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Review

Assessing the Key Factors Measuring Regional Competitiveness

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Abstract: Today's competitive advantage is built through sustainability. Regional competitiveness is undoubtedly one of the most important components for achieving sustainability of development at the local level. The analysis of key factors and their correlations, aimed at gauging regional competitiveness, yields valuable insights into the multifaceted elements that impact the growth and advancement of underprivileged regions. However, a crucial question remains: What precisely are the factors that form the foundation for assessing and measuring regional competitiveness? The literature review and analysis initially identified the ten most frequently mentioned factors for measuring regional competitiveness. The overarching aim of the research is the understanding of the ten main determining factors of regional competitiveness and the extraction of ten propositions based on those ten factors and exploring the relationship between various factors and regional competitiveness. This study's time frame was from August 2023 to January 2024. In this research, our aim was to undertake a traditional literature review, concentrating on the context of doing a more traditional and critical literature review rather than a systematic literature review. We assess and evaluate published research spanning the last five years (2018–2023); we have identified and emphasized ten central and widely published factors that span various domains, including (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. Our main findings on these ten reviewed factors indicate the following. (a) The economy factor should be expanded to include education, healthcare, and environmental sustainability parameters, while (b) there is a need to address youth employment differences in the labor market. (c) Collaborative, multidimensional approaches are important, together with improving health infrastructures and services, to improve poverty and social exclusion. (d) Investments on education and innovation are required to improve prosperity and competitiveness, as are more informed policies and collaborative actions for a greener, healthier, and more sustainable future, and finally, (f) well-planned investments in transportation, the essential link between R&D, innovation, and economic progress, as well as additional high-tech industry development and innovative actions should be taken for permanently sustainable and economic growth of the regions. Overall, the research highlights how economic, social, and environmental factors intertwine to shape successful societies, forming a fundamental understanding of regional competitiveness. The research underscores the interconnectedness of economic, social, and environmental factors in shaping prosperous societies, providing a foundational understanding of regional competitiveness.

Keywords: regional competitiveness; factor; indicator; economy; labor market; poverty; R&D expenditure; high-tech industry; innovation

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1. Introduction

Regional competitiveness refers to the capacity of a specific geographic area to stimulate economic growth and enhance societal well-being through the efficient utilization

of resources and the improvement of residents' quality of life [1]. It encompasses a broad spectrum of factors spanning economic, social, political, and business domains [2].

In recent years, the global emphasis on sustainability has prompted governments worldwide to integrate sustainability principles into their legal frameworks [3]. This approach addresses environmental, social, and economic challenges, paving the way for environmentally friendly economies while mitigating adverse impacts on society and the environment [4]. Regional competitiveness has become a key determinant in realizing sustainability objectives across various research contexts [5].

Sustainable development is often broadly defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" [6]. Sustainable competitiveness is described as "the set of institutions, policies, and factors that determine the level of productivity of a country while ensuring the ability of future generations to meet their own needs" [7].

Competitiveness, as described by Storper (1997), denotes an economy's ability to attract and retain firms with stable or expanding market shares while maintaining or enhancing the standard of living of participants [8]. R. Huggins (2003) emphasizes competitiveness based on creativity, knowledge, and environmental conditions rather than solely on accumulated wealth [9].

Economic competitiveness relies on government–business collaboration, natural resources, diverse economies, quality education, and stability, and drives growth and well-being [10]. It fosters innovation, entrepreneurship, and success [11], measuring adaptability globally [12].

To boost sustainable regional competitiveness, cooperation is vital in investing in education, infrastructure, research, and regulation [13]. This leads to dynamic economic hubs, benefiting individuals and nations. Territorial competitiveness is recognized as cost-effective [14].

The objective of this literature analysis is to assess the competitiveness of regions by analyzing factors that measure regional competitiveness, culminating in the utilization of databases such as the Regional Competitiveness Index, Regional Well-Being, and Eurostat Databases. This analysis specifically considers the sustainability of these factors and explores the role of the EU cohesion policy in promoting regional competitiveness. On a regional level, the combination of sustainability and competitiveness, so-called **"Sustainable Competitiveness",** has received almost no attention so far, except by the European **Regional Sustainability Competitiveness Index (RSCI) [15]**. Regional sustainable competitiveness needs more consideration, as it is likely to be one of the key areas of progress in this field in the future [16]. Furthermore, sustainability concerns have not been addressed nearly at all on a regional level even in the institutional rankings and indices, despite regional competitiveness being a key topic in current policymaking in many countries.

