areas explored included:

1. Background and role of the interviewee in the organization
2. Company's primary business activities
3. Organizational structure and project governance
4. Preferred project management approach (traditional, Agile, hybrid)
5. Agile methodologies in use (Scrum, Kanban, Asana, Jira, Trello, etc.)
6. Complexity and challenges in IT project execution
7. Commonly used digital project management tools
8. IT project lifecycle stages
9. Essential skills and knowledge required for IT project management
10. Competencies of a successful IT project manager

Analysis

KING ICT d.o.o.

KING ICT is a prominent Croatian company specializing in advanced information and communication technology (ICT) solutions. Founded in 1998, it has grown into a regional systems integrator focused on enhancing business efficiency across various industries. Today, it is one of Croatia's leading IT companies, dedicated to providing cutting-edge technological solutions and services. Its operations span multiple areas within the IT sector, including system integration, software development, consulting, and the implementation and maintenance of complex infrastructure projects. The company is recognized for its collaboration with global technology giants such as SAP and is a leading provider of security and ERP solutions, particularly in areas such as cybersecurity and network servicesn (KING ICT d.o.o.).

The interview with Josipa Nikić, Project Manager at KING ICT, conducted on September 12, 2024, in Zagreb, highlighted the company's structured approach to project management. KING ICT, a leading Croatian IT company, operates within a hierarchical structure with divisions such as SAP, PMO, custom product development, and cybersecurity.

Due to public procurement regulations, the company primarily follows the Waterfall methodology, ensuring structured execution for large-scale projects. However, Agile practices (Scrum and Kanban) are integrated where possible, particularly in software development, using Jira and Trello to enhance workflow flexibility and task management.

Key challenges include communication barriers, team alignment, and strict regulatory requirements, which limit Agile adoption in some areas. To balance structure with adaptability, KING ICT employs a hybrid approach, leveraging Agile where feasible while maintaining compliance-driven project execution.

Infobip d.o.o.

Founded in 2006, Infobip has grown into one of the leading service providers in the communication platform industry. The company focuses on omnichannel communication, enabling businesses to connect with their customers across multiple platforms. Infobip provides companies with various communication solutions, including SMS, email, WhatsApp, Viber, Facebook Messenger, AI-powered services, and customer support platforms. The primary goal is to facilitate seamless communication with end-users and enhance the quality of customer interactions. Infobip’s platform supports various industries, including retail, banking, logistics, and technology, helping businesses manage large-scale communications more efficiently and securely. With a global presence spanning over 70 countries, the company operates offices and services worldwide, serving clients across different markets (Infobip d.o.o.).

At Infobip, project management is embedded across multiple departments, including sales, networking, support, QoS, and development. While Scrum and Kanban are primarily used in software development teams, operational projects follow a more flexible approach, adapting to diverse client needs and industry regulations without strict sprint deadlines. The company relies on Workboard, SharePoint, and Salesforce for project tracking, collaboration, and CRM management. These tools help facilitate global coordination, ensuring smooth communication across teams in over 70 countries. Key challenges include cultural differences, time zone management, and rapidly evolving customer demands, requiring agile adaptation and strategic alignment. The interview was conducted with Petra Ivanković, Senior Manager in the Partnerships Operations Department, on September 17, 2024, via Microsoft Teams. She highlighted that while Agile methods are beneficial for development teams, operational projects often demand greater flexibility due to the unique requirements of each telecom operator and market. Despite this, digital tools play a crucial role in maintaining project visibility, tracking milestones, and ensuring cross-team collaboration. Infobip's project management strategy reflects a hybrid model, blending Agile principles where applicable while maintaining adaptability in broader business operations. This approach ensures efficient execution, alignment with global business challenges, and sustained leadership in omnichannel communication solutions.

SPAN d.d.

Founded in 1993, SPAN has evolved from a systems integration provider into a global IT services and solutions company, offering a comprehensive range of services in cloud computing, cybersecurity, and customer support. With over 30 years of experience in technology delivery, the company supports businesses in software and hardware solutions, application development, and system maintenance. Over the past eight years, SPAN has experienced significant growth, expanding from 200 to over 850 employees, driven by the increasing demand for its IT services. The company has developed a Project Management Office (PMO), now comprising more than 40 project managers. The project management structure is divided into three key areas: software development, infrastructure (cloud and servers), and cybersecurity. When a new project request is received, it is assigned to a specialized project manager, who then forms one or more teams based on the project's specific requirements. This structured yet flexible approach ensures efficient project execution, aligning expertise with client needs (SPAN d.d). The interview with Darko Martić, Senior Project Manager at SPAN, was conducted on September 9, 2024, in Zagreb and provided insights into the company's project management practices and challenges. SPAN employs a hybrid project management model, allowing project managers to tailor their approach based on project complexity, client expectations, and industry requirements. While Waterfall methodology is often preferred, particularly for projects that require detailed planning, regulatory compliance, and structured execution, the company also integrates Scrum where iterative development and frequent feedback loops are beneficial. This flexibility allows teams to adjust project workflows dynamically, ensuring efficient execution and client satisfaction. To support its multi-project environment, SPAN relies on Microsoft DevOps, Azure, and Microsoft Project for project tracking, collaboration, and delivery management. These tools enhance workflow transparency, task automation, and resource allocation, streamlining operations across different teams. The biggest challenges SPAN faces include managing large teams, as the company has rapidly expanded in recent years, balancing multiple projects with varying scopes and deadlines, and ensuring effective collaboration across teams working on software development, cloud infrastructure, and cybersecurity solutions. By adopting a structured yet adaptive approach, SPAN continues to optimize its project management strategies, ensuring efficiency, quality, and alignment with client needs.

Collective Mind Development d.o.o.

Collective Mind Development was founded in 2018 as a software development company, specializing in custom solutions for mobile and web applications. With offices in Osijek and Zagreb, the company focuses on delivering high-quality, client-oriented IT solutions, working with a diverse range of clients, from large enterprises to startups. Their services include web and mobile application development, UI/UX design, and fully dedicated external or in-house development teams. Their mission is to create visionary, high-standard products that meet customer needs, emphasizing teamwork and technical expertise to transform ideas into market-ready solutions. The team is highly skilled in technologies such as JavaScript, React, Go, and mobile platforms including iOS and Android (Collective Mind Development d.o.o.). The interview with Ivona Miletić, Director of Collective Mind Development for Croatia, was conducted on September 18, 2024, via Microsoft Teams. She provided insights into the company's Agile approach to project management, organizational structure, and the challenges they face in IT project execution. Collective Mind Development operates within a matrix organizational structure, which enables flexibility, collaboration, and knowledge-sharing across teams. The company primarily follows Scrum, adapting it to their needs with two-week sprints, continuous releases, and regular client feedback cycles. Given the nature of their projects, which often involve cross-functional teams working on multiple assignments simultaneously, efficient coordination and structured time management are essential for maintaining productivity and meeting deadlines. One of the key challenges identified in the interview was talent acquisition and retention, as finding skilled IT professionals remains a competitive aspect of the industry. Additionally, ensuring security compliance and maintaining agile adaptation to project scope changes are crucial for successful project execution. To overcome these challenges, the company relies on Slack, Jira, Trello, and Microsoft Teams to streamline communication, task management, and workflow tracking. The interview confirmed that Collective Mind Development's Agile-driven approach allows them to remain competitive in the software development industry, ensuring efficient project execution, strong client collaboration, and continuous product innovation.

Results

The study identified several key challenges associated with Agile methodologies in IT project management, highlighting the difficulties companies face when implementing Agile frameworks such as Scrum and Kanban. While Agile offers flexibility, adaptability, and iterative progress, its real-world application is often constrained by regulatory requirements, team coordination, resource management, and organizational structure. One of the most significant challenges is regulatory and compliance constraints, particularly in companies like KING ICT, where public sector contracts require strict adherence to Waterfall methodologies. The need for detailed documentation, predefined budgets, and milestone-based execution often limits the extent to which Agile can be applied in large-scale projects. As a result, Agile is typically integrated only in certain phases, such as software development, while the overall project follows a more structured approach. Another major challenge is global coordination and cultural differences, which is evident in Infobip. With operations spanning over 70 countries, Agile adoption becomes complex due to time zone differences, diverse regulatory environments, and varying client expectations. Maintaining Agile consistency across geographically dispersed teams requires strong communication strategies and digital tools, but even with these solutions, alignment remains an ongoing challenge. Managing large, multi-project environments is also a critical issue, particularly for rapidly growing companies like SPAN. With an expanding workforce and increasing project complexity, resource allocation and workflow organization become more difficult.

While Agile encourages self-organizing teams, the reality of large-scale IT project management often demands a higher degree of centralized planning, making a hybrid approach more practical than a fully Agile model. Additionally, talent acquisition and retention emerged as a significant challenge, especially for Collective Mind Development. Agile success relies heavily on experienced developers, skilled project managers, and cross-functional teams that can operate autonomously. However, finding and retaining qualified IT professionals is an ongoing challenge in a highly competitive market. Without the right personnel, Agile frameworks lose their efficiency, as inexperienced teams may struggle with decision-making, sprint execution, and backlog management. The study also found that company size and organizational structure play a role in Agile adoption challenges. Smaller, innovation-driven companies like Collective Mind Development benefit the most from Agile due to their flat hierarchy and close collaboration between teams. In contrast, larger enterprises such as SPAN and KING ICT often require more structured governance, risk management, and project visibility, which can conflict with Agile's decentralized decision-making.

4. CONCLUSION

The challenges of Agile methodologies in IT project management stem from structural, operational, and regulatory factors. While Agile promotes speed, flexibility, and continuous delivery, its effectiveness can be limited in projects requiring strict compliance, detailed documentation, and large-scale coordination. Organizations managing complex, multi-phase projects often struggle with Agile's lack of predictability in budgeting and scheduling, leading many to adopt hybrid models that combine Agile with traditional methodologies. Global IT firms, particularly those operating in multiple markets, face additional barriers related to team alignment, time zone differences, and cross-cultural collaboration. Ensuring that Agile teams remain coordinated and consistent across various locations requires strong leadership, effective digital tools, and well-defined Agile governance frameworks. Talent management is another critical factor in Agile's success. Without skilled professionals who understand Agile principles and can work autonomously, teams may struggle to maintain iterative progress, proper sprint execution, and backlog prioritization. As Agile methodologies rely on self-organizing teams and decentralized decision-making, companies must invest in continuous training and leadership development to sustain long-term Agile effectiveness. Despite these challenges, Agile methodologies remain a highly effective approach for software development and are widely used to increase adaptability, enhance team collaboration, and accelerate project execution. However, the study confirms that Agile is not a one-size-fits-all solution, and its success depends on contextual adaptation, strategic application, and integration with hybrid models where necessary. Organizations that effectively balance Agile's flexibility with structured governance, whether through full Agile adoption or hybrid implementation will continue to achieve the best outcomes in modern IT project management.

LITERATURE:

1. Anderson, D. J. (2010). *Kanban: Successful Evolutionary Change for Your Technology Business.* Blue Hole Press.
2. Beck, K. (1999). *Extreme Programming Explained: Embrace Change.* Addison-Wesley.
3. Beck, K., Beedle, M., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., … Thomas, D. (2001). *Manifesto for Agile Software Development.* Retrieved from https://agilemanifesto.org/
4. Collective Mind Development d.o.o. (n.d.). Services. Retrieved from https://softwarecity.hr/tvrtka/collectivemind/

5. Conforto, E. C., & Amaral, D. C. (2016). Agile project management and hybrid approaches: Identifying critical factors and elements of hybridization. Project Management Journal, 47(3), 30-45.
6. Denning, S. (2022). Reinventing Capitalism in the Digital Age. Cambridge University Press.
7. Digital.ai. (2022). 16th Annual State of Agile Report. Retrieved from https://stateofagile.com/
8. Infobip d.o.o. (n.d.). About us. Retrieved from https://www.infobip.com
9. KING ICT d.o.o. (n.d.). *About us.* Retrieved from https://king-ict.eu/o-nama/
10. PMI – Project Management Institute. (2021). *A Guide to the Project Management Body of Knowledge (PMBOK Guide), 7th Edition.* Project Management Institute.
11. Rigby, D. K., Sutherland, J., & Takeuchi, H. (2016). Embracing Agile. *Harvard Business Review, 94*(5), 40-50.
12. Schwalbe, K. (2015). *Information Technology Project Management.* Cengage Learning.
13. Schwaber, K., & Sutherland, J. (2017). *The Scrum Guide.* Retrieved from https://scrumguides.org/
14. SPAN d.d. (n.d.). *About us.* Retrieved from https://www.span.eu/hr/o-nama/

OVERCONSUMPTION AND CONSCIOUS SHOPPING IN TERMS OF SOCIO-DEMOGRAPHIC CHARACTERISTICS

Ivana Ondrijova
University of Presov, Faculty of Management and Business
Konstantinova 16, 08001 Presov, Slovakia
ivana.ondrijova@unipo.sk

Martin Rigelsky
University of Presov, Faculty of Management and Business
Konstantinova 16, 08001 Presov, Slovakia
martin.rigelsky@unipo.sk

Simona Gejgusova
University of Presov, Faculty of Management and Business
Konstantinova 16, 08001 Presov, Slovakia
simona.gejgusova@smail.unipo.sk

ABSTRACT

This study explores the interplay between overconsumption and conscious shopping through the lens of socio-demographic factors, focusing on consumer behavior in Slovakia. In light of increasing environmental degradation and the urgency of transitioning toward sustainable consumption, it is essential to understand which population groups exhibit greater environmental awareness and responsibility. The primary aim was to identify statistically significant differences in the perception of overconsumption and levels of conscious shopping based on variables such as gender, age, education, and income. Data were gathered via a structured questionnaire survey conducted among 157 respondents. The analysis confirmed that women, younger individuals, those with higher education, and respondents with lower income demonstrated higher awareness of environmental consequences related to consumption and engaged more frequently in sustainable practices such as recycling, repairing products, or choosing long-lasting goods.The research also found notable associations between the perception of overconsumption and specific consumer behaviors, particularly in relation to product selection criteria (e.g., environmental considerations, manufacturer's reputation) and practices aimed at reducing consumption. Interestingly, income emerged as a complex factor—while lower-income respondents often expressed stronger environmental attitudes, their behavior was shaped by affordability concerns. These findings highlight the significance of integrating socio-demographic differences into the design of educational campaigns, public policies, and sustainable marketing strategies. From a practical perspective, the results underline the importance of targeted interventions aimed at specific consumer segments. Furthermore, the study suggests that increasing consumer awareness may not be sufficient unless social and economic barriers are also addressed. While the study provides valuable insights, it is limited by its relatively small and non-representative sample. Future research should therefore include longitudinal and qualitative approaches to deepen understanding of consumer motivations and to explore the influence of digital platforms on sustainable behavior.

Keywords: *Conscious shopping, Environmental behavior, Overconsumption, Socio-demographic factors, Sustainability*

1. INTRODUCTION

The issue of overconsumption and conscious shopping represents one of the key challenges in contemporary consumer behavior, with direct implications for environmental sustainability and social responsibility. Different segments of consumers approach these topics in diverse ways, with socio-demographic factors such as gender, age, education, and income playing a significant role. In the context of the growing environmental crisis and the challenges associated with the circular economy, it is essential to identify which population groups are more or less inclined toward conscious consumer behavior. This study focuses on examining differences in the perception of overconsumption and the level of conscious shopping across various socio-demographic groups in Slovakia.

2. THEORETICAL BACKGROUND

One of the most prominent theoretical frameworks addressing excessive consumer behavior is the Theory of Planned Behavior (Ajzen, 1991). This theory suggests that individual behavior is influenced by attitudes, subjective norms, and perceived behavioral control. Various studies show that positive attitudes toward sustainability can lead to more responsible consumer behavior (Kollmuss & Agyeman, 2002). However, even when consumers are informed about the negative impacts of overconsumption, their behavior often does not change, indicating the existence of psychological and social barriers (Thøgersen, 2006). Psychological factors play a key role in consumer behavior. Numerous studies suggest that emotional and cognitive factors influence consumer decision-making (Richins, 1994). For example, overconsumption may be linked to emotional needs such as the pursuit of happiness, status, or identity (Belk, 1988). These factors can lead to impulsive buying and the excessive accumulation of material goods, which negatively affects the environment (Chatzidakis, Hibbert, & Smith, 2007).

Social and cultural factors also significantly influence consumer behavior. The culture in which individuals live shapes their values and norms, which can promote overconsumption. For instance, in Western culture, consumption is often associated with personal success and status (Schor, 2000). These norms can reinforce the cycle of overconsumption, as individuals strive to align with cultural ideals (Klein, 2000). Overconsumption has serious ecological consequences, including the depletion of natural resources, pollution, and climate change. If everyone lived as the average Western consumer, we would need more than two planets to sustain that way of life. This planetary overload leads to ecosystem degradation, biodiversity loss, and a decline in quality of life (Rockström et al., 2009).

Gender is an important socio-demographic factor influencing the perception of overconsumption and conscious shopping. Research suggests that women generally show greater interest in environmental and social issues, which translates into more sustainable consumer behavior. For instance, studies have found that women are more likely to engage in pro-environmental and prosocial behaviors driven by biospheric values and personal norms (Čapienė et al., 2024; Moitra et al., 2024). In contrast, men are often influenced by egoistic values and social norms, which can result in different consumption patterns (Čapienė et al., 2024). However, not all studies have found significant gender differences.

One study examining responsible consumerism revealed that gender was not a significant predictor of responsible consumer behavior, suggesting that other factors, such as age and education, may play a more prominent role (Pedrini & Ferri, 2014). These findings highlight the complexity of gender's role in shaping consumer behavior and point to the need for further research to understand its nuances.

Age is another critical factor influencing perceptions of overconsumption and conscious shopping. Younger consumers—especially Millennials and Generation Z—tend to be more environmentally conscious and willing to adopt sustainable practices. Studies have shown that younger generations are more likely to prioritize sustainability in their purchasing decisions and are willing to pay a premium for environmentally friendly products (Nichols & Holt, 2023; Etheredge et al., 2024). This trend is partly driven by growing awareness of environmental issues and the influence of digital platforms that emphasize sustainability (Karunia, 2024). In contrast, older generations, such as Baby Boomers, tend to show less interest in sustainable consumption and are less likely to be influenced by sustainability claims (Nichols & Holt, 2023). However, some studies suggest that older age groups may still exhibit strong environmental concerns and engage in sustainable behaviors, especially when motivated by a sense of responsibility and place attachment (Čapienė et al., 2024; Pedrini & Ferri, 2014).

These findings underscore the importance of considering age as a key demographic variable in understanding consumption patterns. Income and economic status significantly influence the perception of overconsumption and the ability to engage in conscious shopping. Individuals with higher incomes are more likely to afford and prioritize sustainable products, as they face fewer budget constraints (Szulc-Obłoza & Zurek, 2024; Pedrini & Ferri, 2014). In contrast, consumers with lower incomes may prioritize affordability over sustainability, leading to higher levels of overconsumption driven by economic necessity (Mehraj et al., 2023). However, the relationship between income and sustainable consumption is not entirely straightforward. Some studies have found that income may have a nonlinear relationship with environmental concerns, suggesting that the impact of income on sustainable behavior may vary across income groups (Park et al., 2012).

