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SOCIOECONOMIC RESILIENCE IN THE CONTEXT OF SUSTAINABILITY: A COMPARISON OF THE NORDIC AND BALTIC STATES

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Abstracts
This study examines the concept of socioeconomic resilience in the context of sustainability, comparing the Nordic countries (Denmark, Finland, Iceland, Norway and Sweden) with the Baltic states (Estonia, Latvia and Lithuania). Socioeconomic resilience, defined as the capacity of societies to absorb shocks, adapt, and transform while maintaining essential functions, is a key component of sustainable development. The Nordic region is renowned worldwide for its comprehensive welfare systems, strong institutions, and the integration of environmental sustainability into policymaking. These factors contribute to high levels of resilience through inclusive economic models, political stability, and social cohesion. In contrast, the Baltic states have achieved rapid economic transformation and EU integration since the 1990s, but have also faced many challenges and threats, including financial instability, energy dependence, high levels of emigration and, more recently, illegal immigration from third countries, encouraged by Belarus and the war between Ukraine and Russia. The dynamic nature of socio-economic situations, especially during crises such as pandemics and natural disasters, affects socio-economic resilience. This paper aims to estimate an index of socioeconomic resilience that considers sustainability and to compare Nordic and Baltic countries. It employs expert assessment, the simple additive weighting (SAW) method, and correlation methods. The research focuses on filling the gap in resilience theory while considering economic and social issues in the context of sustainability and regional integration. This is achieved by evaluating indicators such as institutional quality, economic diversification, social capital, and environmental performance.

Keywords: *Socioeconomic resilience, Sustainability, Nordic countries, Baltic states, Resilience index, Governance and social cohesion.*

JEL Codes: *N30, Q56.*

Introduction

Economic recessions, climate crises, technological disruptions and geopolitical conflicts seem to be part of what can be called the new normal. Such shocks are becoming more frequent, which tends to have a cumulative negative impact on different socio-economic systems. All this encourages to treat the resilience of systems as one of the key factors to ensure long-term stability and the ability to recover after crises (Cvetković & Šišović, 2024; Melnyk et al., 2023; Ruggiero et al., 2024). In the literature, resilience is typically understood as a good and desired system attribute.

Recent vast of literature on resilience indicate the significance of the topic. The number of articles on socio-economic resilience in the context of COVID-19 pandemic has particularly increased since the lockdown (Thompson et al., 2023; Maoela et al., 2024; Li et al., 2025; Zebrowski et al., 2025). Other studies focus on government health investment and economic resilience (Guo et al., 2025), network resilience (Qi & Mei, 2024) as well as gender vulnerability and resilience in the context of socioeconomic changes (Cullen et al., 2016). In general, resilience is a concept increasingly used across various disciplines, including psychology

(Lada et al., 2025; Puig-Lagunes et al., 2025), engineering (Bhattacharya-Mis & Laumond, 2014; Senyange et al., 2025), sociology (Cullen et al., 2016), and crisis management (Chong et al., 2025; Thompson et al., 2023), each of which keeps several semantic and theoretical definitions. Meanwhile, the other number of studies integrate the perspective of sustainability in socioeconomic resilience concept (Zhong et al., 2024) while including socio-economic parameters, geographic locations and natural environmental factors (Sun et al., 2024).

The complex character of socioeconomic resilience has resulted in the incorporation of diverse perspectives in its scholarly examination. Key determinants highlighted include social and financial resilience interlinkages (Ševčenko-Kozlowska et al., 2025), social capital (Alfitri, 2024), urban economic resilience (Guo, 2025), social connections and networking (Gronenborn et al., 2017; Alfitri, 2024; Haynes et al., 2023), disasters and contingencies (Chong et al. 2025; Zhang et al., 2024; Maoela et al., 2024), community resilience (Kelly et al., 2015; Mulligan et al., 2025), migration (Gleeson et al., 2020), or even military dimensions (Andžāns, 2021; Šimelytė & Peyravi, 2024).

Despite the fact that the understanding of resilience has been considerably deepened in recent years, research is mostly limited to individual countries and a better understanding of factors such as the macroeconomic situation, income, culture, and trust in institutions is still needed (Schäfer et al., 2024). On the other hand, although social capital is often identified as one of resilience factors, during a crisis, it may lose its impact on diversification and resilience (Antonietti & Boschma, 2021), and the quality of institutions does not always have a direct and automatic positive effect on resilience (Eke & Eke, 2024).

The abundance of conceptions of resilience also poses problems. There is a lack of a unified definition that would suit different fields and help avoid theoretical, methodological and practical problems arising from this diversity in both research and policy (Nisioti et al., 2023; Southwick et al., 2014; Qi & Mei, 2024). In addition, Kantabutra and Ketprapakorn (2021) highlighted the need for an integrated theory that would be developed and would uniformly incorporate social, cultural, institutional environment and environmental aspects in the context of resilience of various organisations.

Thus, considering both the existing findings and conceptual and empirical challenges in research on resilience, there is still a need for a broader, contextually sensitive approach to better understand how different factors ranging from the quality of institutions to cultural peculiarities affect resilience across countries and regions.

