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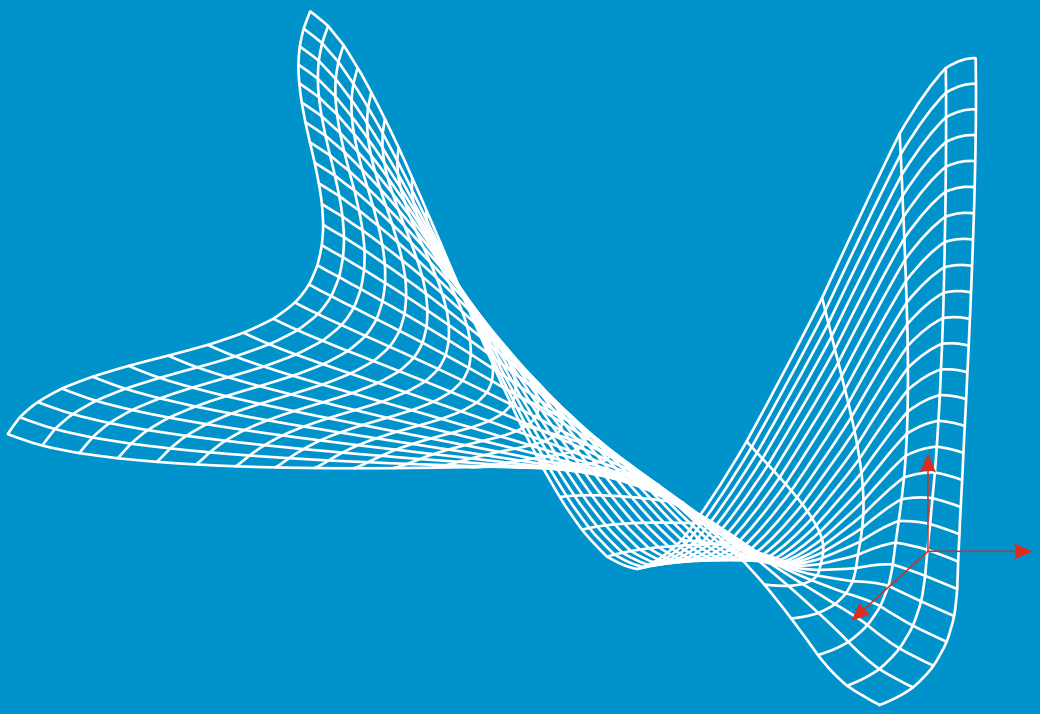

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# Social Investments and Regionalism as a Phase in the Development of Social Policy?

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**Aim:** This article explores the evolving role of social investments and regionalism as contemporary phases in the development of social policy, with a focus on Poland. The research aims to examine how shifting economic, demographic, and technological conditions, including labor market volatility, environmental constraints, and educational inadequacies, create the need for a transformation of traditional welfare models into more adaptive, regionally-sensitive, and investment-oriented strategies.

**Design / Research methods:** This is a conceptual and analytical study based on critical review and synthesis of historical developments, institutional changes, and policy strategies in European and Polish social policy.

**Conclusions / findings:** The paper identifies social investments, particularly in education, as a key instrument for improving societal adaptability to modern challenges. It emphasizes the growing importance of regional differentiation in social policy, highlighting the need for decentralized and flexible approaches. In Poland, this transformation remains limited due to institutional inertia and centralization, despite evidence of local readiness and emerging initiatives.

**Originality / value of the article:** The article offers a novel integration of social investment theory with regionalism, showing their potential synergy for modernizing welfare policy. It is particularly valuable for policymakers, educators, and scholars interested in sustainable and inclusive development, as well as for practitioners designing regionally responsive social programs.

**Implications of the research:** The findings suggest that enhancing local autonomy and investing in adaptive education systems can significantly strengthen social cohesion and labor

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market inclusion. They offer a policy framework for rethinking how central and regional authorities share responsibility for social development.

*Keywords: Social policy, Social investments, Human capital, Welfare state, Poland, Institutional change*

*JEL:* I38, H75, R58, I24, J24.

## 1. Introduction

Looking at the four-hundred-year history of social policy, it can be assumed that its scope is continually expanding. New forms of its implementation are introduced gradually, reflecting the recognition of new needs and the necessity to shape institutional forms for their realization.

Changes in social policy involve the gradual increase of the state's involvement in the sphere of social relations. The institutional expression of this has been the systematic efforts to care for selected groups of citizens - initially, those who, for various reasons, were unable to secure the conditions for their own existence. For more than two centuries, the scope of these changes remained relatively stable.

An underestimated or often overlooked sign of the initiation of a purposefully integrative form of social policy implementation is the introduction of compulsory education for all children in Prussia in 1763, aimed at creating disciplined citizens and workers. Education in this form began to spread in other countries only in the 19th century [Stone 1976].

This article explores the evolving role of social investments and regionalism as contemporary phases in the development of social policy, with a focus on Poland. The research aims to examine how shifting economic, demographic, and technological conditions — including labor market volatility, environmental constraints, and educational inadequacies — create the need for a transformation of traditional welfare models into more adaptive, regionally-sensitive, and investment-oriented strategies.

## 2. Premises of the Regulatory Model of Social Policy

The Industrial Revolution brought, among other things, the accelerated concentration of workers in large urban centers and the increase in importance of their labor in the economy, which led to changes in social relations. This process generated many new social problems, including the increasing risk of social unrest. Its significance cannot be considered without acknowledging the influence of ideas from the Enlightenment which disseminated through education, which was accompanied by an increasing awareness among various social groups of the need for systemic corrections in the functioning of the state [see Ostenhammel 2013].

Industrialization was strongly linked to the growing importance of the state and the development of the nation-state as an institution ensuring social peace and integration. This was reflected in the increased share of the state in the growing national income and its distribution (Wagner's Law on the increasing share of social spending). The increase in labor productivity led the state to intervene and regulate aspects of how work was prepared for and carried out. The state gradually assumed the role of a regulator of socio-economic life, including labor relations, working conditions, and working hours. This was manifested in Bismarck's top-down reforms in the area of health and pension insurance for workers - later adopted by democratic states.

A similar process occurred in public education, which obtained an essential role in preparing individuals for work-related norms. Expanding public education not only served to instill respect for existing standards but also to foster citizenship and a sense of belonging to a particular state, nation, social group, or profession. World War I brought significant changes in the social sphere. One reason was the temporary expansion of the state's role during wartime. These changes involved regulations concerning former soldiers, particularly the wounded, increased roles and employment of women, and modifications to labor relations.

The appeal of certain slogans, including those related to social policy, and the overestimation of institutional roles, also lay behind attempts to create a model of state dominance, e.g.. through the monopolization of its role as a creator in the economy

and social life (e.g., the USSR or other dictatorships). This led to the pursuit of utopias through the elimination of opponents and critics.

The Great Depression of the 1930s made citizens of democratic countries aware of the state's role in ensuring the livelihood of those who lost their jobs and pushed societies to place greater responsibility on governments to create conditions for job generation. World War II brought, particularly in Western countries, the development of institutional forms securing social peace within the framework of the so-called welfare state. This system provided, e.g., a stable improvement in material conditions, social benefits, improved living standards, and low unemployment. A specific coalition of the middle class and workers, along with high taxation of high-income earners, supported the formation of the welfare state and its various models.

Economic and political changes in the late 1970s, such as rising energy prices, increasing social diversification, and capital concentration, caused major shifts in this arrangement. These changes were reflected in the slowdown of social spending growth and its restructuring. After the dissolution of the USSR, this was accompanied by efforts to reduce the role of the state in the economy (globalization) and attempts to economize social policy expenditures [Kennet 2004; Lopez-Casnovas et al. 2005; Piketty 2015].

A very general assessment of the so-called industrial revolution, from the perspective of social policy, can be expressed in three points:

1. An increase in the importance of institutional (mainly state) guardianship and compensation in the form of benefits and regulations aimed at improving living and working conditions;
2. Recognition of the importance of investment in human capital as a factor of socio-economic development;
3. The acknowledgement of the economic, social, and environmental limitations of traditional social policy, indirectly pointing to directions for future changes, such as greater diversification and flexibility in the scope and forms of benefits and services, the purposeful regionalization of policy, and taking into account the specific conditions of residents [see Orczyk 2006; Szarfenberg 2010; Golinowska et al. 2008; Księżopolski et al. 2009; Piątek 2012; Żołędowski et al. 2015].

### 3. Time for Modification – Social Investments?

The beginning of the 21st century marks, on the one hand, a continuation of the restructuring of social benefits and, on the other, attempts to prepare for new living and working conditions shaped by the Internet, ongoing globalization, demographic changes, artificial intelligence, and the growing awareness of environmental problems. These shifts are also accompanied by changes in the structure of social values, including increasing individualization. Signs of transformation are becoming increasingly visible, but their pace and scale are uneven and difficult to incorporate into the institutional organization of social life within individual states, especially as these states must now contend with the growing influence of multinational corporations [see Golinowska 2018].

In this context, the strategy of activating social policy has gained popularity — and more recently, the concept of social investments has emerged [see Rymsza 2013; Kubicki, Błędowski 2014; Necel 2017]. It is assumed that social investments can help create a period of adaptation, thereby increasing the chances for individuals and communities to adjust to and cope with the new uncertainties and threats associated with the transformation of living and working conditions across varied situations [see Golinowska et al. 2008; Księżopolski et al. 2009; Piątek 2012; Żołędowski et al. 2015]. In other words, pilot programs and verification efforts are becoming important tools for shaping modifications to social policy principles — modifications that, while diverse due to differences in living and working conditions, are nonetheless socially acceptable.

The gradual realization of the difficulty in implementing a universal social policy by the central government, especially in democratic states, opens up certain opportunities for modifying or even generating changes in social behavior within regional systems. This trend can be observed in EU countries. It applies not only to the economy but also to environmental specificities, as well as attempts to activate or more broadly include women, youth, and seniors in the workforce. This process gained more significance after the 2008–2009 financial crisis, when demographic limitations and their regional variations became evident, together with the challenges they posed to implementing a standardized, protective social policy. This was

reflected in efforts to reform or modify pension systems as well as initiatives aiming to introduce regionalization (e.g., in Italy and Spain) [Golinowska 2020].

## 4. Social Investments

The issue of the scale and direction of social investments emerged in Europe in the 1990s, parallel to the restructuring of the previously dominant protectionist model of social policy. A key obstacle to increasing social investments was the difficulty in isolating expenditures whose outcomes could clearly be classified as the result of such investments. One solution was the adoption of an operational distinction of objectives whose achievement would not occur without such investments. This approach enables comparisons of the effectiveness of various types of expenditures, and in some cases, assessments of efficiency or the productivity of public spending on social objectives [Morel et al. 2015]. Regardless of ideological origins, social investments became both a form of economization and decentralization, as well as an attempt to overcome the inertia and limited flexibility of the traditional welfare system based on legal-administrative criteria.

Despite ongoing debates about the scope and feasibility of applying social investments, their use expanded steadily. This became evident not only in EU countries but also in Southeast Asia, as well as in South and North America [Garritzmann et al. 2022]. The scale and focus of activities varied across countries. Studies in this field also highlight specific social investments as adjustments to existing policy models. In countries with lower levels of social spending, the decision to prioritize social investments became more pronounced. Most often, these investments were associated with education and the improvement of living conditions. They concerned the adult population, but also targeted the development of institutional childcare systems.

In the EU, data on changes in both the scale and structure of social spending in the 21st century show an increase in targeted expenditures for social policy. After the 2008–2009 financial crisis, such expenditures were no longer purely corrective in nature. Their targeted allocation did not reduce spending on existing policy measures.

Instead, this separation gradually became a stimulus for developing strategies to implement social investments.

Authors of a report prepared for EU authorities identified three distinct strategies for implementing social investment across member states: balanced, basic, and unilateral strategies. In the first group, social investments had a complementary and corrective function, essentially modifying existing benefit and service systems. This approach was typical of countries with a high share of social spending in national income. The second group involved countries where social investments helped to create new areas of social services or significantly expanded their basic scope. The third group included countries that concentrated resources in a specific area, such as the creation of a new benefit or service [Baiocco et al. 2022].

It is worth noting that Poland followed a different path, introducing a new cash benefit for families with children, while the actual share of resources allocated to other social services (like education and healthcare) stagnated. As a result, the benefit primarily improved the situation of families with the lowest incomes [Franielczyk 2024]. Regardless of the adopted strategy, EU countries generally focused their attention and resources on initiatives aimed at preparing societies for life and work under dynamically changing conditions.

This was most strongly reflected in education expansion. The diversity of forms and scope of investment in this area across countries was significant. It included everything from early childhood support to the activation and training of seniors to meet the demands of new technologies and organizational models in both everyday life and employment contexts.

One of the most important features of social investments is that they allow for targeted, focused action while also offering the potential to shape or modify a chain of social values. It is widely acknowledged that social investments should strive to create better developmental conditions for all social groups. However, in each case, regional priorities may emphasize not only specific skill needs but also dimensions of social inclusion. This approach aims to reduce excessive individualization while developing new forms of social interaction.

The implementation of social investments varies widely across countries in both form and scope. The assessment of such investments also differs depending on the perspective:

- From a human capital point of view, the focus is on their creative, mobilizing, and protective functions.
- From a social perspective, inclusivity, behavioral impact on specific social groups, goals, and corrective potential are considered.

Due to this diversity of evaluation criteria, central planning or rigid legal regulation of these processes is difficult. Therefore, decentralized decision-making, flexibility, and regionalized assessment are essential prerequisites for success [Orczyk 2020; Pieliński 2010].

In light of changes in the sphere of labor, social investments are considered in relation to the outcomes they generate for different groups:

1. Future workers – identifying their employability potential while shaping universal skills and discovering talents, and aligning individual plans with external conditions.
2. Development-oriented workers – motivating individuals to improve and upgrade their competencies, and creating conditions for better utilization of those skills.
3. At-risk workers – individuals who, in changing conditions, want to maintain or restore their skills at a level that allows for their continued application and relevance.