Moreover, the availability of affordable sustainable options plays a key role in determining whether lower-income consumers can participate in conscious shopping (Oliver et al., 2022). Education level is a strong predictor of conscious purchasing behavior. Higher education is associated with greater awareness of environmental and social issues, leading to more sustainable consumption patterns (Pedrini & Ferri, 2014; Chirilli et al., 2022). Educated consumers are more likely to seek information about the environmental and social impact of products and to make informed decisions aligned with their values (Shree et al., 2024). In addition, education enhances the ability to critically evaluate marketing claims and make well-informed choices, thereby reducing the likelihood of overconsumption (Mehraj et al., 2023). However, education alone does not guarantee sustainable behavior, as other factors such as income and social norms also play a role (Szulc-Obłoza & Zurek, 2024). Based on the theoretical background, the following research questions were formulated:

RQ1: Are there statistically significant differences in the perception of overconsumption based on socio-demographic characteristics?
RQ2: Are there statistically significant differences in the level of conscious shopping based on socio-demographic characteristics?
RQ3: Are there statistically significant relationships between the perception of overconsumption and the level of conscious shopping?

3. METHODS

The data for this study were collected through a questionnaire survey. The questionnaire items were developed based on the theoretical background related to the researched topic and were divided into two groups.

The first group focused on the perception of overconsumption, with the following specific items:

- *1a: Overconsumption has a minimal impact on the environment*
- *1b: I believe that with modern technologies and proper management, overconsumption can be minimized*
- *1c: I am aware that overconsumption has serious environmental consequences*
- *1d: I think that overconsumption is one of the main causes of environmental problems*
- *1e: I perceive overconsumption as a serious issue that needs to be addressed*
- *1f: I believe that people should be more responsible in their consumption for the sake of the environment*
- *1g: I think there are more important environmental issues than overconsumption*

The second group of items examined the level of conscious shopping:

- *2.1: What factors influence your decision when purchasing new products?:* 2.1a Price, 2.1b Brand; 2.1c Quality; 2.1d Manufacturer's reputation; 2.1e Environmental considerations; 2.1f Current trends; 2.1g Advertising
- *2.2: What factors influence your decision to buy a new product versus repairing an existing one?:* 2.2a Product quality and durability; 2.2b Affordability; 2.2c Sustainability and repairability; 2.2d Current trends
- *2.3: What steps do you take to reduce your consumption?: 2.3a Recycling; 2.3b Repairing items; 2.3c Buying long-lasting products; 2.3d I do not pay attention to this*

The socio-demographic characteristics collected included gender (female, male), age (20–25, 26–35, 36–45, 45–56, over 56 years), education level (secondary without diploma, secondary with diploma, tertiary – bachelor's, master's, doctoral), and net monthly income (under €500, €501–1000, €1001–1500, €1501–2000, €2001–2500, over €2500). Data collection took place in spring 2024, using convenience sampling. The research sample consisted of 157 Slovak respondents, including 88 women (56.05%) and 69 men (43.95%).

The most represented age group was 20–25 years with 67 respondents (42.68%), while the least represented group was over 56 years, with 10 respondents (6.37%). Most participants had completed secondary education with a diploma – 73 respondents (46.50%), while the least represented were those with a doctoral degree – 2 respondents (1.27%). In terms of income, the largest group consisted of 49 respondents (31.21%) with a net income between €1001 and €1500, and the smallest group was those earning €2001–2500, represented by only 2 respondents (1.27%).

4. RESULTS

To verify the first research question, statistically significant differences in the perception of overconsumption were examined. Differences based on gender were tested using the Wilcoxon test, while differences based on age, education, and income were tested using the Kruskal-Wallis test. Table 1 presents the verification of differences for items 1a to 1g.

Item	Gender p-value	Age p-value	Education p-value	Income p-value
1a	**0.000131**	**0.010222**	**0.001968**	**0.040294**
1b	0.494299	**0.017442**	0.391371	0.291292
1c	**2.74E-07**	**3.66E-05**	**0.000345**	**0.002722**
1d	**0.001792**	0.058875	0.08589	**0.003862**
1e	**5.49E-05**	**0.002112**	**0.009546**	**0.00399**
1f	**2.41E-07**	**4.3E-05**	**0.013884**	**0.000397**
1g	0.425475	0.321222	0.05195	0.779225

$p \leq 0,05$, $p \leq 0,001$

Table 1: Differences in the perception of overconsumption (Source:own processing)

Statistically significant differences were further analyzed based on the mean responses across the categories of the examined socio-demographic characteristics. The results indicate that men, older age groups, individuals with lower education, and respondents with higher income were more likely to agree with the statement that overconsumption has a minimal impact on the environment. Respondents aged 36–45 expressed lower agreement with the idea that overconsumption can be reduced through technology and proper management. Greater agreement with the awareness that overconsumption has serious environmental consequences was found among women, younger individuals, those with higher education, and respondents with lower income.

Differences in the perception of overconsumption as one of the main causes of environmental problems were confirmed only in terms of gender (in favor of women) and income (in favor of those with lower income). Overconsumption was perceived as a serious issue that needs to be addressed especially by women, university-educated respondents, and those in the lowest income group. At the same time, the age group 36–45 showed the lowest level of agreement with item 1e. Women, respondents aged 20–35 and over 46, those with higher education, and respondents with the lowest income were more convinced that people should behave more responsibly in terms of consumption for the sake of the environment. No statistically significant differences were confirmed for item 1g ($p \leq 0.05$ or $p \leq 0.001$).

To verify the second research question, statistically significant differences in the level of conscious shopping were examined. Differences based on gender were tested using the Chi-square test for items 2.1 and the Wilcoxon test for items 2.2 and 2.3. For age, education, and income, the Chi-square test was used for items 2.1, and the Kruskal-Wallis test was used for items 2.2 and 2.3. Table 2 presents the verification of differences for items 2.1–2.3.

Item	Gender p-value	Age p-value	Education p-value	Income p-value
2.1a	**0.000191**	**0.004459**	**0.002612**	**2.08E-07**
2.1b	1	0.355861	0.091744	**0.013166**
2.1c	0.191179	0.260683	**0.002399**	0.339096
2.1d	**0.029749**	**0.012905**	**0.001123**	**0.02656**
2.1e	0.051604	0.720932	**0.025528**	0.067989
2.1f	0.053465	0.945513	0.321062	0.712278
2.1g	0.057657	0.23358	0.544846	0.142971
2.2a	0.512679	0.429266	**0.036401**	0.240934
2.2b	**0.018537**	**0.028679**	**0.026642**	0.090759
2.2c	0.740605	0.489046	0.147964	0.84272
2.2d	0.500236	0.732518	0.071584	0.68361
2.3a	0.672862	**0.04991**	**0.014638**	**0.048113**
2.3b	0.866917	0.779279	**0.015088**	0.993566
2.3c	0.940179	0.709453	**0.031673**	**0.042729**
2.3d	0.399938	0.748762	0.066502	0.686521

p≤0,05, p≤0,001

Table 2: Differences in the level of conscious shopping (Source:own processing)

In this research question as well, the confirmed differences were further analyzed based on the average values achieved. In analyzing the factors that influence respondents when deciding to purchase new products, price was more important for women than for men, for the youngest respondents, for those with secondary education, and for those with the lowest income. For brand, a significant difference was confirmed only in terms of income, with the lowest level of agreement found among respondents with an income of €501–1000, and the highest among those earning €2001–2500. Quality was most important among respondents with the highest level of education.

The manufacturer's reputation as a purchasing factor showed differences across all socio-demographic characteristics—being more significant among women, the youngest respondents, those with higher education, and those with incomes of €501–1000 and €2001–2500. The environmental aspect showed differences only in terms of education, being most influential among the most highly educated respondents.

Regarding the factors influencing the decision to buy a new product versus repairing an existing one, differences were found in product quality and durability, which were rated as most important by highly educated respondents. Affordability was more valued by women, by respondents aged 20–25 and over 56, and by those with secondary or tertiary education (first and second degree). Recycling was most preferred by respondents over the age of 56 and least preferred by those aged 26–35, by doctoral-level respondents, and by those with the lowest income. Repairing items was more preferred among respondents with higher education. Purchasing long-lasting products was also more common among the more educated and those with incomes between €1001 and €1500.

No statistically significant differences were found for items 2.1f, 2.1g, 2.2c, 2.2d, and 2.3d at the significance levels of $p \leq 0.05$ or $p \leq 0.001$.

The third research question investigates the statistically significant relationships between the perception of overconsumption and the level of conscious shopping. To verify these relationships, the Cramer V test was used. The results of the analysis are presented in Table 3.

Item	1a	1b	1c	1d	1e	1f	1g
2.1a	0.1679	0.1599	0.2039	0.2884	0.9470	0.1789	0.8786
2.1b	0.8723	0.7736	0.9115	0.6807	0.9740	0.9855	0.2239
2.1c	0.4048	0.2164	0.1949	0.4263	0.5247	0.1779	0.5807
2.1d	0.0430	0.4368	**0.0360**	**0.0265**	**0.0140**	0.0585	0.6422
2.1e	0.0135	0.1549	0.1759	**0.0155**	**0.0405**	**0.0150**	0.4233
2.1f	0.2669	0.1959	0.0660	0.8986	0.0820	**0.0500**	0.4868
2.1g	0.0020	0.2394	0.0645	0.1999	0.4608	0.2054	0.9020
2.2a	0.0295	**0.0290**	**0.0280**	**0.0480**	**0.0140**	0.1289	0.4623
2.2b	0.0040	0.1559	**0.0280**	**0.0235**	**0.0300**	0.2839	0.5832
2.2c	0.0145	0.1599	0.0775	**0.0115**	**0.0150**	0.0540	0.2264
2.2d	0.0195	0.4998	0.4578	0.3723	0.5612	0.3783	**0.0040**
2.3a	0.1244	0.2209	0.5122	0.0730	**0.0290**	**0.0285**	0.2459
2.3b	0.4333	**0.0130**	0.0535	**0.0015**	**0.0020**	**0.0060**	0.1804
2.3c	0.1729	**0.0045**	**0.0260**	**0.0080**	**0.0285**	0.2184	0.1099
2.3d	0.0945	**0.0045**	**0.0210**	**0.0145**	**0.0090**	0.0960	0.7071

p≤0,05

Table 3 Relationships between the perception of overconsumption and conscious shopping (Source:own processing)

The manufacturer's reputation and environmental considerations in the decision-making process when purchasing new products were found to be statistically significantly associated with the perception of the seriousness of overconsumption. The current trends factor was linked to the belief that people should act more responsibly in terms of consumption for the sake of the environment. Among the factors influencing the decision to buy a new product versus repairing an existing one, those that significantly correlated with the perception of overconsumption as a serious issue were: product quality and durability, affordability, and sustainability and repairability. Actions that respondents take to reduce their consumption—such as recycling, repairing items, and purchasing durable products—also showed statistically significant relationships with the perception of overconsumption as a serious problem that needs to be addressed.

5. DISCUSSION

The results of the research confirmed significant differences in both the perception of overconsumption and the level of conscious shopping across different population groups. Women, younger respondents, individuals with higher education, and those with lower incomes demonstrated greater awareness of the impacts of overconsumption and were more inclined to engage in responsible consumption. These findings are consistent with previous studies. Čapienė et al. (2024) and Moitra et al. (2024) highlighted a higher level of environmental and prosocial behavior among women, which aligns with the outcomes of this study. The finding that younger generations—particularly Millennials and Generation Z—are more sensitive to environmental issues is supported by studies such as Nichols & Holt (2023) and Etheredge et al. (2024), which show their greater willingness to pay for sustainable products. In terms of age, younger generations exhibit a higher interest in sustainability, as confirmed not only by this study but also by research from White et al. (2019) and Bianchi & Birtwistle (2012). These authors emphasize that Generation Z, in particular, perceives environmental responsibility as part of their identity and is willing to change their behavior even at the cost of higher expenses. On the other hand, Grønhøj & Thøgersen (2017) warn that pro-environmental behavior among younger respondents is not always stable—while their attitudinal orientation may be strong, it often diverges from actual behavior ("attitude-behavior gap"), which may explain some inconsistent purchasing choices even among environmentally aware young consumers. Interesting findings also emerged regarding education—higher education correlated with stronger anti-overconsumption attitudes and a preference for sustainable products. A similar pattern was observed by Pedrini & Ferri (2014) and Chirilli et al. (2022), who emphasize the importance of education in shaping responsible consumption attitudes. These findings also highlight the need for environmental education as a tool to promote behavioral change, as supported by McKenzie-Mohr (2000).

From the income perspective, the study confirms that respondents with higher incomes do not necessarily demonstrate a higher level of conscious shopping. This paradox was also identified by Szulc-Obłoza & Zurek (2024), who point to the complexity of the relationship between income and sustainable behavior. Although higher income increases access to ecological alternatives, it does not always lead to their preference. In our research, the influence of income was ambiguous—lower income was associated with greater environmental awareness, but not always with behavior. Similarly, Akehurst et al. (2012) caution that environmental attitudes do not necessarily lead to environmental behavior if financial or social barriers are present. More recent research by Cerri et al. (2018) supports this hypothesis, emphasizing the importance of affordability, product transparency, and consumer trust in manufacturers.

Equally important are the findings related to the correlation between the perception of overconsumption and specific consumer actions such as recycling, repairing items, or choosing long-lasting products. These results suggest that a higher level of environmental awareness is linked to actual behavioral change, which aligns with the findings of Shree et al. (2024) and Chatzidakis et al. (2007), who explore why even informed consumers do not always act in environmentally friendly ways—often due to social or psychological barriers. A strong correlation between the perception of overconsumption and behaviors such as recycling, repairs, or the purchase of durable goods was also confirmed by research from Moser (2015) and Joshi & Rahman (2015). These authors recommend focusing on strengthening so-called "environmental norms" and on fostering community awareness as key factors in promoting conscious consumer behavior.

4. CONCLUSION

The research findings confirm that socio-demographic factors such as gender, age, education, and income significantly influence the perception of overconsumption as well as the degree of conscious shopping. Women, younger consumers, and individuals with higher education levels exhibit greater awareness of the ecological impacts of consumption and are more actively adopting measures to reduce their environmental footprint. In contrast, a higher income does not automatically lead to more environmentally friendly behavior, which highlights the complexity of decision-making in consumption. From a practical perspective, it is important to implement educational and awareness campaigns, particularly for younger and less educated groups, which could contribute to changing attitudes and behaviors. It is also crucial to consider socio-demographic differences when creating marketing strategies and supportive policies that reflect the specific needs of different population groups. Future research should focus on long-term monitoring of changes in attitudes and behavior, as well as on deeper qualitative analyses of motivations and barriers in conscious shopping. An important aspect of the research also involves exploring the impact of digital technologies and the online environment on shaping consumer preferences. Despite the valuable findings, this study has several limitations, primarily the limited size and structure of the research sample, which does not allow for full generalization of the results. Another limitation is the method of respondent selection and the potential influence of social desirability in questionnaire responses. Finally, although the study identified statistically significant correlations, it is not possible to draw conclusions about causality between the examined variables.

ACKNOWLEDGEMENT: *This research was funded by the Slovak Research and Development Agency, grant number APVV-23-0472.*

LITERATURE:

1. Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211.
2. Akehurst, G., Afonso, C., & Gonçalves, H. M. (2012). Re-examining green purchase behaviour and the green consumer profile: new evidences. Management Decision, 50(5), 972–988.
3. Belk, R. W. (1988). Possessions and the extended self. *Journal of Consumer Research*, 15(2), 139-168.
4. Bianchi, C., & Birtwistle, G. (2012). Consumer clothing disposal behaviour: A comparative study. International Journal of Consumer Studies, 36(3), 335–341.
5. Čapienė, A., Rūtelionė, A., & Adamonienė, R. (2024). Consumer engagement in sustainable consumption: do demographics matter? *Engineering Management in Production and Services*, *16*(2), 90–103.
6. Cerri, J., Testa, F., & Rizzi, F. (2018). The more I care, the less I will listen to you: How information, environmental concern and ethical production influence consumers' attitudes and the purchasing of sustainable products. Journal of Cleaner Production, 175, 343–353.
7. Chatzidakis, A., Hibbert, S., & Smith, A. P. (2007). Why people don't take their concerns about fair trade to the supermarket: The role of neutralisation. *Journal of business ethics*, *74*, 89-100.

8. Chirilli, C., Molino, M., & Torri, L. (2022). Consumers' Awareness, Behavior and Expectations for Food Packaging Environmental Sustainability: Influence of Socio-Demographic Characteristics. *Foods*, *11*(16), 2388.
9. Etheredge, C. L., Waliczek, T. M., & DelPrince, J. (2024). Demographic Differences in United States Consumers' Perceptions and Willingness to Pay for Sustainable Environmental Practices in the Floral Industry. *Horttechnology*.
10. Grønhøj, A., & Thøgersen, J. (2017). Why young people do things for the environment: The role of parenting for adolescents' motivation to engage in pro-environmental behaviour. Journal of Environmental Psychology, 54, 11–19.
11. Joshi, Y., & Rahman, Z. (2015). Factors affecting green purchase behaviour and future research directions. International Strategic Management Review, 3(1–2), 128–143.
12. Karunia, E. (2024). Consumer Trends: Exploring Shifts and Patterns in Contemporary Consumer Behavior. *The Journal of Business and Management Research*, *6*(2), 103–118.
13. Klein, N., & Sawchuk, K. (2000). No logo: taking aim at the brand bullies. *Canadian Journal of Communication*, *25*(4), 576.
14. Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239-260.
15. McKenzie-Mohr, D. (2000). Fostering sustainable behavior: An introduction to community-based social marketing. *Journal of Social Issues*, 56(3), 543-554.
16. Mehraj, D., Qureshi, I. H., Singh, G., & Nazir, N. A. (2023). Green marketing practices and green consumer behavior: Demographic differences among young consumers. *Business Strategy and Development*. https://doi.org/10.1002/bsd2.263
17. Moitra, R., Rallan, P., & Bhalla, M. (2024). Demographic implications on Sustainable Consumption: An Indian case study. *Journal of Informatics Education and Research*.
18. Moser, A. K. (2015). Thinking green, buying green? Drivers of pro-environmental purchasing behavior. Journal of Consumer Marketing, 32(3), 167–175.
19. Nichols, B. S., & Holt, J. W. (2023). A comparison of sustainability attitudes and intentions across generations and gender: a perspective from U.S. consumers. *Cuadernos de Gestión*, *23*(1), 51–62.
20. Oliver, M., Vrabič-Brodnjak, U., & Jestratijevic, I. (2022). *Consumers' socio-demographics influence between purchase intention and actual behavior of environmentally friendly grocery packaging*. https://doi.org/10.24867/grid-2022-p60
21. Park, S.-J., Choi, S., & Kim, E.-J. (2012). The Relationships between Socio-demographic Variables and Concerns about Environmental Sustainability. *Corporate Social Responsibility and Environmental Management*, *19*(6), 343–354. https://doi.org/10.1002/CSR.284
22. Peattie, K., & Peattie, S. (2009). Social marketing: a pathway to consumption reduction?. *Journal of business research*, *62*(2), 260-268.
23. Pedrini, M., & Ferri, L. M. (2014). Socio-demographical antecedents of responsible consumerism propensity. *International Journal of Consumer Studies*, *38*(2), 127–138.
24. Richins, M. L. (1994). Valuing things: The public and private meanings of possessions. *Journal of Consumer Research*, 21(3), 504-521.

25. Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E. F., ... & Foley, J. A. (2009). A safe operating space for humanity. *Nature*, 461(7263), 472-475.
26. Schor, J. (2000). *Do Americans shop too much?* (Vol. 6). Beacon Press.
27. Shree, P. V., Lochana, K., & Krishnakumari, S. (2024). Responsible Consumption: Developing Sustainable Habits of Living for The Future. *International Journal of Scientific Research in Science and Technology*, *11*(5), 324–329. https://doi.org/10.32628/ijsrst2411454
28. Szulc-Obłoza, A., & Zurek, M. (2024). Attitudes and sustainable behaviors with special consideration of income determinants. *European Research on Management and Business Economics*.
29. Thøgersen, J. (2006). Norms for environmentally responsible behaviour: An extended taxonomy. *Journal of environmental Psychology*, *26*(4), 247-261.
30. White, K., Habib, R., & Hardisty, D. J. (2019). How to SHIFT consumer behaviors to be more sustainable: A literature review and guiding framework. Journal of Marketing, 83(3), 22–49.

NEW PHENOMENA AND TERMINOLOGY IN INFLATION: SHRINKFLATION, SKIMPFLATION, EXCUSEFLATION, GREEDFLATION, STICKYFLATION AND THEIR COMPANIONS

Arpad Ferenc Papp-Vary
Department of Marketing, Budapest University of Economics and Business, Hungary
Lámfalussy Research Center, Faculty of Economics, University of Sopron, Hungary
Márkadoktor Branding Consultancy, Budapest, Hungary
papp-vary.arpad@uni-bge.hu

ABSTRACT

In recent years, consumers have increasingly felt the effects of rising inflation. Yet price increases are not always immediately visible, as companies often adopt innovative or even concealed strategies. These practices have given rise to a series of new economic phenomena and corresponding linguistic terms. Shrinkflation refers to a reduction in product size while the price remains unchanged. Skimpflation denotes a decline in the quality of goods or services without a corresponding price drop – or, in some cases, even alongside a price increase. Excuseflation involves price increases justified by external factors – such as the Covid-19 pandemic or the Russia-Ukraine war. Finally, greedflation highlights unjustified price hikes driven by corporate profit maximization. This study explores these emerging concepts alongside additional inflation-related terms such as warflation, fossilflation, greenflation, climateflation, Bidenflation, Trumpflation, cheapflation, poorflation, stealthflation, and stickyflation. The paper aims to provide a comprehensive overview of these expressions, contributing to a deeper understanding of how inflation is evolving – not only in economic terms, but also in the language and narratives used to describe it in global academic and media contexts.

Keywords: *inflation, shrinkflation, skimpflation, excuseflation, greedflation, warflation, fossilflation, greenflation, climateflation, stickyflation, economic linguistics, consumer behavior*

1. INTRODUCTION

During one of his campaign stops, Donald Trump reached into his jacket pocket, pulled out a box of Tic Tac candies, and said to the audience (Fox News, 2024): "There's something here – I did have something I wanted to show you. Wait a minute... Oh, I have it. I do have it. Look at this. Look at this. So this is Tic Tacs, right? I don't know if I like the company – I've never met them, no idea. But they're so lucky, look at all the television. This is like the greatest commercial they ever had."

But is it really? Because with his other hand, he then held up a much smaller package – a tiny box of Tic Tacs clearly containing far fewer candies: "But that's what's happened. This is inflation. This is Tic Tac. This is inflation. (…) Somebody gave me this one today. I said, I think we'll put it up as an example of inflation."

Donald Trump used the above example in August 2024 while campaigning as a presidential candidate. However, the sitting president at the time, Joe Biden, had addressed a similar issue months earlier, in February 2024, when he spoke to his followers in a video:

> "It's Super Bowl Sunday, and if you're anything like me, you like to be surrounded by a snack or two while watching the big game. You know, when buying snacks for the game, you might have noticed one thing: sports drink bottles are smaller, a bag of chips has fewer chips – but they're still charging just as much.

> And as an ice cream lover, what makes me the most angry is that ice cream cartons have actually shrunk in size – but not in price. I've had enough of what they call shrinkflation. It's a rip-off! Some companies are trying to pull a fast one by shrinking the products little by little and hoping you won't notice. Give me a break. The American public is tired of being played for suckers. I'm calling on companies to put a stop to this. Let's make sure businesses do the right thing." (The Biden White House, 2024)

President Biden specifically used the term "shrinkflation" in his message – and the word even appeared in big bold letters on the video. However, in recent years, several other concepts have emerged in response to runaway inflation: skimpflation, excuseflation, and greedflation. Additional terms have also entered the economic and linguistic lexicon, such as fossilflation, greenflation, and climateflation – none of which yet have clearly established definitions, just like stealthflation, cheapflation, or poorflation.

Of course, both presidents conveniently omitted the fact that the surge in inflation is often associated with their own names and policies – hence the emergence of terms like Bidenflation and Trumpflation. Politicians are also reluctant to admit that inflation is likely to linger for years to come. Yet, there is already a term for this, too: stickyflation.

This study aims to explore these new terms in greater detail, offering the first comprehensive overview. While numerous authors have written about rising inflation in recent years (see, for example, Matolcsy et al., 2020; Ábel & Nagy, 2022; Antalóczy & Sass, 2023; Bod, 2023; Botos, 2023; Csáki, 2023; Halmai, 2023; Lentner, 2023; Molnár & Hajdú, 2023a,b; Balatoni & Quittner, 2024; Ábel et al., 2024; Horváth, Trautmann & Csáki, 2024; Németh, Mészáros & Keresztes, 2024), and there are even some publications that examine the connection between marketing and inflation (Nagy, Józsa & Szalai Módosné, 2024), to date no study has focused specifically on shrinkflation, skimpflation, excuseflation, greedflation, and related terms. Hopefully, this paper will offer new insights from economic, marketing, and linguistic perspectives alike.

2. SHRINKFLATION: SAME PRICE, SMALLER PRODUCT

Among the new phenomena of inflation, shrinkflation is perhaps the most noticeable and easiest to understand. It is no coincidence that both American presidents highlighted this particular concept. The essence of shrinkflation is that a company reduces the size of a product while keeping the price unchanged (Mahmoud, 2024). In other words, consumers end up paying the same amount for a smaller-sized product or package than before. As a result, the price remains the same for the consumer, while the manufacturer incurs lower production costs. The term itself is a blend of the words shrink and inflation. Although shrinkflation is not exclusive to periods of inflation, it becomes significantly more common during such times, as companies face rising costs but are either unable or unwilling to fully pass these on to consumers through price increases (Bennett, 2022). One of the most well-known examples of shrinkflation is the decision by food manufacturer Mondelez to widen the gaps between the triangular pieces of Toblerone chocolate. As a result, the total weight of the chocolate bar was reduced by 20 grams – or 40 grams for the larger size – while the packaging remained the same (Mahmoud, 2024). A similar phenomenon can be observed in the beverage market, where aluminum cans have shrunk from 0.33 liters to 0.25 liters, and some PET bottles that previously held 2 liters now only contain 1.75 liters. Another typical example of shrinkflation is when a box of candy contains fewer pieces. This can happen either because the box itself is smaller, or because the number of candies inside has been reduced while the packaging size stays the same. However, these kinds of changes do not go unnoticed by consumers.

In fact, more and more people are picking up on these tactics and frequently share their dissatisfaction or experiences – just as Presidents Trump and Biden did in their own ways. Although consumers often notice this type of inflation, companies still regularly resort to it. Why? Mainly because when labor, raw material, or other costs increase, companies are faced with two main options. One is to pass the higher costs on to consumers through price increases. The other is to absorb the costs themselves, which reduces profit margins – or in extreme cases, may even lead to operating at a loss (Kirtyán et al., 2024). Raising prices carries the risk of reduced demand, as consumers tend to be price-sensitive across most product categories. In such cases, they might turn to a competitor's product, which may be of lower quality but is more affordable. Alternatively, they may choose substitute products (for example, opting for a different type of snack instead of chocolate), or in some cases, abandon the product altogether. The situation is further complicated by the fact that inflation affects not only individual products, but many aspects of consumers' lives: rent, utility bills, and various other expenses are rising. This leaves less disposable income in household budgets, forcing consumers to cut back and seek cheaper alternatives. In this context, it is understandable why a company might choose shrinkflation over raising prices. This strategy means keeping prices unchanged while reducing the size or quantity of the product. Although the price may occasionally change alongside the reduction – either increasing or decreasing – in its classic form, shrinkflation involves selling a smaller product for the same price. This approach allows consumers to avoid a significant price shock, while companies minimize the risk of a drop in demand. This raises the question: can shrinkflation be considered a form of actual inflation, and is it reflected in official inflation indicators? The United States offers a good starting point for answering this question. The most well-known measure of inflation in the U.S. is the Consumer Price Index (CPI), which tracks the average price changes of goods and services purchased by consumers over a specific period – usually monthly and annually (Bennett, 2024). The data is collected and published monthly by the Bureau of Labor Statistics (BLS). In principle, the BLS treats shrinkflation as a form of price increase. However, applying this in practice is not always straightforward. To ensure price comparability, the BLS makes adjustments – for example, by using unit pricing – to better account for changes in product size or quantity and to provide a more accurate picture (McNair, 2023).

Changes in unit prices are indeed a clear way to demonstrate the impact of shrinkflation. For instance, if a roll of paper towels costs $3 and contains 165 sheets, the unit price is $0.018 per sheet. If the roll is reduced to 147 sheets while the price remains the same, the unit price increases to $0.02 per sheet. This means consumers are receiving less for the same amount of money – essentially, a hidden price increase (McNair, 2023; Kirtyán et al., 2024). Another important question is whether shrinkflation is legal. In the United States, this issue is governed by the Fair Packaging and Labeling Act (FPLA), which was enacted in 1967. The law requires manufacturers to accurately indicate the size and weight of their products so that consumers can make informed decisions when comparing different items. Therefore, as long as the actual size or quantity of the product is properly disclosed, it is considered sufficient under the law. In addition to federal regulations, individual U.S. states may impose further requirements, and practices may differ in other countries as well. The example of Hungary provides an interesting case of regulatory response to shrinkflation. Although this study does not go into detail about the Hungarian legal framework, it is worth noting that a regulation that came into effect on March 1, 2024, obliges food retailers in Hungary with annual revenues exceeding 1 billion forints (approximately 2.5 million euros) to notify consumers if the packaging size of pre-packaged goods has been reduced compared to previous versions.

Specifically, this means that affected products must be marked with a large red exclamation mark accompanied by the message: “Attention! The product has become smaller!” In addition, a general notice must be posted, also displaying a large red exclamation mark, followed by the following text:

> “Dear Customers! To support more informed and conscious purchasing decisions, we draw your attention to the fact that the packaging quantity of certain products has decreased, even though their prices have remained the same or have increased. As a result, customers may get less value for their money. To reduce misleading practices and tackle food inflation, Government Decree 1/2024 (I. 9.) requires stores with significant revenues to display this warning next to the affected product for two months. Please watch for the ! symbol next to the products. Consumers can also find detailed information about the affected items in a publicly accessible online database maintained by the National Food Chain Safety Office (Nébih).” (Portfolio, 2024)

As we can see, consumer information requirements in Hungary are stricter than in the United States – though the inflation rate in Hungary has also been significantly higher, even compared to the already elevated levels seen in the U.S. Returning to the U.S. market, the online platform LendingTree – which allows users to compare and apply for various types of loans – examined nearly 100 different products and found that one-third had undergone size reductions (Davis & Shepard, 2024; Kirtyán et al., 2024). The most significant changes were observed in the category of household paper goods, such as toilet paper and paper towels: 12 out of 20 items (i.e., 60%) had fewer sheets than before. The second most affected category was breakfast items, 44% of which were found to be sold in smaller quantities. For instance, the family-sized Frosted Flakes cereal manufactured by Kellogg’s was reduced from 24 ounces to 21.7 ounces. At the same time, its price increased (!) from $3.64 to $4.48, resulting in a 40% rise in unit price per ounce. (This is a key example where both a size reduction and a price increase occurred simultaneously.) As for sweets, 38% of the products were sold in smaller packages, and the same applied to 27% of snacks, according to LendingTree’s data (Davis & Shepard, 2024; Kirtyán et al., 2024). A 2024 study further revealed that 71% of Americans noticed or experienced shrinkflation at least once during the previous year. Moreover, 57% encountered it on multiple occasions during the same period (Davis & Shepard, 2024). These findings clearly show how widespread the practice of shrinkflation has become and how it affects various product categories.

3. SKIMPFLATION: SAME PRICE, LOWER QUALITY

While shrinkflation typically involves a noticeable reduction in product size, skimpflation is a much subtler phenomenon (Bennett, 2024). In this case, the product’s size remains unchanged, but its quality deteriorates – while the price stays the same. The term skimpflation is a portmanteau of skimp (to cut back or economize) and inflation. Although it can occur in other economic periods, this phenomenon becomes particularly common during inflationary years, when companies face sharply rising costs and consumers experience a decline in real income.
Typical examples of skimpflation include chocolate that contains less or lower-quality cocoa, margarine with a reduced proportion of vegetable oil, or fruit juice that now contains only 50% fruit content compared to a previous 100%. In fast food establishments, skimpflation can be observed when the quality of ingredients declines – often in tandem with shrinkflation, such as serving smaller portions at the same price. Skimpflation does not affect only products, but services as well. For instance, a hotel might discontinue daily housekeeping services. While this can be justified from an environmental or sustainability standpoint, it still represents a decrease in service quality. In the airline industry, typical examples include eliminating complimentary meals and snacks, or introducing various baggage fees.

In retail, the growing use of self-checkout systems and staff-free service options may also fall into this category – even if consumers don't always perceive these changes negatively. In such cases, the quality of the provided service declines, and these practices can also be classified as skimpflation. Whether we're talking about a product or a service, the core idea of skimpflation remains the same: consumers receive less value for the same price, which can lead to a decline in customer satisfaction over the long term. Since these changes are often hidden, consumers may not notice skimpflation right away – but once they do, they are likely to share their experiences on review sites or social media. This, in turn, can cause significant reputational damage to the brand involved. At the same time, it's also true that consumers don't always immediately recognize the drop in quality, so the short-term impact is often minimal (Kirtyán et al., 2024). While in the United States the Fair Packaging and Labeling Act (FPLA) helps ensure consumers are properly informed when it comes to products, ensuring transparency for services is often more difficult. In the U.S., it is generally considered sufficient for service providers to clearly communicate the terms of service, which gives companies broader leeway in terms of what they disclose – and what they don't. Interestingly, the official measure of inflation in the U.S.—the Consumer Price Index (CPI)—does not directly account for the effects of skimpflation. While the CPI can reflect changes in product size, it does not factor in declines in quality. As a result, the hidden or invisible "price increases" caused by skimpflation can distort inflation data, meaning that actual inflation may be higher than what the CPI indicates (McNair, 2023). Last but not least, as we also observed in some cases of shrinkflation, the price does not always remain the same – in fact, it may even increase. The same can happen with skimpflation: not only does the quality decline, but the price may rise simultaneously. This results in a double burden for the consumer – paying more while receiving less.

4. ADDITIONAL FORMS AND TERMS OF INFLATION

In the case of shrinkflation, the size of the product decreases, while in skimpflation, the quality deteriorates – yet in both cases, the price typically, though not always, remains the same. Excuseflation, however, is different: the size and quality of the product or service remain unchanged, but the price increases – justified by some external factor. The term excuseflation is derived from merging the words excuse and inflation. In such cases, the company attributes significant price increases to external economic, political, or social developments and communicates this accordingly. A typical example is warflation, which has indeed contributed to many price hikes – especially for food and energy – both globally and regionally (Molnár & Hajdú, 2023a). However, not all price increases can be blamed on war, and certainly not in full. Warflation is not unique to Europe; it also exists in global discourse under the same name (Signorini, 2022). A similar concept is "Covid inflation," where companies raised prices citing the consequences of the pandemic – even in cases where the increases were only partially justified. Closely related to excuseflation is greedflation – a portmanteau of greed and inflation. This term refers to instances where companies use inflation as a pretext to raise prices, even though the actual increase in production costs is significantly smaller. In reality, such price hikes are often aimed at maximizing corporate profits. This has led to a new dynamic in the business world: rising costs are now frequently associated with rising profits. But how far can this go? Where is the price ceiling that a consumer in a capitalist society can still afford? – this is the question that arises (Matus, 2023; Kirtyán et al., 2024). According to Albert Edwards, strategist at Société Générale, greedflation was clearly observable during the pandemic and the Russia-Ukraine war, when many companies raised their prices citing rising raw material costs – while simultaneously achieving record-high profits. A study by the Federal Reserve Bank of Kansas City also found that, in many cases, the ratio between companies' prices and their production costs does not align with economic realities.

In an era of economic slowdown, higher input costs, and rising labor expenses, corporate profit margins should logically shrink rather than grow. Yet, according to data from the Bureau of Economic Analysis (BEA), corporate profit margins have reached historically high levels globally (Matus, 2023). Similar conclusions have been drawn by other studies focusing on U.S. firms (De Loecker, Eeckhout & Unger, 2020; Konczal & Lusiani, 2022; Ábel et al., 2023). One of the greatest risks of excuseflation – and especially of greedflation – is that it can erode consumer trust in a brand. When a company significantly raises prices to increase profits while blaming external factors, it may eventually lose its loyal customers. This becomes particularly problematic if the company later faces real economic challenges and needs to raise prices again, as consumers are unlikely to accept such increases a second time – potentially resulting in a loss of market share (Mapes-Christ, 2023). This reminds us of the story of The Boy Who Cried Wolf: if companies use external excuses too often, consumers may stop believing them – just when the threat becomes real. Among the various excuses used to justify price increases, several other interesting inflation-related terms are worth mentioning. One such term is fossilflation, which refers to inflation driven by rising prices of fossil fuels such as oil, natural gas, or coal. This often compels companies to raise their prices. In contrast, greenflation refers to the price and cost increases associated with environmental and sustainability efforts – for instance, the transition to renewable energy sources (see Molnár, Regős & Horváth, 2023). A related term is climateflation, which highlights the direct and indirect inflationary impacts of measures aimed at combating climate change (Schnabel, 2022). As Horváth & Sárdi (2023) point out: "With the spread of electromobility, renewable energy sources, and environmentally friendly products, companies must adapt to changing consumer habits – and this adaptation is expensive. According to a forecast by a British bank, the cost of economic transformation could reach $300 trillion by 2050, and the resources to fund this will likely come from price increases."

In this context, it is worth mentioning the study "Inflation in the Digital Age – The Measurement and Distortions of Inflation in the 21st Century", published in March 2020—just before the major outbreak of the Covid-19 pandemic. The study was authored by György Matolcsy, who was then President of the Hungarian National Bank, along with three of his senior colleagues. Márton Nagy was then Deputy Governor (Vice President) of the bank and is now Hungary's Minister for National Economy. Dániel Palotai was then Executive Director and Chief Economist of the Hungarian National Bank, and Barnabás Virág served as Executive Director at the time. Although the previously discussed terms do not appear in their study, the authors – senior officials at the Central Bank of Hungary – emphasize that inflation should not be viewed solely as a monetary phenomenon, but rather analyzed within broader economic, social, and technological contexts. As they point out, today's inflationary processes are influenced by factors such as global technological competition, demographic shifts, and the costs associated with transitioning to sustainability and a green economy. But who is responsible for inflation? Even if they are not entirely to blame - or at least not solely – political leaders are often held accountable. The term Bidenflation links the rise in inflation to the policies of President Joe Biden's administration. Critics argue that large-scale economic stimulus packages, support for renewable energy, stricter regulations on fossil fuels, and aid to Ukraine may all have contributed to the surge in inflation. The term Bidenflation is most commonly used in the rhetoric of the Republican Party and conservative commentators as a critique of President Biden. In contrast, Trumpflation is associated with Donald Trump's two presidential terms and his economic policies. Critics of Trump argue that tax cuts, measures aimed at stimulating the economy, increases in government spending, and trade wars – including tariffs imposed on China and other countries – all contributed, and continue to contribute, to rising inflation.

