

Civil Protection One of the Ten Key Factors Measuring Sustainable Regional Competitiveness

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Abstract

Sustainable regional competitiveness is widely recognized as a cornerstone for fostering economic growth, social well-being, and environmental sustainability at the local level. Building upon our previous research, in which we extensively examined the ten factors shaping regional competitiveness, this study continues the investigation by focusing on the same nine factors while replacing environmental considerations with civil protection, utilizing updated literature spanning 2020 to 2025. The study's time frame was from March 2025 to November 2025. A literature review methodology was adopted, emphasizing critical evaluation rather than a systematic review. Recent studies published within the last five years were analyzed, with particular attention to these ten recognized factors: (1) economy, (2) labor market, (3) poverty and social inclusion, (4) healthcare, (5) educational infrastructure, (6) environmental considerations, (7) transportation infrastructure, (8) science and technology, (9) high-tech industries, and (10) innovation. The key findings of the study emphasize the distinct yet interconnected role of each factor in shaping regional competitiveness. Economic development remains foundational, closely linked with education, causes of death, and sustainability, highlighting that a strong economy alone is insufficient. Labor market dynamics, including youth employment and skills development, are crucial for translating potential into growth, while addressing poverty and social exclusion requires coordinated social and economic policies. Public health indicator reflect societal challenges and helps identify areas where targeted interventions can enhance well-being and productivity. Education strengthens human capital, supports innovation and high-tech industries, and promotes social inclusion, creating the foundation for sustainable regional growth. Environmental issues shape the risks that civil protection must manage, while effective environmental protection reduces the need for emergency response. Transportation infrastructure connects economic activity, Research & Development (R&D), Information and Communication Technologies (ICT) deployment, and innovation, enhancing regional integration. Science and technology, particularly ICT, drive productivity and competitiveness, while human capital plays a central role in the development of high-tech industries, supporting innovation and economic diversification. Finally, innovation underpins the capacity of regions to adapt and maintain a long-term competitive advantage. Overall, this research demonstrates that by retaining the same nine core factors and replacing environmental considerations with civil protection, it is possible to gain new insights into regional competitiveness.

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1. Introduction

In our previous research, we examined the foundations of regional competitiveness by analyzing the key factors that drive economic growth, social well-being, and sustainable development [1,2]. Building upon this work, the present study continues the investigation, focusing on the same nine core factors while replacing environmental considerations with civil protection and incorporating the most recent literature.

While the previous study provided a comprehensive assessment of structural competitiveness factors, it did not explicitly examine the institutional and operational mechanisms that enable regions to anticipate, absorb, and recover from systemic shocks. The present study therefore differs conceptually and empirically, as it moves beyond structural sustainability dimensions and introduces civil protection as an autonomous determinant of regional competitiveness. This shift reflects the growing recognition that resilience capacity constitutes a foundational pillar of sustainable development rather than a secondary governance attribute.

Regional competitiveness refers to the ability of a specific geographic area to stimulate economic activity and enhance residents' quality of life through efficient resource use, innovation, and institutional support [3]. It encompasses a wide spectrum of economic, social, technological, and institutional dimensions, reflecting the complex interplay of factors that shape regional development [4].

The increasing frequency of climate-related disasters, public health crises, geopolitical instability, and technological disruptions has exposed the vulnerability of regional economic systems. These developments have raised critical questions regarding whether traditional competitiveness frameworks adequately capture a region's capacity to maintain functionality under stress. As a result, integrating resilience-oriented institutional mechanisms into competitiveness measurement has become both a theoretical and policy imperative.

To clarify the conceptualization of regional competitiveness, we adopt a structured analytical framework that distinguishes three key components: first, the determinants, which are the core factors that directly influence competitiveness, including the economy, labor market, education, health, civil protection, transport, technology, high-tech industry, and innovation; second, the moderators, which are factors that affect the strength or direction of the determinants' impact, such as governance quality, institutional capacity, social cohesion, and environmental risk; and third, the outcomes, which are the measurable manifestations of competitiveness, encompassing economic performance (e.g., GDP per capita, productivity), social well-being (e.g., health, inclusion), and resilience to shocks (e.g., disaster recovery time, infrastructure continuity) [5,6].

In recent years, the global emphasis on sustainability has encouraged governments and institutions across Europe to integrate social, economic, and resilience-oriented principles into regional policies and legal frameworks [7]. These efforts address challenges such as natural disasters, emergencies, social inequalities, and uneven economic development, promoting sustainable growth while enhancing societal welfare [8].

Regional competitiveness has thus emerged as a key determinant for achieving sustainable development objectives, linking economic performance with long-term social and institutional outcomes [9]. Sustainable competitiveness can be understood as the

combination of institutions, policies, and factors that determine regional productivity while ensuring the capacity of future generations to meet their needs [10].

Prior research highlights that competitiveness is not limited to purely economic measures. Storper (1997) defines it as a region's ability to attract and retain firms while improving living standards, whereas Huggins (2003) emphasizes creativity, knowledge, and supportive institutional conditions over mere wealth accumulation [11,12]. Porter (1990), one of the foundational studies in this field, underlines the role of clusters and competitive advantage derived from local business ecosystems [13]. These seminal works continue to provide a basis for contemporary research on regional competitiveness, guiding the selection of core factors for further analysis [14].

Economic competitiveness relies on government–business collaboration, diverse economies, high-quality education, and political stability, all of which drive innovation, entrepreneurship, and societal well-being [15,16]. Enhancing sustainable regional competitiveness also requires investments in education, infrastructure, research, ICT, and regulation, creating dynamic and resilient economic hubs [17,18]. Territorial competitiveness is increasingly recognized as a cost-effective strategy for promoting balanced regional growth [19,20].

The decision to replace environmental considerations with civil protection in the core-factor structure reflects analytical refinement rather than a conceptual exclusion of sustainability [21]. While environmental performance captures long-term ecological balance, civil protection captures the operational capacity of institutions to manage acute risks and ensure continuity of economic and social systems. Civil protection has been selected as a core factor due to its critical role in enhancing regional resilience and safeguarding societal well-being, as explained and justified in the following section, Civil Protection and Environment Interactions, of this research [22]. By encompassing disaster preparedness, emergency management, risk mitigation policies, and protective infrastructure, civil protection strengthens a region's ability to withstand shocks, recover rapidly, and maintain continuity in economic and social activities [23,24]. Its integration into the analysis highlights how proactive safety measures and institutional preparedness contribute to long-term competitiveness, linking societal resilience directly with economic stability and sustainable regional development [25].

While previous studies often include Civil Protection as a sub-dimension of governance, infrastructure, or resilience, we argue that it constitutes an autonomous factor of regional competitiveness [26]. Civil Protection directly contributes to regional resilience by mitigating the economic and social impact of disasters, enabling the continuous functioning of economic systems and labor markets [27]. Drawing on resilience economics and disaster economics, Civil Protection can influence growth indirectly by reducing recovery costs and maintaining investor confidence [28]. Thus, its role is analytically distinct from traditional governance or infrastructure measures, and it has independent explanatory power for regional performance outcomes [29]. This theoretical framing allows us to formulate testable propositions about the relationship between Civil Protection and specific dimensions of competitiveness, such as innovation sustainability, labor market stability, and economic resilience.