## 5. Education and Regionalism in Poland

The current pace and specificity of changes in labor market demand, in particular for workers and their competencies, are forcing adaptive processes, especially in non-formal education. It has become essential not only to align the skills of those already employed with employers' needs, but also to activate economically inactive individuals, convincing them of the relevance of acquiring competencies for various types of employment, both existing and emerging, as well as those essential for

functional participation in society. This requires investments in non-formal education and changes to the quality assurance system in education.

This also entails developing a model of education for current and future immigrants, as a condition for obtaining citizenship. Generally, the process demands that individuals reevaluate not only their professional careers but also the conditions shaping their behavior and lifestyle.

Proper preparation for a specific job cannot happen without taking into account the interests and involvement of employers and service recipients, nor without adapting to local standards. Shifts in labor market demand require not only changes in the number of employed persons but also frequent adjustments in competencies, especially concerning temporary or task-based work. This is linked to a growing demand for short-term, task-oriented, and adaptive education, which local and regional authorities must assess and support. In this context, social investments serve as a support tool, though they require continuous analysis of labor market trends and evaluation of educational outcomes. Here, the use of human capital theory is fully justified, and linking participation with benefits appears reasonable.

Such changes can be introduced without fundamental institutional reform of social policy implementation methods. However, the near future will demand structural shifts in the nature of work and social life. Preparing for this will require restructuring the entire social services system.

Applying social investments based on human capital theory has limited potential in systemic transformation. Structural and phased preparation for changes in work and social life should begin with reform of the school system. Reforming the school system means initiating long-term transformation that considers changing operational conditions, not just one-off legal acts. Past reforms of the education system in Poland have largely been incremental tweaks to a 19th-century model. A serious approach to education reform requires a strategic plan that includes phases of preparation and implementation, clear evaluation criteria, the identification of limitations and implementation resources, and acknowledgment of evolving conditions and diversity of needs. This points to the need for not only a stronger role of the central government using legal frameworks to ensure equal opportunities but also for mechanisms that

identify and nurture students' individual traits as members of a community [Kawula 2008; Pisz 2010].

This requires serious preparation. In the case of primary schools, reflecting on the purpose and consequences of changes is especially crucial since these schools function as the first and main social sorters, helping children become aware of their capabilities (Sen 2009, 225-320), in the context of peer groups, but also in terms of how their skills can be used locally and regionally. Identifying such capabilities is difficult at the primary level; tests should only support or adjust opinions, not determine them. While necessary competencies may be included as indicators, other traits, like autonomy in task execution, the desire for self-improvement, the importance of feeling safe, and the link between personal activity and family situation, should be reflected in clear, written suggestions [Butler 2021]. These behavioral characteristics evolve throughout schooling, but in an increasingly individualized world, their identification and development will play an increasing role in how graduates assess their school experience.

This justifies, perhaps, reconsidering the idea of an intermediate stage of education, such as a middle school, as a way to help students better understand their potential career paths and educational choices.

In the case of schools as public institutions, the key is to instill values of responsibility and consistency, while respecting rules of cooperation and competition, and their relation to freedom of choice. Shaping the foundations of civil society is a crucial task for schools. However, we already know that a universal model cannot be established, actions in this regard are usually contextual and environment-specific.

Unfortunately, Polish society has largely accepted the notion that it is the family, not the school, that is responsible for shaping the student, and that schools serve only an advisory or service role. This shift in the school-family relationship (e.g., teachers–parents, private education, tutoring) is reflected in institutional solutions that have led to increased formalism, and as a result, reduced the school's actual impact on shaping students' attitudes, skills, knowledge, and behaviors. Reforms should move toward greater school autonomy, with official teacher salaries treated as minimum base pay, supplemented by a dedicated project-based fund managed jointly by the school administration, the parents' council, and the municipality.

The challenge is to create conditions and rules that enable institutions like the family, school, and civil organizations to coordinate and complement each other's efforts, while also helping young people in their local environments identify their strengths and opportunities relative to their peers. This includes understanding various development paths, how to pursue them, and the obligations and limits involved.

Until now, regionalism in social policy has been treated mainly as a functional necessity to be acknowledged by central authorities. The recognition of the socio-cultural specificity of regions has been limited. However, this began to change in most EU countries after 2010 (though much less so in Poland), when differences in labor market activity and demographic structure became more pronounced, and were increasingly seen not as obstacles, but as potential development opportunities. There is now a stronger rationale for harmonizing actions at lower levels of government, taking into account residents' interests and awareness of differing risk levels and their mitigation, both in the short and long term [Kazepov 2010].

Residents of municipalities, counties, and regions want, and will increasingly demand, a say in the conditions that shape their lives. Social investments in areas such as employment preparation and the development of social services can support this effort. A key rule is worth recalling here:

"Consumers of goods and services will never form a civil society, but stakeholders and participants in achieving common goals at least have a chance to form a community."

So far, the national social policy has limited the autonomy of regions and local communities in shaping their development paths, reducing them to the role of implementers. And yet, social services (education, healthcare, social assistance) enable social inclusion and help develop social cohesion [Hausner 2019, 72-77; Grewiński 2021].

We should begin with public education, whose essence should be reducing excessive individualism while recognizing individual potential and strengthening interpersonal relationships. Ideally, this will be supported by expanding the public education system's capacity (for example, turning schools into centers of local social life and improving digital infrastructure). This would allow for the emergence of new initiatives to improve education in new technologies, artificial intelligence, and

human relationships that help individuals feel valued by others. This concept assumes that the right to education can be used as an opportunity to develop the capabilities of students and residents within their local or regional contexts [Robeyns 2006; Borowicz 1988].

Social policy has developed within capitalism (in its various phases) as a means of citizen integration. Its scope and operational model reflected a certain universalism, but the way it was applied in each country depended on historical background, economic development, culture, and occupational structure. These remain important external variables (since material conditions shape consciousness), but today we must also explore ways to use specific, modern aspects of work and life and align them with individual traits, by recognizing and cultivating them. Starting from the school level.

Improved alignment in this area is possible. Though local and regional environments are limited by school and community capacities, they offer more flexibility than bureaucratic regulation, and may better support the recognition of individuals' potential, helping raise living standards and strengthen community integration, particularly in the realm of services.

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# Literature Review of Integrating Cultural Heritage in the Reclamation Processes

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**Abstract:**

**Aim:** Reclamation is a complex and costly process that involves technical and biological activities aimed at restoring degraded areas for specific future uses. The effectiveness of reclamation depends on the chosen direction, which influences whether the land can immediately serve its intended function or requires further development. Beyond environmental benefits, reclamation and development efforts support economic growth, job creation, and improved quality of life, while also contributing to the preservation of cultural heritage and sustainable development. The article presents the results of literature review focusing on answering the following questions: how is cultural heritage linked to the issues of the regeneration of degraded areas and how do different forms of regeneration use cultural heritage to counteract the effects of degradation of given areas?

**Design / Research methods:** A secondary study was conducted focusing on reviewing existing research materials, concentrated on summarizing the obtained data.

**Conclusions / findings:** The concepts of reclamation, rehabilitation, restoration, revitalization, recultivation, and revegetation were explained. The research part focused on four approaches to heritage in the context of revitalization: cultural heritage in areas after natural disasters; cultural heritage in areas damaged by human intervention; preparations for intervention in the event of natural disasters and disasters resulting from human intervention; and cultural heritage as a means/tool facilitating the regeneration of given areas.

**Originality / value of the article:** Materials devoted to the subject of heritage are related to four different aspects. Two of them are associated with the preservation of heritage in degraded areas, the third is related to the group of remedial and preventive actions, and only a small part is devoted to heritage as a tool and its role in revitalization processes.
*Keywords: cultural heritage, reclamation, revitalization, reconstruction, recultivation, devastated areas, economic culture.*

JEL: Q01, Q56, Z10.

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## 1. Introduction

Cultural heritage is seen as an important element supporting socio-economic development, a tool for building dialogue and reconciliation in regions affected by ethnic or religious conflicts, and as an expression of the cultural richness and diversity of countries and regions in the world (UNESCO, n.d. a). The main components of cultural heritage include tangible and intangible elements. Tangible heritage includes both immovable and movable goods. This category includes architectural monuments, museums and their collections, historical artifacts, archival and library resources, and the culturally shaped landscape. Intangible heritage refers to practices, ideas, knowledge, and skills passed down from generation to generation. It also includes a set of accompanying instruments, objects, artifacts, and cultural spaces. It is manifested, among others, through oral traditions, language, rituals, social practices, festive ceremonies, performing arts, as well as knowledge and practices related to nature and space, including traditional crafts. Heritage can also be presented through natural and digital components. Natural heritage includes physical and biological formations, groups of these formations, geological and physiographic structures, as well as designated areas constituting the habitat of endangered species of flora and fauna. This category also includes places of exceptional universal scientific, aesthetic, or conservation value. Digital heritage, on the other hand, comprise the collected resources created in the virtual space, reflecting the intellectual and creative achievements of humanity. This includes unique materials in the form of texts, databases, static and moving images, sound recordings, graphics, software, and websites (Knapik, Król 2023). A specific type of heritage is absence heritage (or heritage of absence), which does not yet have a precise definition, however, as noted by the team of James-Williamson et al. (2024), it refers to heritage that has ‘disappeared’: i) purely by accident, ii) deliberately erased, iii) forgotten or destroyed by natural disasters, iv) forgotten or destroyed by human actions/war, v) modified / adapted to suit particular interests.

The protection of cultural heritage can play a key role in stimulating economic development, supporting the growth and revitalization of areas. Activities in this area contribute to the creation of jobs, increasing property values, increasing tax revenues,

supporting the establishment of new industries, and providing space for business initiatives, which in turn translates into an improvement in the quality of life of local communities. A sustainable approach to cultural heritage is not limited only to the protection of buildings and areas of historical importance, but also includes supporting a variety of activities and initiatives aimed at achieving long-term social and economic development goals (Goddard-Bowman 2014).

A human's environment, the place where they were raised and/or live, is a condition for building social capital; it allows one to identify with a given place and build relationships. Cultural heritage plays a motivating role in participating in social processes (Rottermund 2024). Devastated areas are places destroyed or damaged as a result of human actions or natural phenomena. Humans can not only be the source of this destruction, but also contribute to their regeneration and the acquisition of resilience, preventing certain actions, dealing with the consequences, and mastering the ability to rebuild after the disruption. Cultural heritage contributes to the building of such resilience. It supports the creation of an engaged and innovative community, both in the social, environmental, economic, and managerial dimensions (Fabbricatti et al. 2020). Cultural heritage is treated as an important resource that strengthens cultural resilience, reconstruction, understanding, and the ability to accept loss, as well as ongoing changes and uncertainty. It has the ability to absorb disruptions. Its value lies not only in its tangible structure, but also in its role in society (Holtorf 2018). Cultural heritage strengthens cultural identity, expands social capital, and stimulates local communities, constituting an important element of sustainable development (Knapik, Król 2023).

The category of regeneration, used in the title of this article, refers to several interrelated concepts: *revitalization, reconstruction,* and *recultivation*. The *revitalization* process is interpreted as a long, coordinated, and comprehensive process of revival, bringing back to life (moving out of a state of crisis) and supplementing with new functions. Within cities, the revitalization process may include the revitalization of: post-industrial, post-railway, and post-military areas, degraded city centers and multifunctional pre-war areas of urban development, housing estates (especially in the case of large-panel technology), and the landscape of cities. Revitalization is not only associated with renovations, but also with work with

people—this process is carried out jointly by various groups of stakeholders (including the authorities, local community, and other participants). It assumes the use of specific conditions of a given area and the strengthening of its local potentials (Mackiewicz, Staszewska 2023). Within the framework of revitalization, cultural heritage is repositioned; it is a multifaceted effort encompassing revalorization, restoration, reconstruction, modernization, and activities aimed at revitalizing and restructuring historical events, devastated buildings, districts, or cities (Oloidi, Okonkwo 2020). Another concept associated with the issues studied is *reconstruction*, interpreted as reproducing based on preserved remains / fragments / of messages (PWN, n.d.). In the context of cultural heritage, reconstruction is understood as a process of a more technical nature (compared to revitalization), the aim of which is to restore destroyed material resources and infrastructure following an armed conflict or a natural disaster. This process should be carried out taking into account the accompanying elements of intangible heritage, such as beliefs, practices, and traditional knowledge, which are the foundation for preserving the cultural values of local communities (UNESCO 2018). The category of *recultivation* refers to influencing renewed growth or flourishing (Mariam-Webster Dictionary, n.d.) associated with restoring original functions or roles, creating favorable conditions for the development of given processes (including biological ones) and their maintenance (Kozińska, Greinert 2013).

The research aims to synthesize how cultural heritage is linked to the issues of reclamation of degraded areas and how different forms of regeneration use cultural heritage to counteract the effects of degradation of given areas. Identifying research gaps and directions for future research will constitute the basis for ongoing scientific research. It may also be a valuable source of synthesized materials for lecturers and students in subjects related to restructuring devastated areas and cultural heritage management.

## 2. Research methodology

The literature review presented below was conducted in order to prepare a lecture on the subject “The Restructuring of devastated areas.” There are many publications

in the literature on the reclamation of degraded areas, in particular regarding their classification and directions of application. However, there is no textbook, a compact publication that would discuss the most important issues related to the subject, in particular: soil and air pollution, phases of land reclamation, directions of reclamation and management, lime and fertilizer needs for land reclamation, forestry and agricultural reclamation, reclamation of hard coal and lignite mines and reclamation of copper mine tailings. A considerable gap is also in connecting the above issues with cultural heritage management. A compact publication will be a convenience for teaching staff and students of fields related to environmental protection and engineering, as well as the promotion of sustainable development among the young generation.