And the list of terms doesn't stop there: the concept of cheapflation highlights how inflation affects different social groups in varying degrees. Low-income households are more exposed to the negative effects of inflation, as a larger portion of their consumption basket consists of essential goods and services – such as food and energy. These categories often experience higher-than-average inflation, which further deepens purchasing power inequalities (Chen, Levell & Connell, 2024). In response, consumers try to save money – for example, by switching to cheaper versions of food products. This phenomenon is clearly observable among Hungarian households as well (Lentner, 2023; Molnár & Hajdú, 2023b; Nagy, Józsa & Szalai Módosné, 2024). Closely related is the concept of poorflation, referring to the idea that in times of inflation, almost everyone becomes poorer to some extent – even if not equally. Despite significant wage increases, rising property values, high returns on investments, or record-breaking stock market gains, if the prices of everything else increase just as much or even more, people ultimately end up with less disposable income. In effect, they grow poorer over time.

Another term worth mentioning is stealthflation, which refers to "hidden" or "stealth" inflation. This concept broadly encompasses many of the previously discussed practices, including shrinkflation and skimpflation. As highlighted in the article "Stealthflation: What It Means and How It Affects Us" published by Sales Untangled (2024), stealthflation impacts consumers in a subtle and insidious way, without showing up as direct price increases. While consumers may not immediately notice the effects of stealthflation, over time their satisfaction declines as the value they receive diminishes. This, in turn, can erode brand loyalty and generate negative feedback. Finally, it seems that inflation is here to stay – or, to put it another way, it's "sticking around," as suggested by the term stickyflation. This concept already appeared during the 2007–2008 financial crisis (Business Live, 2008). Stickyflation refers to two related challenges: either central banks are unable to reduce inflation to their targeted level, or they are unable to do so quickly enough. For example, in the current environment, the U.S. Federal Reserve has long aimed for a 2% inflation rate. While it managed to bring inflation down to 3% relatively quickly, pushing it all the way to 2% is proving far more difficult and time-consuming – despite that still being the official target. Stickyflation also refers to the fact that economic growth – reflected in GDP – is not increasing fast enough to "overpower" inflation and surpass it in real terms. At present, inflation really does appear to be sticking around, and the 2020s may well be defined by it. As György Matolcsy, who was then President of the Hungarian National Bank, noted in 2024: "Already in 2019, we at the Hungarian National Bank saw and warned that from 2020 onward, a new era would begin: inflation would return – and not only return but become stubborn, lasting throughout the entire decade." (Haász, 2024) And this doesn't apply only to Hungary, but to neighboring countries, to all of Europe – and indeed, to the entire world, albeit to varying degrees.

5. CONCLUSION

The 2020s will likely go down in history as the era of inflation. Faced with inflation and broader economic challenges, companies are increasingly forced to adopt innovative – though often controversial – strategies. These include shrinkflation, skimpflation, and excuseflation, each of which reduces the value delivered to consumers in different ways. In shrinkflation, the size or quantity of products is reduced while prices remain unchanged –meaning consumers receive less for the same amount of money. Skimpflation, by contrast, involves a (hidden) decline in the quality of products or services, again without a decrease in price. In both cases, the price may sometimes even increase, which adds a second layer of burden for consumers. In the case of excuseflation, companies raise prices while citing external factors – such as economic crises, war, or the pandemic – even when internal factors may be equally responsible.

If such price hikes are driven by greed, or at least perceived that way by consumers, the phenomenon is referred to as greedflation. These strategies can help companies maintain profitability in the short term, particularly in inflationary environments where consumers are highly price-sensitive. However, in the long run, these practices can seriously undermine customer trust and brand loyalty. Such tactics often operate at the edge of legality and ethics: while they may be legal under regulations like the U.S. Fair Packaging and Labeling Act, they can still leave a bad impression on consumers. It is also important to note that official inflation indicators – such as the Consumer Price Index (CPI) in the United States – can only partially account for the effects of shrinkflation and skimpflation. While changes in size can often be identified and adjusted for, quality degradation usually goes unnoticed, which can distort inflation data and lead to an underestimation of its true extent. The phenomena discussed above highlight the need for consumers to adopt a more critical mindset when making purchasing decisions. At the same time, companies must recognize that short-term profit maximization can ultimately lead to a decline in market share and a negative perception of their brand. These practices have, in many ways, become unavoidable in times of economic uncertainty, yet they pose significant regulatory and ethical challenges as well (Kirtyán et al., 2024). Only further research can provide deeper insight into the long-term effects of these strategies – particularly their impact on consumer trust, regulatory development, and the accuracy of inflation indicators. Finally, from the perspective of economic linguistics, the emergence of new terminology is especially noteworthy. Most of these terms originate in the United States. In this study, we introduced a total of 13+1 such expressions: shrinkflation, skimpflation, excuseflation, greedflation, warflation, fossilflation, greenflation, climateflation, Bidenflation, Trumpflation, cheapflation, poorflation, stealthflation, and finally, stickyflation. A summary of these concepts and their definitions can be found in Table 1. The aim of this study was to provide a broader context for understanding these terms and their relevance in today's inflationary environment. It will also be interesting to see how these concepts and terms are translated into different languages and how they are adapted in various cultural and economic contexts. This is a topic worth monitoring in the future as well, as inflation seems likely to persist – making stickyflation a lasting concern – and new terminology will no doubt continue to emerge alongside the 13+1 terms discussed here.

Inflation Term	Brief Explanation
Shrinkflation	Reducing the size or quantity of a product while keeping the price unchanged – consumers pay the same for less.
Skimpflation	Decreasing the quality of a product or service without lowering the price – often done subtly or gradually.
Excuseflation	Raising prices while citing external factors (e.g. war, economic crisis, pandemic), even when internal reasons may be equally responsible.
Greedflation	Price increases driven by profit-seeking, where companies raise prices beyond what cost increases would justify.
Warflation	Inflation triggered by the direct or indirect economic consequences of war, such as disrupted supply chains and energy prices.
Fossilflation	Inflation caused by rising prices of fossil fuels like oil, gas, or coal, affecting production and transportation costs.
Greenflation	Inflation linked to the costs of environmental regulations or transitioning to sustainable, eco-friendly technologies.

Climateflation	Inflation arising from the effects of climate change or from mitigation policies, such as emissions reductions or adaptation efforts.
Bidenflation	A term used to attribute rising inflation in the United States to the policies and decisions made during President Joe Biden's administration.
Trumpflation	A term used to link inflationary effects to the economic or trade policies implemented during President Donald Trump's presidencies.
Cheapflation	A form of inflation that disproportionately affects lower-income consumers, as essential goods become more expensive and they are forced to trade down to cheaper alternatives.
Poorflation	A general loss of purchasing power across all income levels, where people feel poorer even if wages or asset values rise.
Stealthflation	A hidden form of inflation where consumers get less value through subtle changes like smaller sizes, lower quality, or reduced services.
Stickyflation	Inflation that sticks around and remains persistently high over time, despite efforts by central banks or policymakers to bring it down.

Table 1. Emerging Terms of Inflation: Definitions of 13+1 Contemporary Concepts
Source: Definitions by the author, based on academic literature, economic commentary, and media discourse

LITERATURE:

1. Ábel, I. and Nagy, Gy. (2022). Vélekedések az inflációról: Megalapozatlan feltételezések és megdönthetetlen elméletek (Perceptions of inflation: Unfounded assumptions and unshakeable theories). *Külgazdaság,* 66(5), 44–75.
2. Ábel, I., Bognár, G., Lóga, M. and Szabó, I. A. (2024). Changes in the explanation of inflation. *Public Finance Quarterly,* 70(1), 110–133.
3. Ábel, I., Hegedűs, Sz., Nagy, Gy. and Tóth, O. É. (2023). A vállalati haszonkulcs és az infláció: új elem az infláció magyarázatában (Profit margins and inflation: A new element in the explanation of inflation). In Szegedi, K. (ed.), *Szemelvények a BGE kutatásaiból II. kötet (Selected Research from BGE, Vol. II)* (pp. 7–14). Budapest: Budapesti Gazdasági Egyetem.
4. Antalóczy, K. and Sass, M. (2023). Fagyos szelek idején. Körkérdés: Recesszió vagy infláció? Vagy más választás is van? (In times of icy winds. Roundtable: Recession or inflation? Or is there another choice?) *Külgazdaság,* 67(1–2), 5–14.
5. Balatoni, A. and Quittner, P. (2023). A 2021–2023 közötti inflációs hullám okai és háttere (The causes and background of the 2021–2023 inflation wave). *Közgazdasági Szemle (Economic Review),* 71(6), 671–689.
6. Bennett, J. (2022). Beyond Inflation Numbers: Shrinkflation and Skimpflation. Published: 01.12.2022. Retrieved: 11.11.2024, from https://www.stlouisfed.org/publications/page-one-economics/2022/12/01/beyond-inflation-numbers-shrinkflation-and-skimpflation
7. Bod, P. Á. (2023). Döntéshozatal inflációs sokkok és politikai kockázatok idején (Decision-making during inflation shocks and political risks). *Biztosítás és Kockázat (Insurance and Risk),* 10(3–4), 24–37.

8. Botos, K. (2023). Infláció és pénzügyeink (Inflation and our finances). *Pénzügyi Szemle / Public Finance Quarterly,* 69(4), 84–94.
9. Business Live (2008). 'Stickyflation' will affect interest rates. Published: 03.01.2008. Retrieved: 11.11.2024, from https://www.business-live.co.uk/economic-development/stickyflation-will-affect-interest-rates-3964290
10. Chen, T., Levell, P. and O'Connell, M. (2024). Cheapflation and the rise of inflation inequality. *Centre for Economic Policy Research (CEPR),* DP19388. Published: 24.08.2024. Retrieved: 11.11.2024, from https://cepr.org/publications/dp19388
11. Csáki, Gy. (2023). Recesszió és/vagy infláció? (Recession and/or inflation?). *Külgazdaság,* 67(1–2), 46–52.
12. Davis, M. and Shepard, D. (2024). 71% of Americans Have Noticed Shrinkflation — Here Are the Products and Categories That Shrunk the Most. Published: 30.09.2024. Retrieved: 11.11.2024, from https://www.lendingtree.com/credit-cards/study/shrinkflation-report/#bet-breakfast-club-delivery
13. De Loecker, J., Eeckhout, J. and Unger, G. (2020). The Rise of Market Power and the Macroeconomic Implications. *The Quarterly Journal of Economics,* 135(2), 561–644. https://doi.org/10.1093/qje/qjz041
14. Fox News (2024). Former President Trump used Tic Tacs to demonstrate inflation. Published: 14.08.2024. Retrieved: 11.11.2024, from https://www.youtube.com/watch?v=dAMvSfOnRG4
15. Haász, J. (2024). Matolcsy: Három éve úttévesztésben van az ország, teljes fordulat kell (Matolcsy: The country has been on the wrong path for three years, a complete turnaround is needed). *444.hu*, Published: 05.09.2024. Retrieved: 11.11.2024, from https://444.hu/2024/09/05/matolcsy-harom-eve-uttevesztesben-van-az-orszag-teljes-fordulat-kell
16. Halmai, P. (2023). Poszt-Covid infláció, gazdaságpolitikai mix az euróövezetben (Post-COVID inflation, policy mix in the euro area). *Külgazdaság,* 67(1–2), 53–67.
17. Horváth, A., Trautmann, L. and Csáki, Gy. (2024). „Jelenleg a globális feladat az infláció csökkentése úgy, hogy ne romoljanak a növekedési lehetőségek." – Interjú dr. Csáki György egyetemi tanárral ("The global task now is to reduce inflation without harming growth opportunities" – Interview with Professor György Csáki). *Köz-Gazdaság,* 19(3), 5–13.
18. Horváth, S. and Sárdi, G. (2023). A zöldforradalomnak ára van, készüljünk a zöldinflációra (The green revolution has a price — prepare for greenflation). *Index.hu*, Published: 30.10.2023. Retrieved: 11.11.2024, from https://index.hu/gazdasag/geocompass/2023/10/30/elektromobilitas-zold-tudat-zold-atallas-zold-forradalom-zoldinflacio-zsugorflacio-kapzsinflacio-klimaflacio/
19. Kirtyán, P., Palcsák, B., Szmulai, R. and Szőllősi, A. (2024). A shrinkflation, a skimpflation és az excuseflation hatása a fogyasztókra és a marketingre – Órai beadandó a Budapesti Gazdasági Egyetem marketing mesterképzésén, a Holisztikus marketing tárgyból (The impact of shrinkflation, skimpflation, and excuseflation on consumers and marketing – *Student paper in the Holistic Marketing course at Budapest Business University*).
20. Konczal, M. and Lusiani, N. (2022). Prices, Profits, and Power: An Analysis of 2021 Firm-Level Markups. *Roosevelt Institute.* Published: 06.2022. Retrieved: 11.11.2024, from https://rooseveltinstitute.org/wpcontent/uploads/2022/06/RI_PricesProfitsPower_202206.pdf
21. Lentner, Cs. (2023). Szemelvény az infláció természetéről: Főszerkesztői beköszöntő (On the nature of inflation: Editor-in-chief's foreword). *Polgári Szemle: Gazdasági és Társadalmi Folyóirat (Civic Review: Journal of Economic and Social Affairs),* 19(4–6), 7–9.

22. Mahmoud, R. (2024). Shrinkflation: Definition, Examples & Business Rationale. Retrieved: 11.11.2024, from https://www.retaildogma.com/shrinkflation/
23. Mapes-Christ, J. (2023). Inflation, Shrinkflation, Skimpflation, and Excuseflation: What You Need to Know. Published: 05.06.2023. Retrieved: 11.11.2024, from https://www.freedoniagroup.com/blog/inflation,-shrinkflation,-skimpflation,-and-excuseflation-what-you-need-to-know
24. Matolcsy, Gy., Nagy, M., Palotai, D. and Virág, B. (2020). Infláció a digitális korban – Az infláció mérése és torzításai a 21. században (Inflation in the digital age – Measuring and distortions of inflation in the 21st century). *Hitelintézeti Szemle / Financial and Economic Review,* 19(1), 5–36.
25. Matus, T. (2023). Új kifejezés a globális gazdasági közbeszédben: itt a „kapzsinfláció" (A new term in global economic discourse: Greedflation is here). *Mandiner.hu*, Published: 05.05.2023. Retrieved: 11.11.2024, from https://mandiner.hu/makronom/2023/05/itt-a-kapzsinflacio
26. McNair, K. (2023). Getting less for the same price? Explore how the CPI measures "shrinkflation" and its impact on inflation. *Bls.gov*, Retrieved: 11.11.2024, from https://www.bls.gov/opub/btn/volume-12/measuring-shrinkflation-and-its-impact-on-inflation.htm
27. Molnár, L. and Hajdú, N. (2023a). Az infláció hatása a magyar lakosság pénzügyi helyzetére – Szemelvények egy országos, reprezentatív felmérés eredményeiből (The impact of inflation on the financial situation of the Hungarian population – Findings from a national representative survey). *Észak-Magyarországi Stratégiai Füzetek (North Hungarian Strategic Papers),* 20(1), 108–120.
28. Molnár, L. and Hajdú, N. (2023b). A fogyasztók élelmiszervásárlási szokásainak változása az infláció hatására (Changes in consumer food purchasing habits due to inflation). In Piskóti, I. and Nagy, Sz. (eds.), *Marketingkaleidoszkóp 2023: Tanulmányok a Marketing és Turizmus Intézet és partnerei kutatási eredményeiből (Marketing Kaleidoscope 2023: Studies from the Institute of Marketing and Tourism and its Partners)* (pp. 134–150). Miskolc: Miskolci Egyetem, Gazdaságtudományi Kar.
29. Portfolio (2024). "Vigyázat, a termék kisebb lett" – Új plakátok jelennek meg a boltokban a kormány nyomására ("Warning: the product got smaller" – New posters appear in stores under government pressure). *Portfolio.hu*, Published: 22.02.2024. Retrieved: 11.11.2024, from https://www.portfolio.hu/gazdasag/20240222/vigyazat-a-termek-kisebb-lett-uj-plakatok-jelennek-meg-a-boltokban-a-kormany-nyomasara-670733
30. Sales Untangled (2025). Stealthflation means consumers have to brace themselves for hidden price increases. *Sales Untangled.* Retrieved: 30.01.2025, from https://salesuntangled.co.uk/stealthflation-means
31. Schnabel, I. (2022). A new age of energy inflation: climateflation, fossilflation and greenflation. Published: 17.03.2022. *ecb.europa.eu*, Retrieved: 11.11.2024, from https://www.ecb.europa.eu/press/key/date/2022/html/ecb.sp220317_2~dbb3582f0a.en.html
32. Signorini, L. F. (2022). From pandemic to warflation: a key role for the insurance industry. Published: 10.10.2022. *ivass.it*, Retrieved: 11.11.2024, from https://www.ivass.it/media/interviste/intervista/ania-insurance-summit-2022/
33. The Biden White House (2024). President Biden Discusses Shrinkflation. Published: 11.02.2024. Retrieved: 11.11.2024, from https://www.youtube.com/watch?v=GcVTzgZyGro
34. Thomas, C. (2024). Poorflation. *Linkedin.com*, Published: 30.06.2024. Retrieved: 11.11.2024, from https://www.linkedin.com/posts/callum-thomas-4990063_economy-inflation-markets-activity-7199473530093133825-VUyO/

THE STRATEGIC ROLE OF CRITICAL MINERALS IN ELECTRIC VEHICLE PRODUCTION

Tomi Miuc
University of Ljubljana, School of Economics and Business, Slovenia
tomi4miuc@gmail.com

Matej Svigelj
University of Ljubljana, School of Economics and Business, Slovenia
matej.svigelj@ef.uni-lj.si

ABSTRACT
Electric vehicles (EVs) play a central role in global strategies to reduce carbon emissions. However, their production depends on a range of critical minerals—such as lithium, cobalt, nickel, graphite, and rare earth elements—that are largely sourced from geopolitically sensitive regions, including the Democratic Republic of Congo, Chile, and China. This paper analyses the mineral supply chain challenges associated with EV production, focusing on economic, environmental, and geopolitical risks. The growing demand for EVs has exposed supply chain vulnerabilities, including regional concentration of resources, price volatility, and unsustainable mining practices. These pressures are further amplified by competition with other industries dependent on the same raw materials. The study emphasizes the need for a multi-dimensional response, incorporating recycling, technological innovation, ethical sourcing, and international policy coordination. Ensuring a resilient and sustainable mineral supply chain is essential for supporting the continued growth of electric mobility while minimizing its broader environmental and social impacts.
Keywords: *electric vehicles, critical minerals, sustainable supply chain*

1. INTRODUCTION

Electric vehicles (EVs) are widely regarded as a cornerstone in the global strategy to mitigate climate change and reduce greenhouse gas emissions. As countries strive to meet carbon neutrality goals, the electrification of transport systems offers a promising pathway. Unlike conventional internal combustion engine vehicles, EVs depend heavily on a complex range of critical minerals, with a typical EV requiring six times as many mineral inputs (Mullan et al., 2022). Minerals such as lithium, cobalt, nickel, and rare earth elements are essential for battery production, structural integrity, and motor efficiency (Habib et al., 2020). This mineral dependence introduces a unique set of challenges and vulnerabilities. The global supply of these minerals is geographically concentrated, with countries like the Democratic Republic of Congo (cobalt), Chile and Argentina (lithium), and China (graphite and rare earths) dominating the market (International Energy Agency, 2022). Such reliance heightens the risk of geopolitical disruptions, price volatility, and supply chain fragility. Moreover, mining and processing operations have raised significant concerns regarding environmental degradation, water use, and social impacts including labor rights violations and child labor (Gerdes, 2020). On the other hand, the surge in demand for EV-related minerals also offers unprecedented opportunities for innovation throughout the supply chain—improved extraction techniques and direct lithium extraction to refined recycling processes and blockchain-based traceability tools have emerged in recent years (World Economic Forum, 2021). This paper examines how the accelerating shift towards electric mobility is influencing mineral demand, reshaping global supply chains, and creating a new frontier of industrial and policy challenges. It explores the roles of different minerals, evaluates their sources and supply dynamics, and assesses the environmental, economic, and social implications of their growing importance.