This paper investigates the relationship between socioeconomic resilience and sustainability by comparing the Baltic countries – Estonia, Latvia, and Lithuania – with the Nordic region, comprising Denmark, Finland, Iceland, Norway, and Sweden. These two regional blocs share a Northern European context and overlapping membership in institutions such as the European Union and the European Economic Area, yet they diverge in historical experiences, governance models, and levels of institutional maturity. The Nordic countries are often regarded as examples of sustainable governance, characterised by inclusive welfare systems, strong democratic institutions, and integrated environmental policy frameworks (OECD, 2022). In contrast, the Baltic states have undergone rapid economic and political transformation since regaining independence in the early 1990s, achieving notable growth and integration into Western institutions. Nevertheless, they continue to grapple with structural vulnerabilities, including demographic decline, governance inefficiencies (Dabla-Norris & Kochhar, 2019). However, in terms of handling obstacles and threats, the Baltic States offer an excellent example of resilience. The area has showed its seriousness about becoming more robust in several spheres, including cybersecurity, public involvement, defence, handling emergencies, etc. (Bajarūnas & Keršanskas, 2018; Praks, 2024; Rogers, 2018; Šešelgytė & Bladaitė, 2020). This study explores socioeconomic resilience through four interrelated dimensions: institutional quality, economic diversification, social capital, and environmental performance.

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Through a comparative analysis, the paper highlights the strengths of the Nordic model while also identifying opportunities for resilience-building in the Baltic region. The findings suggest that while the Nordic countries offer a robust framework for embedding sustainability, the Baltic states possess considerable adaptive capacity that could be strengthened through targeted policy innovation, investment in human capital, and regional cooperation.

Literature review

Models of resilience

The idea of resilience is based on a theoretical framework that highlights the need to adapt in order to ensure long-term survival, and it recognises how change is everywhere. The term 'resilience' is inherently interdisciplinary, and namely this cross-disciplinary approach allows us to see the intricate web of interconnections within regional socioeconomic systems (Lada et al., 2025; Ruggiero et al., 2024; Qi & Mei, 2024).

In our earlier studies, we showed that regional resilience is a phenomenon acquiring new dimensions and growing into its own separate area of study. The UN, the EU and the OECD all support this idea, and they have all adopted strategic documents that back it up (e.g., OECD, 2022). According to Keenan et al. (2021), in 2019, the OECD launched the initiative New Approaches to Economic Challenges, which was designed to learn from previous financial and social crises and to apply these lessons in order to avoid harmful consequences in the future. As well as the global NAEC initiative, where the idea of resilience is understood to mean the ability of a system to reallocate resources to restore a dynamic equilibrium that has been disturbed by spontaneous internal or external shocks. On the other hand, shocks, unlike crises or stress, tend to involve significant immediate losses. A crisis is when something really bad happens for a long time, but an economic stress is when something bad happens to the economy. However, in this context, the concept of resilience can be understood differently in the literature; therefore, we will further discuss several models frequently mentioned in the literature, highlighting different conceptual aspects.

The return of the system to its previous state after various disturbances is usually associated with the concept 'engineering resilience'. This model emphasises the ability of the system to regain its initial stable state that was lost after a shock or disturbance. Holling's early research was very important in conceptualising resilience in this system, where he defined resilience as a measure of the persistence of relationships within the system and the capability of that system to withstand change while maintaining its structure and functioning (Miller et al., 2010; Olsson et al., 2015). The parameters of this model are often linear, suggesting that recovery refers to a direct return to equilibrium rather than a transformation to a new state. Although the return to a previous state is more characteristic of inanimate objects (Kharrazi, 2019), the model is directly related to various contexts, including community resilience, where it is reflected in the ability of social units to mitigate hazards and recover effectively from disasters, although the equilibrium paradigm is not always sufficiently effective (De Florio et al., 2014).

Socioecological resilience is non-linear and encompasses the capability of systems to adapt and transform in the face of social, ecological, or climatic change (Miller et al., 2010). It includes aspects such as learning, governance, institutions, social capital, and the capability to change (González-Quintero & Avila-Foucat, 2019; Miller et al., 2010). However, there are thresholds beyond which the system in a new state may be less resilient to future disturbances and may have difficulty in restoring its original state (González-Quintero & Avila-Foucat, 2019). On the other hand, changes can also be positive, leading to the community's renewal. They depend on social norms, values, and collective decisions, which can have a significant impact on the social-ecological resilience of systems (Christensen & Krogman, 2012).

While engineering and socio-ecological models of resilience have expanded the

understanding of how systems respond to disruptions, the modern context of governance and risk often shifts to an institutional or standardised conception of resilience. This particular approach is reflected in the ISO 22300:2021 standard, which combines the terms of security and resilience into a unified vocabulary, providing a basis for consistent management of risks, hazards and uncertainties across organisational and regional systems (see International Organization for Standardization, 2021). In the ISO 22300:2021 standard, resilience is defined as the "ability to absorb and adapt in a changing environment" during a "disruptive event"; i.e., a shock event. It is evident that external shocks pose a bunch of threats to regional economies.

Some authors distinguish an 'adaptive cycle' in the context of resilience. According to Kharrazi (2019), it can heuristically summarise and explain part of the ability of natural and social systems to survive through complex phases of adaptation and renewal. In this context, adaptation is a key concept, emphasising that a resilient system is not only elastic but also encompasses several centres of attraction. That is, the system retains certain basic functions even though it may operate in different structures and configurations. According to Fath et al. (2015), to function continuously throughout the adaptive life cycle, the system needs activation energy or resources for growth, followed by appropriate structure and complexity to maintain maturity. In this context, the implementation of crisis plans can help to avoid collapse, but in the event of a catastrophe, the ability to improvise and reorient will allow the system to go through a new cycle.

Socio-economic resilience and interlinkages with sustainability

The term 'socioeconomic resilience' shall be understood as the capacity of communities and economies to adapt to and recover from various shocks, including economic downturns, environmental changes, and social disruptions (plg. Kumar & Mehany, 2022; Mancini et al., 2012). The integration of sustainability principles within the framework of socioeconomic resilience is imperative in addressing the challenges presented by contemporary global issues.