The literature on the subject distinguishes two main types of reviews: traditional and structured. Each has its advantages and disadvantages. The main advantage of conventional reviews is their reliance on researcher creativity (PSR, n.d.). Systematized reviews (SLRs) are much more structured. The following features characterize them: i) they are narrowed to specific topics, ii) the selection of sources and the method of searching for articles are predetermined, iii) the text selection method is controlled and based on defined criteria, iv) the evaluation of materials is rigorous (Abamczyk, Korbel 2022). A mixed model combining both approaches was chosen to provide a reliable summary of existing knowledge. A traditional review was used to determine the theoretical bias of reclamation of devastated areas (Section 3.1). It allowed for an overview of the general research topic. Subsequently, an SLR was conducted, narrowing the research topic to the approach to cultural heritage (Section 3.2). The second part focused on a high-level overview of two questions: i) How is cultural heritage related to the reclamation of degraded areas, and ii) How do different forms of regeneration use cultural heritage to counteract degradation effects in given areas? It provided an opportunity to examine existing research gaps and identify needs and directions for future research. The SLR was conducted based on i) the Web of Science (WoS) and Scopus databases of scientific texts and ii) gray literature, available through open access through the Google search engine. For this article purposes, gray literature was limited to scientific texts that were not selected from the WoS and Scopus databases. Combining these two methods also resulted in a small

number of selected texts. Queries were defined for groups of entries connected by the AND operator, as shown in Table 1. However, inoperative pages were removed from the gray literature group, and the focus was shifted to full texts, not just abstracts. Master's theses were also excluded from the analysis. This approach yielded 60 texts that were subjected to content analysis.

**Table 1. Research process**

| Keywords | WoS [number of materials] | Scopus [number of materials] | Google [number of websites/ materials*] |
|---|---|---|---|
| **Reference level** | | | |
| cultural heritage | 68,152 | 88,875 | 242 |
| reclamation | 33,936 | 70,735 | 174 |
| degraded area | 54 | 83 | 171 |
| Sum | 102,142 | 159,693 | 587 |
| **Narrowing level** | | | |
| cultural heritage AND reclamation AND degraded area | 0 | 1 | 175 |
| Negative selection | 0 | 0 | -115 |
| Texts analyzed | 0 | 1 | 60 |

* The most relevant results, without very similar items.

Source: own study.

## 3. Results

### 3.1. Reclamation of devastated areas—the theoretical basis

There are many classifications of reclamation directions in the literature. They include an increasing number of reclamation and development methods, which indicates the dynamic development of this field of science. The accuracy of the choice of the reclamation direction depends on a number of factors that characterize the area requiring reclamation as well as its surroundings, both in the spatial and socio-economic sense (Ostręga, Uberman 2010).

Various terms have been used to describe the repair of land disturbed by industrial use, including recultivation, reclamation, rehabilitation, reconstruction, renaturation,

restoration and revegetation. Based on a literature review, in Table 2 are shown basic definition regarded to regeneration of degraded land.

**Table 2. Basic definition regarded to regeneration of degraded land**

| Term | Definition | Source |
|---|---|---|
| Reclamation | Represents restoring or giving the usable values to degraded land by appropriate land modeling, improvement of grounds properties, water regulation, soils restoration and roads construction. | Liu et al. (2018) |
| Rehabilitation | Means the return to the natural state according to the original land development plan in accordance with the aesthetic qualities of the surrounding areas. | Gaćina (2023) |
| Restoration | Understood as the return to the original state of the altered land, the state before degradation. | Zha et al. (2025) |
| Revitalization | Is the term that covers both stages: reclamation and land development, and it means the state restoration, giving the opportunity to perform the utility function of this area. | Liu et al. (2025) |
| Recultivation | Means the creation of a new cultivated landscape defined by various types of human use, such as agriculture and forestry as well as local recreation. | Opryshko, Oblitsov (2013) |
| Revegetation | Means the process of replanting and rebuilding the soil of disturbed land, it may be a natural process produced by plant colonization and succession, manmade rewilding projects, accelerated process designed to repair damage to a landscape. | Li et al. (2025) |

Source: own elaboration based on the sources given in the table.

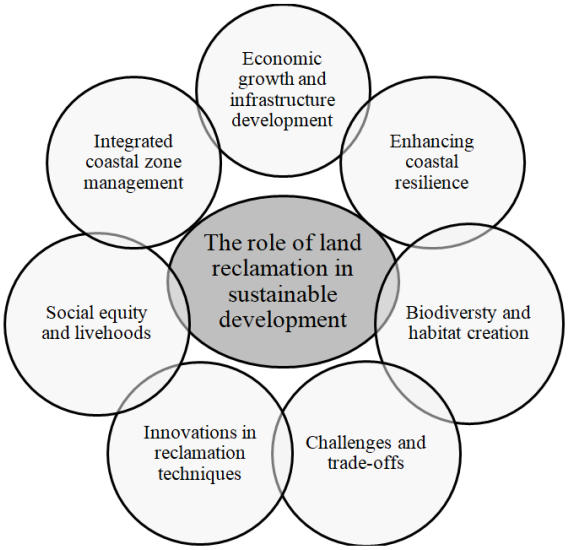
The reclamation of degraded areas has many advantages, including economic, ecological, social and health benefits. The economic advantages include increased land value, stimulation of the local economy and savings for public administration. Improving soil quality, restoring ecosystems, reducing erosion and pollution are the ecological advantages. The social advantages include improving the quality of life, education and environmental awareness. Due to land reclamation air quality is improving and the stress is reduced, which has a positive impact on human health.

Land reclamation plays an important role in sustainable development (Figure 1). By creating new land from coastal or underwater areas, cities can accommodate population growth and foster economic activities. For instance, the Palm Jumeirah in Dubai, United Arab Emirates, is an example of successful land reclamation. This

artificial archipelago hosts luxury hotels, residential complexes and commercial spaces. The revenue generated from these developments significantly contributes to Dubai's economy (Alawadi et al. 2018). The second role is enhancing coastal resilience. Coastal cities face rising sea levels and increased vulnerability to natural disasters. Land reclamation can act as a buffer against storm surges and erosion. The Maasvlakte 2 project in the Netherlands demonstrates this concept. By reclaiming land in the North Sea, the Dutch created a massive port extension (van Hassel et al. 2020). Designing artificial habitats for marine life can enhance biodiversity. An example is the Chek Lap Kok Airport in Hong Kong. It was built on reclaimed land, but the adjacent wetlands were preserved and transformed into a haven for migratory birds (Li, Loo 2016). Land reclamation faces criticism due to ecological disruption, loss of natural habitats, and altered hydrodynamics. The Songdo International Business District in South Korea showcases the trade-offs. While it's a modern, sustainable city built on reclaimed land, it required substantial investment and ecological compensation (Kim, Choi 2018). Technological advances are allowing for more efficient and environmentally friendly methods of remediation. Geotubes, sludge recycling and ecosystem-based approaches are gaining ground. An example is Singapore, which, despite its limited land area, has reclaimed huge areas, including Gardens by the Bay. Their commitment to sustainable practices is an example for other nations (Zappi, Ong 2013). Land reclamation projects should consider social equity. Displaced communities, fishermen, and indigenous groups often bear the brunt of such developments. The Kansai International Airport in Japan faced protests from local fishermen who lost their livelihoods due to land reclamation (Furudoi 2010). Balancing economic progress with social justice remains a challenge. Holistic planning that integrates land use, conservation, and disaster risk reduction is essential. Coastal cities must adopt adaptive strategies. The Mumbai Coastal Road Project aims to reclaim land for a coastal highway. However, it must address concerns related to mangroves, marine ecosystems, and community displacement (Movik et al. 2023).

In summary, land reclamation holds immense promise for sustainable development, but it requires a delicate balance between progress and environmental stewardship. Continuing, it is essential to prioritize responsible practices that serve the interests of both current and future generations.

**Figure 1. The role of land reclamation in sustainable development**




Source: own elaboration based on The Importance of Land Reclamation (2025).

The requirements for land reclamation vary depending on the circumstances of occupational connection, in wide-ranging geographic terms, depending on which mechanisms of the natural environment are targeted for recovery, restoration, and renovation procedures. These procedures could be of diverse categories, subcategories, and forms (classification). Sequentially, depending on the means of carrying out the reclamation process, each category or form could be divided into successions of various subcategories and subforms (Ukhurebor et al. 2022). In Table 3, based on the literature review classification of land reclamation is presented.

**Table 3. Land reclamation classification**

| Categories | Subcategories | Form |
|---|---|---|
| Hydrotechnical | Drainage | Reclamation / drying-out of swamplands, marshlands, or wetlands |
| | Flood monitoring and management | Flood and water logging monitoring and management/eradication of wet spots |
| | Irrigation | Humidifying irrigation / fertigation / sterilizing irrigation / unfreezing irrigation/soil-cleaning irrigation |
| | Drainage and humidifying | Control and management of water-air regime of drained lands / irrigation of drained swamplands, marshlands, and wetlands |

| | | |
|---|---|---|
| | Irrigating or watering | Irrigating of arid areas / irrigating of low-water areas/irrigating under the situations in tropical locations |
| Agrotechnical | Control and management of drainage | Creating depressions in-ground / mole plowing / narrow conventional plowing / soil adornment / wrinkling / soil slotting / ridging/bed-forming |
| Land | Accumulation / conservation of soil | Nonmould board releasing / deep plowing / decompaction of the soil / sheeterosion, subsurface erosion, ravine erosion, and soil blowing monitoring and management |
| | Reconstruction of the soil | Development of topsoil / granulometric enhancement of the soil via the addition of sand and clay / thickening of humus-accrued prospect |
| | Cultivation and technical | Levelling of the surface / land clearance and management |
| | Reclaiming and landscaping | Reclamation of open-cast mines such as rock dump pits, peat mines / ash-disposal locations / demolitions instigated by natural catastrophes such as hurricanes, floods, storms, and dust |
| Vegetative | Phytoreconstructive | Development of woodland belts/complete afforestation/phytoncide or resortplanting |
| | Conservation of landscape | Protection of water / control and management of wind, snow, bank, landslide, and landslip |
| Climatic | Thermal | Control and management of frosts, frost-killing and damping-out/basin, and thermal / agrothermal |
| | Distribution of moisture | Enhancement of precipitation / control and management of snow-melting |
| | Weakening of wind | Local arrangements / antihurricane measures, especially in Hurricane formation areas |
| Agrochemical | Salt enriching, acid monitoring, and stabilizing the soil | The use of mineral fertilizers / monitoring and management of nutrient distribution / the use of lime, especially on acidic soils / acid monitoring, especially on solonetzic soda soils, solonchak soils, and other soils with high alkalinity / the use of gypsum, especially on alkali and solonetzic soils / soil conditioning and stabilization against soil puncture / soil silicatization |
| | Sanitary and disinfecting | The use of arboricides and pesticides |

Source: own elaboration based on Ukhurebor et al. (2022); Golchenko et al. (2003).

Based on the work of Ostręga & Uberman (2010), Table 4 presents a classification of reclamation directions, dividing them into general and specific (functions). The existing classifications have been supplemented primarily with such directions as: cultural—with a contemplative function, recreational—with a cultural function and didactic. It should be noted that this classification should be treated flexibly, and individual directions and functions can be combined in any combinations depending on the characteristics of the area requiring remedial actions. The presented classification constitutes a complete list of possible methods of reclamation and development of post-industrial areas, while its development into a detailed classification includes the most important possible directions, which may be extended by additional ones falling within the general directions.

**Table 4. General and specific directions of land reclamation**

| General directions | Detailed directions (functions), examples | Source |
|---|---|---|
| Forest | Afforestation with the following functions: biotic, productive and reproductive (economic), protective | Lupardus et al. (2019) |
| | Tree plantings of landscape (aesthetic), park, and recreational nature | |
| Agricultural | Crops, breeding | Kumar, Choudhury (2024) |
| Aqueous | Recreational: swimming pools, water sports | Zhou et al. (2023) |
| | Economic: retention tanks, drinking water tanks, industrial water tanks | Ji (2022) |
| | Fishing | Zeng et al. (2023) |
| | Natural | Ostręga, Uberman (2010) |
| Recreational | Recreation and tourism: e.g. beaches, sports and recreation facilities, accommodation facilities (camping and tent sites, summer cottages, hotels, guesthouses), catering facilities | Li et al. (2023) |
| | Sports: e.g. ski slopes, bike trails, infrastructure for traditional and extreme sports | Levin, Paltseva (2023) |
| | Cultural: e.g. theatres and amphitheaters, stages, exhibitions, exhibition and concert halls, galleries | Chen et al. (2025) |

| | | |
|---|---|---|
| Cultural | Contemplative: e.g. memorial parks, places of remembrance, places of religious worship | Song et al. (2014) |
| Didactic | Thematic (educational) trails, museums, including industrial museums, open-air museums, eco-museums, archives of documentation related to the history of industry, training centers, historical monuments, cultural parks | Coles (2003) |
| Natural | Protective: e.g. nature reserves, ecological areas, Natura 2000 areas, natural monuments, documentation sites, nature and landscape complexes, species protection of plants, animals and fungi | Tang et al. (2025) |
| | Turfing, bushing, greening | |
| Housing | Housing, social and summer construction | Ostręga, Uberman (2010) |
| Economic | Industrial: e.g. industrial parks | Zhou et al. (2024) |
| | Services: e.g. business incubators, warehouses, shops; also in the form of economic activity zones, parking lots | |
| | Municipal: e.g. landfills | Koda et al. (2023) |

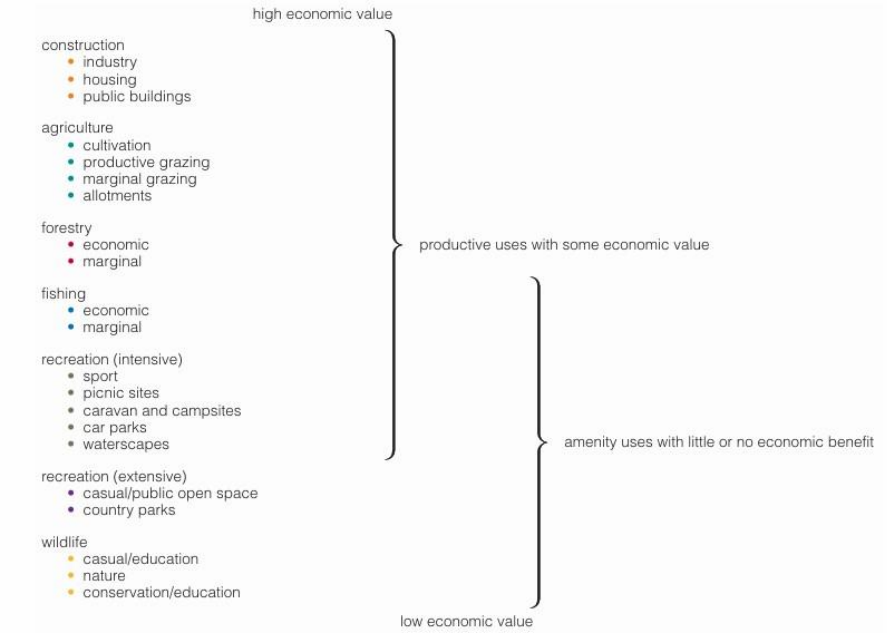
Source: own elaboration based on the sources given in the table.