The research adopted a thorough and multi-faceted methodological framework designed to investigate the role of minerals in EV production, combining technical, economic, environmental, and geopolitical perspectives. The approach was grounded in an extensive literature review and data synthesis. Data sources include academic publications, industry reports, financial statements, and publicly available datasets from reputable organizations, such as the International Energy Agency and the U.S. Geological Survey.

2. GEOGRAPHICAL DISTRIBUTION OF MINERAL SOURCES AND RESOURCE AVAILABILITY

The global distribution of critical minerals used in EV production reveals a pronounced concentration of supply in a handful of countries. This geographical asymmetry presents strategic vulnerabilities and highlights the need for diversified sourcing strategies and international cooperation (U.S. Geological Survey, 2023). Lithium, a basis of battery chemistry, is primarily extracted from brine deposits in Chile, Argentina, and Bolivia, often referred to as the "Lithium Triangle", as well as from hard rock sources in Australia (Martin et al., 2016). While global lithium resources are estimated at approximately 98 million metric tons, economically extractable reserves stand at 26 million metric tons. Particularly, Bolivia holds the largest single share of resources, but exploitation is hindered by political, logistical, and climatic challenges. Australia leads in production, contributing nearly half of global output (U.S. Geological Survey, 2023). Cobalt extraction is even more geographically distorted, with the Democratic Republic of Congo (DRC) accounting for roughly 70% of global mine production (U.S. Geological Survey, 2023). This dominance is accompanied by widespread concerns over labor practices, including child labor and unregulated artisanal mining (Williams et al., 2021). Meanwhile, cobalt refining is heavily centered in China, which consumes the majority of global supply for battery production (U.S. Geological Survey, 2023). Nickel resources are more evenly distributed but are still dominated by countries such as Indonesia, Australia, Russia, and the Philippines. Lateritic and sulfide deposits vary by region, affecting the environmental and economic feasibility of extraction. Indonesia alone contributed 49% of world production in 2022, while Australia holds the same share of global reserves as Indonesia, each with 21% (U.S. Geological Survey, 2023). Graphite, copper, manganese, iron, and aluminum also present varied geographical patterns. Graphite production is overwhelmingly controlled by China, with significant reserves also located in Turkey and Brazil. Copper is abundant in Chile and Peru, while manganese is dominated by South Africa. Iron ore resources are largest in Australia and Brazil, and aluminum is sourced primarily from bauxite deposits in Guinea, Australia, and China (U.S. Geological Survey, 2023; Brough & Jouhara, 2020). Rare earth elements, especially neodymium and dysprosium, are nearly monopolized by China, which accounts for over 70% of global production. This control raises supply chain concerns, especially given the strategic importance of rare earths in motor magnets and other clean energy applications. Efforts to develop rare earth mining in the United States, Canada, and Australia are underway, but capacity remains limited due to environmental and regulatory hurdles (Ciacci et al., 2019). The distinction between mineral reserves and resources is crucial. Reserves denote the economically viable portion under current conditions, while resources encompass all known and estimated quantities regardless of present feasibility. Understanding this distinction is essential for evaluating future supply potential and long-term planning (Backhaus, 2021). The geographical concentration of mineral production introduces substantial geopolitical risk into the EV supply chain. Countries dependent on a narrow range of suppliers are exposed to price shocks, export restrictions, and diplomatic tensions (Gerdes, 2020). A robust mineral strategy for EV production must therefore include diversification of supply sources, increased investment in domestic exploration, and expanded efforts in mineral recycling and substitution.

3. SUPPLY CHAIN DYNAMICS AND STAKEHOLDERS

The supply chain for EV-critical minerals spans over several complex and linked stages, including extraction, processing, refining, battery manufacturing, vehicle assembly, and ultimately, recycling or disposal. Each segment of this chain involves a unique set of stakeholders whose roles are vital to ensuring a stable, ethical, and sustainable mineral flow (Carreon, 2023). At the upstream end of the chain are mining companies, responsible for the extraction of raw materials. Dominant players include Albemarle Corporation (USA), SQM (Chile), and Ganfeng Lithium (China) in the lithium segment; Glencore (Switzerland) and Vale (Brazil) for cobalt and nickel; and Syrah Resources (Australia) and China Molybdenum for graphite. These companies operate across continents, often in geopolitically sensitive or environmentally vulnerable regions (International Energy Agency, 2022). Following extraction, processing and refining operations concentrate and purify raw minerals for industrial use. These stages are often geographically decoupled from mining, with countries like China dominating the refining of cobalt, lithium, and rare earth elements. This concentration gives China a disproportionate influence on global supply dynamics, pricing, and material availability. Midstream players include battery cell manufacturers and EV producers. Companies such as Tesla, BYD, and CATL rely heavily on long-term mineral contracts, joint ventures, or strategic investments in mining firms to secure raw materials. Tesla, for example, has pursued vertical integration strategies to mitigate exposure to supply shocks (World Economic Forum, 2021). Governments, regulatory agencies, and non-governmental organizations (NGOs) play crucial roles in shaping the governance of supply chains. They enforce labor laws, environmental regulations, and trade policies. Initiatives like the Global Battery Alliance and the ICMM Mining Principles aim to foster transparency, sustainability, and ethical sourcing. These efforts are vital to addressing concerns over child labor, ecological damage, and community displacement (Gerdes, 2020). Emerging technologies are also reshaping supply chain dynamics. Innovations such as direct lithium extraction, battery recycling, and blockchain-based traceability tools are being explored to increase efficiency and transparency. Recycling technologies, in particular, hold potential to decouple mineral supply from primary extraction, creating closed-loop systems that reduce dependency on high-risk regions (World Economic Forum, 2021). However, the EV mineral supply chain remains susceptible to a range of disruptions. Geopolitical tensions, trade restrictions, natural disasters, and labor strikes can all delay or constrain supply. The COVID-19 pandemic underscored these vulnerabilities, causing significant delays in mineral shipments and price spikes (Breiter et al., 2022). As such, a resilient supply chain must prioritize diversification, regional partnerships, and the establishment of strategic reserves (Mitchell & Miller, 2021). In conclusion, the supply chain for EV minerals is a multifaceted ecosystem shaped by powerful commercial interests, regulatory frameworks, and technological progress. Ensuring its sustainability will require coordinated action among governments, corporations, and civil society, with shared commitments to ethical sourcing, environmental stewardship, and long-term resource security.

4. ECONOMIC AND ENVIRONMENTAL IMPACTS

The increasing demand for minerals driven by EV production is reshaping both national economies and environmental landscapes. The impacts are multifaceted and vary significantly depending on the mineral in question and the socio-economic context of the producing country (Erickson, 2021). Economically, mineral rich nations such as the DRC, Chile, and Indonesia have experienced growing fiscal reliance on mineral exports (AFDB, 2024). In the DRC, cobalt revenues have become a central component of national income, despite volatile pricing and ethical controversies surrounding artisanal mining (Williams et al., 2021; AFDB, 2024).

Similarly, Chile and Argentina benefit from lithium exports, but face challenges balancing economic gains with the need for resource governance and local benefit sharing (Álvarez, 2023; World Economic Forum, 2023). While mineral exports can fuel GDP growth and infrastructure development, they often carry the risk of economic overdependence and the "resource curse," whereby sectors such as agriculture and manufacturing are neglected in favor of extractive industries (AFDB, 2024; Williams et al., 2021). On the environmental front, the extraction and processing of critical minerals impose considerable burdens on ecosystems (Sandalow, 2023). Lithium mining in the Lithium Triangle involves brine evaporation techniques that require immense water use, leading to competition with local communities and degradation of fragile salt flat ecosystems (Osborne, 2022). In the DRC, cobalt mining is associated with deforestation, soil erosion, and heavy metal contamination of waterways (OSVehicle, 2022). These ecological consequences are compounded by weak enforcement of environmental regulations and limited technological capacity for cleaner extraction methods (Sandalow, 2023). Moreover, the energy-intensive nature of mineral refining processes, particularly for aluminum and rare earth elements, contributes significantly to greenhouse gas emissions (Habib et al., 2020). China's dominance in refining has raised additional concerns due to its reliance on coal-powered electricity, exacerbating the carbon footprint of EV mineral supply chains (World Economic Forum, 2021). Socially, the human costs of mining cannot be overlooked. In the DRC, widespread reports of child labor and dangerous working conditions persist in artisanal mining operations, where regulation is minimal and economic desperation drives participation. These practices raise serious ethical questions for downstream companies and consumers, pressuring them to improve due diligence and transparency (Baumann-Poly, 2023). In response, global initiatives such as the Global Battery Alliance and the International Council on Mining and Metals (ICMM) have proposed principles for ethical sourcing, worker protections, and environmental stewardship. These frameworks aim to ensure that the transition to clean mobility does not replicate the exploitative practices of past industrial booms (Gerdes, 2020). Finally, efforts to mitigate environmental and social impacts are gaining momentum through innovation. Closed-loop recycling of end-of-life batteries, urban mining, and the development of less resource-intensive battery chemistries such as lithium iron phosphate (LFP) are being explored to reduce dependence on primary extraction. However, the scalability of these solutions remains a challenge (Toro et al., 2023; Ambrose and O'Dea, 2021). In summary, while the EV revolution promises significant environmental benefits through reduced tailpipe emissions, it simultaneously generates a new set of economic and ecological pressures. A just and sustainable mineral supply chain must align technological advancement with responsible resource governance, equitable economic development, and rigorous environmental safeguards.

5. EFFECTS ON OTHER INDUSTRIES

The rapidly rising demand for minerals critical to EV production is reverberating across several other industries that traditionally relied on these same raw materials. The reallocation of supply chains, shifts in price structures, and prioritization of EV-related applications are causing ripple effects that require careful attention from stakeholders outside the automotive sector (Bajolle et al., 2022). One of the clearest examples is lithium, which has historically been used in ceramics, lubricants, pharmaceuticals, and air treatment systems. Prior to the EV boom, non-battery uses accounted for a significant share of lithium consumption. However, as of the early 2020s, over 70% of lithium demand is now directed toward battery production (U.S. Geological Survey, 2023). This rapid shift has resulted in reduced availability and increased costs for manufacturers in the glass and ceramics industries, leading to calls for supply diversification and substitution (Martin et al., 2016).

Cobalt, another battery-critical mineral, has also seen a redirection of demand. Previously used in high-strength alloys, medical prosthetics, and magnets, cobalt is now being aggressively absorbed by the battery sector. This transition is particularly impactful for industries dependent on high-performance alloys, such as aerospace and defense, where substituting cobalt without compromising material integrity is technically difficult (Ambrose & O'Dea, 2021). Nickel, traditionally utilized in stainless steel and electroplating, is experiencing parallel pressures. The increased demand for high-purity nickel sulfate in EV batteries is reshaping supply contracts and influencing mining investment priorities. Stainless steel manufacturers, particularly in emerging markets, have expressed concern about long-term supply security and escalating input costs (Garside, 2022; U.S. Geological Survey, 2023). Copper, a critical material for both EVs and broader electrification efforts, is facing supply bottlenecks due to simultaneous demand from renewable energy infrastructure, data centers, and telecommunications (Lèbre, 2020). The EV sector alone requires up to four times more copper per vehicle compared to internal combustion engine cars (Lynch, 2021). This has raised concerns over inter-industry competition for limited resources and the sustainability of copper-intensive expansion in multiple economic domains (Manthey, 2023). Similarly, aluminum, widely used in packaging, construction, and aerospace, has become increasingly vital in EV applications due to its light weight and structural strength (Gándara, 2013). The surge in demand for lightweight vehicles has intensified aluminum procurement pressures, especially in regions where energy-intensive smelting operations face carbon reduction mandates (World Economic Forum, 2021). Rare earth elements, including neodymium and dysprosium, are essential not only for EV motors but also for wind turbines, medical imaging equipment, and various consumer electronics (Transparency Market Research, n.d.; Britannica, n.d.). The strategic overlap in end-use sectors has led to geopolitical tensions and efforts to secure supply through international alliances and stockpiling programs (Business Insider, 2024; Morrison, 2019). In some cases, these pressures are catalyzing technological innovation and material substitution. For instance, in response to cobalt price volatility and ethical concerns, battery manufacturers are accelerating the development of cobalt-free chemistries, such as LFP and manganese-rich formulations (Ambrose and O'Dea, 2021). Similarly, efforts to reduce rare earth dependency are being pursued in both the EV and wind energy sectors through advancements in ferrite-based motors and magnet-free designs (Maani et al., 2021). Overall, the evolving mineral economy for EVs is not operating in isolation but is deeply interconnected with global industrial dynamics. Strategic coordination between sectors, long-term investment in sustainable mining and recycling, and adaptive policy frameworks will be necessary to balance competing demands while enabling decarbonization across the economy.

6. MARKET PRICE TRENDS AND VOLATILITY

The price behavior of critical minerals used in EV production has been marked by substantial volatility over the last decade, driven by shifting demand patterns, supply disruptions, policy changes, and speculative investment activity. Understanding these market dynamics is essential for stakeholders seeking to build resilient supply chains and make informed investment decisions (Lèbre et al. 2020; Backhaus, 2021). Lithium has exhibited one of the most pronounced price cycles among all battery materials. Between 2015 and 2018, lithium carbonate prices rose sharply as demand surged with the rise of EV manufacturing, peaking at over $20,000 per tonne. However, this rally was followed by a dramatic decline in 2019–2020 due to overcapacity in the supply chain, slower-than-expected EV adoption in some markets, and falling subsidies in China. Prices rebounded significantly in 2021 and 2022, reaching new highs due to renewed demand and concerns over raw material shortages, before moderating in 2023 as Chinese production increased and speculative pressures subsided (Krass, 2023; OilPrice.com, 2023).

Cobalt has experienced similar boom-bust dynamics. Prices peaked in 2017–2018 due to anticipated shortages and increased battery demand, reaching over $90,000 per tonne. However, the development of cobalt-thrifty and cobalt-free battery chemistries, along with expanded mining activity in the Democratic Republic of Congo, led to a steep price correction. By 2023, cobalt prices had declined significantly, though demand remains strong for use in certain high-energy-density battery types. Nickel markets have also seen turbulence. Initially dominated by the stainless steel industry, the rise of nickel-rich battery cathodes for EVs has created new sources of demand, particularly for Class 1 high-purity nickel. Supply disruptions in Indonesia and geopolitical tensions involving major producers like Russia have further contributed to price swings. The London Metal Exchange (LME) nickel price spiked in early 2022 amid fears of shortages, before stabilizing as inventories recovered and alternative supply sources came online (Belder, 2024; U.S. Geological Survey, 2023). Graphite and rare earths have faced less public attention but remain exposed to price variability. China's dominant position in both markets has allowed it to influence pricing through export quotas and strategic stockpiling. In the case of rare earths, geopolitical tensions, particularly U.S.-China trade frictions, have contributed to price instability and prompted supply chain diversification efforts in other nations (Morrison, 2019; Northern Graphite Corporation, n.d.). Market volatility has been further amplified by policy uncertainty (Mitchell and Miller, 2021). Sudden shifts in EV subsidies, environmental regulations, and trade tariffs can drastically alter demand forecasts and investor sentiment (Batabyal, 2019). The COVID-19 pandemic also disrupted logistics networks, reduced industrial output, and introduced new sources of unpredictability into global mineral markets (Breiter et al., 2022).

MPI							
	Lithium	**Cobalt**	**Nickel**	**Iron ore**	**Aluminium**	**Copper**	**Manganese**
2010	100.00	100.00	100.00	100.00	100.00	100.00	n.a.
2011	116.13	77.74	75.71	80.97	85.90	82.58	n.a.
2012	130.65	65.93	72.40	76.47	88.55	87.04	100.00
2013	116.13	75.12	57.78	80.58	73.82	78.83	97.42
2014	122.58	81.44	66.23	40.75	81.02	70.43	83.87
2015	335.48	62.17	36.13	24.26	63.53	50.68	49.03
2016	364.52	84.95	45.53	47.13	73.31	61.84	122.58
2017	483.87	195.08	47.70	42.57	88.28	74.66	91.61
2018	220.97	142.67	44.96	40.89	81.49	66.38	108.39
2019	127.42	83.96	57.38	53.98	75.16	66.40	81.29
2020	156.45	83.09	69.81	90.83	85.49	84.92	80.65
2021	853.23	182.18	83.05	65.54	114.38	104.35	86.45
2022	1,530.65	133.83	120.28	66.11	101.76	91.46	80.65
2023	279.03	74.68	68.23	81.62	93.01	91.86	75.48

Table 1: Mineral price index year-end since 2010
(Source: Own work)

To analyze these trends, we developed a Mineral Price Index (MPI), in which we normalized prices across key minerals to a common 2010 baseline (Table 1).

This tool enabled comparison of relative changes and highlighted periods of synchronized price spikes, such as those occurring in 2017–2018 and 2021–2022. The MPI underscored how tightly mineral prices are coupled to expectations around EV growth, policy momentum, and supply chain constraints. In conclusion, the volatility in mineral markets points toward the need for adaptive strategies, including price hedging, long-term procurement contracts, and diversified sourcing. Companies and governments alike must account for these fluctuations in their planning, as pricing instability can impact the pace and cost of the global transition to electric mobility.

7. POLICY RECOMMENDATIONS

Addressing the challenges posed by the rapid expansion of EV production requires a coordinated set of policy and technological responses. These strategies must simultaneously ensure secure access to critical minerals, promote sustainable extraction practices, and encourage innovation that reduces dependency on finite resources (Mitchell & Miller, 2021; Sandalow, 2023; Ambrose & O'Dea, 2021; Toro et al., 2023). At the policy level, governments play a crucial role in shaping the future mineral economy. National strategies should prioritize the diversification of supply sources through trade agreements, development aid to mineral-rich nations, and domestic exploration incentives. Countries heavily reliant on mineral imports must adopt measures to mitigate geopolitical risk, such as strategic stockpiling and bilateral supply partnerships (Mitchell & Miller, 2021). Environmental regulations should be strengthened to ensure that mineral extraction aligns with sustainability goals. Governments must enforce robust standards for water usage, emissions control, and waste management, particularly in vulnerable regions like the Lithium Triangle and the Congo Basin. These standards should be harmonized across jurisdictions to avoid regulatory arbitrage and to support responsible sourcing frameworks (Osborne, 2022; Sandalow, 2023; OSVehicle 2022). Social considerations must also be integrated into policy design. This includes protecting the rights of local communities, ensuring fair labor conditions, and addressing the informal mining sector. Transparency initiatives can help track revenues, expose corruption, and promote accountability across the mineral value chain (Banvick and Gupta, 2014; Agusdinata et al., 2022; Williams et al., 2021). International collaboration is critical for addressing the inherently global nature of mineral markets. Forums like the Global Battery Alliance provide platforms for harmonizing sustainability criteria, sharing best practices, and fostering investment in ethical supply chains.