The present discourse entails the examination of various models and practices that stimulate resilience at multiple levels, including individual households, communities, and larger economies. Hegazy et al. (2025) conducted a systematic literature review with the aim of identifying key topics in the field of socio-economic resilience. The aforementioned themes include climate change mitigation, biodiversity conservation, water management, flood control, sustainable agriculture, urban sustainability, green infrastructure, sustainable housing design, the role of housing in improving health and wellbeing, socioeconomic well-being, and financing in housing with NBS and economic viability. Moreover, the extant literature underscores the necessity for governance models that can be adapted to local contexts, thereby ensuring inclusive access to ecosystem services, biodiversity, and climate adaptation benefits (Gerstetter et al., 2021; Kauark-Fontes et al., 2023). These approaches offer valuable insights for urban housing strategies, particularly in low-income areas, and promote environmental and social equity.

A critical aspect of socioeconomic resilience is the role of place-based business models, which have emerged as essential mechanisms for fostering resilient local economies. Gregorio (2017) contends that these models contribute to sustainability by linking business practices more closely to local contexts. This, in turn, enhances both social responsibility and economic stability. The involvement in local economic development has been demonstrated to engender resilience, whilst concomitantly ensuring that commercial enterprises remain integral components of their respective communities, thereby consolidating the bonds and shared interests amongst relevant stakeholders. This localized approach also addresses the harm reduction perspective, where corporate social responsibility takes on a proactive and community-oriented emphasis.

The degree to which socioeconomic resilience is manifested is found to be influenced to a significant degree by factors relating to childhood development and the economic status of the family

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unit. As Gonzalez et al. (2020) demonstrate, the impact of familial socioeconomic factors on cognitive development in children is considerable. The study indicates that economic stability and parental education levels have the capacity to influence cognitive resilience and overall developmental outcomes. In a similar vein, Meliasari and Sahadewo (2024) have proposed a household economic resilience index, demonstrating that measuring and understanding multidimensional household characteristics can provide insight into resilience, particularly in the context of child growth and development.

The assessment of resilience can also be informed by examining past disasters and recovery efforts. For instance, the study by Li et al. (2015) on counties recovering from the 2008 Wenchuan earthquake illustrates the importance of socioeconomic variables in determining resilience levels post-disaster. By analysing factors such as sex ratios, per capita GDP, and access to medical facilities, the research highlights how these characteristics influence a community's ability to rebound from significant shocks and supports sustainable development initiatives.

In the context of climate change and water resources, Liu et al. (2020) introduce a new index for examining socioeconomic drought, which considers the resilience of regional water systems under increasing population pressures and climate variability. This innovative approach illustrates how resilience can be quantitatively measured and managed, emphasising the adaptive strategies necessary for maintaining socioeconomic stability in the face of environmental changes.

The exploration of resilience in urban settings also underscores how socioeconomic status significantly influences recovery and adaptation processes. For instance, Wu et al. (2021) detail the disparities in vulnerability and resilience to the disease across socioeconomic statuses in Wuhan, China. The findings of the study indicate that higher socioeconomic status is associated with reduced infection rates and decreased mental distress. This finding indicates that addressing socioeconomic inequalities is imperative for enhancing community resilience against future uncertainties.

The adoption of resilience-focused frameworks in epidemic responses has the potential to enhance broader community capacities. Schmidt-Sane et al. (2021) posit that the implementation of a comprehensive resilience framework facilitates the optimisation of existing capacities for the management of health, social and economic impacts during epidemics. This capacity for adaptability has the potential to play a pivotal role in enhancing the long-term sustainability of community responses to public health challenges.

Finally, the role of small and medium-sized enterprises (SMEs) in fostering socioeconomic resilience cannot be overlooked. The extant literature on continuous improvement (Zighan & Ruel, 2023) demonstrates how SMEs can cultivate resilience through adaptive practices that enhance their capacity to manage disruptions, particularly in volatile environments such as those created by the pandemic caused by the severe acute respiratory syndrome (SARS-CoV-2) virus. These enterprises are the foundation of numerous local economies, and their resilience exerts a direct influence on the socioeconomic fabric of communities. Thus, in summary, strengthening socio-economic resilience depends on sustainable, locally tailored solutions, which include both structural and individual measures ensuring the capability to adapt, recover and thrive in the face of volatility.

Regional integration and resilience of Nordic countries and Baltic states

Comprehensive evaluation of the Nordic nations' socioeconomic resilience requires consideration of a number of factors and characteristics. A substantial number of studies have been conducted, providing comprehensive investigations of various elements that must be taken into account when assessing the socioeconomic resilience of the Nordic states.

The Nordic countries distinguish themselves by their distinctive approach to building resilience,

which is based not only on the protection of critical infrastructure but also on the continuity of societal functioning. As Pursiainen (2018) notes, instead of a narrow approach to critical infrastructure, Denmark, Finland, Norway and Sweden build on a broader conception of vital societal functions, which includes healthcare, energy, administrative capability and public safety. This system stems from the defence doctrine developed during the Cold War, which has been transformed into a multifaceted security policy that allows countries to effectively adapt to various crisis situations.

Another key feature is the flexibility and adaptability of the governance system. Nordic public governance reforms distinguish themselves by the principle of layering, where new reforms complement rather than replace the old ones. As Greve et al. (2019) point out, such dynamics of reforms reflect an adaptive, context-determined approach. Its essence is flexibility, long-term stability and the capability to integrate various governance doctrines. This model is based on high trust in public institutions, strong social partnership and a consistent role of the state in solving societal problems.

Delving deeper into the aspects of territorial governance, a study by Van Well et al. (2018) showed that resilience of the Nordic countries to natural hazards is based on five dimensions of territorial governance: coordination of actions, integration of policy sectors, promotion of stakeholder participation, capability to adapt to changes, and consideration of territorial peculiarities. Although shared values (subsidiarity, transparency, municipal autonomy) ensure a certain common model, the different nature of hazards, demographic challenges and disparities in institutional resources lead to uneven levels of resilience between countries.