The analysis draws on a combination of established and new databases to strengthen the evaluation [30]. These include the Regional Competitiveness Index, Regional Well-Being, and Eurostat, as well as the ESPON Database for regional development indicators, the European Quality of Government Index (EQI) for governance and institutional quality, and the DESI—Digital Economy and Society Index for digital and ICT-related factors. Complementary data sources such as the ESPON Data Navigator, Eurostat Regional Statistics, OECD Regional Database, and EU-ADAPT for climate adaptation and resilience provide additional insights into regional sustainability [31–33].

By integrating these datasets, this study reassesses the ten core factors while placing new emphasis on civil protection alongside the established dimensions [34]. Technological and innovation factors highlight ICT deployment and digital infrastructure, while civil protection emphasizes preparedness, risk reduction, and societal resilience [35].

In this study, civil protection is conceptualized as an independent institutional factor that enhances regional resilience and complements environmental sustainability. While traditional environmental factors remain important for sustainable competitiveness, civil protection focuses on operational capacities such as emergency response, early warning systems, and institutional preparedness [36]. This distinction allows us to explore how civil protection strengthens competitiveness without replacing environmental considerations.

The aim is to provide policymakers, regional development agencies, and stakeholders with comprehensive insights into regional competitiveness and sustainability, focusing on the new ten major factors: economy, labor market, poverty and social inclusion, healthcare, educational infrastructure, civil protection, transportation infrastructure, science and technology, high-tech industries, and innovation [1,2,37].

This study makes three primary contributions to the literature. First, it advances the theoretical debate by integrating resilience economics into regional competitiveness analysis. Second, it offers methodological innovation through the operationalization of civil protection indicators using harmonized European regional datasets. Third, it provides policy-relevant evidence demonstrating that institutional preparedness and disaster-risk management are not peripheral governance elements but core determinants of sustainable territorial development.

This approach offers a more nuanced understanding of sustainable regional competitiveness, bridging traditional competitiveness measures with contemporary resilience-driven priorities [38]. As illustrated in Figure 1, the integration of economic performance, social cohesion, territorial balance, and civil protection dimensions provides a comprehensive structure for assessing long-term regional sustainability. The findings aim to inform evidence-based policymaking, enabling regions to reduce economic, social, and territorial disparities, enhance resilience, and promote long-term, balanced development.

In an era characterized by heightened uncertainty and systemic risk, incorporating civil protection into competitiveness measurement is essential for accurately assessing long-term regional sustainability [39]. The findings therefore contribute to a more resilience-oriented policy framework capable of reducing territorial disparities and strengthening economic continuity across European regions.

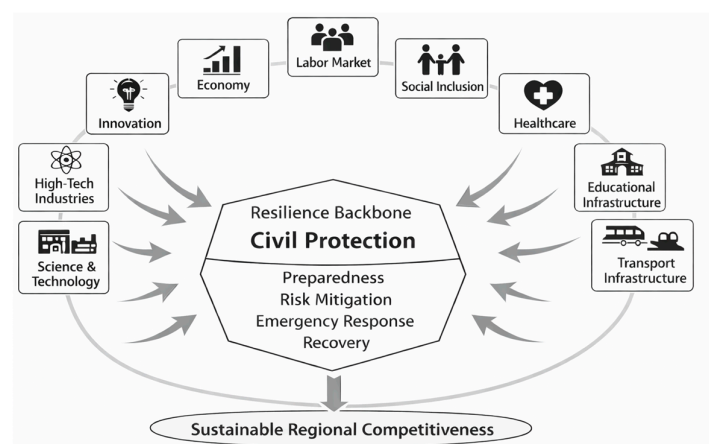


Figure 1. Conceptual Framework of Regional Competitiveness.

2. Methodology and Literature Research

The theoretical foundation for understanding and evaluating regional competitiveness was established through a comprehensive literature review, drawing upon key concepts and insights from previous research. Although this is a narrative review, we ensured rigor by predefining search keywords, databases, and inclusion/exclusion criteria. Data extraction followed a standardized template capturing factor, indicator, theoretical underpinning, and observed outcomes. Each source was critically assessed for relevance, methodological quality, and empirical robustness. This structured approach increases transparency and replicability even within a non-systematic review framework.

The study utilizes data and indicators from a combination of established and supplementary databases to ensure a robust analysis. The primary databases employed are the Regional Competitiveness Index (RCI), the Regional Well-Being Database, and Eurostat, while additional sources include the ESPON Database, the European Quality of Government Index (EQI), and the Digital Economy and Society Index (DESI). Factors from RCI, DESI, EQI, and other databases were extracted to quantify each factor (e.g., labor productivity for Economy, disaster preparedness scores for Civil Protection). These indicators provide measurable proxies that can be used in future empirical testing or comparative regional assessments. These resources collectively provide economic, social, technological, institutional, and resilient-related information necessary to assess regional competitiveness, including aspects of civil protection.

- Regional Competitiveness Index (RCI): Based on the Global Competitiveness Index, the RCI evaluates competitiveness for EU NUTS-2 regions over the past decade, covering areas such as governance, infrastructure, health, human capital, labor market, and innovation [40,41].
- Regional Well-Being Database: Drawn from OECD frameworks, this database measures regional well-being across multiple dimensions, focusing on individuals' experiences, local characteristics, and overall quality of life, with scores ranging from 0 to 10 [42].
- Eurostat: Provides comprehensive regional statistics on economic, social, demographic, and institutional indicators, supporting quantitative analysis and cross-regional comparisons [43].
- ESPON Database: Offers detailed indicators for regional development, economic performance, social cohesion, and resilience, enabling a multidimensional assessment of regional competitiveness, including civil protection measures such as disaster preparedness, emergency response capacity, and risk mitigation [44].
- European Quality of Government Index (EQI): Provides regional-level data on institutional quality, governance, and public service performance, supporting analysis of asymmetric and policy-driven factors, including local governance of civil protection initiatives [45].
- Digital Economy and Society Index (DESI): Captures digital economy performance, ICT adoption, e-government services, and citizens' digital skills, particularly relevant for evaluating technology-related competitiveness and innovation [46].

The literature analysis phase involved systematically compiling indicators from these sources. Screening was based on (i) publication date (2020–2025), (ii) relevance to the ten factors, (iii) empirical or conceptual rigor, and (iv) language (English). Studies were weighted qualitatively based on sample size, methodological robustness, and relevance to regional competitiveness. Studies not meeting these criteria were excluded to maintain the consistency and reliability of the conclusions. To identify relevant studies, searches were conducted using Google Scholar, ResearchGate, and SpringerLink for publications

between 2020 and 2025. Specific predefined keywords, including “regional competitiveness”, “sustainable development”, “civil protection”, and other related phrases, were applied to extract insights into contemporary research trends. Alternative phrasings and cross-referencing within the publications helped refine the selection to ten definitive research themes corresponding to the ten major factors under investigation. This narrative review followed a structured process: (i) selection of peer-reviewed literature from major databases (Scopus, Web of Science) using keywords related to regional competitiveness, sustainability, and civil protection; (ii) screening of articles based on relevance and methodological rigor; and (iii) extraction of indicators for each factor. Civil protection indicators were identified using criteria such as institutional capacity, emergency response times, and the effectiveness of early warning systems, as these are not explicitly categorized in major datasets such as RCI and DESI.