There may be as many methods of land reclamation and development as there are ideas. However, it is important to take into account the characteristics of the facility in terms of a number of factors in the process of selecting the direction of reclamation, which will allow for defining the optimal functions for the areas subject to remedial actions. The basic directions of reclamation, i.e. agricultural and forestry, are widely known and most frequently used. In many cases, however, using only these two directions would eliminate other possibilities resulting from the specificity of the facilities, as well as from social or economic needs.

Ideally, all brownfield remediation projects would return the land to productive agricultural use, successful forestry, or productive industrial or recreational use. However, in most situations, end use will be determined in part by what is physically possible at the site and by cost. Expected costs per hectare of remediation practices vary considerably, ranging from $185/ha to $3,012/ha and increasing with country GDP. Cost estimates also vary considerably across available data sources, indicating differences in cost reporting practices (Verhoeven et al. 2024). Therefore, remediation

must be funded upfront, through the mine permitting and bonding process, or a very expensive legacy will be left for future generations to sort out. Furthermore, some end uses of remediated land are more valuable than others. Figure 2 compares the economic value of different options for remediated land. Selling reclaimed land for residential or commercial development will generate significantly more income than leaving the land for forest or agricultural development (Sloss 2013).

**Figure 2. Economic value of future usage for reclaimed land**




Source: own elaboration based on Sloss (2013).

### 3.2. Revitalization of devastated areas—the approach to cultural heritage

The results of the research conducted by M. Li (2024) indicate the existence of various groups of factors influencing the destruction of cultural heritage. These factors include natural factors (including fires, earthquakes, strong winds, floods, including sea level rise related to climate change), as well as human-induced activities (including terrorism and explosions). Fires occur as a result of electrical and wiring defects, the use of fireworks and arson, as well as careless smoking, honey collection,

lighting bonfires and burning rubbish, as well as due to increased temperature and low rainfall. In addition to their direct impact, heavy rains and floods also cause secondary disasters (for example, collapse of cliffs). Other types of threats to cultural heritage include erosion of river banks and coastlines, sea level rise, strong winds and disasters caused by plants (including their roots), drought, as well as insect activity (e.g. termites) and lightning. Human-caused damage is associated with explosions, terrorist acts, and bombings. The existence of a diverse threat in groups of buildings and archaeological sites in Asia and Europe (Li 2024).

Texts devoted to the issues of revitalization of degrader and / or devastated areas caused by economic, spatial-functional, environmental and / or technical phenomena, from the point of view of cultural heritage, can be divided into three groups of texts, which address the following issues:

i) cultural heritage in areas after natural disasters (including earthquakes, floods, fires, etc.),
ii) cultural heritage in areas damaged by human intervention (including armed conflicts/post-military operations, post-industrial and post-railway operations), and
iii) preparations for intervention in the event of natural disasters and disasters resulting from human intervention.

Cultural heritage can also be perceived not only as a goal of protection, but also as
iv) a means/tool facilitating the regeneration of given areas.

*3.2.1.Cultural heritage in areas degraded by natural disasters*

The significant impact of natural disasters on cultural heritage has been highlighted in many scientific texts (Fatoric, Seekamp 2017; Costanzo et al. 2018; Min et al. 2020; Rosa et al. 2021; Lawangen, Roberts 2023). Heritage restoration plays an important role in preserving cultural, historical, ritual infrastructure and a sense of place, and helps to restore a semblance of normalcy to communities affected by natural disasters (Dalya et al. 2023). According to Dalya et al. (2023), the impact of a disaster on cultural heritage is a function of three elements: i) the damage and/or disruption caused by the event, ii) the priorities for heritage conservation and their balance with other priorities (including disaster risk reduction), and iii) the

preferences, resources and capacities of individual households to cope with the challenges of post-disaster reconstruction.

**Table 5. Examples of studies related with the cultural heritage in areas affected by natural disasters**

| Type of disaster | Devastated area | Key issues | Source |
|---|---|---|---|
| Earthquake | Nepal, Kathmandu Valley, Bungamati, Thecho, Pilachhen and Harisiddhi districts | - Enforcement of building codes for seismic safety, along with the costs of incorporating traditional architectural features, influenced changes in the tangible cultural heritage of historic urban districts.<br>- Enforcement of building codes for seismic safety, along with the costs of incorporating traditional architectural features, probably also improved seismic safety – increasing the seismic resistance of the buildings.<br>- Reducing seismic risk was a higher priority for government and residents than cultural heritage as manifested in the selection of modern technologies and building materials.<br>- Building codes were partly mutually exclusive with the protection or restoration of traditional heritage.<br>- Heritage was effectively relegated to decorative elements on the exterior of houses. | Dalya et al. (2023) |
| Intense weather events (floods and destruction caused by intense storm) | Italy, Alberobello in the Puglia region | - Trullo buildings (architectural heritage with a cone-shaped roof made of stones) are an example of the resilience of cultural heritage to extreme weather events.<br>- The protection and mobilization of cultural heritage as a resource to cope with the challenges of climate change in a given territory is associated with the perpetuation of traditional construction techniques. | Mascitelli et al. (2023) |
| Floods and landslides | Gwatemala, city of Sacapulas | - Development of the black salt beach, the space was reduced, the use of the area was changed by exploring the hot | Yon Secaida et al. (2023) |

| | | | |
|---|---|---|---|
| | | springs located below the river bank on the beach (discovery of new beach value).<br>- In addition to the functioning salt industry, the promising tourism industry was stimulated.<br>- Drawing attention to the need to formalize the actions taken. | |
| Heavy rainfall | Greece, Corfu Town (UNESCO Heritage Site) | - Under the forecasted climate conditions, no significant changes in the flood risk level are expected, and the flood-prone areas will remain largely in line with the current status. | Dimitriou (2022) |
| Earthquake | Nepal | - A natural disaster may be a potential reason for a revival of tourism (the phenomenon of so-called 'dark tourism').<br>- The number of tourist arrivals in age groups over 16 years fell immediately after the earthquake, but quickly recovered.<br>- Nepal is a tourist destination with high resilience despite the earthquake.<br>- Media interest and the specificity of Nepali heritage (features of a given place) may have an impact. | Min et al. (2020) |
| Rainwater and flood disasters | Traditional Villages in Mentougou District, China | - Improved zone management is being implemented in traditional villages to minimize the risk of flooding.<br>- The key factor determining the effectiveness of flood control measures remains the terrain, with the degree of afforestation and vegetation coverage also playing an important role. In the process of spatial planning of rural areas, it is essential to maintain a balance between infrastructure development and environmental protection (including thoughtful land management, planting planning, implementation of regulations on vegetation management). | Lv et al. (2025) |

Source: own elaboration based on the sources given in the table.

Another important aspect is to point to the knowledge and techniques of past generations that are resistant to adverse weather conditions. In this case, cultural

heritage is a value and resource that serves to mitigate natural hazards (Mascitelli et al. 2023). Another dimension is related to the specificity of a given cultural heritage, which may affect interest in it (including tourists) regardless of natural disasters. An example is the heritage of Nepal (including natural attractions and religious sites), which encourages visits even after the 7.8 Richter scale earthquake, as well as the specificity of dark tourism, which is characterized by increased tourist traffic to places associated with death, tragedies and disasters (Min et al. 2020). The above affects the resilience of a given place, and thus the speed of its regeneration. Examples of research devoted to the issues of cultural heritage in areas degraded by natural disasters are presented in Table 5.

*3.2.2. Cultural heritage in areas degraded by human activity*

The damage and destruction of cultural heritage resulting from human activity is widely discussed internationally, both in relation to the destruction resulting from wars and armed conflicts (Between Aleppo…, 2023; Rouhani 2023; Abdelzayed et al. 2023; UN-Habitat 2021; Ali et al. 2022), as well as the introduction of political, economic and social changes (Mackiewicz, Staszewska 2023; Rottermund 2024).

The subject of armed conflicts and wars in the literature on the subject refers mainly to the destruction of cultural heritage sites in Afghanistan, Iraq, Libya, Mali, Nepal, Syria and Yemen (UNESCO, n.d. b). As noted by M. Beiraghi (2012), the instability of a country resulting from social unrest has been classified as one of the most destructive factors threatening cultural heritage. In such a situation, international institutions are unable to enter the country and have difficulty in contacting government entities to assess the risk and save cultural assets. Moreover, the protection of cultural heritage has a much lower priority than saving human lives. Additional elements include the phenomenon of vandalism and looting (robbing and destruction) of cultural heritage, as well as public ignorance about the value of heritage and its protection and the prioritization of political issues (Beiraghi 2012). Cultural heritage can be destroyed unintentionally (as collateral damage), or it can be deliberately ‘attacked’. The aim of the latter may be to erase the memory of the target group—the so-called ‘cultural genocide’ (Between Aleppo… 2023) and destruction (Bouchenaki 2012), or even erasure of the identity of a given group (Ali et al. 2022). Protecting heritage in times of conflict is not only about taking care of its material

dimension (movable and immovable property), but also focusing on protecting the identity of a given community (Jaramillo Contreras 2012). The difficulty of this protection is related not only to fear for life, but also to the complexity of the economic, social and political challenges of post-conflict environments, as well as the difficulty of reconciling the expectations of a diverse group of stakeholders (Abdelzayed Valdeolmillos, Boussaa 2023). The contemporary model of protection of cultural assets should also take into account the growing pressure of modernization, the growing demand for heritage and the shift of the focus from heritage values to social needs (Purchla 2024). Heritage renovation in post-conflict conditions, according to C. Larkin and I. Rudolf (2024), is an ambivalent and random process related to the selective use of emotional historical symbols. It may be related, among others, to the instrumentalization of heritage sites by given social groups, mainly used to support ethnic-nationalist claims and commercial interests (Larkin, Rudolf 2024). Post-war reconstruction can also be a means of cultural diplomacy (Khani 2023). Ali et al. (2022) developed a list of strategies for the revival of cultural heritage after wars, including three groups: i) urban, ii) social, and iii) economic. The first one is related to the reconstruction of urban structures (as it was; mixing old and new; or symbolic revival), functional re-balancing (as it was; adaptation and reuse of heritage with new functions; reconsidering some uses; or adding new uses), and revitalizing the city's memory (reconstruction of landmarks, symbols and heritage building). According to these researchers, social strategy includes the following mechanisms. These activities focus on meeting the basic needs of society and improving the standard of living by creating new jobs. An important element of the strategy is also strengthening the role of the local community through its active participation in decision-making processes and the implementation of reconstruction projects. At the same time, actions are being taken to raise the cultural awareness of residents and educate them on the importance of protecting and revitalizing cultural heritage. Supporting the return of residents to areas covered by revitalization activities by providing them with appropriate living conditions and strengthening social ties within the local community is also of key importance. Another important aspect is the recreation of local customs, traditions and activities related to cultural heritage, which constitute a unique feature of the community's identity. The economic strategy is primarily aimed at stimulating the

local economy by enhancing the area's economic potential through the introduction of new initiatives, the revival of traditional practices, and the provision of financial support. One key approach involves investing in the urban heritage of the area to drive regional economic revitalization, which includes restoring traditional crafts, creating employment opportunities, and promoting culturally rooted activities that can boost tourism. In parallel, the strategy emphasizes securing adequate financial resources for the effective management of cultural heritage revitalization efforts. This includes mobilizing support from the private sector, international institutions, and organizations, as well as encouraging private investment and engagement in the post-revitalization management of the area. Additionally, the plan envisions offering financial advances to local residents to support the restoration, maintenance, and preservation of their heritage assets (Ali et al. 2022).

In the context of post-railway and post-industrial damage, texts on cultural heritage refer mainly to the conservation of architectural objects – individual buildings, mainly railway stations (Chaves 2022), located on the railway line (Qiao et al. 2025), railway revitalization (Lu et al. 2024); reuse of given buildings – as galleries, museums and service buildings often unrelated to their original purpose (Bianchi, De Medici 2023), including the creation of an industrial heritage park (Chen et al. 2025) and carrying out conservation works on industrial buildings (Huang et al. 2025) or objects. The aforementioned elements of cultural heritage were damaged as a result of many elements, including, among others, the specificity of the climate, extreme natural phenomena and the passage of time. The thread related to damage resulting from armed conflicts seems to dominate over the others. Selected studies on cultural heritage in areas being destroyed by human intervention are presented in Table 6.