In the context of resilience, it is important to note that in the Nordic countries, even the most vulnerable groups in society such as refugee children can expect relatively favourable conditions for adaptation and well-being in the context of health. A systematic review by Mattelin et al. (2024) has demonstrated that although refugee children face significant challenges, factors such as social support, maintenance of cultural identity, and access to health and education services significantly contribute to building their resilience. The Nordic universalist welfare model, with its focus on equality and inclusion, creates a favourable environment for the growth of social and economic resilience at both the national and local community levels.

The Baltic states have demonstrated a notable degree of socioeconomic resilience in the face of numerous challenges. In the context of national social security systems, economic policies, and financial systems, European integration has been demonstrated to exhibit deficiencies (Rausser et al., 2018). Notwithstanding the prevailing political and financial concerns regarding the EU growth, the Baltic states have demonstrated resilience by adeptly managing diplomatic crises, thereby underscoring the prevalence of neoliberal capitalist traits in Central and Eastern Europe (Kallaste & Woolfson, 2013).

The adoption of the Euro by the Baltic states has been demonstrated to have a positive effect on economic performance, thus promoting development and enhancement in nations such as Slovakia, Latvia, Lithuania, and Estonia (Molendowski & Petraškevičius, 2020). Furthermore, the Baltic states have demonstrated an enhancement in their economic performance, with exports playing a pivotal role in their economic growth (Supe & Jurgelāne, 2017).

During periods of economic recession, the Baltic states have witnessed rises in unemployment and reductions in remuneration within certain industry sectors (Šilingienė & Radvila, 2016). Nevertheless, these countries have demonstrated a rapid recovery from financial crises, with all three meeting the criteria for Eurozone membership. Common economic ties and traits across the Baltic states point to a degree of cross-sectional reliance and shared economic attributes (Dritsaki & Dritsaki, 2020).

It is evident that the Nordic-Baltic area has witnessed a considerable degree of collaboration over time (Alfieri et al., 2024). Sweden, Estonia, Latvia and Lithuania have developed banking systems that are closely linked and have established

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supervisory cooperation, thereby demonstrating a high degree of financial integration. The Baltic states, being the most globally integrated countries in the Nordic-Baltic group, have been quite important in promoting regional integration (Holmen et al., 2023).

Since the 1990s, Nordic countries have provided considerable support to the Baltic states, particularly in terms of security. It is therefore imperative to emphasise the necessity of collaborative endeavours in order to ensure the maintenance of regional security (Dudzevičiūtė, 2023). It is evident that defence cooperation among Nordic countries in the Baltic Sea area has had a significant impact on enhancing regional security (Dahl et al., 2021). The adherence of Nordic governments to social-democratic internationalist ideas, with its roots in the history of Nordic internationalism, has been instrumental in fostering enhanced cooperation with Baltic neighbours (Roosaar et al., 2023). The Baltic states of Estonia, Latvia and Lithuania have historical and financial ties to their Nordic neighbours on the Baltic Sea, and it is this fact that has enabled them to assist in the promotion of economic cooperation and integration (Ashyrov et al., 2025).

The emphasis on resilience in areas including knowledge exchange, finance, and economics (Burinskas et al., 2021; Šimelytė & Tvaronavičienė, 2022) demonstrates the interconnectedness and cooperative efforts within the Nordic-Baltic region. In addition, Baltic-Nordic cooperation is increasingly based on the principle of total defence, which links resilience to the ability to defend oneself and recover from crises. Although the countries have different history and NATO membership, they share common threats and the desire to strengthen regional security. The Swedish and Finnish defence models have influenced the Baltic countries, and their accession to NATO is seen as an important step promoting closer coordination of Nordic-Baltic resilience (Wrange et al., 2024). Thus, the capacity of the region to overcome obstacles and promote continuous socioeconomic development is demonstrated by its flexibility to adapt, cooperate, and utilise resources from neighbouring nations.

Methodology

It is imperative to acknowledge that divergent measures can yield disparate outcomes with regard to resistance. The concept of resilience signifies a nation's capacity to withstand diverse forms of shocks and to facilitate a swift and effective recovery. Consequently, the utilisation of economic measurement as a metric for evaluating a nation's resilience is questionable. Therefore, the proposed resilience index will encompass additional factors to assess socio-economic resilience within the context of sustainability.

The endurance of a condition is comprised of a complex amalgamation of factors spanning multiple dimensions. Zaman and Vasile (2014) seminal study introduced a novel framework for categorising factors reflecting a nation's ability to endure internal and external shocks or recover from them. The study proposed the conceptualisation of economic vulnerability and resilience as distinct categories.

Dachin's (2012) study constitutes an integration of the trade dependency index, the import penetration index and the export propensity index, with the objective of assessing Romania's economic vulnerability. In the preceding literature (e.g., Briguglio et al., 2008; Dachin, 2012; Giannakis & Bruggeman, 2017), experts have identified four indicators that may be incorporated into the assessment of economic resilience. These indicators are outlined as economic openness, which is a measure of international variables, export concentration, which is a lack of diversification, and reliance on strategic imports. It also includes criteria such as gross domestic product (GDP), employment, unemployment rate, household and labour income, and education level.

The quality of life of the population is influenced by a number of factors, including access to healthcare services (Guo et al., 2025), sanitation, psychological support systems (Mulligan et al.,

2025), and conditions conducive to a long and fulfilling life. These factors, in turn, influence the mortality rate, infant mortality rate, and life expectancy of the population (Ševčenko-Kozlowska et al., 2025). Furthermore, the effective government system guarantees inclusive and transparent governance (Šimelytė & Peyravi, 2024) (measured as low bureaucracy and corruption level), rule of law and access to justice. The representation of women in senior and mid-level management positions is indicative of gender equality. Meanwhile, environmental factors are subdivided into six categories (Holmen et al., 2025), namely: energy use, greenhouse gas emission, water and waste management, air quality, number of penalties and environmental violation. These categories represent the environmental impact and sustainability performance of the country. For instance, the rate of landfill for municipal waste, a substantial waste stream and a focal point of waste management strategies, displays considerable variation among European countries.