While this study is a narrative review, a comparative synthesis was conducted by mapping findings from each study to the ten core factors, assessing convergences, divergences, and relative emphasis. This structured mapping allows the derivation of evidence-based propositions while highlighting research gaps. Future work may conduct quantitative or cross-regional empirical analyses using these mapped indicators.

The methodology followed a traditional narrative approach, aiming to summarize, interpret, and synthesize existing literature on regional competitiveness. This involved extracting propositions from the ten factors and analyzing their interrelations with sustainable regional competitiveness outcomes [47]. The eligibility of search results was determined based on assessments of the title, abstract, and full text. The researchers (A.K. and E.K.) screened more than 600 articles (including the 400 from the previous research) for eligibility using the following criteria:

- Inclusion of papers published between 2020 and 2025 (including earlier papers for terminology definition).
- Investigation of the relationship between regional competitiveness and the ten specified factors.
- Studies published in English.
- A broad approach to encompass studies aligning with the review’s objectives; no contact was made with authors for supplementary information.

From this process, the researchers selected 200 references that satisfied the criteria. Of these, about 185 were published between 2020 and 2025, while fewer than 15 date back to before 2020, mainly to define terminology. This approach facilitated the development of robust theoretical and conceptual frameworks, ensured that the study builds upon and extends prior knowledge, and provided new insights into sustainable and resilient regional competitiveness.

To complement the narrative review, a brief bibliometric overview of the selected 201 publications was conducted to provide additional transparency and context. As illustrated in Figure 2 the study followed a systematic selection and screening procedure to ensure methodological consistency and replicability. The analysis examined temporal trends, thematic focus, and publication outlets, revealing a marked increase in studies on sustainable regional competitiveness and resilience after 2020.

While most research addresses innovation, governance, and digital transformation, civil protection appears underrepresented as an independent factor, often discussed only peripherally within broader governance or infrastructure frameworks. Publication sources primarily include journals indexed in Scopus and Web of Science, spanning regional studies, sustainability, economic geography, and public administration. Keyword co-occurrence analysis highlights strong connections among “regional competitiveness”, “innovation”, “sustainable development”, and “governance”, whereas terms related to civil protection and disaster resilience appear less frequently. This

bibliometric insight con-firms a measurable research gap, supporting the study's rationale for explicitly integrating civil protection as a core determinant of sustainable regional competitiveness.

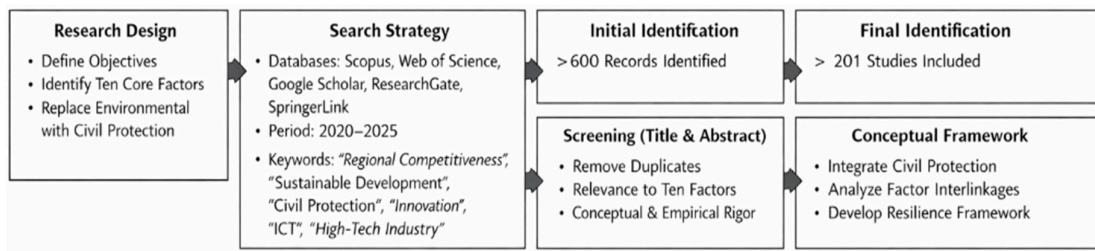


Figure 2. Flowchart illustrates the structured narrative literature review process.

3. Thematic Synthesis and Conceptual Framework

After a thorough review of the relevant literature and analysis of data related to sustainable regional competitiveness, ten key factors were identified as central to the assessment of regional performance (Table 1).

The literature review indicates that Economy, Labor Market, and Education are foundational factors, consistently linked to regional growth, workforce adaptability, and human capital development. Innovation and High-Tech Industry drive competitive differentiation and technological advancement. Civil Protection, Health, and Poverty and Social Inclusion enhance resilience, social well-being, and sustainability. Transport and Technology/Science and Digital Society serve as enabling factors, supporting connectivity, ICT adoption, and knowledge flows. This synthesis provides a structured, evidence-based overview of factor importance, moving beyond narrative description to a comparative assessment.

Our review highlighted that these factors are highly interconnected and cannot be considered in isolation. For instance, the strength of the economy shapes labor market conditions, which in turn can influence poverty levels and social inclusion. Similarly, health outcomes are linked to access to education, technological infrastructure, and the presence of high-tech industries, while the effectiveness of civil protection measures contributes directly to regional resilience and sustainable development. Recognizing these interdependencies is essential for formulating strategies that enhance sustainable regional competitiveness.

All factors have a European dimension and are relevant to countries across the EU. As described in Section 2, this study draws on the most recent research on regional competitiveness and its drivers, primarily from publications between 2020 and 2025, which often incorporate historical data to provide context and support terminology definitions. It is important to note that the results obtained may vary depending on the country analyzed. Differences in economic development, institutional capacity, governance quality, and social conditions across EU member states can influence the relative importance of each factor and the observed outcomes. Accordingly, the findings of this study should be interpreted with consideration of country-generic contexts, highlighting the need for regionally tailored policy recommendations.

Across the ten factors, several patterns emerge. Some factors, such as innovation and infrastructure, appear most frequently in the literature, while others, like civil protection, show strong interdependence with resilience measures. These intersections highlight the systemic nature of sustainable regional competitiveness.

Table 1. Ten factors measuring sustainable regional competitiveness.

Factors and References for Sustainable Regional Competitiveness	Economic Factors	Social Factors	Infrastructure and Technology Factors	Sources
	(1) Economy [48–66]	(3) Poverty and Social Inclusion [67–85]	(6) Civil Protection [86–108]	Eurostat, ESPON Database, Regional Well-Being Database, EQI.
	(2) Labor Market [109–124]	(4) Health [125–137]	(7) Transport [138–151]	Eurostat, Regional Well-Being Database, EQI, Eurostat.
	(9) High-tech Industry [152–165]	(5) Education [166–178]	(8) Technology/Science and Digital Society [179–189]	Regional Competitiveness Index (RCI), DESI, Eurostat, Regional Well-Being Database, EQI, Eurostat.
			(10) Innovation [190–200]	

3.1. Economy Factor

Efficient resource allocation, GDP dynamics, and market diversity directly influence regional competitiveness and resilience [48]. Empirical evidence shows that regions with diversified economic structures and efficient resource utilization exhibit higher resilience to crises, linking economic performance directly to social well-being and long-term competitiveness [49]. It influences not only the pace of economic growth but also the ability of a region to provide stability and resilience against external shocks. Building on these earlier insights, we explore in greater detail how economic performance interacts with social well-being, civil protection, and environmental sustainability [50]. Understanding this interplay is crucial for developing policies that promote growth while ensuring long-term societal and ecological balance [51].

The economy of a region is a fundamental driver of development, shaping the conditions under which communities thrive [52]. Regional competitiveness encompasses more than just GDP growth; it includes innovation capacity, education quality, institutional effectiveness, social cohesion, and environmental responsibility. By integrating these dimensions, we recognize that a strong economy must support human development alongside material prosperity [53]. Without such integration, growth risks being uneven, short-lived, or detrimental to broader societal goals [54].