**Table 6. Examples of studies related with the cultural heritage in areas affected by human activity**

| Type of human action | Devastated area | Key issues | Source |
|---|---|---|---|
| Armed conflict (2014–2017) | Ancient city of Mosul, Irak | - Highlighting the potential of grassroots initiatives to rebuild cultural heritage, restore urban character and revive the cosmopolitan spirit. | Larkin, Rudolf (2024) |

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| | | - These initiatives provide space for community resilience. Compared to externally funded initiatives, they have a greater chance of survival and deeper impact. They also have the potential to create network synergies and exchanges between communities, and indicate that historic heritage sites need to be integrated into shared living spaces. | |
| Armed conflict—bombing (1999) | Knez Milosa Street, Belgrade, Serbia | - An example of cultural heritage destruction as collateral damage during the bombing of a military target.<br>- A case study of the rescue operation of art objects from a government building by spontaneously acting staff of the National Museum in Belgrade. | Radin (2012) |
| Civil War (1967–1970) | Oron National Museum Collections—destruction of the wooden sculpture collection (Ekpu ancestors figures), Nigeria | Recommend that cultural institutions develop their own physical resources to store endangered objects and create synergies between institutions, individuals and governments. | Kasai Kingi (2012) |
| Armed conflict | Historic residential areas, Syria | Identifying the consequences of damage to historic residential areas, including: changes to the urban fabric, poor maintenance of buildings (due to high renovation and repair costs), outflow of existing residents and inflow of displaced people (transformation of cities, difficulties in asserting rights to housing, land and ownership), land speculation, creation of informal landfills, | UN-Habitat (2021) |

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|---|---|---|---|
| | | limited economic activity (destruction of old market areas and craft buildings), loss of traditional crafts, loss of green areas (including traditional orchards-courtyard gardens), increased housing needs, loss of institutional and administrative capacity to undertake planning and management of the city and its cultural heritage. | |
| Armed conflict (1980–1988) | Iran | - Identify the low interest in research on the impact of the Iranian war on cultural heritage, its protection and post-conflict reconstruction.<br>- Reflect on the factors that contribute to endangered cultural heritage gaining international significance. | Rouhani (2023) |
| War (2015 action) | Temple of Baalshamîn in Palmyra, Syria | Plans implemented as part of the Collart-Palmyre Project at the University of Lausanne, the aim of which is to publish the documentation kept in the Paul Collart archive and make it available to researchers and Syrian refugees (including photos, sketchbooks and notebooks, a 3D reconstruction of the Temple of Baalshamin and the development of a brochure presenting the history of Palmyra). | Michel (2023) |
| Political, economic and social changes (systemic transformation) | - Nikiszowiec district, Katowice, Poland<br>- Kaufhaus estate in Ruda Śląska, Poland | Examples of the degradation of infrastructure and public space and increasing social problems.<br>- Description of a workers' housing estate located in the city of Katowice, which until the 1990s was supported by a mine. The Return to Tradition in Nikisz program: Activities | Mackiewicz, Staszewska (2023) |

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| | | for the revitalization of social capital and promotion of the unique cultural heritage of the district. Establishment of a branch of the Katowice History Museum (Heart of Nikiszowiec), opening a tourist information point, investment in technical infrastructure and raising the attractiveness of public space, video monitoring, professional activation program.<br>- Historic workers' houses (built before 1918). Reform of the system of allocation and sale of municipal apartments. | |
| Deindustrialization | Piekary Śląskie, Poland | - Concentration on post-industrial and post-mining areas.<br>- Analysis of a multifunctional approach (innovative strategy combining the to the concept of blue-green infrastructure) revitalization in the context of urban area development. | Kantor-Pietraga et al. (2025) |
| Damage to railway infrastructure | Beira Train Station, Mozambique | - Analysis of damage, material characteristics and building comfort conditions.<br>- Identification of appropriate repair actions and maintenance tasks.<br>- Emphasis that the conservation of cultural heritage objects is a difficult task and requires a deep understanding of the object in question. | Chaves et al. (2022) |
| Damage to railway infrastructure | The South Manchuria Railway (Shenyang–Yingkou section), China | - Constructing a hierarchical analysis model for heritage values and using fuzzy control tools to mitigate the influence of subjective cognition on the experimental results. | Qiao et al. (2025) |

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| | | - Measuring the degree of risk and the scope of protection required for these architectural heritage objects and the actual needs of the stakeholders.<br>- The preservation and renovation of public buildings among these modern architectural heritages were found to be relatively successful.<br>- The condition of residential buildings does not meet the objective needs of the users.<br>- The city dwellers are more accustomed to their living conditions and take better care of the architectural heritage. On the other hand, the residents of small towns are looking for better living conditions (moving instead of renovation). | |
| Damage to rail infrastructure, abandonment process | Railway Heritage, Italy | - Treating building reuse as a cultural development strategy and not limiting it to individual buildings but extending it to infrastructure enhances the effect achieved.<br>- Defining the criteria for assessing alternative reuse strategies in the Italian reality in line with the approach of improvement and recycling. | Bianchi, De Medici (2023) |
| Industrial changes | Greenway Railway in Taichung City, Taiwan | Identifying five forces contributing to revitalization: storytelling, market responsiveness, aesthetics, regenerative capacity, and local cultural design. | Lu et al. (2024) |
| Industrial changes | Industrial Heritage Parks in Hebei Province: Dahua, Miansan | - Carrying out a comprehensive assessment of industrial heritage parks and conducting an analysis in the dimensions of history and | Chen et al. (2025) |

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| | and Shimeiji, China | culture, transport, aesthetics, infrastructure, practicality and comprehensiveness.<br>- Common features of the parks include their high assessment in the area of history, culture and convenience of facilities and a low assessment in terms of practicality and comprehensiveness (functionality layout, business diversity and general coordination).<br>- Differentiating features include primarily communication accessibility, comprehensiveness and practicality, aesthetics and convenience of facilities. | |
| Industrial changes | Examples from China, India and the UK | - Addressing the issues of carbon dioxide emissions related to the renovation of post-industrial buildings.<br>- To show the need to reduce carbon dioxide emissions (especially in countries with large populations and rapid urbanization), to identify the reasons why this is not taken into account during the renovation of buildings (to identify the gap in the integration of heritage protection with carbon dioxide emission reduction strategies), and to identify a group of problems that arise when assessing renovation options. | Huang et al. (2025) |

Source: own elaboration based on the sources given in the table.

*3.2.3. Preventive measures in the event of natural disasters and destruction resulting from human activities*

The aim of preventive actions is primarily to minimize the risk associated with the destruction of cultural heritage. Research conducted for this purpose focuses, among others, on developing guidelines for disaster risk management, which can be implemented by managers of given facilities, local and national authorities and international organizations.

Finland is a country described as safe (with a low risk of armed conflict) and at the same time, implementing strategies for the protection of cultural assets in the event of such a conflict. The country in question implements a nationwide register of cultural assets of national importance, which are protected in accordance with the provisions of the Hague Convention. This register includes architectural heritage, archaeological sites, as well as museum, library and archive collections that require protection in the event of armed conflict. As M. Pesu (2012) further notes, these activities can be integrated with systems for preventing and mitigating the effects of natural disasters. The researcher also emphasizes the need for closer cooperation between the cultural heritage protection sector and the emergency services and other relevant entities. There is already an increase in cooperation between institutions responsible for cultural heritage and representatives of other sectors in the context of responding to climate challenges affecting heritage. In the future, regular updating and evaluation of the register is planned. Early planning is crucial, as it is the foundation for the proper protection and conservation of cultural heritage objects. This process should be seen as a shared responsibility of property owners, defense forces, emergency services and heritage protection professionals (Pesu 2012).

Another example of countries using a prevention system is Japan, where a unique 'bosai culture' has developed, focusing on developing the ability to prepare for disasters (mainly natural ones, related to typhoons, floods, earthquakes, tsunamis and seismic activity of volcanoes). Bosai culture is associated with, among others, the development of technical means and requirements, law and a strong civic culture. This culture is associated with the awareness of society resulting from previous experiences, collectivism (social orientation towards the group) and religious and cultural influences. Two types of preventive measures are used in this country: i)

hard—regulations, engineering and architectural requirements, ii) soft—education on Disaster Risk Reduction integrated with formal, non-formal and informal education, and supporting civic culture (Pastrana-Huguet et al. 2022).

M. Beiraghi (2012) draws attention to the need to build an official network of experts involved in the protection of heritage resources. Through the network, it is possible to provide information and share it internationally. In the event of a conflict or disaster, the stage of searching for experts will be omitted, thus saving time for such activities (Beiraghi 2012).

Among other solutions, technological support is also mentioned, based on the rapid collection and analysis of photo galleries and information provided by staff and citizens. Its aim is to preserve the memory of local communities. The system also allows for the assessment of damage during the destruction process (e.g. earthquake) and after the event. The system includes three components: i) a smartphone application, ii) a service for exchanging data with databases and iii) a service enabling control of 3D reconstruction (Costanzo et al. 2018).

Selected studies on preventive actions to prevent the destruction of cultural heritage are presented in Table 7.

**Table 7. Research examples focusing on proactive approaches to the preservation of cultural heritage**

| Type of action | Area | Key issues | Source |
|---|---|---|---|
| Drawing attention to the problem, raising awareness, among others, of the scientific community | Serbia | - Indication of the lack of systematic databases on the impact of floods on cultural heritage, as well as the lack of educational materials on the management of assets with historic buildings in flood situations.<br>- Review of the development of flood protection throughout history, including a presentation of the history of floods in Serbia. | Momcilovic Petronijevic, Petronijevic (2022) |
| Increase understanding of sandstone degradation mechanisms and support the development of | China | - Investigation of degradation mechanisms that contribute to mitigating the challenges of acid rain and water logging | Lyu et al. (2025) |

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|---|---|---|---|
| effective conservation strategies | | | |
| Increased understanding of degradation mechanisms of paper-based archival materials | n.d. | - Indication of damage caused by various factors, including extreme weather events (including heavy rain and flash floods).<br>- Investigation of the effects of direct immersion in salt solutions on different types of paper, emphasizing the importance of timely intervention. | David et al. (2025) |
| Using sensor networks to monitor vibrations | Italy | - Performing coherence analysis to identify frequencies.<br>- Contribution to the design of sensor networks for monitoring structural health. | Pirrotta et al. (2025) |
| Creating a fire protection technology strategy | Macau | - Study of the development and technological applications of industrial heritage in the field of fire protection.<br>- Search for ideas and strategies related to fire protection of industrial heritage. | Huang et al. (2024) |

Source: own elaboration based on the sources given in the table.

*3.2.4. Cultural heritage as a tool for regeneration*

K. Łagodzińska (2013) indicates three models combining the issues of revitalization and culture:

i) culture-led regeneration, in which culture plays a key role as a catalyst and driver of revitalization processes, implemented through, among others, the creation of flagship cultural facilities or complexes, the development of public spaces or the implementation of place rebranding programs;
ii) cultural regeneration, an approach integrating cultural activities with a broad development strategy for a given area, combining it with environmental, social and economic initiatives;
iii) culture and regeneration, in which separate entities are responsible for the sphere of culture and revitalization, with culture playing a supporting and complementary role to revitalization activities.

**Table 8. Main advantages and threats of using cultural heritage in the revitalization process**

| **Advantages** |
|---|
| Changing degraded areas (e.g. pathological) into attractive places to live and visit |
| Promotion of a given place (place marketing) |
| Strengthening of local identity |
| Defining the character of a given place, its distinguishing features |
| Increasing the prestige of a given place (in the eyes of residents and guests) |
| Building pride in the place of residence |
| Integration of the local community |
| Strengthening civic attitudes and civil society |
| Inspiration for socio-cultural activities |
| Maintaining social and intergenerational bonds |
| Activation of older people |
| Increasing the market value of buildings and their surroundings |
| A source of inspiration for entrepreneurs (new business opportunities) |
| Protection of existing jobs (including maintaining existing companies) |
| Reducing migration to other centers |
| Stopping the process of depopulation |
| Development of the tourism market |
| Increased interest in cultural services |
| Use of available resources |
| Preservation of a given heritage element |
| Maintaining traditional crafts |
| Possibilities of policy interventions for the protection of cultural heritage |
| **Threats** |
| Gentrification process |
| Conflict between different expectations of heritage inheritors |
| Conflict related to differences in the perception of the authenticity of a given heritage |
| Conflict related to different valuations of heritage protection and development of a given area |

Source: own elaboration based on: Konior, Pokojska (2020); Alexandrakis et al. (2019); Galluccio, Giambona (2024); Rodrigues et al. (2025).

Heritage is visible in many aspects of revitalization—spatial, social and economic. It is used primarily in the revitalization processes of post-industrial areas and urban spaces. Cultural heritage provides a number of market and non-market benefits related to both utility and non-utility values (Alexandrakis et al. 2019). A. Konior and W. Pokojska (2020) emphasize that in the coming years the awareness of the importance of heritage will increase, while revitalization processes based on it will gain popularity. These researchers specified a group of advantages (related to

improving the quality of life in many aspects) and threats to the use of cultural heritage in the revitalization process. Both groups are presented and supplemented in Table 8.

## 4. Concluding remarks

Reclamation involves the targeted development of an area that requires remedial action. The selected reclamation direction determines the scope of work, which may consist of technical activities related to the appropriate land formation, including excavations and dumps, soil and earth cleaning, elimination of pollution, securing technical infrastructure, construction of a communication and drainage system, construction of hydrotechnical devices for the assisted filling of excavations with water from rivers and biological procedures in the case of agricultural or forest reclamation. After carrying out reclamation, it is necessary to start the development phase, defined as agricultural, forest or other use of the reclaimed land. In practice, only in the case of some directions, e.g. agricultural and forest, can the reclaimed area immediately fulfill the planned target functions. In the case of other directions, the development process consists of equipping the area and post-industrial facilities so that they can fulfill the intended functions. The process of reclamation and the development of degraded areas is a complex, time-consuming and expensive undertaking. The proper implementation of these projects requires careful characterization and determination of methods for selecting the most advantageous possible directions of reclamation and development.