The index is based on various definitions of resilience and interlinkages with sustainability. Consequently, the framework will encompass three pillars of sustainability, incorporating three groups of factors and 38 sub-factors. The factors in question are economically sound (11), socially beneficial (13), and environmentally viable (13). It is important to note that all sub-factors may represent positive aspects of resilience or negative aspects of vulnerability. The estimation of the resilience index will be conducted using the simple additive weighting (SAW) method. The evaluation process involves the analysis of indicators across multiple dimensions. It is imperative to note that the sum of the significances of all indicators must be equal to one. In this instance, it is hypothesised that each factor exerts an equal influence on the enhancement or diminution of the nation's resilience.

$$\sum_{n}^{i=1} \boldsymbol{w_1 = 1}$$

As dimensions of the factors' measurement, they will be normalized. The following formulas are applied:

For maximizing factors:

$$\boldsymbol{x_{ij} = \frac{a_{ij}}{a_j^{max}}}$$

For minimizing factors:

$$\boldsymbol{x_{ij} = \frac{a_{ij}^{min}}{a_{ij}}}$$

Table 1. Factors and sub-factors of the proposed financial resilience index and social resilience index

Criterion	Sub-criterion	Measurement	Min or max
Economics	Economic development	of real GDP	Max
	Current account balance	% of GDP	Min
	Credit to the private sector domestically	% of GDP	Min
	Government expenditures	% of GDP	Max
	Non-performing credits	% of all credits	Min
	Foreign capital	FDI Net inflows, % of GDP	Max
	Added value of industry	% of Gross added value	Max
	High-tech export	% of all households	Min
	International trade	Difference between export and import, in % of GDP	Min
	Households with heavy financial burden due to the housing costs		Min
	Inflation	Consumer price, (annual %)	Min
Social	Level of Education	Spending on education in current euros	Max
	Mortality rate	Crude (per 1,000 people)	Min
	Literacy	% of total population	Max

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	Health system	Medical expenditure in % of GDP	Max
	Nutrition and sanitation	Aggregated ratio	Max
	Psychological support systems	Number of mental health professionals per 10,000 people	Max
	Access to credit or savings	% of individuals or households with access to formal credit	Max
	Employment	15+, total population (%)	Max
	Gender equality	Females in senior or middle management as a share of employment in %	Max
	Internet availability	% of population	Max
	Effectiveness of local institutions	Aggregated ratio	Max
	Life expectancy	Average in years	Max
	Infants mortality	Number of deaths per year	Min
Environmental	Energy dependency	ratio between net imports and gross available energy	Min
	Energy efficiency	amount of energy needed to produce a unit of GDP, Gigajoule per thousand EUR PPS	Max
	Expansion of renewable energy use	% of total energy use	Max
	Total greenhouse emission	Tons of CO_2 equivalent.	min
	Emission intensity	ratio of greenhouse gas emissions produced to GDP	Min
	Reduction of greenhouse emission	Changes in % of carbon dioxide generated per unit of energy utilized	Max
	Total water withdrawal and consumption	litres of water per day	Min
	Water use efficiency	value added per unit of water use, in Eur	Max
	Waste diverted from landfill	% of waste deposited into landfills	Max
	Air Quality	Index	Min
	Area of land disturbed/restored	% of the annual environmental protection budget	Max
	Environmental incidents or violations	units	Min
	Environmental fines or penalties	units	Min

**Source: Authors.*

The study covers the period of 2016-2023. Few data bases, including the ones for the studies of economic, social, and environmental sub-factors, Eurostat, European environmental agency and the Global competitiveness report form the data set for the analysis. The study employs expert assessment, the simple additive weighting (SAW) method and correlation methods. This allows a holistic evaluation of the resilience structure based on social, economic and environmental factors.

Results

Six experts in total made an assessment to ascertain the weights of the criteria. When the total weight would equal one, the experts were asked to allocate the weight for each sub-criteria. Furthermore, none of the sub-criteria could be assigned 0 or assessed in negative value (Table 2). The consistency of the experts' viewpoints was investigated in order to evaluate the dependability of this method. One expresses the degree of consistency as a concordance coefficient.

With the above expert judgements, a concordance coefficient of W = 0.46 was computed. Chi-square = 0.9364, df = 5, p = 0.001 tests the relevance of the concordance coefficient.