Evaluating regional economic competitiveness requires a comprehensive approach that considers both input and outcome factors [55]. Input factors include labor productivity, efficient resource allocation, infrastructure quality, and industrial structure [56]. Outcome factors, on the other hand, assess the region's ability to deliver sustained prosperity while enhancing residents' quality of life [57]. While traditional metrics such as GDP per working-age individual provide useful insights, they fall short of capturing social well-being, resilience, and human development, which are increasingly critical in today's complex socio-economic environment [58,59].

To achieve a more holistic understanding, economic assessments should incorporate multidimensional indicators such as education, healthcare access, civil protection readiness, environmental sustainability, and social welfare [60]. This approach highlights the interdependence between economic performance and the region's capacity to maintain safety, ecological balance, and overall quality of life [61]. Aligning local competitiveness with broader national and global objectives ensures that growth is not only measurable in economic terms but also meaningful for society and the environment [62].

Successful regional economies do more than maximize output; they cultivate ecosystems that foster innovation, adaptability, and inclusive growth [63,64]. Policies and institutions that support civil protection, resilient infrastructure, sustainable resource

management, and social cohesion are essential for long-term competitiveness [65]. By emphasizing the interplay between economic performance, societal well-being, and sustainability, regions can build resilient economies capable of thriving under changing conditions while contributing positively to both local and global development [66].

Proposition 1. *Regional economic performance is positively influenced by efficient resource allocation, market diversity, and investment in human capital. Regions with higher GDP per capita and productivity indices are expected to show stronger competitiveness outcomes.*

3.2. Labor Market Factor

Workforce adaptability, employment flexibility, and alignment of skills with industry needs enhance regional competitiveness and resilience [109]. The labor market drives competitiveness through workforce adaptability, inclusion, and skill alignment with regional economic needs [110]. High employment, lifelong learning, and access to quality jobs enhance both productivity and social cohesion [111]. Studies indicate that regions with dynamic labor markets experience lower unemployment disparities, faster recovery from economic shocks, and higher capacity for innovation adoption. Understanding these relationships is essential for designing policies that support not only economic growth but also social stability and long-term adaptability [112].

Human capital remains a central pillar of regional development, affecting productivity, innovation, and the capacity to respond to changing market demands [113]. Regional disparities in education, skills, and employment opportunities, however, can result in uneven competitiveness and social outcomes [114,115]. Addressing these disparities requires aligning education and training programs with local economic needs, fostering a workforce capable of adapting to evolving industries [116]. By investing in human capital, regions can enhance both individual opportunities and collective economic resilience [117].

Policies that promote full employment, lifelong learning, and social inclusion are key to developing a labor market that supports sustainable growth [118]. Civil protection measures further reinforce workforce stability by mitigating the impact of environmental or economic shocks, ensuring continuity in employment and productivity [119]. Together, these strategies create an environment where the workforce can thrive even under challenging conditions [120].

A comprehensive approach to labor market analysis considers not only human capital but also regional economic structures, social dynamics, and institutional capacity [121]. Evaluating workforce performance through this multidimensional lens allows policymakers to address both immediate labor needs and long-term resilience goals [122].

Finally, a labor market that integrates education, training, civil protection, and sustainability considerations strengthens regional competitiveness while promoting inclusive growth [123]. By focusing on both productivity and resilience, regions can cultivate economies that can withstand shocks, foster innovation, and support the well-being of all residents [124]. This multidimensional perspective aligns local labor market development with broader national and global objectives.

Proposition 2. *Regions with higher workforce adaptability, employment flexibility, and skills alignment with industry needs demonstrate greater resilience to shocks and higher regional competitiveness scores.*

3.3. Poverty and Social Exclusion Factor

Lower levels of poverty and social exclusion increase labor participation, social cohesion, and access to education and health, thereby strengthening competitiveness [67].

Poverty reduction and social inclusion strengthen competitiveness by increasing labor participation, social cohesion, and equitable access to education and health [68]. Empirical indicators, such as multidimensional poverty indices and social inclusion measures, demonstrate that addressing structural and individual vulnerabilities reduces regional inequalities and enhances resilience during economic or environmental crises [69]. By examining these interconnections, we aim to identify strategies that not only reduce inequalities but also strengthen the resilience and adaptability of regional economies [70]. Understanding the social dimensions of development is critical for fostering equitable growth that benefits all residents [71].

Social exclusion is a complex and multidimensional process that often leaves certain groups vulnerable due to unemployment, limited access to education, healthcare, childcare, and social participation, as well as inadequate housing and living conditions [72,73]. Addressing these vulnerabilities requires comprehensive policies that create economic opportunities while promoting social integration. By targeting both structural and individual barriers, regions can foster inclusive environments that support social cohesion and collective prosperity [74].

Poverty is highly context-dependent, varying both within and across regions, and is influenced by factors such as urbanization, cost of living, and local economic structures [75]. Effective anti-poverty strategies must be tailored to these local realities, integrating interventions across education, social welfare, civil protection, and healthcare systems [76]. Targeted measures, including income support and community development programs, can mitigate the effects of economic shocks and environmental disruptions [77]. By combining social protection with proactive economic planning, regions can enhance resilience and ensure that vulnerable populations are not left behind [78].

Long-term unemployment and labor market exclusion are closely linked to social marginalization, making targeted workforce interventions essential [79]. Programs that promote skill development, lifelong learning, and access to quality employment reduce disparities and improve social mobility [80]. Civil protection initiatives complement these policies by safeguarding vulnerable populations during disasters or economic crises, ensuring continuity in both employment and essential services [81]. This integrated approach strengthens social cohesion, enabling regions to maintain stability even in the face of external shocks.

Institutional quality, governance, and local autonomy play a pivotal role in addressing poverty and promoting social inclusion [82]. Regions with effective local governance and well-structured policies tend to achieve better outcomes in reducing inequalities and fostering inclusive growth [83]. Investments in infrastructure, human capital, innovation, and transparent governance are crucial to creating equitable labor markets [84]. Additionally, multidimensional monitoring of social, economic, and political indicators allows policymakers to tailor interventions, track progress, and ensure that inclusion strategies remain effective over time [85]. By combining education, civil protection, social welfare, and governance measures, regions can build resilient, inclusive, and competitive economies.

Proposition 3. *Lower levels of poverty and social exclusion positively influence regional competitiveness by increasing labor participation, social cohesion, and access to education and health.*

3.4. Health Factor

Populations with better access to healthcare and higher life expectancy contribute to sustained labor productivity and regional competitiveness. Health influences competitiveness by shaping human capital quality and productivity [125]. Regions with

better access to healthcare, lower preventable mortality, and robust public health systems show higher labor productivity, innovation capacity, and adaptive resilience [126]. Civil protection and emergency preparedness further reinforce health outcomes, ensuring that populations remain productive during crises.

Health is a fundamental determinant of economic productivity and overall sustainable regional growth [127,128]. Populations with better health outcomes exhibit higher labor productivity, lower absenteeism, and stronger innovative capacity, which directly enhances competitiveness. Yet, health disparities persist across regions and countries, influenced by geography, socio-economic status, and gender, highlighting the need for targeted interventions [129].