Cross-border research and innovation partnerships can accelerate the development of next-generation materials and recycling technologies (Toro et al., 2023). From a technological standpoint, the most impactful innovations focus on reducing the material intensity of EVs and enabling circularity. Battery chemistries that minimize or eliminate cobalt and nickel, such as lithium iron phosphate and solid-state batteries, offer pathways to lower risk exposure and environmental impact. Continued R&D investment is essential to scale these technologies for mainstream use (Ambrose & O'Dea, 2021; Janek & Zeier, 2023). Recycling infrastructure must be expanded to capture the growing volume of end-of-life batteries. Urban mining, direct recovery of metals, and second-life applications for batteries are promising avenues. However, achieving commercial viability will require public-private partnerships, consistent regulatory frameworks, and economies of scale. Recycling can significantly reduce the need for primary extraction, easing supply constraints and lowering emissions across the life cycle (World Economic Forum, 2021). Educational initiatives and workforce development programs are equally important. The emerging mineral economy demands skilled labor in fields ranging from geoscience and metallurgy to recycling and sustainability management.

Governments and academic institutions must work together to ensure that training programs align with future industry needs. In sum, the transition to an electrified transport system depends not only on access to raw materials but also on the ability to govern, innovate, and adapt. Coordinated policy efforts, technological breakthroughs, and global cooperation can transform today's mineral challenges into long-term opportunities for sustainable growth.

8. CONCLUSION

The global transition to EVs represents a shift in the transportation and energy sectors, promising reduced carbon emissions and greater sustainability. However, this shift is linked to the mineral economy, which introduces new vulnerabilities, dependencies, and responsibilities. As demonstrated in this paper, rising demand for minerals such as lithium, cobalt, nickel, and rare earth elements is fundamentally reshaping global supply chains, international trade dynamics, and environmental policy frameworks. While the opportunities presented by the EV revolution are immense, they are accompanied by substantial challenges. Geographical concentration of mineral reserves, ethical concerns surrounding extraction practices, and significant price volatility all pose risks to stable and equitable growth. The effects extend beyond the EV sector, impacting traditional industries and testing the resilience of existing economic systems. Sustainable progress will depend on a holistic approach that incorporates responsible sourcing, robust governance, technological innovation, and international cooperation. Policies must support fair labor practices, environmental stewardship, and local community engagement. At the same time, new technologies must be developed and scaled to reduce reliance on high-risk materials, improve recycling efficiency, and enhance transparency throughout the value chain.The findings of this paper reinforce the urgency of embedding sustainability at the core of mineral supply strategies for electric vehicles. As global stakeholders navigate this transition, the choices made today will shape not only the future of mobility, but also the broader economic and ecological footprint of the 21st century industrial landscape. Achieving a secure, just, and environmentally sound mineral market is not merely desirable, it is imperative for the success of the global energy transition.

ACKNOWLEDGEMENT:. *This research was supported by the Slovenian Research and Innovation Agency (Research Programme P5-0117)*

LITERATURE:

1. AFDB (2024). *African economic outlook 2024*. https://www.afdb.org/sites/default/files/2024/06/06/aeo_2024_-_country_notes.pdf
2. Agusdinata, D. B., Eakin, H. & Liu, W. (2022). Critical minerals for electric vehicles: a telecoupling review. *Environmental Research Letters, 17*(1), 013005.
3. Álvarez, J. P. (2023). *This is lithium's role in Chile and Argentina, Latin America's Lithium powerhouses.* https://www.bloomberglinea.com/english/this-is-lithiums-role-in-chile-and-argentina-latin-americas-lithium-powerhouses/
4. Ambrose, H., & O'Dea, J. (2021). *Electric Vehicle Batteries: Addressing Questions about Critical Materials and Recycling.* Union of Concerned Scientists. http://www.jstor.org/stable/resrep29545
5. Backhaus, R. (2021). Battery Raw Materials - Where from and where to? *ATZ worldwide, 123*(9), 8–13. https://doi.org/10.1007/s38311-021-0715-5
6. Bajolle, H., Lagadic, M. & Louvet, N. (2022). The future of lithium-ion batteries: Exploring expert conceptions, market trends, and price scenarios. *Energy Research & Social Science, 93*, 102850.
7. Batabyal, A. (2019). *What is a tariff? An economist explains.* https://daily.jstor.org/parter-post-from-the-conversation-on-math-or-econ/

8. Baumann-Pauly, D. (2023). *Cobalt Mining in the Democratic Republic of the Congo: addressing root causes of human rights abuses*. https://bhr.stern.nyu.edu/wp-content/uploads/2024/01/Cobalt-Mining-2023_White-Paper.pdf
9. Bavinck, M. & Gupta, J. (2014). Legal pluralism in aquatic regimes: A challenge for governance. *Current Opinion in Environmental Sustainability, 11*, 78-85.
10. Belder, D. (2024). *Nickel price forecast: Top trends that will impact nickel in 2024*. https://investingnews.com/daily/resource-investing/base-metals-investing/nickel-investing/nickel-forecast/
11. Breiter, A., Horetsky, E., Linder, M. & Rettig, R. (2022). *Power spike: How battery makers can respond to surging demand from EVs*. https://www.mckinsey.com/capabilities/operations/our-insights/power-spike-howbattery-makers-can-respond-to-surging-demand-from-evs
12. Britannica (n.d.). *Neodymium.* https://www.britannica.com/science/neodymium
13. Brough, D. & Jouhara, H. (2020). The aluminium industry: A review on state-of-the-art technologies, environmental impacts and possibilities for waste heat recovery. *International Journal of Thermofluids, 1*, 100007.
14. Business Insider (2024). *Rare Metals Prices Surge As China Restricts Exports.* https://markets.businessinsider.com/news/stocks/rare-metals-prices-surge-as-china-restricts-exports-1033748449
15. Carreon, A. R. (2023). *The EV battery supply chain explained*. https://rmi.org/the-ev-battery-supply-chain-explained/
16. Ciacci, L., Vassura, I., Cao, Z., Liu, G. & Passarini, F. (2019). Recovering the "new twin": Analysis of secondary neodymium sources and recycling potentials in Europe. *Resources, Conservation and Recycling, 142*, 143-152.
17. Erickson, C. (2021). *EV Impact: Battery disruptors are jolting metal supply chains.* https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/ev-impact-battery-disruptors-are-jolting-metal-supply-chains-66518783
18. Gándara, M. F. (2013). Aluminium: the metal of choice. *Mater. Tehnol, 47(3),* 261-265.
19. Garside, M. (2022). *Nickel production in major countries 2021*. https://www.statista.com/statistics/264642/nickel-mineproduction-by-country/
20. Gerdes, J. (2020). *Why we need to build batteries better*. https://www.energymonitor.ai/tech/energy-storage/why-we-need-to-build-batteriesbetter/
21. Habib, K., Hansdóttir, S. T., & Habib, H. (2020). Critical metals for electromobility: Global demand scenarios for passenger vehicles, 2015–2050. *Resources, Conservation and Recycling, 154*, 104603.
22. International energy agency (2022). *Minerals used in electric cars compared to conventional cars.* https://www.iea.org/data-andstatistics/charts/minerals-used-in-electric-cars-compared-to-conventional-cars
23. Janek, J., & Zeier, W. G. (2023). Challenges in speeding up solid-state battery development. *Nature Energy, 8*(3), 230-240.
24. Krass S. (2023). *Lithium price trends 2023: From oversupply to looming demand challenges.* https://batteryjuniors.com/2023/10/31/lithium-price-trends-2023/
25. Lèbre, É., Stringer, M., Svobodova, K., Owen, J. R., Kemp, D., Côte, C., Arratia-Solar, A., & Valenta, R. K. (2020). The social and environmental complexities of extracting energy transition metals. *Nature communications, 11*(1), 1-8.
26. Lynch J. (2021). *Copper's role in growing electric vehicle production*. https://www.cmegroup.com/openmarkets/commodities/2021/copper-role-in-electric-vehicle-production.html

27. Maani, T., Mathur, N., Singh, S., Rong, C., & Sutherland, J. W. (2021). Potential for Nd and Dy Recovery from end-of-life products to meet future electric vehicle demand in the US. *Procedia Cirp, 98*, 109-114.
28. Manthey, E. (2023) *Uncertain global economic recovery looms over copper*. https://think.ing.com/articles/uncertain-global-economic-recovery-looms-over-copper/
29. Martin, G., Rentsch, L., Höck, M., & Bertau, M. (2017). Lithium market research–global supply, future demand and price development. *Energy Storage Materials, 6*, 171-179.
30. Mitchell P., & Miller R. (2021). *Why mineral supply may be an e-mobility roadblock*. https://www.ey.com/en_us/mining-metals/why-mineral-supply-may-be-an-e-mobility-roadblock
31. Morrison, W. (2019). *Trade dispute with china and rare earth elements*. https://sgp.fas.org/crs/row/IF11259.pdf
32. Mullan, C., van Halm, I. (2022). *Booming EV sales challenge critical mineral supply chains*. https://www.energymonitor.ai/sectors/transport/booming-ev-sales-challengemineral-supply-chains/
33. Northern Graphite Corporation (n.d.). *Graphite pricing*. https://www.northerngraphite.com/about-graphite/graphite-pricing/
34. OilPrice.com (2023). *Lithium prices have crashed spectacularly, here's what next*. https://finance.yahoo.com/news/lithium-prices-crashed-spectacularly-next-200000652.html
35. Osborne M. (2022). *Mining lithium for electric vehicle batteries may threaten flamingos, a study finds.* https://www.smithsonianmag.com/smart-news/mining-lithium-for-electric-vehicle-batteries-may-threaten-flamingos-a-study-finds-180979741/
36. OSVehicle (2022). *The negative environmental impact of mining for electric car batteries*. https://www.osvehicle.com/the-negative-environmental-impact-of-mining-for-electric-car-batteries/
37. Sandalow, B. (2023). *The challenges of mining for electric-vehicle batteries*. https://www.mccormick.northwestern.edu/news/articles/2023/03/the-challenges-of-mining-for-electric-vehicle-batteries/
38. Toro, L., Moscardini, E., Baldassari, L., Forte, F., Falcone, I., Coletta, J., & Toro, L. (2023). A systematic review of battery recycling technologies: *Advances, challenges, and future prospects. Energies, 16*(18), 6571.
39. Transparency Market Research (n.d.). *Neodymium market*. https://www.gminsights.com/industry-analysis/aluminum-market
40. U.S. Geological Survey (2023). *Mineral commodity summaries.* https://pubs.usgs.gov/periodicals/mcs2023/mcs2023.pdf
41. Williams, J. T., Vangu, A. M., Mabiala, H. B., Mangungulu, H. B., & Tissingh, E. K. (2021). Toxicity in the supply chain: cobalt, orthopaedics, and the Democratic Republic of the Congo. *The Lancet Planetary Health, 5*(6), e327-e328.
42. World Economic Forum (2021). *5 innovators making the electric vehicle battery more sustainable.* https://www.weforum.org/agenda/2021/05/electric-vehicle-battery-recyclingcircular-economy/
43. World Economic Forum (2023). *Lithium: Here's why Latin America is key to the global energy transition.* https://www.weforum.org/agenda/2023/01/lithium-latin-america-energy-transition/

THE IMMERSIVE TRUTH EFFECT: HOW VIRTUAL REALITY ENHANCES PERCEPTIONS OF ADVERTISEMENT TRUTHFULNESS

Filip Zivaljic
Međimurje University of Applied Sciences in Čakovec
Bana Josipa Jelačića 22a, 40000 Čakovec
fzivaljic@gmail.com; filip.zivaljic@mev.hr

ABSTRACT
This study investigates the impact of virtual reality (VR) technology on student perceptions of advertising truthfulness. Employing an experimental design, 169 participants were assigned to either a VR viewing condition (n = 60) or a traditional mobile viewing condition (n = 109). Following exposure to an identical advertisement, participants' attitudes toward the advertisement's truthfulness were assessed using a standard marketing scale. The findings reveal a statistically significant difference ($p < .001$) in perceived truthfulness, with the VR group exhibiting a higher level of perceived truthfulness compared to the mobile group ($t = -4.096$, $df = 167$). This suggests that the immersive characteristics of VR may enhance consumer trust in advertised products. The paper explores the implications of these results, discusses potential underlying mechanisms, and proposes directions for future research within the domains of VR advertising and consumer behavior.
Keywords: *Virtual Reality (VR) advertising, Consumer perception, Advertisement truthfulness, Immersive experience, User trust, M37, M31, C91, D83, O33*

1. INTRODUCTION

Virtual Reality (VR) represents an advancement in human-computer interaction, offering users entry into interactive, computer-generated, three-dimensional environments characterized by a high degree of immersion (Steuer, 1992). This immersion, often achieved by occluding the user's view of the physical world, distinguishes VR from related technologies like Augmented Reality (AR), which integrates virtual elements into the real-world environment (Milgram & Kishino, 1994; Rauschnabel et al., 2022). While VR's application as a promotional tool is still evolving, its potential to reshape advertising communication is considerable. By fostering a strong psychological sense of 'presence'—the feeling of being situated within the virtual space—and enabling optimized, engaging visual experiences, VR can influence consumer attitudes and behavioral intentions, such as travel planning and purchase decisions (Tussyadiah et al., 2018; Wedel et al., 2020). Despite this potential, empirical investigation into how VR's unique immersive qualities affect fundamental consumer judgments, specifically the perceived truthfulness of advertising messages compared to less immersive platforms like mobile devices, remains limited. This study aims to address this gap by experimentally examining the differential impact of VR versus mobile advertisement presentation on perceived ad truthfulness.

2. LITERATURE REVIEW

The evolution of digital technology has transformed user experiences and interactions with digital content. Virtual Reality (VR), defined as an interactive computer-generated 3D environment that completely immerses users, represents a significant shift in digital interaction (Cearley and Burke, 2018; Azuma, 1997). As a marketing tool, VR has gained popularity for providing sensory simulations of experiences before purchase, particularly in travel marketing where it helps motivate visit intentions and supports consumer decision-making (Gibson and O'Rawe, 2018; Cho et al., 2002).

This trend is reflected in consumer behavior, with nearly half of Millennial consumers using VR to preview vacation destinations (The Priceline Group, 2016). VR's value in marketing stems from its ability to enhance imagery richness and vividness, potentially leading to more positive consumer responses (Van Kerrebroeck et al., 2017). This is particularly relevant for experience marketing, which emphasizes product experience rather than specific features. Advertising effectiveness has been extensively studied using the hierarchy-of-effects model (Barry, 1987; Smith et al., 2008; Vakratsas and Ambler, 1999). This model, developed by Lavidge and Steiner (1961), proposes three stages of psychological response: cognitive (information processing), affective (emotional attitudes), and conative (behavioral intentions). Research typically measures these dimensions through awareness and recall, emotional responses, and purchase intentions respectively (Li et al., 2002; Luna and Peracchio, 2001; Bart et al., 2014). Most advertising research focuses on immediate post-exposure responses when ad memory is most accessible. However, there's typically a delay between exposure and purchase, during which advertising effects may diminish due to wear-out and forgetting (Bass et al., 2007). Delayed effectiveness depends on message characteristics and receiver factors, with Chattopadhyay and Nedungadi (1992) finding that positive effects on brand attitude may disappear after one week. Despite growing interest in longitudinal advertising studies, limited research exists on VR advertisements. Recent research has expanded beyond measuring actual visits to include psychological effects and behavioral responses. Studies have demonstrated advertising impacts on awareness, information requests, and visit likelihood (Kim et al., 2005). Park et al. (2013) proposed a destination advertising response model incorporating attitudes toward ads and destinations, purchase trip facets, and total expenditure. Research has also examined internet marketing efficacy through website content and social media (Leung et al., 2013; Li et al., 2017). Tussyadiah et al. (2018b) reported that VR content can induce positive attitude changes and higher visit intentions for tourism destinations. Truthful advertising provides accurate information about advertised products, which consumers have a right to receive. Such information helps consumers make satisfactory purchase decisions and improves their experience (Kehinde, 2005). Truthful information can reasonably be expected to increase consumer satisfaction and enhance patronage, potentially leading to repeat sales. Research in psychology has investigated why Virtual Reality (VR) effectively shapes attitudes and behaviors toward virtual stimuli (Schuemie et al., 2001), primarily focusing on the concept of presence. VR creates environments where users can access information through multiple sensory channels—visual, auditory, and kinesthetic—enabling realistic perception of the portrayed environment (Slater and Usoh, 1993). Additionally, VR environments provide situated affordances (Schuemie et al., 2001), offering action-supportive information about how users can interact with the environment. Building on these findings, we hypothesize that VR's immersive and experiential nature creates a heightened sense of presence and realism that may influence consumers' perception of advertising truthfulness compared to traditional mobile device presentations, potentially resulting in higher perceived truth values for identical content when presented in virtual reality.

3. METHODOLOGY

This study utilized a between-subjects experimental design to isolate the effect of the independent variable, advertisement presentation format (VR vs. mobile), on the dependent variable, perceived advertisement truthfulness. A sample of 169 undergraduate students (Mean Age = 21 years, SD = 7.08; 59% female) from the Faculty of Economics and Business, University of Osijek, Croatia, participated in the experiment. Participants were recruited through convenience sampling via classroom announcements. Eligibility criteria included being 18 years or older.

Based on the theoretical premise that VR's heightened immersion and presence foster greater engagement and perceived realism compared to mobile platforms (Cummings & Bailenson, 2016; Steuer, 1992; Tussyadiah et al., 2018), we formulated the following hypothesis:

H1: There is a significant difference in perceived advertisement truthfulness between participants viewing an advertisement in Virtual Reality compared to those viewing the same advertisement on a mobile device, such that VR exposure will result in higher ratings of perceived truthfulness.

Participants were randomly assigned to one of two conditions: VR (n = 60) or mobile (n = 109). The experimental stimulus consisted of a standardized, pre-recorded video advertisement for the online travel marketplace 'GetYourGuide' (https://www.youtube.com/watch?v=QWrpx-lb1zw). The advertisement's content, including presented product features and benefits, was identical across both conditions.

VR Condition: Participants viewed the advertisement using a Meta Quest 3 VR headset (resolution: 2160 x 2160 pixels per eye). Each participant received individual guidance in a designated quiet area, including a brief tutorial on headset operation and adjustment for comfort. Mobile Condition: Participants viewed the identical advertisement on their personal smartphones. Both groups viewed the advertisement in the classroom.

Figure 1. Depiction of the VR condition methodology. A student participant is fitted with a virtual reality headset by a researcher to facilitate immersive viewing of the advertising stimulus. (Source: Author)

Following advertisement exposure, participants completed a self-administered questionnaire. The primary dependent measure, perceived advertisement truthfulness, was assessed using a four-item scale adapted from Feldman, Bearden, and Hardesty (2006), which exhibits similarity to items used by Block and Keller (1995). This scale measures the degree to which participants believe the advertisement is credible, believable, and truthful.