Table 2. Weights assigned by the experts

Criterion	Sub-criterion	E1	E2	E3	E4	E5	E6	Average
Economic	Economy development	0.18	0.15	0.14	0.15	0.15	0.15	*0,153*
	Current account	0.19	0.14	0.14	0.11	0.1	0.11	*0,132*
	Credit to the private sector domestically	0.05	0.09	0.06	0.08	0.1	0.1	*0.080*
	Government expenditures	0.05	0.075	0.08	0.07	0.05	0.06	*0.064*
	Non-performing credits	0.07	0.05	0.06	0.07	0.05	0.07	*0.062*
	Foreign capital	0.15	0.155	0.14	0.14	0.15	0.13	*0.144*
	Value added of industry	0.05	0.03	0.05	0.08	0.09	0.1	*0.067*
	High-tech export	0.03	0.03	0.05	0.04	0.07	0.06	*0.047*
	International trade	0.03	0.03	0.07	0.05	0.04	0.05	*0.045*
	Households with heavy financial burden due to the housing costs	0.1	0.12	0.1	0.11	0.09	0.09	*0.102*
	Inflation	0.1	0.13	0.11	0.1	0.11	0.08	*0.105*
Total sum		**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**
Social	Level of Education	0.08	0.11	0.11	0.12	0.1	0.12	*0.11*
	Mortality rate	0.1	0.09	0.1	0.09	0.1	0.09	*0.10*
	Literacy	0.07	0.07	0.08	0.08	0.07	0.08	*0.08*
	Health system	0.08	0.07	0.08	0.09	0.09	0.08	*0.08*
	Nutrition and sanitation	0.08	0.06	0.07	0.06	0.06	0.05	*0.06*
	Psychological support systems	0.09	0.08	0.06	0.05	0.06	0.06	*0.07*
	Access to credit or savings	0.05	0.06	0.04	0.05	0.04	0.04	*0.05*
	Employment	0.09	0.08	0.09	0.1	0.08	0.1	*0.09*
	Gender equality	0.07	0.03	0.04	0.03	0.05	0.06	*0.05*
	Internet availability	0.08	0.1	0.1	0.09	0.09	0.08	*0.09*
	Life expectancy	0.09	0.09	0.1	0.11	0.11	0.1	*0.10*
	Effectiveness of local institutions	0.07	0.07	0.05	0.05	0.07	0.05	*0.06*
	Infants mortality	0.05	0.09	0.08	0.08	0.08	0.09	*0.08*
Total sum		**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	***1.00***
Environmental	Energy use	0.06	0.06	0.04	0.08	0.07	0.06	*0.06*
	Energy efficiency	0.08	0.05	0.07	0.11	0.08	0.09	*0.08*
	Expansion of renewable energy use	0.05	0.065	0.05	0.05	0.04	0.08	*0.06*
	Total greenhouse emission	0.1	0.12	0.08	0.1	0.1	0.05	*0.09*
	Emission intensity	0.045	0.06	0.05	0.07	0.08	0.08	*0.06*
	Reduction of greenhouse emission	0.08	0.07	0.06	0.06	0.05	0.07	*0.07*
	Total water withdrawal and consumption	0.08	0.06	0.07	0.06	0.05	0.07	*0.07*
	Water use efficiency	0.09	0.1	0.08	0.07	0.14	0.1	*0.10*
	Waste diverted from landfill	0.085	0.075	0.14	0.08	0.09	0.09	*0.09*
	Air Quality	0.12	0.14	0.13	0.15	0.12	0.12	*0.13*
	Area of land disturbed/restored	0.15	0.1	0.11	0.09	0.05	0.06	*0.09*
	Number of environmental incidents or violations	0.03	0.05	0.06	0.08	0.07	0.06	*0.06*
	Environmental fines or penalties	0.03	0.05	0.06	0.05	0.06	0.07	*0.05*
Total sum		**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**	**1.0**

**Source: authors' calculation.*

Six experts have evaluated the sub-criteria of economic, social and environmental resilience. The primary economic criterion of economic development was assigned an average value of 0.153, with foreign capital (0.144) and current accounts (0.132) following closely behind. Furthermore, the experts identified the level of education as the most significant of the proposed social factors, with an average rating of 0.11. This was followed by the mortality rate, which received an average rating of 0.1, and life expectancy, which received an average rating of 0.09. The least important was access to credit or savings (0.05) and gender equality (0.05). The third group of factors comprised 13 items. The experts have evaluated the most significant factors in terms of air quality (0.13)

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and water use efficiency (0.10). In a close second, three equally weighted factors have been identified: total greenhouse emissions (0.09), the diversion of waste from landfill (0.09), and the area of land disturbed or restored (0.09). Environmental penalties for the experts have been least important while considering environmental factors.