Examining causes of death provides deeper insight into regional health disparities and resilience [130]. Preventable mortality, chronic disease prevalence, and injury-related deaths reveal structural weaknesses in healthcare systems, socio-economic inequalities, and emergency preparedness [131]. Incorporating this information into regional planning strengthens civil protection strategies, ensuring that vulnerable populations are safeguarded and continuity in economic activity is maintained during crises [132].

Access to healthcare and education plays a central role in mitigating health inequalities [133]. Financial, geographic, and social barriers to medical services exacerbate disparities, particularly in rural or underserved regions [134]. Civil protection and emergency preparedness initiatives further reinforce health outcomes by providing rapid response to natural disasters, epidemics, or industrial accidents, thereby reducing preventable deaths and supporting community resilience [135].

Monitoring health indicators alongside causes of death allows policymakers to design evidence-based interventions, assess policy effectiveness, and prioritize investments in both preventive and responsive health measures [136]. This multidimensional approach strengthens regional competitiveness while promoting sustainability, resilience, and social well-being [137].

Proposition 4. *Populations with better access to healthcare, lower morbidity, and higher life expectancy contribute to sustained labor productivity and competitiveness.*

3.5. Education Factor

Investment in education and vocational training improves human capital quality, innovation output, and regional competitiveness. Education supports competitiveness through human capital development, vocational training, and research-driven innovation [166]. Higher education and aligned professional programs increase the skill base, enhance labor mobility, and facilitate knowledge transfer to high-tech industries [167]. Evidence shows that educational investment directly contributes to innovation, adoption, economic diversification, and resilience.

Higher education plays a critical role in shaping regional socio-economic trajectories, particularly by acting as a hub for research, innovation, and industrial cluster development [168]. Universities and vocational institutions contribute to economic competitiveness by improving workforce skills, fostering knowledge transfer, and supporting entrepreneurial ecosystems [169].

Investment in education enhances a region's attractiveness, not only for businesses but also for researchers and students [170]. The alignment between professional education systems and regional economic structures strengthens social and economic development, creating pathways for inclusive and sustainable growth.

Education also directly contributes to sustainability [171]. Curricula that integrate environmental awareness, disaster preparedness, and sustainable management practices equip graduates with the skills needed to implement civil protection strategies, respond

to emergencies, and support resilient communities [172]. By connecting education with civil protection, regions can reduce vulnerability to natural or technological shocks while promoting equitable development.

The quality and accessibility of education influence population settlement patterns and labor mobility, affecting regional competitiveness [1,173]. Regions with robust educational institutions tend to retain talent, encourage innovation, and create dynamic labor markets, enhancing both economic productivity and societal well-being [174].

Assessment of education's impact requires examining multiple indicators, including graduation rates, skill alignment with local industries, migration patterns of graduates, and institutional capacity to incorporate sustainability and civil protection into curricula [175]. Integrating quantitative metrics with qualitative insights ensures a comprehensive evaluation of education's role in sustainable regional development [176].

Finally, higher education acts as a catalyst for innovative ecosystems, supporting industries in adopting sustainable technologies, enhancing resource efficiency, and implementing disaster risk reduction measures [177,178]. This interconnected approach strengthens the resilience of both the economy and society.

Proposition 5. *Investment in education and vocational training positively correlates with regional innovation output and human capital quality, which in turn enhances competitiveness.*

3.6. Civil Protection Factor

Effective civil protection and disaster preparedness reduce economic losses, stabilize labor markets, and enhance competitiveness. Civil protection enhances regional competitiveness by reducing vulnerability to natural, technological, or social shocks [86]. Theoretical and empirical studies show that proactive disaster preparedness, infrastructure resilience, and social inclusivity reduce economic losses, maintain continuity in production, and foster investor confidence. Civil protection integrates resilience economics, quantifying costs and benefits to optimize sustainable development strategies [87]. Recent literature highlights that climate change, environmental degradation, and unplanned urbanization increase disaster risks, requiring civil protection to move beyond reactive emergency response toward integrated prevention, resilience, and adaptation strategies [88]. International organizations such as the European Commission and OECD advocate ecosystem-based solutions, early warning systems, and environmental risk assessments as core components of modern civil protection planning [89].

Civil Protection is grounded in regional economic and resilience theory, where investments in emergency preparedness, disaster mitigation, and infrastructure continuity have measurable economic returns [90]. Beyond normative arguments for safety, Civil Protection directly impacts productivity, reduces recovery costs, supports labor market stability, and attracts investment. By linking these mechanisms explicitly to regional competitiveness outcomes, Civil Protection is analytically justified as an independent factor [91]. Although environmental considerations were previously a separate factor, Civil Protection now incorporates relevant environmental risk mitigation (e.g., disaster preparedness, climate adaptation).

Civil protection indicators include: (i) effectiveness of early warning systems, (ii) emergency response times, (iii) institutional preparedness and capacity, and (iv) disaster recovery efficiency [92]. This framework primarily focuses on EU regions but is designed to be adaptable to global contexts, considering variations in institutional structures and data availability. While related to environmental risk management or public safety, civil protection uniquely integrates operational capacity with policy coordination, emphasizing proactive resilience rather than solely risk mitigation.

Resilient and sustainable regional development requires more than economic and social indicators [93]. Building on this insight, we introduce civil protection as a key determinant of regional competitiveness, emphasizing its role in safeguarding communities, infrastructure, and economic activity.

Civil protection is increasingly recognized as a strategic element of regional competitiveness [94]. By ensuring that communities, infrastructure, and economic systems are prepared for and resilient to disasters, emergencies, and crises, civil protection enhances a region's capacity to maintain continuity in economic activity, safeguard human capital, and protect key assets [95]. Regions with robust civil protection frameworks experience fewer disruptions, recover faster from shocks, and can attract investment more reliably, all of which strengthen their competitive position relative to less-prepared regions.

Moreover, integrating civil protection with sustainability initiatives—such as resilient urban planning, climate adaptation, and social equity programs—creates a multidimensional advantage, aligning economic performance with environmental stewardship and social cohesion [96]. In this way, civil protection not only mitigates risks but actively contributes to long-term, sustainable, and inclusive regional competitiveness.

Civil protection encompasses policies, strategies, and practices designed to prevent, prepare for, respond to, and recover from disasters, emergencies, and crises, whether natural, technological, or social in origin [97]. Regions with effective civil protection systems are better equipped to maintain economic continuity, reduce social vulnerability, and protect critical infrastructure [98].

Integrating civil protection into regional competitiveness frameworks ensures that growth is resilient and sustainable [99]. Regions exposed to natural hazards or industrial risks face potential economic and social disruptions; robust civil protection mechanisms mitigate these threats, allowing regions to maintain stability and attractiveness for investment [88,100].

Disaster preparedness and emergency response are closely linked to human capital and community well-being [101]. Training, education, and awareness programs enhance the capacity of residents and businesses to respond effectively to crises, reducing mortality, economic losses, and social disruption. Such interventions also promote long-term sustainability by preserving environmental resources and community assets [102].