Protecting cultural heritage can play a key role in sustainable development. Activities in the area of economic development, supporting growth and rehabilitating devastated areas contribute to the creation of new jobs, increasing property values, increasing tax revenues, supporting the establishment of new industries and providing space for business initiatives, which in turn translates into an improvement in the quality of life of local communities.

Apart from explaining concepts such as reclamation, rehabilitation, restoration, revitalization, recultivation, and revegetation, the article specifies four approaches to heritage in the context of reclamation processes. These include:

-cultural heritage in areas after natural disasters,

-cultural heritage in areas damaged by human intervention,

-preparations for intervention in the event of natural disasters and disasters resulting from human intervention,

- cultural heritage as a means/tool facilitating the regeneration of given areas.

It is noticeable that the last group of issues refers exclusively to aspects of revitalization. This group is discussed primarily from the perspective of the advantages and threats linking the revitalization of cultural heritage with its impact on degraded areas, particularly from the perspective of culture as a catalyst for change (*culture-led regeneration*). The remaining research gap focuses on the two models: *cultural regeneration* and *culture & regeneration*, which constitute a space for further research.

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# The Impact of Online Trading on Stock Market Efficiency: what have we learned from the Gamestop case?

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**Abstract:**
**Aim:** To examine the impact of online trading and technological innovations on stock market efficiency, with a focus on the GameStop case as an illustrative example.

**Research methods:** Conceptual and qualitative analysis drawing on the GameStop event, regulatory comparisons between the US and Europe, and a review of literature on electronic trading platforms, financial information dissemination, and social media–driven investor coordination.

**Findings:** Online trading platforms, Web 2.0, and social media have transformed investor behaviour and market dynamics. The GameStop case revealed how coordinated retail investors can challenge traditional market mechanisms and the efficient market hypothesis. The "gamification" of trading apps encourages speculative behaviour and raises concerns about investor risk awareness. Regulatory approaches to short selling differ between the US and Europe, highlighting the need for balanced, internationally coordinated frameworks. Strengthened financial education and updated regulation are essential to mitigate risks while retaining the benefits of technological advances.

*Keywords:* Online trading, Stock market efficiency; GameStop case, Social media
*JEL: G14, G18, G23, O33*

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## 1. Introduction

Several recent events involving the stock market can provide interesting indications of how the combined effect of some important phenomena, with different times and modes, has contributed to profoundly reshaping the reality of the stock markets. These are distinct phenomena but strongly interrelated, as the common root lies in the impact of technological innovation on the activity of financial markets and the behaviour of investors. In particular, we can distinguish:
a) the effects of technological innovation on the methods and transaction costs of stock market negotiations (electronic stock exchanges and online trading);
b) the availability, timeliness and cost-effectiveness of information from reliable sources (Internet and WWW);
c) the possibility of interaction between investors and the exchange of information of uncertain reliability (WWW 2.0);
d) the progressive replacement of individual operators ("retail investors") between investor-savers and investor-speculators and, for the latter category, the phenomenon of "gamification" of investment activity.

These phenomena, due to the growing interconnection of financial markets at a global level (Raddant, Kenett 2020), have affected almost all the leading financial centres, albeit with different intensity and characteristics, depending on the specific economic, cultural and regulatory factors that characterise the different national contexts.

In the following, after briefly recalling some theoretical foundations regarding the efficiency of the financial market, each of these phenomena is examined, evaluating their possible implications for the conditions of stock market trading. An analysis of the GameStop case is then proposed, which has caused a considerable outcry, both for the very significant fluctuations recorded by the stock market performance and for the socio-political implications that have characterised the affair, when some observers have interpreted it as a conflict between a multitude of small investors and the powerful hedge funds of Wall Street. Finally, some possible lines of intervention are discussed to preserve transparency and fairness in negotiations and the orderly functioning of capital markets.

## 2. Theoretical framework: the efficient market hypothesis

The theory of the efficient market or Efficient Market Hypothesis (EMH), whose complete definition is due to the Nobel laureate Eugene Fama in 1970, constitutes one of the fundamental pillars of financial economics (Fama 1970). The essential core of the EMH is the relationship between information and the prices the market expresses. A financial market can be efficient if, at any moment, the price of the securities traded fully reflects the relevant information. In such a financial market, neither technical analysis (forecasting future prices based on the study of past prices) nor fundamental analysis (study of companies through the analysis of accounting data, the industrial sector and the competitive position) should allow an investor to achieve systematically higher returns than those that another investor would obtain from a portfolio, with the same degree of risk, composed of securities chosen at random. Suppose all available information is immediately incorporated into the prices, and the movements of securities depend only on currently unknown information. In that case, the performance of securities can only be random (Random Walk Hypothesis).

In the past decades, a vast literature has developed on the topic of the efficiency of financial markets and different meanings and typologies of efficiency have been elaborated;[1] the most commonly referred to are reported below:

• Information-evaluation efficiency is obtained when all available information is used to determine a company's value correctly. It is based on selecting available information and using only reliable information.

• Technical-operational efficiency: occurs when the market carries out its functions at the lowest cost for participants, minimising the direct and indirect operations costs.

• Allocative efficiency: occurs when the result of transactions concluded in the particular market is optimal from an allocative point of view, that is, the allocation of resources available on the market is the best among all possible ones (so-called Pareto optimum);

In particular, the phenomena described in the introduction have had an impact on information-evaluation efficiency and technical-operational efficiency, albeit with

[1] For a comprehensive literature review see Bock, Geissel (2024).

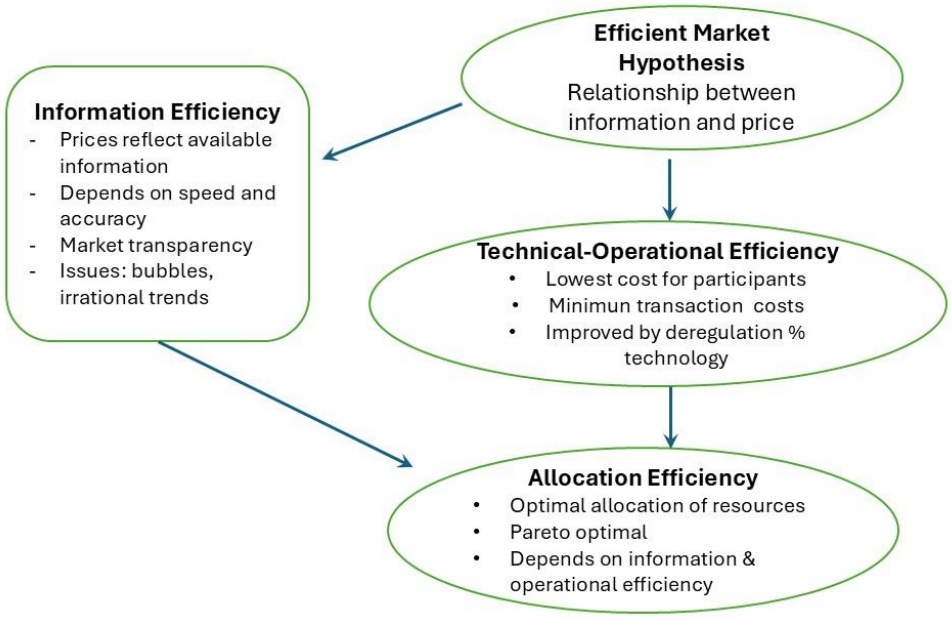
sometimes contrasting effects and, in any case, inevitable repercussions on allocative efficiency.

Information-evaluation efficiency is defined as a function of the speed and precision with which the information available to operators is reflected in prices. In particular, it refers to the degree of "market transparency" (the speed with which information is correctly incorporated into current prices).[2] Empirical tests by financial economists have produced conflicting evidence for the various markets under analysis (Degutis, Novickyt 2014). However, the conditions of a strong, efficient market are hardly found. The analysis of historical data shows instead that financial markets are often inefficient (think, for example, of the formation of speculative bubbles), and prices do not follow random trends since their movements generate short-term trends, sometimes fuelled by irrational choices made by investors.[3] While the empirical evidence on market efficiency is uncertain, there is no doubt regarding operational efficiency and its increase, which is also confirmed by the consequent reduction in transaction costs. The operational efficiency of financial markets has increased thanks to important innovations, first of all, regulatory, with the progressive deregulation of markets and, subsequently, technological, with the dematerialisation of securities and the transition from in-person markets (public exchanges) to virtual markets (online platforms).

[2] This type of efficiency can occur with different degrees of intensity; the HMH distinguishes between: a) Weak efficiency: the prices observed on the market reflect all the information contained in the historical series of prices themselves; it is not possible to formulate an investment strategy with an expected return (possibly adjusted for risk) higher than that of the market based only on the information contained in the historical series of prices; b) Semi-strong efficiency: market prices reflect not only the information contained in the historical series of prices but also any other publicly available information; therefore, it is not possible to formulate an investment strategy with an expected return (possibly adjusted for risk) higher than that of the market, based only on publicly available information; c) Strong efficiency: market prices reflect any public or private information; it is not possible, therefore, to formulate an investment strategy with an expected return (adjusted for risk) higher than that of the market, not even if you have confidential information (Fama 1970).

[3] Technical analysis, for example, is based precisely on the assumption that specific historical price trends tend to repeat themselves with a certain regularity. Therefore, the future behaviour of prices is predictable. Behavioural finance studies the errors investors make in their investment choices, highlighting their frequent irrationality.

**Exhibit 1. Market efficiency interactions**




## 3. Electronic stock exchanges and online trading: the impact on transaction costs and practice

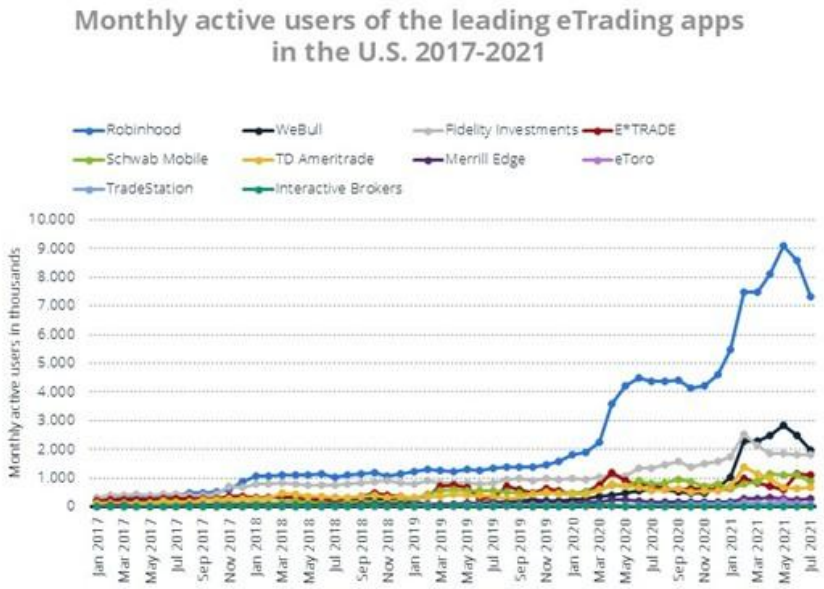
Innovation in stock trading accelerated during the late twentieth century. Until then, retail investors traded primarily by telephone through banks and intermediaries, incurring relatively high commissions—particularly in countries where specialised stockbrokers held legal monopolies. By contrast, in the United States, lighter regulation encouraged the rise of low-cost intermediaries, with Charles Schwab pioneering the model. From the 1980s onward, advances in electronics and market deregulation prompted exchanges to adopt new technologies to enhance efficiency. Initially, orders were placed by phone and transmitted through closed computer networks, but the mid-1990s marked a decisive shift: the spread of the World Wide Web and broadband enabled the rapid growth of online brokers. This model soon

expanded to Europe and Asia, extending beyond equities to include more complex and volatile instruments such as Forex, covered warrants, and derivatives. As Esaton et al. (2022) observe, brokers also began consolidating their services by investing in investor education, operational assistance, and integrated banking channels.

The emergence of mobile trading apps represented the next decisive stage. By shifting from desktop computers to smartphones and tablets, these platforms made trading more immediate and user-friendly, spurring forecasts of continued sector growth (Van der Beek, Coralie 2021). These developments significantly advanced financial market efficiency. They reduced transaction costs, simplified access, and increased liquidity through broader international participation. In addition, they allowed prices to adjust more quickly to new information (Haghani et al. 2022), while also facilitating enhanced oversight by regulatory authorities such as the SEC, Consob, and major exchanges.

At the same time, the business models underpinning these apps have introduced new challenges. Their commission-free policies rely heavily on payment for order flow (PFOF), a practice in which brokers route orders to market makers in exchange for small payments. This system enables zero-commission trading but, as critics argue, risks creating opacity and conflicts of interest. Market makers—often large firms employing high-frequency trading—profit from bid-ask spreads and their privileged access to order information. While occasional investors may be unaffected, frequent or high-volume traders could face suboptimal execution if brokers prioritise revenue over client outcomes. Moreover, the concentration of flows among a few dominant market makers raises concerns about informational advantages and deepening asymmetries, as highlighted by Benabou and Laroque (1992).

**Exhibit 2. Trading apps active users in US**




Taken together, these developments show that technological innovation has substantially improved access, liquidity, and efficiency in financial markets. Nevertheless, they also underscore the emergence of structural risks, particularly regarding transparency, incentives in order routing, and the unequal distribution of information among market participants.

## 4. Internet and the WWW

The advent of the Internet, even in its early forms in the 1990s, significantly increased access to low-cost information. This development particularly benefited small investors who had previously been excluded from rapid sources such as press agencies or real-time market data, which were largely reserved for institutional operators. Before the Internet, small investors relied on next-day financial

newspapers, intermediaries, or cumbersome processes to obtain official company filings. Today, all essential documents—from financial statements to prospectuses—are readily accessible online via company websites, regulatory authorities, or market platforms, and can be searched efficiently.

Numerous websites now provide databases, studies, and analyses, often at modest costs, making resources once exclusive to professional research departments widely available. This has reduced the informational advantage of financial intermediaries and contributed to greater market efficiency by promoting more uniform information distribution. While institutional investors retain some advantages, the gap has narrowed considerably.