Responses were captured using a 5-point Likert-type scale ranging from 1 ("Strongly Disagree") to 5 ("Strongly Agree"). Feldman, Bearden, and Hardesty (2006) reported adequate reliability for this scale (α = .79) and provided evidence of its convergent and discriminant validity through confirmatory factor analysis. Scale scores were computed by averaging responses across the items, after reverse-scoring the appropriate item (see Appendix). Statistical analysis was performed using JASP software (JASP Team, 2024). An independent samples t-test was employed to compare mean perceived truthfulness scores between the VR and mobile groups. Prior to the main analysis, the assumptions of normality (via Shapiro-Wilk test) and homogeneity of variances (via Levene's test) were assessed. Cohen's d was calculated to quantify the magnitude of the effect size.

3. RESULTS

This analysis investigated whether perceived advertisement truthfulness differed between participants exposed to the ad in virtual reality (VR) versus on a mobile device. Descriptive statistics revealed a higher mean truthfulness rating for the VR group (M = 3.596, SD = 0.776) compared to the mobile group (M = 3.131, SD = 0.665). An independent-samples t-test confirmed a statistically significant difference in these ratings ($t(167) = -4.001$, $p < .001$), indicating that participants in the VR condition perceived the advertisement as significantly more truthful. This difference represents a medium-to-large effect size (Cohen's d = 0.65), suggesting a substantial impact of the presentation format on perceived truthfulness. The reliability of the truthfulness scale was high (Coefficient ω = 0.815, Coefficient α = 0.802). While Levene's test confirmed homogeneity of variances ($F(1, 167) = 1.467$, $p = .228$), the Shapiro-Wilk test suggested a slight deviation from normality ($W = 0.979$, $p = 0.012$).

1. Unidimensional Reliability

Frequentist Scale Reliability Statistics

Coefficient	Estimate	Std. Error	95% CI Lower	95% CI Upper
Coefficient ω	0.815	0.023	0.770	0.860
Coefficient α	0.802	0.028	0.747	0.857

2. Independent Samples T-Test

Independent Samples T-Test

	t	df	p
Attitude Toward the Ad (Truthfulness)	-4.096	167	< .001

Note. Student's t-test.

Assumption Checks

Test of Normality (Shapiro-Wilk)

Residuals	W	p
Attitude Toward the Ad (Truthfulness)	0.979	0.012

Note. Significant results suggest a deviation from normality.

Test of Equality of Variances (Levene's)

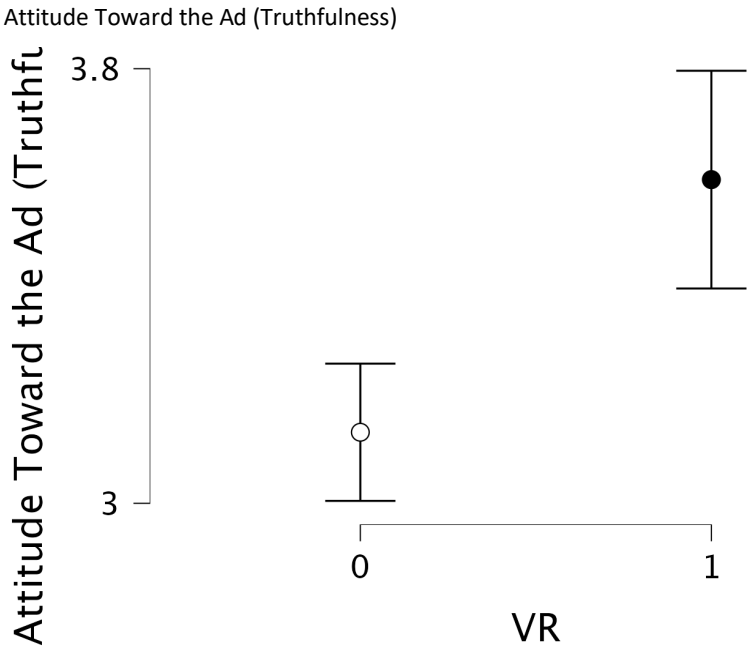
	F	df_1	df_2	p
Attitude Toward the Ad (Truthfulness)	1.467	1	167	0.228

Descriptives

Group Descriptives

	Group	N	Mean	SD	SE	Coefficient of variation
Attitude Toward the Ad (Truthfulness)	0	109	3.131	0.665	0.064	0.213
	1	60	3.596	0.776	0.100	0.216

Descriptives Plots



As shown and further supported by visual inspection of the descriptive plots, the VR group consistently reported higher truthfulness ratings. These findings provide strong support for Hypothesis 1 (H1).

3. DISCUSSION

The findings of this study provide a compelling argument for what we term the "Immersive Truth Effect": the medium through which an advertisement is experienced significantly impacts its perceived truthfulness. Participants who viewed an advertisement within an immersive VR environment perceived its claims as significantly more truthful than those who viewed the identical content on a mobile device. The magnitude of this effect (Cohen's d = 0.65) highlights its practical significance. This outcome aligns with theoretical frameworks emphasizing the psychological consequences of VR's defining features – immersion and presence (Cummings & Bailenson, 2016; Steuer, 1992). The capacity of VR to engender a strong sense of "being there" within the advertised scenario, coupled with its ability to command attentional resources and minimize external distractions, likely facilitates a different mode of information processing compared to mobile viewing (Tussyadiah et al., 2018). The heightened sensory realism and focused engagement inherent in the VR experience may reduce psychological distance and enhance the perceived authenticity of the presented message, leading to higher truthfulness ratings. Mobile viewing, often fragmented and subject to environmental interference, may encourage more heuristic or skeptical processing. These results contribute to the literature on media effects and advertising persuasion by demonstrating that the technological affordances of the delivery medium itself can act as a potent persuasive cue, influencing core beliefs about message veracity. It extends beyond simply acknowledging VR's engagement potential to quantify its impact on credibility perceptions. This research introduces and supports the "Immersive Truth Effect," suggesting that media immersion is a variable influencing advertising effectiveness, specifically regarding perceived truthfulness. It calls for integrating media characteristics, particularly immersion, into existing models of persuasion and consumer information processing.

For advertisers, this study suggests that VR is not merely a novel platform but potentially a more persuasive one for certain objectives. Utilizing VR for product demonstrations, virtual tours (e.g., real estate, tourism), or experiences where conveying realism and building trust is crucial could yield significant advantages in terms of perceived credibility compared to standard digital formats. This study is subject to certain limitations. The use of a student sample from a single university may restrict the generalizability of the findings to diverse consumer populations. The findings are based on a single advertisement for a specific service category; the effect's magnitude might vary across different ad types, product categories, or creative executions. The novelty effect associated with VR technology, particularly for less experienced users, cannot be completely discounted as a potential contributing factor, although randomization mitigates systematic bias. Furthermore, mediating psychological variables (e.g., presence, cognitive load, emotional response) were not directly measured, limiting insights into the precise mechanisms underlying the observed effect. Future research should aim to replicate these findings across diverse populations and advertising contexts. Investigating the role of mediating variables such as presence, engagement, perceived realism, and cognitive elaboration is crucial for understanding the psychological pathways of the Immersive Truth Effect. Comparing different VR technologies (e.g., varying levels of fidelity and interactivity) and exploring potential moderators (e.g., prior VR experience, product involvement, individual skepticism levels) would further refine our understanding.

4. CONCLUSION

This experimental study demonstrated that the medium used to present an advertisement significantly influences consumer perceptions of its truthfulness. Exposure to an advertisement via an immersive Virtual Reality headset led to significantly higher perceived truthfulness ratings compared to viewing the same advertisement on a mobile device. This finding, termed the "Immersive Truth Effect," underscores the potent influence of VR's immersive capabilities on fundamental consumer judgments. While acknowledging study limitations and the need for further investigation, the results strongly suggest that VR can enhance the perceived credibility and authenticity of advertising messages beyond what is achievable through less immersive platforms like mobile video. As VR technology advances, understanding and leveraging its unique psychological effects, particularly its capacity to enhance perceived truthfulness, will become increasingly important for developing effective and persuasive marketing communication strategies.

LITERATURE:

1. Azuma, R.T., 1997. A survey of augmented reality. Presence Teleoperators Virtual Environ. 6 (4), 355–385.
2. Barry, T.E., 1987. The development of the hierarchy of effects: an historical perspective. Curr. Issues Res. Advert. 10 (2), 251–295.
3. Bart, Y., Stephen, A.T., Sarvary, M., 2014. Which products are best suited to mobile advertising? A field study of mobile display advertising effects on consumer attitudes and intentions. J. Mark. Res. 51 (3), 270–285.
4. Bass, F.M., Bruce, N., Majumdar, S., Murthi, B.P.S., 2007. Wearout effects of different advertising themes: a dynamic Bayesian model of the advertising-sales relationship. Mark. Sci. 26 (2), 179–195.
5. Bendixen, M.T., 1992. Advertising effects and effectiveness. Eur. J. Mark. 27 (10), 19–32.
6. Cearley, D., Burke, B., 2018. Top 10 Strategic Technology Trends for 2019. October 15, Retrieved from. Gartner.

7. Chattopadhyay, A., Nedungadi, P., 1992. Does attitude toward the ad endure? The moderating effects of attention and delay. J. Consum. Res. 19 (1), 26–33.
8. Cho, Y., Wang, Y., Fesenmaier, D.R., 2002. Searching for experiences: the web-based virtual tour in tourism marketing. J. Travel Tour. Mark. 12 (4), 1–17.
9. Cummings, J. J., & Bailenson, J. N. (2016). How immersive is enough? A meta-analysis of the effect of immersive technology on user presence. *Media Psychology*, 19(2), 272–309.
10. Gibson, A., O'Rawe, M., 2018. Virtual reality as a travel promotional tool: insights from a consumer travel fair. In: Jung, T., Tom Dieck, M.C. (Eds.), Augmented Reality and Virtual Reality: Empowering Human, Place, and Business. Springer, Cham, Switzerland, pp. 93–107.
11. Hapairai, P.M., Walters, G., Li, S., 2018. The effectiveness of ad-induced emotion in reducing tourist risk perceptions towards politically unstable destinations. Tour. Recreat. Res. 43 (4), 483–496.
12. JASP Team (2024). JASP Retrieved from https://jasp-stats.org/
13. Kehinde, D.A.J., 2005. Truthfulness as a Factor in the Language of Advertising.
14. Kim, D.Y., Yeonghyeon, H., Fesenmaier, D.R., 2005. Modeling tourism advertising effectiveness. J. Travel Res. 44 (1), 42–49.
15. Kong, S., Huang, Z., Scott, N., Zhang, Z., Shen, Z., 2019. Web advertisement effectiveness evaluation: attention and memory. J. Vacat. Mark. 25 (1), 130–146.
16. Lavidge, R.J., Steiner, G.A., 1961. A model for predictive measurements of advertising effectiveness. J. Mark. 25 (6), 59–62.
17. Leung, X., Bai, B., Stahura, K.A., 2013. The marketing effectiveness of social media in the hotel industry: a comparison of facebook and twitter. J. Hosp. Tour. Res. 39 (2), 147–169.
18. Li, H., Daugherty, T., Biocca, F., 2002. Impact of 3D advertising on product knowledge, brand attitude, and purchase intention: the mediating role of presence. J. Advert. 31 (3), 43–57.
19. Li, L., Peng, M., Jiang, N., Law, R., 2017. An empirical study on the influence of economy hotel website quality on online booking intentions. Int. J. Hosp. Manag. 63, 1–10.
20. Liu, S.Q., Mattila, A.S., 2017. Airbnb: online targeted advertising, sense of power, and consumer decisions. Int. J. Hosp. Manag. 60, 33–41.
21. Luna, D., Peracchio, L.A., 2001. Moderators of language effects in advertising to bilinguals: a psycholinguistic approach. J. Consum. Res. 28 (2), 284–295.
22. Milgram, P., & Kishino, F. (1994). A taxonomy of mixed reality visual displays. *IEICE Transactions on Information and Systems*, E77-D(12), 1321–1329.
23. Milgram, P., et al. (1995). Augmented reality: A class of displays on the reality-virtuality continuum. *Proceedings of SPIE - The International Society for Optical Engineering*, 2351, 282-292.
24. Muehling, D.D., Laczniak, R.N., 1988. Advertising's immediate and delayed influence on brand attitudes: considerations across message-involvement levels. J. Advert. 17 (4), 23–34.
25. Park, D.B., Yoon, Y.S., 2009. Segmentation by motivation in rural tourism: a Korean case study. Tour. Manag. 30 (1), 99–108.
26. Rauschnabel, P. A., et al. (2019). Augmented reality marketing: How mobile AR apps can improve brands through inspiration. *Journal of Retailing and Consumer Services*, 49, 276-286.
27. Reinhard, M.A., Messner, M., 2009. The effects of source likeability and need for cognition on advertising effectiveness under explicit persuasion. J. Consum. Behav. 8 (4), 179–191.

28. Saat, R.M., Selamat, M.H., 2014. An examination of consumer's attitude towards corporate social responsibility (CSR) web communication using media richness theory. Procedia - Soc. Behav. Sci. 155, 392–397.
29. Schuemie, M., Van Der Straaten, P., Krijn, M., & Van Der Mast, C.A.P.G. (2001). Research on presence in virtual reality: A survey. CyberPsychology & Behavior, 4(2), 183-201.
30. Sheinin, D.A., Varki, S., Ashley, C., 2011. The differential effect of ad novelty and message usefulness on brand judgments. J. Advert. 40 (3), 5–18.
31. Slater, M. & Usoh, M. (1993). Representations systems, perceptual position, and presence in immersive virtual environments. Presence: Teleoperators and Virtual Environments, 2(3), 221-233.
32. Smith, R.E., Chen, J., Yang, X., 2008. The impact of advertising creativity on the hierarchy of effects. J. Advert. 37 (4), 47–61.
33. Steuer, J. (1992). Defining Virtual Reality: Dimensions Determining Telepresence. *Journal of Communication*, 42(4), 73–93.
34. The Priceline Group, 2016. New Survey from the Priceline Group Reveals Insights into How Travelers Expect Technology to Transform Experiences. June 9, Retrieved from. PR Newswire.
35. Tussyadiah, I.P., Wang, D., Jung, T.H., Tom Dieck, M.C., 2018b. Virtual reality, presence, and attitude change: empirical evidence from tourism. Tour. Manag. 66, 140–154.
36. Vakratsas, D., Ambler, T., 1999. How advertising works: what do we really know? J. Mark. 63 (1), 26–43.
37. Van Kerrebroeck, H., Brengman, M., Willems, K., 2017. When brands come to life: experimental research on the vividness effect of virtual reality in transformational marketing communications. Virtual Real. 21, 177–191.
38. Wedel, M., Bigné, E., & Zhang, J. (2020). Virtual and augmented reality: Advancing research in consumer marketing. *International Journal of Research in Marketing*, 37(3), 483-504.

Appendix: Perceived Advertisement Truthfulness Scale Items
(Adapted from Feldman, Bearden, & Hardesty, 2006)
Participants rated their agreement with the following statements on a 5-point scale (1 = Strongly Disagree, 5 = Strongly Agree):

1. The ad appears to be a truthful advertisement.
2. The information contained in the advertisement is credible.
3. I think the information contained in the ad is believable.
4. Some of the claims made in the ad are exaggerated. (R)

(R) indicates the item should be reverse-scored before calculating the scale average.

CHALLENGES OF INTERNATIONAL LAW IN BIPOLAR AND MULTIPOLAR GLOBAL REALITY: THE LEGAL FRAMEWORK FOR PREVENTING GENOCIDE AND THE RESPONSES OF JUSTICE SYSTEMS

Dasa Panjakovic Senjic
Baltazar Polytechnic Zaprešić, Zaprešić, Croatia,
dpanjakovicsenjic@bak.hr

ABSTRACT

This paper explores the key challenges facing international law in the context of preventing and punishing genocide crime. Particular emphasis was placed on the changes brought about by the transition from bipolar to multipolar world order. By analyzing the recent jurisprudence of the International Court of Justice, focusing on the cases of the Gambia v. Myanmar and Ukraine v. the Russian Federation, the paper questioned the evolution of the interpretation of the Convention on genocide. In the multipolar era, characterised by growing systemic rivalry and fragmentation of international order, traditional judicial response mechanisms face new obstacles. This includes the implementation deficit of international courts and the United Nations crisis of credibility. The paper also explores the role of new technologies, such as artificial intelligence, in the legal field. It analyses how they can affect the future of international criminal law and crisis management. Through an overview of relevant literature, the paper offers a comprehensive insight into the complexity of genocidal law in the 21st century. Concrete guidelines are proposed to strengthen the legal framework and ensure accountability in the multipolar world.

Keywords: *international law, genocide, multipolar, bipolar, International Court of Justice, judicial response, genocide Convention, artificial Intelligence*

1. INTRODUCTION

International law, as a dynamic system of standards and principles, is constantly facing new challenges. Changes in the global political arena raise complex questions about the effectiveness of existing legal mechanisms. The transition from the bipolar world order, marked by the cold War, to the complex multipolar reality of the 21st century, has put a number of challenges before the international community. At the heart of these challenges lies the legal framework for preventing and punishing genocide crimes. Genocide is the most serious crime against humanity. Raphael Lemkin defined it as a coordinated plan of various actions aimed at destroying the essential foundations of life of national groups, with a view to destroying the groups themselves. The Convention on the Prevention and punishment of crime of genocide, adopted in 1948, is a cornerstone of international criminal law. However, its application and interpretation in practice have proven to be extremely complex. This is particularly evident in the context of changing geopolitical relations. The recent jurisprudence of the International Court of Justice raises new questions. The cases of the Gambia v. Myanmar and Ukraine v. the Russian Federation are particularly important. These cases raise questions as to the jurisdiction of the Court of Justice, the erga omnes nature of the obligations under the Convention and the question of the use of force to prevent genocide. Rusan Novokmet points out that these cases strengthen the Convention by reaffirming the prerequisites for the establishment of the jurisdiction of the Court of Justice. At the same time, they point to deep divisions within the international community.

These divisions are becoming more pronounced in the multipolar world. Power is no longer concentrated in the hands of a hegemon. Instead, it is scattered among a number of regional actors. Traditional judicial response mechanisms face new obstacles. Munich Security Report 2025 warns of an increasingly multipolar era marked by growing systemic rivalry. This leads to a fragmentation of international order and a crisis of liberal multilateralism. In this environment, the United Nations faces a crisis of credibility. Conceived as a guarantor of global peace and security, they are marked by repeated failures in preventing mass crimes. These failures range from Rwanda and Srebrenica to Ukraine and Gaza. This paper aims to explore the key challenges facing international law in the context of preventing and punishing genocide crime. The analysis focuses on bipolar and multipolar global reality. First, the paper will analyze the evolution and interpretation of the legal framework for the prevention of genocide. A special focus will be on the recent ICJ jurisprudence. Second, the challenges that multipolar poses to international law will be explored. This includes the multilateralism crisis and the implementation deficit of international courts. Thirdly, the work will address the responses of justice systems and the role of new technologies. In particular, artificial intelligence will be analysed in the future of international criminal law.