Civil protection contributes to inclusive development by prioritizing vulnerable populations, including low-income groups, the elderly, and marginalized communities [103]. Regions that integrate social equity into civil protection planning strengthen social cohesion, reduce inequalities, and enhance collective resilience, reinforcing the social dimension of regional competitiveness [104].

Infrastructure resilience is another critical aspect. Investments in sustainable urban planning, resilient transportation, energy networks, and ICT systems support rapid response to emergencies while minimizing economic disruption [65]. Civil protection policies therefore intersect with multiple regional competitiveness factors, including the economy, labor, health, and education [105].

Monitoring, early warning systems, and risk assessment tools are essential for effective civil protection [106]. By integrating data on hazards, vulnerabilities, and regional capacities, policymakers can design evidence-based interventions that support sustainable development goals while enhancing economic and social resilience.

Finally, civil protection strengthens regional adaptability and long-term competitiveness by fostering a proactive culture of preparedness and sustainability [107,108]. Regions that prioritize civil protection are better positioned to recover from crises, maintain investor confidence, and promote a safe, productive, and inclusive environment for residents.

Proposition 6. *Effective civil protection and disaster preparedness mechanisms reduce recovery time after crises, minimize economic losses, and increase investor confidence, positively impacting regional competitiveness.*

3.7. Transport Factor

Efficient, sustainable, and resilient transport networks facilitate labor mobility, goods distribution, and rapid disaster response, enhancing competitiveness. Transport infrastructure drives competitiveness through efficient mobility, goods distribution, and emergency response capabilities [138]. Evidence indicates that well-connected, sustainable, and resilient transport networks facilitate labor access, reduce logistical costs, and support rapid crisis response, linking infrastructure quality directly to economic performance and regional resilience.

Transport infrastructure, including roads, railways, ports, and intermodal connections, is crucial for the efficient movement of goods, people, and services [139]. High-quality transport systems facilitate trade, reduce logistical costs, and attract investment, directly strengthening regional competitiveness [140]. They also enable the effective distribution of resources during emergencies, linking transport planning to civil protection and regional resilience.

Sustainable transport is increasingly recognized as a multidimensional driver of regional development [141]. Investments in low-emission transport modes, energy-efficient infrastructure, and smart mobility solutions support environmental sustainability while improving accessibility and connectivity [142]. By aligning transport policies with sustainability objectives, regions can reduce carbon footprints, enhance public health, and ensure long-term economic viability.

The transport sector also interacts closely with other dimensions of competitiveness, including economic activity, labor mobility, education, and healthcare [143]. Efficient transportation networks allow residents to access jobs, schools, and medical services while ensuring rapid response capabilities in emergencies, thus linking infrastructure to civil protection outcomes.

Urban and regional planning play a critical role in transport efficiency [144]. Integrating land use, population density, and transit-oriented development creates transport systems that are resilient, environmentally responsible, and economically beneficial [145]. This integration is essential for mitigating the impacts of disasters or disruptions, enhancing both sustainability and regional adaptability [146].

Digital technologies and ICT integration further enhance transport competitiveness [147]. Smart traffic management, predictive maintenance, and real-time monitoring reduce congestion, prevent accidents, and optimize resource allocation [148]. These innovations not only support economic efficiency but also strengthen civil protection capacities, enabling swift evacuation or rerouting during emergencies [149].

Investing in robust transport infrastructure is thus both an economic and social priority [150]. Regions with resilient, sustainable, and well-maintained transport systems are better positioned to withstand shocks, maintain supply chains, and support inclusive development [151]. Transport is not merely a facilitator of commerce but a strategic tool for sustainable, resilient, and competitive regional development.

Proposition 7. *Regions with efficient, sustainable, and resilient transport networks experience higher regional competitiveness by facilitating labor mobility, goods distribution, and rapid disaster response. Transport quality can be measured via connectivity indices, average travel times, and transport-related resilience metrics.*

3.8. Technology/Science and Digital Society Factor

High ICT adoption and digital literacy enable innovation, efficient service delivery, and knowledge-based economic growth, strengthening regional competitiveness [179]. Technological advancement and ICT integration enhance competitiveness by enabling innovation, knowledge dissemination, and efficient public service delivery. Early warning systems, digital communication networks, and ICT-enabled civil protection improve resilience. Empirical research shows that digital adoption correlates with higher regional productivity, social inclusion, and sustainable development.

The digital transformation of society has implications beyond the economy [180]. Integrating ICT into regional planning enhances efficiency, reduces resource consumption, and supports sustainable solutions [181]. Digital tools facilitate smart mobility, energy management, and resilient infrastructure, aligning technology investments with sustainability objectives.

Civil protection benefits directly from ICT integration [182]. Early warning systems, real-time monitoring, and digital communication networks strengthen regional preparedness for natural disasters, health emergencies, and industrial accidents [183]. By embedding ICT in civil protection strategies, regions can safeguard human capital, maintain economic continuity, and protect critical infrastructure [184].

Collaboration between public institutions, private enterprises, and higher education—often described through the quadruple helix model—is essential for effective innovation ecosystems [185]. Policies that encourage technology transfer, knowledge dissemination, and industry–academia partnerships amplify regional innovation capacity and competitiveness [186]. These efforts also foster adaptive capabilities that enhance resilience in the face of crises.

The development of digital skills, broadband access, and smart infrastructure ensures that regions can leverage technology for economic growth while promoting social inclusion and sustainability [187].

The integration of science, technology, and digital society with sustainable practices and civil protection strengthens regional resilience [188]. By adopting ICT-driven solutions, regions can optimize resource allocation, improve public service delivery, and reduce vulnerability to external shocks, ultimately reinforcing long-term competitiveness [189].

Proposition 8. *High ICT adoption rates and digital literacy enable innovation, efficient service delivery, and knowledge-based economic growth, which directly strengthen regional competitiveness.*

3.9. High-Tech Industry Factor

Development of high-tech industries, supported by skilled human capital and R&D, enhances innovation capacity and regional competitiveness [152]. This factor emphasizes how specialized skills, knowledge-intensive activities, and innovation ecosystems contribute to both economic growth and sustainable regional development [153]. High-tech industries contribute to competitiveness through knowledge-intensive production, innovation ecosystems, and skilled human capital [154]. Evidence highlights that investment in R&D, technology transfer, and collaboration between academia, government, and private sectors fosters industrial growth and economic diversification [155]. Integrating sustainability and civil protection strengthens resilience and continuity in high-tech operations.

High-tech industries are characterized by rapid technological change, knowledge-intensive production, and a reliance on highly skilled labor [156]. Innovation is central to these industries, enabling regions to maintain a competitive edge while fostering

sustainable economic growth. The sector thrives in environments where human capital—engineers, researchers, and technologists—is continuously developed and effectively utilized [157].

Human capital is the primary driver of high-tech sustainable regional competitiveness [158]. Investment in education, training, and skill development ensures a steady supply of qualified personnel capable of producing, adapting, and advancing cutting-edge technologies [159]. Regions that prioritize human capital development experience higher innovation outputs, improved productivity, and stronger resilience to economic shocks.

High-tech enterprises do not operate in isolation [160]. Their growth relies on a dynamic interplay between educational institutions, research centers, public policy, and private investment [161]. This quadruple helix model fosters innovation, accelerates knowledge transfer, and builds regional innovation capacity. Civil protection considerations are increasingly integrated into high-tech operations, ensuring continuity of critical research and manufacturing during emergencies, natural disasters, or health crises [162].