From this point of view, the Internet and the WWW have represented a further step towards greater market efficiency, as one of the pillars of informational evaluation efficiency is precisely the uniform distribution of information among operators.

But a crucial point was the possible Interaction between investors offered by Web 2.0. Although it is impossible to indicate a precise date, the term Web 2.0 began to circulate in 2004; however, for some years before, static websites were starting to be joined by applications capable of actively involving the users, encouraging them to provide content instead of simply viewing it. Internet surfers could now publish articles and comments, create their pages on different sites, and upload documents and photos to make them available, in a more or less selective way, to other users. With Web 2.0, self-publishing platforms such as WordPress and applications called Social Media spread. Examples of Web 2.0 sites include Wikipedia, Facebook, X, Instagram, LinkedIn and various blogs, which have fundamentally changed how information is distributed online. These new network functions enable a higher level of information sharing and interconnection between participants, allowing users to actively participate in the experience rather than simply acting as passive spectators gathering information (Omarova 2021).

The social aspect of the Internet has thus been transformed; social media allows users to share their thoughts and opinions with others, creating new ways of organising activities, connecting with other people, and coordinating initiatives. They

can tag, share, tweet and signal to other users their agreement or disagreement with the information published.

Of course, the additional potential of WWW 2.0 has also impacted financial information. Transparent discussion of activities in public forums contributes to economic growth, improves the efficiency of capital allocation, and disseminates financial analysis and non-traditional trading strategies, which is also potentially positive. In market dynamics, asset prices reflect an average of different points of view. While this mechanism is supposed to be reliable, it sometimes does not work perfectly, and unconventional perspectives may prove it correct.

However, there are also obvious downsides to the Internet behaving more like an open forum. Social media is vulnerable to disinformation (fake news) operations for several reasons. First, they use targeting systems based on what users watch and suggest more or less similar content. For those with mainstream preferences, recommended content converges on mainstream media. For those interested in unconventional ideas, algorithms tend to generate "rabbit holes" or exposure to progressively more extreme positions. Strategically placed ads can accelerate the process and disinformers, skilled at feeding their opinions into this system, can successfully create self-reinforcing bubbles of oriented users.

In a context where information is consumed through monothematic channels or which do not offer professional mediation of the news, the tendency to select facts and opinions that confirm our preconceived vision of things, ignoring contrary evidence ("confirmation bias"), becomes increasingly dangerous (Cipriano, Gruca 2014). The same search engines, which tend to personalise the results of our searches, facilitate the creation of information bubbles that become the basis for hazardous and, in fact, externally directed investment choices.

Furthermore, despite the considerable efforts of the major platform operators, the presence of fake accounts on social media remains a complex problem to solve. Troll factories, which are large groups of individuals paid to write comments, can be implemented to create the illusion of active and numerically significant communities, distorting users' perceptions. Artificial intelligence can generate realistic profile photos that portray non-existent individuals and is making great strides towards publishing detailed and credible texts.

Another significant factor, more evident in specialised discussion forums, is the informal hierarchy among users. Some influencers play an important role in orienting a group's choices (Oedzes et al. 2019). Some can condition the behaviour of significant numbers of users, as those companies that widely use influencers for their communication activities have well understood. This also applies offline, but social media is a formidable amplifier and accelerator (Guan 2023).

The financial sector is an exciting target for malicious actors of all kinds. Attacks against companies or financial institutions are frequent. Fake news can be fuelled to provide the market with signals and undermine trust in companies or the credibility of financial institutions, contributing to the high volatility of prices. Although there is no evidence that the GameStop case was influenced, in its development, by episodes of disinformation, the affair has highlighted a different aspect of Web 2.0: the possibility, through the Internet, of implementing a coordinated action by a plurality of investors capable of influencing the trend of prices. Given the possible impact on their efficiency, this has represented the most disruptive aspect concerning the normality of financial markets. Among the hypotheses that are at the basis of the efficient market theory, one of the most important is that according to which none of the market operators can influence prices. This condition, however, could be respected in huge and liquid markets, such as those of currencies or even very large-float stocks, such as blue chips. In the case of stocks with a smaller float, in less liquid markets, it is not uncommon for some large operators to be able to influence prices with orders of a specific size. This will likely happen frequently to the detriment of small savers. Now, the GameStop case shows how, precisely in a market that is not particularly large, the power of large operators can find a form of contrast in the coalition of small savers who coordinate their actions via social media. This coalition, another aspect to reflect on, is not created around the sole objective of profit but is also fuelled by ethical-social motivations and playful aspects. In these cases, there has been talk of social media-driven trading (SMD trading) and meme stocks. This term refers to those stocks whose trading volume increases not necessarily because of the issuing company's economic results but because of social media's attention that can arise from various factors unrelated to the earnings prospects, financial position or other corporate fundamentals.

## 5. Gamification of investment activity

In the context of private investors in stocks, there has always been a substantial dichotomy between those operators who invest with a long-term time horizon and other operators who manage their financial activities in very short periods, usually lasting a few days or even just a few hours, betting on the performance of stocks daily, choosing the securities and the time of purchase based on the sensitivity gained on the market trend.

The purchase of stocks by retail investors for a long-term horizon was quite widespread until the 1980s, especially in Anglo-Saxon countries, where a fair number of small shareholders existed. Subsequently, the growing complexity and volatility of the markets have led many retail investors to entrust the management of their stock portfolios to specialised professionals, investing through the intermediation of mutual funds or asset management companies.

The typology of the speculator operator, with a short and very short-term time horizon, has instead found its habitat of choice in online trading. In particular, simple and intuitive trading apps offer a dynamic and fun way to invest in the stock market, allowing traders to adopt different operational strategies and involve even segments of the population previously unfamiliar with these activities and, sometimes, lacking financial culture. Many engage in stock market operations more as an exciting pastime than for factual investment purposes. This trend is supported by functions activated by trading apps, such as drawing up investor rankings based on the results achieved, and assigning badges and bonuses to the best-ranked, just like in the most popular video games.

Indeed, while the innovations of trading apps may have positively influenced market efficiency, allowing the expansion of the audience of participants with favourable repercussions in terms of liquidity, their influence on the behaviour of their customers in trading habits remains an open question. After all, investing in the stock market, or any market, is not a game. There are concerns that gamification may desensitise users to the inherent risk of investing. Fusing gaming and investing may cause users to lose sight of the real risks associated with their operations. This can be dangerous and encourage investment behaviours that users would not normally

engage in. This is a key challenge for trading apps in the coming years, mainly when regulators focus more on gamification.

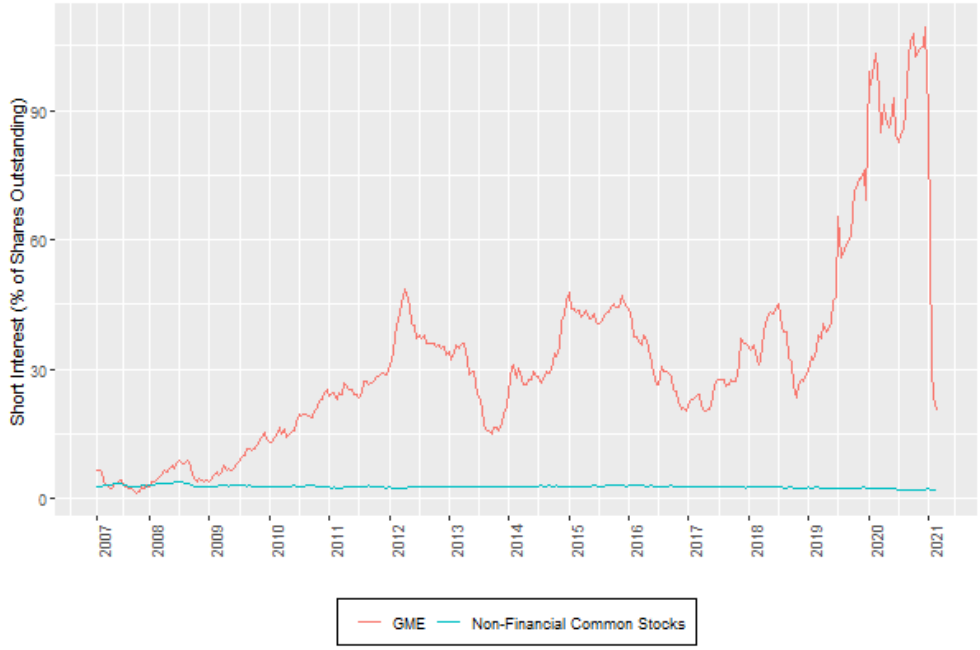
## 6. The GameStop case

GameStop is a chain of retail stores, with numerous outlets spread worldwide, specialising in video games and consumer electronics for electronic gaming. It was going through a deep crisis due to competition in the video game sector, online gaming sites, and the distribution of video games via the Internet. The stock price reflected these considerations, declining from just under $ 50 at the beginning of 2014 to $ 3 by the fall of 2020. The stock's disappointing performance and the unfavourable scenario expected for the company aroused the interest of "bears," who were convinced that the fundamentals were such as suggesting that GameStop would not be able to overcome and face the pandemic. On the other hand, the 2019 budget had closed with a loss of $795 million, and it was necessary to reduce the sales network significantly, closing a large number of stores. However, in October 2020, a young, successful entrepreneur, Ryan Cohen, purchased a significant stake in the company, urging management to commit to the relaunch of the company. Encouraged by Ryan Cohen's attempt, users of the "subreddit r/wallstreetbets," a social news site Reddit forum, launched an initiative supporting GameStop, inviting forum participants to invest in the stock. This appeal gained increasing support, and the share price began to increase on January 11, 2021, due to the company's announced entry into the board of directors of three new directors, including Ryan Cohen himself. The stock's upward trend intensified in the following days. The stock closed on January 22 at $65 (corresponding to a market capitalisation of $4.5 billion), with a rise of 51% in a single day. On January 25, the stock opened at $97 and rose to $160; then, after eight suspensions due to excessive volatility, the price fell below $60 per share, finally closing at $76. On January 26, the stock opened at $88 per share, rising throughout the session until closing at $149, with a gain of over 90% in a single day. In fact, in January alone, the company's market capitalisation grew from $1.3 billion on January 1 to $10.3 billion as of January 26, when GameStop shares recorded a volume of $20

billion in transactions, establishing itself as the most traded stock in all major markets. The sudden and unexpected rise in the price has caught off guard those who, in the previous weeks, had sold the stock short, expecting a decline. This has caused a market situation known as a "short squeeze" (literally "squeezing the bears"), which occurs when the failure of the price of a stock sold short to fall forces the same sellers to close their positions by purchasing at increasing prices, contributing to fuelling the rise itself.

The short squeeze materialised, therefore, in January 2021, causing severe financial consequences for some hedge funds (speculative investment funds) and the generality of short sellers. To realise the extent of the coverage required, consider that, as can be seen from the graph shown here, approximately 110% GameStop's shares had been sold short, which caused strong tensions on the stock price.

**Exhibit 3. Short sale of Gamestop shares from 2007 to 2021**




Source: SEC (2022).

On January 27, 2021, RobinHood and other trading platforms (such as TD Ameritrade, E-Trade, Charles Schwab) imposed some limits on the ability of their customers to purchase GameStop shares, easing the upward pressure on the price, which, between January 27 and February 2, essentially halved. The trading platforms justified these limits with the impossibility, based on their resources, to increase the guarantee margins for the required purchases. Trading platforms, such as Robinhood, also provide clearing services to their customers through participation as a clearing member in the central counterparty, the National Securities Clearing Corporation (NSCC); they are therefore required to pay margins to NSCC to guarantee their customers' positions. Following the high volatility recorded on January 27, exposures arising from open positions on GameStop (and other volatile stocks) caused several clearing members, including RobinHood, to exceed a threshold (trigger), triggering the application of the "excess capital premium charge" in practice an extraordinary increase in the margin requests. This circumstance generated an overall margin request of approximately $ 3 billion for RobinHood. In order to contain exposures, before the opening of the session on January 28, RobinHood informed NSCC of its decision to introduce purchase limits on GameStop and other volatile stocks. As permitted by its Regulation, NSCC assessed the market situation and withdrew the request for the excess capital premium charge for all clearing members. The immediate consequence was the decrease in the price of the company's shares below $ 100, with a reduction of approximately 40% of the value recorded in the previous week. The decision by the trading platforms has drawn intense criticism from small investors and accusations of market manipulation, as it undoubtedly allowed hedge funds to be exposed to short sales, effectively limiting their losses.

Despite the decline, some users on the r/wallstreetbets forum have actively convinced GameStop shareholders to hold on to the shares, expecting their value to increase. However, due to further declines in the share price, investors who held on to the shares in their portfolios have suffered significant losses.

A first recovery occurred on February 24, when GameStop share prices doubled in just 90 minutes of trading, reaching an average of $200 per share, to rise by 41 per cent on March 8. On March 9, the stock reached its highest value since January, with a market capitalisation of over $17 billion, and shares closed at $246.90.

Subsequently, as can be observed from the following graph, the price trend continued to show high volatility, although less noticeable than that recorded in January and February, to close the year at a value of $148.39.

It is clear from observing the graph that the performance of the GameStop stock is anomalous and that it is difficult to interpret its oscillations based on the company's economic reality.

**Exhibit 4. GameStop stock price, 2021**


Source: Yahoo Finance.

From this point of view, the GameStop affair demonstrates the market's informational inefficiency. However, some non-relevant aspects must be considered to mitigate this assessment.

First of all, it must be considered that empirical evidence and important theoretical works have shown that it is not realistic to hypothesise perfectly efficient markets at all times. Although they may be efficient, there are possible temporary imperfections that justify investors' investment of time and resources in the analysis activity. Otherwise, the very assumption of efficiency made possible by the arbitrage of market operators would fail. Therefore, even supporters of market efficiency cannot eliminate the idea of temporary inefficiencies. It is probably precisely the attention aroused by inefficiencies of this magnitude that confirms the tendential efficiency of the markets.