1.1. Methodology

This paper uses qualitative methodology based on literature and document analysis. The methodological approach combines three main elements: doctrinal legal analysis, comparative analysis of jurisprudence and interdisciplinary synthesis of findings. The doctrinal legal analysis focuses on the interpretation of the 1948 Convention on the Prevention and punishment of crimes of genocide and its evolution through the practice of international courts. The comparative analysis of jurisprudence includes a systematic study of the decisions of the International Court of Justice, in particular in the cases of the Gambia v. Myanmar and Ukraine v. the Russian Federation. The interdisciplinary synthesis of findings integrates the perspectives of international law, geopolitics and technology to provide a comprehensive insight into contemporary challenges. This approach makes it possible to analyse how changes in the global power structure are reflected in concrete legal mechanisms. The research is based on primary sources, including international conventions, court rulings and reports from international organisations, and secondary sources such as scientific articles and expert analyses. The selection of literature was carried out on the basis of relevance for the topic of research and the current state of the art of the source. Work published in the last five years has been prioritised to ensure an analysis of the latest trends. The analysis was carried out through thematic coding of content, identification of key arguments and synthesis of findings into a coherent analytical unit. Research limitations include the focus on available sources in English and Croatian and the time frame covering the period from 2020 to 2025.

2. THE LEGAL FRAMEWORK FOR PREVENTING GENOCIDE: EVOLUTION AND INTERPRETATION

The legal framework for the prevention and punishment of genocide crimes is based on the 1948 Convention. The convention was created in response to the horrors of the Holocaust. It defines genocide as any of the following acts committed with the intention of destroying, in whole or in part, a national, ethnic, racial or religious group as such. This shall include: the killing of the members of the group; the infliction of serious physical or mental injuries on members of the group; deliberate subjection of the group to living conditions which should lead to its total or partial physical destruction; imposition of measures to prevent intra-group birth; forced transfer of children from one group to another. The key element of genocide crime is intent to destroy (Dolus specialis). It distinguishes him from other crimes against humanity.

It is the demonstration of that specific intention that is one of the greatest challenges in legal proceedings. William A. Schabas points out the complexity of this concept in the Cambridge bibliography on genocide in international law. It stresses that the definition of genocide must be interpreted in the context of the evolution of international law and changes in international relations. The evolution of the interpretation of the genocide Convention has been largely shaped through the jurisprudence of international courts. Particularly important are the International Criminal Tribunal for the former Yugoslavia, the International Criminal Tribunal for Rwanda and the International Court of Justice. These courts have developed and clarified key concepts. This includes the definition of protected groups, the threshold of partial destruction and the demonstration of genocidal intent. In his work on the crime of genocide under international law, Claus Kress points out that international criminal law is moving towards broadening the definition of genocide. It carries the risk of trivializing a crime. Kress advocates a strict interpretation that maintains focus on collective destructive acts. The specific intention to destroy the protected group must remain at the centre of the definition. Cambridge's bibliography further clarifies that crime must not be watered down by too broad an interpretation. It is important to maintain the balance between the need to protect groups and to preserve the precision of the legal definition. The recent jurisprudence of the International Court of Justice further deepened the understanding of the Convention. In the case of the Gambia v. Myanmar, the ICJ confirmed that each State Party to the Convention has the right to bring proceedings against the other State Party. This right exists irrespective of whether the State is directly affected. This confirmed the erga omnes partes nature of the Convention obligations. This strengthens the mechanism for its implementation. Rusan Novokmet stressed that the decision represents a significant step in strengthening the Convention. Reaffirming the prerequisites for the establishment of the jurisdiction of the Court is essential. However, it also points to deep divisions within the international community. In the case of Ukraine against the Russian Federation, the ICJ faced the issue of misuse of the Convention as an excuse for military intervention. The Russian Federation claimed that its special military operation was necessary to prevent genocide against the Russian speaking population in Ukraine. In his preliminary ruling, the ICJ rejected the allegations. The court ordered Russia to immediately suspend military operations. In doing so, he sent a strong message against the instrument of the Convention for political purposes. This decision is crucial because it sets clear limits on the use of the Convention as justification for unilateral military action. William A. Schabas stresses that the interpretation of genocide crime is constantly evolving. It reflects changes in international relations and values.

3. MULTIPOLAR CHALLENGES FOR INTERNATIONAL LAW

The world is in transition from a unipolar order to a complex multipolar system. A unified order was dominated by the United States after the end of the cold War. This transformation is characterized by the rise of new forces, such as China and Russia. Regional actors are also being strengthened. This leads to fragmentation of international order and weakening of existing multilateral institutions. Munich Security Report 2025 points out that we have entered an era of increasing multipolarity marked by growing systemic rivalry. This new geopolitical reality poses serious challenges to international law. Mechanisms for preventing and punishing genocide atrocities have been particularly affected. The Munich Security Report analyses in detail how systemic rivalry affects international institutions. The report warns that fragmentation leads to a weakening of consensus on fundamental standards of international law. This includes standards on the prevention of genocide. One of the key challenges is the crisis of multilateralism. The United Nations, as the central institution of global governance, faces a deep crisis of credibility.

Daniel Araya states in his Article on the transformation of the United Nations for a multipolar World that the UN is a hostage to geopolitical interests from 1945. The veto rights of the five permanent members of the Security Council often paralyze UN action in situations of mass crimes. This was evident in the cases of Rwanda, Srebrenica, Darfur. Today it is visible in Ukraine and Gaza. Araya proposes three key transformations of the UN for a multipolar world. First, decentralisation - expanding cooperation with regional organisations such as the EU, ASEAN, the African Union and Mercosur. Secondly, democratisation - empowering developing countries and regional blocs, strengthening the role of the General Assembly. Third, digitalisation - use of AI and robotics, real-time data analytics, digital platforms for smaller countries. In A multipolar world, where great powers compete for influence, consensus in the Security Council becomes almost impossible. Another major challenge is the implementation deficit of international courts. While ad hoc tribunals for the former Yugoslavia and Rwanda have achieved significant results in prosecuting war crimes, the International Criminal Court faces serious difficulties. Dan Steinbock points out in his Article on genocidal justice in the multipolar world that the ICC has weak political support and limited resources. In more than 20 years of existence, the Court has provided convictions in only a few cases. Many arrest warrants have remained unfulfilled. Steinbock provides concrete data on the performance of the various courts. In less than 7 years, the Tribunal for the former Yugoslavia issued 161 indictments and reached 90 convictions. The Rwandan tribunal has condemned more than 60 individuals. In contrast, in more than 20 years, the ICC has secured convictions in only 4 cases. The change in the form took place around 2010 when the ICC prosecutor launched an investigation in Kenya without explicit state support. The ICC has launched investigations against several non-member States, including Russia, Libya, Myanmar, the United States and Israel. The third challenge is the rise of authoritarian international law. Authoritarian States such as China and Russia actively promote alternative norms and institutions. They run counter to the liberal values underpinning the existing international order. They use the language of international law to justify their actions. This is evident in the case of Russian abuse of the Convention on genocide in Ukraine. This trend leads to the fragmentation of international law and the creation of parallel legal systems. Lisa Richardson, in her paper on the opportunities and challenges of the multipolar world for the African Union, points out that regional actors are trying to develop their own mechanisms. The African Union is developing its own mechanisms for the protection of human rights and conflict resolution. However, these regional mechanisms also depend on the political will of the Member States. They often face a shortage of resources. Richardson stresses the need to find new ways to strengthen the rule of law in the multipolar world.

4. REPLIES OF JUSTICE SYSTEMS AND NEW TECHNOLOGIES

In the face of multipolar challenges, justice systems need to adapt to the new reality. This applies to both the international and the national levels. One of the key aspects of this adaptation is the use of new technologies. Artificial intelligence, which has the potential to transform the legal profession, is particularly important. It can strengthen liability mechanisms. However, the application of AI in law also presents significant ethical and regulatory challenges. These challenges should be carefully considered. Artificial intelligence can significantly advance the investigation and prosecution of genocide crimes. AI tools can analyze large amounts of data. This includes satellite images, videos, communications and testimonies. The goal is to identify crime patterns and gather evidence. Harry Surden, in his review of artificial intelligence and law, points out that AI can help automate routine tasks. An overview of documents is one of these tasks. This frees up time for legal professionals to focus on more complex aspects of the case.

Surden emphasizes the importance of a realistic approach to AI technology. It focuses on the real possibilities of technology, not futuristic speculation. In the context of genocide, this could mean faster and more effective collection of evidence of genocidal intent. Proof of genocidal intent is often the hardest part of the procedure. Surden highlights the three main areas of application of AI in law: use by lawyers in the practice of law, use by people and companies subject to law, and use by civil servants administering law. Isaac Kofi NTI and associates in their scientometric review on the application of artificial intelligence in law provide a comprehensive insight into the development of this area. They analyse 177 papers published between 1960 and 2023. Their analysis identifies the most productive authors, countries and institutions in this field. They also identify the strongest citation explosions and thematic areas of application of AI right. Their study shows that AI applications in law are constantly evolving. However, a systematic study and sufficient attention are still lacking. NTI and associates stress the importance of methodological design of the necessary platforms. This includes the collection, cleaning and storage of data. They also underline the importance of cooperation between stakeholders, researchers and industry experts. Their analysis of co-authoring networks, cooperation between countries/regions and co-emergence of key words provides insight into the current state of the area. They identify gaps and potential for future research in the application of AI in legal systems. However, the use of AI in the judiciary raises a number of ethical issues. Andrea Bucher, in an Article on AI power Navigation in the legal field, stresses the importance of respecting the ABA model rules of Professional responsibility. Aspects of competence, confidentiality and oversight are particularly important. Lawyers and judges must be aware of the limitations and biases of the AI system. This is necessary to avoid wrong decisions. There is a risk that AI is used to create deep fakes or other forms of disinformation. Bucher analyzes the Rule 1.1 model on competence in detail. Competent representation requires the legal knowledge, skill, thoroughness and preparation reasonably required for representation. Comment 8 extends the concept of competence to technological advances. Lawyers must keep up with changes in law... including the benefits and risks associated with the relevant technology. Bucher highlights three key options for lawyers facing AI technology: refuse the case if they cannot handle AI tools competently, invest time in acquiring the necessary knowledge of AI technology, or team up with a colleague who already possesses the necessary technological knowledge. AI regulatory challenges are right complex and multi-layered. Clear regulatory frameworks should be developed for the use of AI in law. These frameworks must ensure transparency, accountability and protection of human rights. They must also address the issues of algorithm bias, data protection and responsibility for AI-generated decisions. Bucher stresses the importance of continuing education and adapting the legal profession to new technologies. This is crucial to maintaining ethical standards in the digital age. In addition to technological innovation, strengthening the judicial response also requires political will and cooperation. In A multipolar world where the interests of the great powers are often opposed, it is important to strengthen the role of independent judicial institutions. It is also important to support the work of civil society. In its crisis Management Report 2025, FGS Global stresses the importance of integrating legal advice into crisis management from the outset. This is particularly important in situations of mass crime. Swift and effective action is needed to protect victims and ensure the accountability of perpetrators. The FGS Global report also noted that the information environment has changed significantly. Americans are increasingly turning to alternative, independent media sources. This includes podcasts, newsletters and social media. This creates new challenges for crisis management and communication on genocidal crimes. Information can be quickly disseminated and manipulated. In such an environment, it is important to develop strategies to combat disinformation. It is necessary to ensure that accurate information on genocidal crimes is communicated to the public.

In this context, cases such as those initiated by South Africa against Israel before the ICJ show the importance of international law. Melanie O'Brien analyses in detail the legal elements of genocide in the context of the situation in Gaza. She points out that by July 2025, 57,680 Palestinians had been killed and 137,409 injured. The ICJ believes that Palestinians represent a different national, ethnic, racial or religious group. O'Brien analyses three specific behaviours: killing members of the group, inflicting serious physical or mental harm, and deliberately creating living conditions leading to the destruction of the group. This case shows that smaller States can also use international law to hold more powerful actors accountable.

5. CONCLUSION

International law faces profound challenges in a multipolar global reality. The transition from bipolar to multipolar world order has brought significant changes. Growing systemic rivalry and fragmentation of international order have led to a crisis of multilateralism. Existing mechanisms for preventing and punishing genocide crimes have been weakened. The United Nations, as the central institution of global governance, faces a crisis of credibility. The International Criminal Court suffers from an implementation deficit and lack of political support. This paper provides a unique analysis linking three key aspects of contemporary challenges of international law. The first aspect is the evolution of genocide jurisprudence through recent cases before the ICJ. Another aspect is the systematic analysis of the impact of multipolarity on legal mechanisms. The third aspect is the innovative integration of technological solutions, in particular artificial intelligence, into judicial processes. This triad analysis represents an original contribution to existing literature that usually focuses on individual aspects of the problem. The concrete contribution of this work is reflected in several key areas. First, the paper identifies specific ways in which multipolar influence the application of the Convention on genocide, which has not been systematically analysed by previous literature. Secondly, the paper provides a detailed analysis of how AI technologies can transform genocide investigations, which is a new field of research. Third, the paper synthesizes findings from different disciplines - international law, geopolitics and technology - into a coherent analytical unit. Fourth, the paper proposes concrete reform measures addressing identified problems at systemic level. The unique relevance of this work lies in its interdisciplinary approach, which goes beyond the traditional limits of legal analysis. While existing literature mainly focuses on the doctrinal analysis of genocidal law or geopolitical aspects of multipolar, this paper integrates both approaches with a technological perspective. This enables a comprehensive understanding of contemporary challenges and potential solutions. The paper also analyses systematically for the first time how the fragmentation of the international order affects concrete legal mechanisms for preventing genocide. Based on the analysis carried out, the paper identifies six key recommendations for strengthening international law in the multipolar world. First, we need to reform the United Nations through decentralisation, democratisation and digitalisation. This includes strengthening regional mechanisms and expanding cooperation with civil society. Second, international courts must develop new strategies to increase their effectiveness. This includes the use of AI technologies to improve investigations and prosecutions. Thirdly, a comprehensive regulatory framework for AI law should be developed to ensure the ethical application of technology. Fourth, States must strengthen their political will to co-operate in preventing genocide. This requires a new global agreement that reflects a changing balance of power. Fifth, new mechanisms should be developed to combat disinformation and provide accurate information on genocidal crimes. Sixth, it is important to strengthen the capacities of civil society and independent media in documenting and reporting on mass crimes. These recommendations represent a practical contribution that can guide future reforms of international institutions.

Finally, the future of international law will depend on the ability of the international community to adapt to the multipolar reality. This requires an inclusive and collaborative approach that ensures that the votes of all actors are heard. Only through such an approach can the international community fulfill the promise of the Convention on Genocide. It is necessary to ensure that the horrors of the past never happen again. This work contributes to this goal by providing an analytical framework for understanding contemporary challenges and concrete guidelines for future action in the multipolar world.

Based on the analysis carried out, the following areas requiring further research shall be identified. First, empirical research is needed on the effectiveness of AI tools in processing genocidal crimes. Future research should analyse specific cases of the use of AI technologies in international court proceedings. This includes an analysis of the accuracy of the AI algorithm in identifying genocidal patterns, the speed of the processing of evidence and the impact on final judicial decisions. The ethical implications of the use of AI in such sensitive legal proceedings should also be explored. Second, comparative research into regional approaches to the prevention of genocide in the multipolar world is needed. Future research should analyse how different regional organisations - the European Union, the African Union, ASEAN, the Organization of American States - develop their own mechanisms to prevent mass crimes. It is particularly important to explore their effectiveness in relation to global mechanisms and possibilities for interregional cooperation. Third, longitudinal research is needed on the evolution of the concept of genocide in the practice of international courts. Future research should monitor how the interpretation of the Convention on genocide changes over time and how different geopolitical contexts affect judicial decisions. This includes an analysis of the impact of multipolarity on the consistency of jurisprudence and the development of new legal standards. Fourth, interdisciplinary research is needed on the impact of disinformation on the perception of genocidal crimes. Future research should analyse how false information is used to justify or deny genocide and how this affects the international response. This includes exploring the role of social media, state media and other communication channels in shaping public opinion on genocide crimes. Fifth, research is needed on the development of new legal instruments to prevent genocide in the digital age. Future research should explore how existing legal frameworks can be adapted to new forms of genocidal crime using digital technologies. This includes the analysis of cyber-genocide, the use of social networks to foster hatred and the role of algorithms in the spread of genocidal ideologies. Sixth, research is needed on the economic aspects of the prevention of genocide in the multipolar world. Future research should analyse how economic sanctions, trade measures and financial instruments can be used to prevent genocidal crimes. It is particularly important to explore the effectiveness of such measures in the context of a fragmented global economy and an increasing number of economic blocks.

LITERATURE:

1. Araya, D. (2025). Transforming the United Nations for a multipolar World. The Centre for International Governance Innovation. Available at: https://www.cigionline.org/articles/transforming-the-united-nations-for-a-multipolar-world-order/
2. Bucher, A. (2025). Navigating the power of artificial Intelligence in the legal field. Houston Law review, 62 (4). Available at: https://houstonlawreview.org/article/137782-navigating-the-power-of-artificial-intelligence-in-the-legal-field
3. Kress, C. (2016). The crime of genocide under International Law. Oxford Research Encyclopedia of International Law. Available at: https://www.legal-tools.org/doc/8799cd/pdf/

4. McAndrews, J., Bouchier, M., & Gardner, P. (2025). Crisis Management 2025: Law and practice. FGS Global. Available at: https://fgsglobal.com/insights/crisis-management-2025-law-and-practice
5. Munich Security Report 2025. (2025). Introduction. Available at: https://securityconference.org/publikationen/munich-security-report-2025/introduction/
6. NTI, IK, Boateng, S., Quarcoo, JA, & Nimbe, P. (2024). Artificial Intelligence application in Law: A Scientometric review. Artificial Intelligence and applications, 2 (1), 1-10. Available at: https://ojs.bonviewpress.com/index.php/AIA/article/download/729/542/12751
7. O'Brien, M. (2025). Is the genocide happening in Gaza? He intoxicated Juris. Available at: https://opiniojuris.org/2025/08/04/is-genocide-happening-in-gaza/
8. Richardson, L. (2024). The African Union in a multipolar world: Opportunities and challenges. University of Ottawa. Available at: https://ruor.uottawa.ca/bitstreams/412ff200-4592-46e6-b094-a6ce09047f06/download
9. Rusan Novokmet, R. (2024). The ICJ's orders on Provisional measures in the cases of the Gambia v. Myanmar and Ukraine v. Russian Federation: Strengthening or weening the genocide Convention? Croatian Yearbook of European Law and Policy, 20, 1-34. Available at: https://hrcak.srce.hr/file/451061
10. Schabas, W. A. (2008). Evolving interpretations of the crime of genocide. In the genocide Convention at Sixty. Available at: https://digitalcommons.usf.edu/cgi/viewcontent.cgi?article=1241& context = GSP
11. Schabas, W. A. (2010). Genocide in International Law: the Crimes of Crimes. Cambridge University Press. Available at: https://resolve.cambridge.org/core/books/genocide-in-international-law/bibliography/A8549B29EA342413C56C9C9503338BC5
12. Steinbock, D. (2025). Genocide Justice in a multipolar World. Modern Diplomacy. Available at: https://moderndiplomacy.eu/2025/07/30/genocide-justice-in-a-multipolar-world/
13. Surden, H. (2019). Artificial Intelligence and Law: an overview. Georgia State University Law review, 35 (4). Available at: https://readingroom.law.gsu.edu/gsulr/vol35/iss4/8/


MEĐIMURSKO VELEUČILIŠTE U ČAKOVCU
MMVIII


UNIWERSYTET WARSZAWSKI
WYDZIAŁ ZARZĄDZANIA


Faculté des sciences juridiques
économiques et sociales-salé


ENCG TANGER
ENCGT


universidade
de aveiro