Sustainability is a core aspect of high-tech industry development [163]. By adopting green technologies, energy-efficient processes, and sustainable manufacturing practices, high-tech industries contribute to environmental stewardship while supporting economic competitiveness.

Policy measures are essential for nurturing high-tech ecosystems [164]. Targeted strategies include supporting R&D investments, fostering collaboration between industry, universities, and government, and promoting the adoption of digital and green technologies [165]. These policies not only enhance competitiveness but also strengthen civil protection and regional resilience, ensuring continuity in the face of crises.

Proposition 9. *Strong social networks, civic engagement, and trust among stakeholders facilitate collaboration, innovation diffusion, and crisis response, enhancing competitiveness outcomes.*

3.10. Innovation Factor

Sustainability-oriented innovation, integrated with civil protection, drives long-term competitiveness by enhancing adaptability, resilience, and inclusive growth. Innovation enables regions not only to improve productivity and economic performance but also to address environmental pressures, social inequalities, and emerging risks that threaten regional stability [190]. Innovation drives long-term competitiveness by enabling regions to anticipate change, adapt to shocks, and implement sustainable technologies [191]. Empirical studies show that sustainability-oriented innovation, when integrated with civil protection strategies, enhances resilience, reduces environmental impact, and supports inclusive economic growth [192]. Innovation also fosters adaptive capacity in SMEs and high-tech clusters, reinforcing regional development.

From a sustainability perspective, innovation supports the transition toward low-carbon economies, circular production models, and efficient resource management [193]. Regions that prioritize eco-innovation and sustainable technologies strengthen their competitive position while simultaneously reducing environmental degradation and enhancing social well-being [194]. Innovation thus becomes a strategic tool for aligning economic growth with environmental responsibility and intergenerational equity.

Innovation also plays a critical role in strengthening civil protection and regional resilience [195]. Technological solutions such as early warning systems, risk modeling, resilient infrastructure design, and digital emergency management platforms enhance preparedness, response capacity, and recovery from natural hazards, climate-related events, and systemic crises [196]. Integrating civil protection objectives into innovative

strategies ensures that regions remain functional and competitive even under adverse conditions.

Small and medium-sized enterprises (SMEs) are key actors in sustainability-driven innovation, yet they often face financial, technological, and institutional barriers [197]. Supporting SMEs through targeted funding, knowledge transfer, and collaborative innovation networks enables the diffusion of sustainable practices and resilient technologies across regional economies [198]. Public–private partnerships and open innovation frameworks further enhance adaptive capacity and long-term sustainability.

Ultimately, innovation anchored in sustainability enhances regional competitiveness by enabling regions to anticipate change, adapt to shocks, and pursue growth paths that are environmentally sound, socially inclusive, and economically viable [199]. Regions that integrate innovation, sustainability, and civil protection are better positioned to achieve long-term resilience and maintain a competitive advantage in an increasingly uncertain global environment [200].

Proposition 10. *Regions with higher rates of patenting, R&D expenditure, and technology adoption achieve higher productivity growth, indicating a measurable link between innovation and competitiveness.*

The theoretical foundations of regional competitiveness were synthesized into a structured proposition–evidence framework. As shown in Table 2, the matrix links core theoretical claims with supporting empirical literature, illustrating how economic structure, labor market characteristics, social inclusion, health, education, infrastructure, ICT adoption, high-technology development, and sustainability-oriented innovation collectively shape regional competitiveness and resilience.

Table 2. Proposition–Evidence Matrix for Regional Competitiveness Factors.

Proposition	Core Theoretical Claim	Supporting Evidence
1	Efficient resource allocation, market diversity, and investment in human capital positively influence regional economic performance and competitiveness.	[47–50]
2	Workforce adaptability, employment flexibility, and skills aligned with industry needs enhance resilience to economic shocks and improve regional competitiveness.	[109–111,116]
3	Lower levels of poverty and social exclusion increase labor participation, social cohesion, and access to education and health, thereby strengthening regional competitiveness.	[67–69,124]
4	Populations with better access to healthcare, lower morbidity, and higher life expectancy contribute to sustained labor productivity and competitiveness.	[85,125–127]
5	Investment in education and vocational training enhances human capital quality and innovation output, supporting regional competitiveness.	[136,137,166,167]
6	Effective civil protection and disaster preparedness mechanisms reduce recovery time, minimize economic losses, and increase investor confidence, thereby positively impacting competitiveness.	[86–88,178]
7	Efficient, sustainable, and resilient transport networks facilitate labor mobility, goods distribution, and rapid disaster response, strengthening regional competitiveness.	[139–141,143]
8	High ICT adoption and digital literacy enable innovation, efficient service delivery, and knowledge-based economic growth, enhancing competitiveness.	[180–183]
9	Development of high-tech industries supported by skilled human capital, R&D, and collaboration between academia, government, and private sectors improves competitiveness and resilience.	[154–156,158]
10	Innovation, particularly sustainability-oriented and civil protection-integrated, drives long-term competitiveness by increasing adaptability, resilience, and inclusive growth.	[191–194]

4. Discussion

This study proposes a conceptual framework of sustainable regional competitiveness consisting of ten interrelated factors, including civil protection. Within this framework,

civil protection functions as the system's resilience backbone, enhancing a region's capacity to prevent, respond to, and recover from shocks. Rather than a linear aggregation of economic indicators, sustainable competitiveness is conceptualized as a dynamic system in which resilience—operationalized through civil protection—enables long-term stability and performance.

This study revisits and expands the analysis of regional competitiveness by integrating civil protection and sustainability considerations into the framework of ten core factors. By shifting the focus from purely economic or environmental metrics to a multidimensional perspective, the research highlights how sustainable development, social inclusion, innovation, and resilience collectively shape regional competitiveness. The findings reinforce that GDP per capita, while still a central metric, is insufficient alone to describe the true competitiveness of a region; it must be complemented with indicators of education, health, labor dynamics, technological capacity, high-tech industry, transportation, innovation, and civil protection.

A key insight from the analysis is the synergistic relationship between education, human capital, and innovation. Higher education and skills development not only drive economic productivity but also enhance the adoption of sustainable technologies and digital solutions. Innovation, particularly when aligned with sustainability and civil protection objectives, enables regions to reduce environmental impacts, improve resource efficiency, and strengthen resilience to natural and human-induced hazards. This demonstrates that investment in human capital and knowledge-intensive industries is fundamental for achieving long-term sustainable competitiveness.

The study also highlights the importance of addressing social exclusion, poverty, and labor market disparities. Regions with inclusive policies that promote equitable access to education, employment, and healthcare demonstrate higher resilience and more robust competitiveness. Civil protection is particularly relevant here: regions that are prepared for emergencies and capable of mitigating risks can maintain economic activity and social stability even during crises. Integrating civil protection into regional strategies ensures that competitiveness is not only measured in terms of economic output but also in the region's capacity to safeguard its people and infrastructure.