## 7. Regulation of short selling in the United States and Europe

Short selling has often been indicated as an element of destabilisation of financial markets; however, in principle, this statement is not entirely acceptable. Short selling is a necessary tool for that arbitrage activity that should allow the market to correct temporary situations of inefficiency and realign prices to their actual value (fair value). Regarding information efficiency, short-selling signals tend to incorporate into prices the information available to those who believe that the securities in question are overvalued.

It is, therefore, clear that the regulation of short selling involves a tricky balancing act: the rules must allow the market to benefit from the liquidity and information efficiency produced by short selling while preventing, at the same time, extreme speculation that destabilises it. To this end, the first objective of regulation should be to increase transparency by allowing operators to have information on the volume of short sales for securities traded on a given market. However, a regulation focusing exclusively on informational aspects may not be sufficient. In fact, in the presence of significant short sales, a downward trend, not justified by the fundamentals of the security, may not be counterbalanced by a flow of purchases due to market imperfections and high transaction costs (unlike the short seller, the buyer must pay for the security). When conditions make it difficult for the market to perform a stabilising function, the downward price trend could trigger further selling due to a possible "snowball effect." Hence, there is a need for a combination of constraints, appropriately calibrated, to control the undesirable effects of short selling and protect the issuing companies and the market from the undesirable consequences of strong short selling without eliminating the benefits that the possibility of short selling entails for market efficiency.

*The European Precautionary Approach*

In Europe, the debate on short selling regulation intensified after the 2008 financial crisis and the subsequent sovereign debt crisis, when excessive downward pressure on bank shares and government bonds threatened financial stability. To address these systemic risks, the European Union adopted a harmonised framework

through Regulation (EU) No. 236/2012, establishing stricter rules than those in the United States. This regulation reflects a precautionary approach, recognising the interconnectedness of European financial markets and their vulnerability to contagion effects.

A key feature of the European framework is the role of the European Securities and Markets Authority (ESMA). ESMA coordinates national regulators, ensures consistent application of rules, and may issue opinions or instructions to member states. Crucially, ESMA has the power to impose temporary bans on short selling in situations of market stress, enhancing the EU's capacity to act swiftly across borders.

This power has been exercised in several instances. During the sovereign debt crisis, national authorities in countries such as Spain, Italy, and Greece introduced temporary bans on short selling of financial stocks to stem excessive volatility. More recently, at the onset of the COVID-19 pandemic in March 2020, regulators in France, Spain, Italy, Belgium, Austria, and Greece imposed temporary restrictions on short selling. ESMA played a central role in coordinating these measures and extending transparency requirements across the Union, demonstrating the flexibility and strength of the European system in times of crisis.

The European system therefore places a heavy emphasis on market discipline through disclosure. Net short positions exceeding 0.1% of a company's issued share capital must be reported to national regulators, and positions above 0.5% are made public. This is far stricter than U.S. reporting obligations and reflects Europe's philosophy of prioritising stability and transparency, even at the cost of some trading flexibility.

Another important dimension is Brexit. Since leaving the EU, the United Kingdom has taken steps to diverge from EU short-selling regulation. The UK's Financial Conduct Authority (FCA) has retained core transparency and anti–naked short selling rules but has explored more flexible approaches, reflecting the UK's ambition to position itself as a competitive global financial centre. This divergence underscores the EU's distinctively cautious regulatory culture compared with both the U.S. and the UK.

Recent policy debates in Europe also point toward further refinement of the framework. In 2022–2023, the European Commission launched consultations on

revising the Short Selling Regulation, partly in response to concerns from market participants about burdens on liquidity provision. Nonetheless, policymakers continue to stress that Europe's experience with systemic crises justifies a precautionary approach. In this sense, the European regulatory model represents not only a set of legal rules but also a broader philosophy: safeguarding market integrity and financial stability takes precedence over the unfettered operation of speculative trading strategies.

*U.S. Regulation as a Comparison*

In the United States, the supervisory authority, the Security Exchange Commission (SEC), introduced, in 2005, Regulation SHO, which modernised the regulation on short selling with the intent of preventing frequent cases of default by the seller and, in particular, to limit "naked" short selling. A "naked" sale is when the short seller does not promptly borrow the securities sold with the risk of being unable to deliver to the buyer within the standard three-day settlement period. Hence, the consequent default occurs most frequently when a market maker, in the presence of a customer's purchase request, sells short a security that is not very liquid, risking being unable to obtain the security in time for delivery.

The SHO regulation has established two standards, "locate" and "close-out," that are primarily aimed at preventing the opportunity for traders to engage in "naked" transactions. The "locate" (Rule 203) requires the broker-dealer to ensure that the security it sells short can be borrowed and delivered within the expected timeframe. The "close-out" (Rule 204), on the other hand, requires broker-dealers to close out uncovered positions no later than the start of normal trading hours on the day following the settlement date, by purchasing or borrowing securities of a type and quantity similar to those in the contract.

Over time, many revisions and changes to the regulation in question have been made. One of the main issues the SEC addressed was using short selling to manipulate the price of a stock artificially. The remedy involved the rewording of Rule 201—(Short Sale Price Test Circuit Breaker)—designed to prevent short selling from causing further price declines in stocks that have already suffered a significant loss in the current trading session. The rule limits the price at which short selling can be

conducted, stipulating that when the price of a stock has declined by at least 10% in a single trading day, short-selling orders must be priced above the current price.

In addition to Regulation SHO, short sellers are subject to the broad anti-fraud provisions of federal securities law, such as Rule 10b-5 of the Exchange Act, which prohibits manipulative conduct, including the intentional dissemination of false information. In this regard, the SEC has broad and pervasive powers to investigate and punish fraudulent conduct, comparable to the judicial system's.

The Financial Industry Regulatory Authority (FINRA) plays an important role in market reporting, which collects information obtained from broker-dealers, who are required to report short positions in all stocks twice a month. FINRA validates and aggregates all the information and publishes it with the NYSE and NASDAQ. In 2011, the SEC also adopted a rule requiring broker-dealers to maintain additional information about trading activities. More specifically, broker-dealers are required to report, in specific registers, the transactions carried out through the accounts of large traders and, upon request, to electronically report these transactions to the SEC through the Electronic Blue Sheets systems.

In practice, however, the force of the regulation in the United States is less binding than the European one. Events like that of GameStop, with its excessive volatility, were possible due to the lack, in the United States, of stringent rules like those in Europe, which would not have allowed short selling to reach 140% of the free float.

**Exhibit 5. EU vs US**

| Comparison of Short Selling Regulation: Europe vs. United States | | |
|---|---|---|
| Aspect | Europe (EU Regulation No. 236/2012) | United States (SEC Regulation SHO & related rules) |
| Regulatory philosophy | Precautionary, restrictive; prioritizes stability and transparency, especially after 2008 crisis and sovereign debt crisis. | More market-oriented; aims to prevent abuses (e.g., naked short selling) while preserving flexibility for liquidity and trading. |

| Comparison of Short Selling Regulation: Europe vs. United States | | |
|---|---|---|
| Supervisory bodies | European Securities and Markets Authority (ESMA) + national regulators. ESMA can coordinate and impose temporary bans. | Securities and Exchange Commission (SEC); enforcement also supported by FINRA and exchanges (NYSE, NASDAQ). |
| Naked short selling | Explicitly prohibited for stocks and government bonds. | Restricted through 'locate' (Rule 203) and 'close-out' (Rule 204) requirements, but not outright banned. |
| Disclosure & transparency | Mandatory reporting of net short positions:<br>• ≥ 0.1% → report to regulator<br>• ≥ 0.5% → public disclosure. | Broker-dealers report short positions twice monthly to FINRA; aggregated data published. Large trader reporting obligations apply. No individual public disclosure thresholds like in EU. |
| Temporary bans | Regulators (with ESMA coordination) can impose bans during market stress. Used in sovereign debt crisis (2011–12) and COVID-19 crash (2020). | No equivalent EU-style temporary bans. SEC uses circuit breakers (Rule 201) to limit short sales when stock drops ≥10% in a day. |
| Price restrictions | General prohibition of naked short sales and restrictions on CDS purchases linked to sovereign debt. | Rule 201 (price test circuit breaker): short sales must be priced above current market price if stock falls ≥10% in one day. |
| Anti-manipulation rules | Strict anti-abuse provisions, transparency obligations seen as deterrents. | Rule 10b-5 of the Exchange Act prohibits manipulation (e.g., spreading false info). |
| Crisis responses | Coordinated bans in multiple EU states during crises (2008–09, sovereign debt, COVID-19). | No coordinated bans; relies on disclosure and circuit breakers. |
| Brexit/UK divergence | UK retained core rules but is exploring more flexibility under FCA. | N/A |
| Recent reforms | EU consultations (2022–23) on revising SSR to balance liquidity vs. stability. | Ongoing adjustments to SHO, but generally less restrictive than EU. |
| Market outcome example | EU rules would have prevented GameStop-like case (short interest above 100% of float). | GameStop case (2021) showed vulnerabilities due to looser disclosure and restrictions. |

## 8. Conclusions

In the concluding remarks, it is appropriate to ask what solutions, on a regulatory level, could be appropriately introduced to limit the risk factors deriving from new technologies without limiting their advantages in terms of market efficiency.

It has been said how the development and diffusion of digital technologies in financial intermediation is transforming the structure of supply and demand in capital markets and how this innovation constitutes, at the same time, an opportunity and a threat for supervisory authorities and investors.

For Supervisory Authorities, the digitalisation of trading activities makes a whole series of control procedures easier, which can be automated and carried out effectively, sometimes even using specific algorithms and with limited human intervention. However, it also represents a threat as technological developments have created a plurality of new entities, including unsupervised entities that perform services previously offered only by financial intermediaries. Furthermore, digitalisation leads to new risks with systemic relevance, whose management can complicate the market's operations.

From investors' perspective, online trading and new platforms have represented a great opportunity. They have made investment activity more straightforward and immediate, drastically reduced transaction costs, and allowed access to practically complete information even if it is not always completely reliable (outside of official sources). The other side of the coin is given by the risks associated with the possibility of being victims of real scams or even just being influenced by misleading information on social networks or by the commercial policies of trading apps, ending up unknowingly taking on much higher risks than they would be willing to take. This is also because some innovative instruments make significant use of leverage, resulting in a substantial, but not always perceived, increase in risk levels.

The other side of the coin is given by the risks connected to the possibility of being victims of real scams or even just being influenced by misleading information on social networks or by the commercial policies of trading apps, ending up unknowingly taking on much higher risks than those they would be willing to take. This is also because some innovative tools accentuate the use of financial leverage,

determining a substantial, but not always perceived, increase in risk levels. The task that lies ahead on the legislative level in terms of technological evolution is, therefore, arduous and complex. Furthermore, it must be taken into account that capital markets tend to become increasingly international, if not downright global, where the objectives of national regulators are not always completely convergent. The legislative process that will be determined should start from an organic and shared regulatory framework at a supranational level. Regulatory and supervisory authorities generally focus on implementing international standards into national legislation, especially in the critical areas of governance, risk analysis, and assessment. However, the same authorities are convinced of the need to continuously update rules and regulations to keep pace with technological evolution. The innovations made possible by new technologies have called into question the traditional rules formulated before digitalisation, which are not always adequate and compliant with new developments. As emerging technologies drive new business models and services, governments must quickly create, modify and apply suitable regulations to preserve negotiations' orderly and regular conduct. The overriding question is how to limit the risk factors arising from new technologies while ensuring, at the same time, the benefits that they bring to the efficiency of the markets. The assumption that regulations can be developed gradually and thoughtfully and then remain in force, unchanged, for long periods has been effectively overturned in the current scenario. It would be ideal if the regulatory frameworks were periodically reviewed to ensure they are in step with the rapidly developing market. For example, it is necessary to review, adapt and apply the responsibilities and rights of investors to cases in which an intermediary provides its services online. This emerges from the fact that most investors, especially those who invest for fun and are attracted by the possibility of obtaining easy and fast profits, do not pay due attention to compliance by their counterparts with regulatory constraints. In detail, an investor must carefully analyse hazardous financial instruments, be aware of the dimensions of the Internet, critically evaluate the information available in forums and verify that the broker he is dealing with is authorised to operate in Italy.

Since trading requires a lot of practice and specific skills, it would be appropriate to increase the financial knowledge of individual users, promote events and programs and organise trading courses aimed at achieving full financial literacy.

Ideally, access to online trading platforms and trading apps could be allowed only to those who have adequate financial education, making it mandatory, by law, not only to verify new accounts through, for example, facial registration (among brokers authorised by Consob, to date, only the eToro platform provides for it) but also by subjecting the investor to a knowledge test, asking him questions on basic financial concepts. Only in the event of a positive outcome, that is, after having passed the test and, therefore, having reached a certain critical threshold (percentage of correct answers), can the individual user continue the registration process.

A further discriminating factor could be age. Age certainly cannot be considered an indicator of the level of financial knowledge, but it is reasonable to assume that a mature investor, compared to perhaps a particularly young one, has a wealth of experience, such as being more aware of the risks and any anomalies or unforeseen events typical of the financial market.

A final consideration concerns social networks and virtual communities focused on finance. These are growing in size and potential economic impact, as demonstrated by the role played in the GameStop case by discussion forums among small investors. Such communities are highly susceptible to manipulation and can be a prime target for malicious individuals or groups conducting malicious disinformation operations.

Sophisticated online disinformation operations can be complicated to distinguish from spontaneous behaviour. Financial authorities should learn how these operations work and act as a first line of detection and defence. An appropriate legal framework should be implemented so that industry watchdogs can provide data and expert knowledge to government actors tasked with analysing and responding to disinformation operations. This can be achieved by implementing organisational modules that allow entities with different levels of access to classified information to collaborate and, in different jurisdictions, by adapting existing legislation.

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