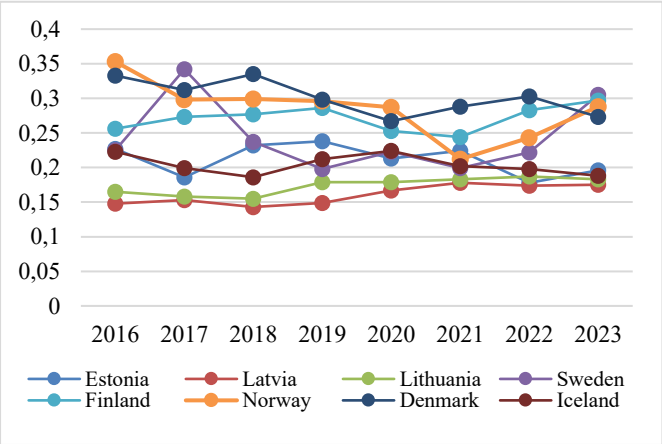

Figure 1. Economic resilience sub-factors

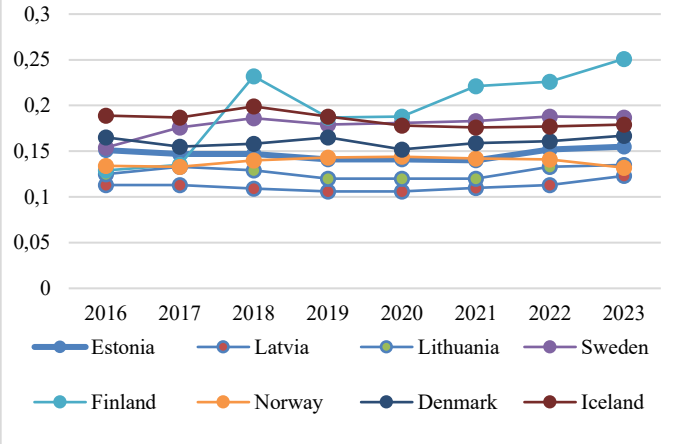

Figure 2. Environmental factors

As illustrated in Figure 1, there has been an observed fluctuation in the aggregated economic resilience sub-factors of the Baltic states and Nordic countries over time. The highest recorded value was 0.353, which was observed in Norway in 2016, while the lowest recorded value was 0.147, which was observed in Latvia in 2018. Nevertheless, the highest mean ratio was calculated in Denmark (0.30), followed by Norway (0.27) and Finland (0.24). Conversely, the lowest ratio was observed in Latvia (0.16) and Lithuania (0.17). Meanwhile, social resilience (Fig. 3) sub-factors have not exhibited the same level of fluctuation as economic sub-factors over the period 2016 to 2023. It has been suggested that the majority of sub-factors are characterised by increased stability, assuming a more durable form over an extended period. In order to effect change, it is hypothesised that these sub-factors require an external or internal stimulus. The period under scrutiny has seen fluctuations in the aggregated social resilience sub-factors, with an average ranging from 0.11 to 0.13 in both the Baltic states and Nordic countries. The lowest ratio was observed in Latvia (0.11) and Lithuania (0.11), while the highest was recorded in Denmark (0.13). It is evident that the environmental resilience factors have exhibited a lack of stability during the specified period in all countries, with Finland demonstrating the highest ratio (0.251) in 2023 and Latvia exhibiting the lowest (0.106) in 2019. However, the mean of environmental resilience has been distributed as follows: 0.11 in Latvia, followed by 0.13 in Lithuania, and 0.2 in Finland.

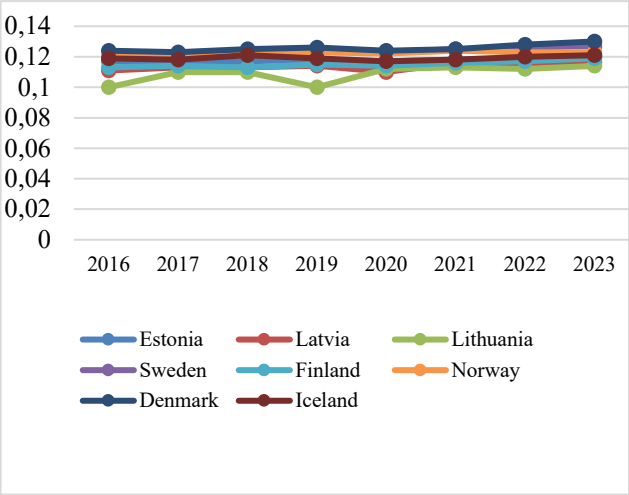

Figure 3. Social resilience sub-factors

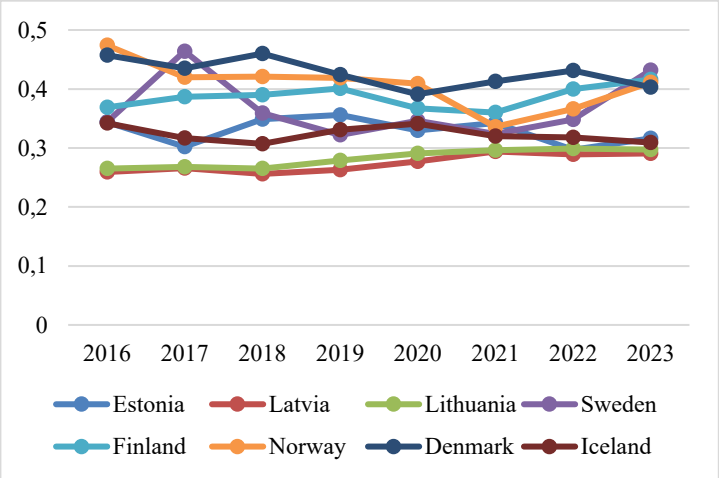

Figure 4. Socioeconomic resilience

The calculation of the socioeconomic resilience index is finally complete, having been determined as the sum of the social resilience sub-factors and the economic resilience sub-factors. It is evident that the values have been subject to fluctuation over time. It has been observed that the highest mean value was recorded in Denmark (0.46) in 2018, followed by Norway (0.457) in 2016. The mean estimate for the highest value was 0.43 for Denmark and 0.41 for Norway. The Nordic countries of Finland and Sweden follow closely behind, with respective scores of 0.39 and 0.37. The lowest values have been observed in Latvia (0.27) and Lithuania (0.28). A comparative analysis reveals that Estonia (0.32) exhibited a marginally higher value compared to Iceland (0.31).

In the subsequent phase of the study, an estimation of the correlation between the environmental resilience index and the socioeconomic resilience index is to be conducted. The correlation demonstrated that there was no statistically significant relationship between the socioeconomic and environmental indices in the case of Estonia ($r = -0.08$, $p = 0.842$) and similarly in the case of Latvia ($r = -0.028$, $p = 0.947$). Meanwhile, Lithuania demonstrated a robust and substantial correlation between socioeconomic and environmental resilience ($r=0.934$, $p<0.001$). Furthermore, a positive moderate correlation was identified between economic sub-factors and environmental resilience in the case of Lithuania ($r=0.774$, $p<0.001$). It is evident that a substantial correlation between the environmental resilience index and the socioeconomic resilience index is non-existent in the Swedish context ($r = 0.079$, $p = 0.853$). Conversely, a robust and positive correlation is observed between the environmental resilience index and the social resilience sub-factors in Sweden ($r = 0.820$, $p = 0.013$). A similar pattern of results was observed in the Nordic countries of Denmark, Finland and Iceland, as was the case in the Baltic states of Estonia and Latvia. The findings indicated an absence of a relationship between environmental resilience and socioeconomic resilience as well as between environmental resilience and the sub-factors of socioeconomic resilience. Meanwhile, in the case of Norway, a strong significant correlation was estimated between economic resilience sub-factors and the environmental resilience index ($r=-0.887$, $p=0.03$). The findings demonstrate that socioeconomic resilience and environmental resilience exhibit fluctuations over time. These phenomena are contingent on long-term policies and annual funding, borrowing, trade, and greenhouse gas emissions. It is noteworthy that transportation and industry production, along with FDI, exert a significant influence on these indicators. Concurrently, social resilience factors, including life expectancy, mortality and gender equality, demonstrate a gradual and incremental progression over time.