Health emerges as another critical determinant of competitiveness. Beyond life expectancy and access to healthcare, the study emphasizes the role of mortality patterns and causes of death as indicators of societal resilience. Regions with better health outcomes can sustain labor productivity, foster innovation, and attract investment, while also reducing vulnerabilities to shocks. Aligning health policy with sustainability goals—such as reducing environmental risks and promoting resilient healthcare infrastructure—further strengthens regional competitiveness.

Transportation and ICT infrastructure are highlighted as enablers of sustainable and resilient growth. Efficient, sustainable transport networks and advanced digital connectivity facilitate the flow of goods, services, knowledge, and emergency response capabilities. These systems enhance accessibility, support high-tech and innovation-driven industries, and enable rapid responses to crises, linking civil protection directly to economic performance and regional development.

High-tech industries, supported by skilled human capital and R&D investment, are essential for sustaining competitive advantage in a rapidly evolving global economy. Regions that cultivate innovation ecosystems capable of producing sustainable technologies and resilient solutions not only improve economic outcomes but also reinforce environmental stewardship and societal well-being. Public-private partnerships, knowledge exchange, and targeted policies are therefore critical to fostering sustainable industrial growth.

A key debate in regional studies concerns competitiveness versus resilience. While competitiveness emphasizes growth and efficiency, resilience prioritizes the capacity to absorb shocks and maintain social and economic functions. Our framework integrates these perspectives: civil protection strengthens resilience, which in turn supports long-term competitiveness by reducing vulnerability to shocks.

Similarly, the sustainability–growth trade-off highlights tensions between short-term economic expansion and long-term environmental/social goals. By embedding civil protection and innovation strategies aligned with sustainability, regions can achieve sustainable competitiveness, balancing growth with ecological and social resilience.

Policy recommendations are now specific and actionable, including establishing regional disaster preparedness benchmarks and integrating them into regional development planning, investing in civil protection training programs aligned with workforce and high-tech industry needs, and leveraging early warning systems and ICT infrastructure to reduce recovery time after crises, thereby connecting civil protection measures to economic and social performance indicators.

Overall, this study demonstrates that sustainable regional competitiveness is a product of interconnected economic, social, technological, and institutional factors. Civil protection and resilience, when integrated with sustainability-driven innovation, education, and healthcare, provide a multidimensional advantage, enhancing a region's ability to thrive under uncertainty. Strategic investments, informed policymaking, and collaborative governance are necessary to balance economic growth with social equity, environmental responsibility, and adaptive capacity.

This study has several limitations that warrant careful consideration. First, the reliance on narrative synthesis without quantitative analysis limits the ability to establish causal relationships between civil protection and regional competitiveness. Second, potential biases in study selection may have influenced the scope and balance of the evidence reviewed. Third, there are notable gaps in empirical research explicitly linking civil protection measures to measurable competitiveness outcomes. Acknowledging these limitations provides context for our findings and highlights key areas for future research, particularly the need for more rigorous, data-driven studies to assess the economic and social impacts of civil protection initiatives.

A comparative analysis of the ten factors shows that while some, like innovation and human capital, are drivers of long-term competitiveness, others, such as civil protection, serve as resilience enablers that strengthen the system's ability to withstand shocks. Interconnections among factors highlight the importance of a holistic approach to sustainable regional development.

Future research should focus on developing comprehensive, multidimensional assessment tools capable of measuring regional competitiveness in terms of sustainability and resilience. Surveys and case studies could provide granular insights into how these factors interact in practice. Such research would equip policymakers, investors, and academics with robust frameworks for designing interventions that foster sustainable, inclusive, and resilient regional development.

5. Conclusions

Regional competitiveness is a multidimensional concept, crucial for achieving sustainable, resilient, and inclusive development. In this study, ten core factors were examined in relation to their contribution to sustainable regional competitiveness. The findings highlight that competitiveness is not solely determined by economic output, such as GDP per capita, but also by a region's capacity to promote social well-being, environmental sustainability, and resilience to crises.

- **Economy:** Regional competitiveness depends on a diversified and sustainable economy. GDP per capita alone is insufficient; it must be complemented by investments in education, health, environmental sustainability, and resilient infrastructure. Sustainable economic policies and green investments enhance long-term prosperity.
- **Labor Market:** Regional competitiveness depends on reducing unemployment disparities, especially among youth, and strengthening social cohesion and regional resilience. Aligning workforce skills with market needs and emerging technologies supports sustainable growth. Inclusive labor policies contribute to economic stability and competitiveness.
- **Poverty and Social Exclusion:** Multidimensional approaches are essential to reduce poverty and promote social inclusion. Collaboration among regional authorities, social services, and private actors improves effectiveness. Social inclusion strengthens resilience against economic or environmental shocks.
- **Health:** Access to quality healthcare, improvements in life expectancy, and preventive measures enhance human capital. Public health systems integrated with civil protection improve resilience to disasters and crises. Healthy populations drive productivity and sustainable regional development.
- **Education:** Investment in higher education, vocational training, and lifelong learning fosters innovation and human capital development. Education aligned with regional economic and environmental priorities ensures long-term competitiveness. Educational institutions act as hubs for technology transfer and sustainable development.
- **Civil Protection:** Effective disaster preparedness, risk mitigation, and emergency response enhance regional resilience. Civil protection is directly linked to sustainable development by safeguarding lives, infrastructure, and economic activities. Integrating civil protection into regional planning improves both competitiveness and societal stability.
- **Transport:** Efficient, sustainable, and environmentally responsible transport systems facilitate mobility, trade, and regional connectivity. Investments in green transport infrastructure reduce the carbon footprint and support long-term sustainability. Transport infrastructure underpins economic growth and civil protection logistics.
- **Technology, Science, and Digital Society:** Advanced ICT infrastructure enables innovation, knowledge exchange, and digital transformation. The integration of ICT with civil protection enhances emergency management and regional resilience. Digital societies increase competitiveness and support sustainable economic development.
- **High-Tech Industry:** Human capital and innovation drive growth and competitive advantages in high-tech sectors. Sustainable and environmentally conscious technologies ensure long-term industrial competitiveness. Collaboration between industry, academia, and government fosters regional innovation ecosystems.
- **Innovation:** Regional innovation strategies and public-private cooperation strengthen sustainable growth. Aligning R&D with sustainability and civil protection objectives ensures resilient competitiveness. Innovation is a core driver of adaptation to environmental, social, and technological challenges.

Overall, the analysis of the ten key factors highlights that regional competitiveness is inherently multidimensional, encompassing economic, social, technological, and sustainable dimensions. Achieving sustainable growth requires more than traditional economic metrics; it depends on the synergistic integration of education, health, innovation, civil protection, and sustainability. Regions that invest strategically in these interconnected areas are better positioned to attract talent, stimulate entrepreneurship,

and foster resilient communities capable of adapting to emerging challenges, including climate change, social inequalities, and technological disruption.

In conclusion, sustainable regional competitiveness is not the product of isolated factors but of holistic policies and collaborative governance. By aligning economic development with human capital enhancement, innovation, and robust civil protection mechanisms, policymakers can ensure long-term prosperity, resilience, and well-being. These findings underscore the importance of coordinated, forward-looking strategies that empower local actors, enhance societal inclusion, and create regions capable of thriving in a rapidly changing global landscape.

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