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Discussion and conclusion

The enhancement of national resilience and preparedness for diverse disasters, economic recessions, and other shocks continues to be a significant challenge for governments globally. Nevertheless, varying degrees of resilience are apparent worldwide, and the need for improvement is acknowledged. In order to enhance the state's resilience, it is imperative to comprehend the concept of resilience and the criteria for its evaluation, with particular emphasis on socioeconomic factors and their influence on the state's resilience.

The analysis of different aspects of resilience is conducive to the establishment of a more profound comprehension of the strengths and weaknesses of resilience, particularly in the context of comparing countries in regional integration. Furthermore, by establishing a comparative analysis with neighbouring countries, it is possible to identify and analyse the good practices observed in those countries and to adopt them into the home country. In light of the necessity to consider both socioeconomic and environmental resilience, a number of institutional aspects have been incorporated.

The multicriteria decision-making process was utilised in order to assess the indices of socioeconomic resilience and environmental resilience. This strategy facilitates the minimisation or maximisation of criteria. The minimised criteria are indicative of the country's vulnerability, while the maximised criteria are associated with characteristics that enhance resilience. This finding is consistent with the conclusions of a study conducted by Zaman and Vasile (2014), which examined economic resilience in Romania in comparison with other nations. The present study has revealed vulnerabilities and resilience from three perspectives: economic, social, and environmental. The notion of economic resilience is associated with the reduction of failure probability. The present study finds resonance with the methodological concepts articulated by Rose and Krausmann (2013), Šimelytė and Peyravi (2024), and Ševčenko-Kozlowska (2025). The researchers developed a resilience measure to facilitate business recovery. In contrast, Christmann et al. (2010) focused exclusively on the concepts of social vulnerability and resilience.

Denmark and Norway have been found to have the highest socioeconomic resilience indicators, which are associated with strong public institutions, social protection systems and economic stability. Meanwhile, Lithuania and Latvia demonstrate the lowest resilience indicators, especially in economic and social terms, reflecting the structural and institutional weaknesses of these countries.

In this context, it is interesting that over the entire period under examination, the growth of socio-economic resilience in Lithuania and Latvia, although not insignificant, remained stable, even in the face of the pandemic. Meanwhile, Sweden, Norway and Denmark experienced significant downturns and upturns. This is also confirmed by the results of the study by Olsen et al. (2022), which show that resilience is not a static process but the one that responds to external shocks. For instance, in Denmark, the COVID-19 pandemic has led to strengthening of public services, while in Iceland, it has highlighted dependence on the tourism sector, initiating a public discussion on economic diversification. Such dynamics reveal different structures of resilience: the Baltic countries are characterised by stability with low level of socio-economic resilience, while the Nordic countries are described by high but variable resilience, depending on the challenges posed by crises and the political and institutional responses they trigger. For example, an assessment of Lithuania's response to the 2008 global economic crisis (Bruneckienė et al., 2018) reveals reactive but limited structural resilience. Institutions are able to react quickly, but a long-term vision that would strengthen the foundations of growth and reduce vulnerability in the future is lacking.

Theoretical and practical implications

The results of the study allow us to compare the resilience profiles of different countries (Baltic and Nordic), to identify weak points, and shape policies tailored to the specific context. Despite the variation in outcomes across regions, including those among Nordic countries, the research findings contribute to the theoretical framework of resilience by offering an alternative approach for assessing socioeconomic and environmental indices to evaluate their relationship. Furthermore, the findings may prove advantageous to the institution responsible for formulating the state's long-term strategy by identifying the areas necessitating the most attention to enhance socioeconomic and environmental resilience. This is crucial to comprehend and bolster during natural disasters, pandemics, or acute pollution events such as a nuclear power station explosion.

All aspects of the project align with the concepts of sustainability and the economic welfare of the nation's populace. The findings indicate that, despite belonging to the same region, the socioeconomic and environmental resilience of the examined countries exhibits variability.

This study contributes to addressing the problem of the lacking unified definition of resilience while applying an integrated, multidimensional model of resilience, which encompasses economic, social, and environmental factors and combines them into an overall socioeconomic resilience index. It also deepens the cross-cultural understanding of resilience: although studies can apply a unified assessment framework, the content, dynamics, and determinants of resilience may vary depending on the cultural context. For example, the assessment of social resilience highlighted education and health indicators, which are emphasised in the Nordic countries. Meanwhile, in the Baltic countries, a lower importance for institutional effectiveness or gender equality is observed, which may reflect cultural and political realities. This encourages a shift from a one-dimensional analysis towards a more holistic and culturally sensitive conception of resilience.

Limitations and future research.

The ensuing discourse will address the limitations of the present study and propose a number of areas for future research. Firstly, it should be noted that the scope of the research is confined to the Baltic states and Nordic countries. However, there is a possibility that it may be expanded to encompass a comparison with EU members. Moreover, the incorporation of additional factors into the evaluation process would facilitate the identification of the country's vulnerability and resilience. Furthermore, it is imperative that the socioeconomic resilience index is subject to annual estimation, thereby facilitating the comparison of changes in the situation. Furthermore, the statistical relationship between socioeconomic and environmental factors was not demonstrated by all countries. In the context of Lithuania, an association was observed between environmental resilience and socioeconomic factors. In contrast, two Nordic countries, Norway and Sweden, exhibited a statistically significant correlation between the environmental index and a specific sub-factor of the socioeconomic index.

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