Decision-makers must understand and harness each region's unique advantages to craft policies that align with local conditions and aspirations, thereby contributing to broader economic and social progress at the national level [17]. Competitiveness results from an aggregate of factors, and this review delves into the realm of regional competitiveness by examining various factors, including the economy, regional labor market, poverty, health, education, environment, transport, technology/science, high-tech industry, and innovation [18].

When identifying directions for support under the cohesion policy, particular emphasis should be placed on developing policies and enhancing factors that facilitate the transformation of regions towards a developed and competitive trajectory [19]. Government spending, directed towards increasing competitiveness, has a broad impact on various aspects, including economic growth, social welfare, and regional competitiveness [20]. Enhancing the quality of public sectors can significantly influence economic development, ultimately contributing to balanced regional development [21].

The objective of this research is to provide insights for policymakers in managing efforts to reduce economic, social, and territorial disparities in European countries and regions, thereby fostering balanced regional development.

The value added by this study lies in its comprehensive analysis of regional competitiveness, sustainability, and their intersection based on the ten major factors and the concluding propositions for each factor. By scrutinizing factors measured in databases such as the Regional Competitiveness Index, Regional Well-Being, and Eurostat Databases, this study aims to provide insights into the sustainability of these factors and explore the role of EU cohesion policy in promoting regional competitiveness. By adding something new to the literature, such as the ten propositions, the study delves into the research concept of sustainable competitiveness, particularly on a regional level, offering a nuanced understanding that can inform policymaking and decision-making processes. So, the results obtained from this study would be useful for policymakers, regional development agencies, researchers, and stakeholders involved in crafting strategies and policies aimed at fostering balanced regional development, reducing economic, social, and territorial disparities, and promoting sustainable growth.

2. Methodology and Literature Search

The foundational theoretical framework for understanding and evaluating regional competitiveness is established through a literature review on regional competitiveness, drawing upon key concepts and insights from existing research. The proposed factors and information utilized are sourced from reputable databases, including the Regional Competitiveness Index (RCI), Regional Well-Being Databases, and Eurostat.

The literature analysis phase commenced by compiling a comprehensive database of indicators, incorporating these three primary sources: the **Regional Competitiveness Index (RCI)**, the **OECD Regional Well-Being** database, and the **Regional Innovation Scoreboard (RIS):**

- **RCI:** Based on the Global Competitiveness Index, assesses competitiveness in the past decade for EU NUTS-2 regions in areas like governance, infrastructure, health, human capital, labor market, and innovation [22].
- **OECD Well-Being:** Uses the OECD framework to measure well-being in regions and cities, focusing on individuals' well-being experiences, local characteristics, and overall well-being across regions, with scores ranging from 0 to 10 [23].
- **RIS:** Compares innovation performance across EU countries, European nations, and neighboring regions, helping countries identify strengths and weaknesses in their innovation systems for improvement [24].

The analysis adhered to guidelines, and exploration was conducted through Google Scholar and Science Direct for studies published between 2018 and 2023. Specific predefined terms, such as "regional competitiveness", along with other specified phrases, were employed to obtain insights into the current research landscape in this subject area. An alternative phrasing search was carried out within relevant publications, leading to the selection of 10 definitive search terms (research themes) for this literature analysis. The primary purpose of our analysis was traditional or narrative, involving the analysis and summarization of a body of literature. This literature or narrative analysis encompasses a comprehensive examination of published literature on the specific topic of regional competitiveness, focusing on the research question of the factors that explain the main determinants of regional competitiveness. It involves extracting propositions based on these factors and exploring the relationship between various factors and regional competitiveness [25]. This literature review contains the most pertinent studies and points to important past and current research and practices. It provides background and context, demonstrating how our research will contribute to the field. This was achieved by presenting a comprehensive background of the literature within our topic of interest, highlighting new research streams, identifying gaps, or recognizing inconsistencies. This methodological approach helped us refine, focus, and shape our research questions, as well as develop theoretical and conceptual frameworks. The eligibility of search results was determined based on

assessments of the title, abstract, and full text. Two researchers (A.K. and I.B.) screened more than 400 articles for eligibility using the following criteria:

- Inclusion of papers published between 2018 and 2023 (including earlier papers for terminology definition).
- Investigation of the relationship between regional competitiveness and the 10 specified factors.
- Limited to studies published in English.
- A broad search approach was adopted to encompass studies aligning with the review's objectives. No contact was made with authors for supplementary information.
- Only full-text publications in English were considered, which may have introduced a potential bias in selection.

Finally, the two researchers selected 193 references that satisfied the above-mentioned criteria. Of these, 153 references were published between 2018 and 2023, while the remaining 40 references date back to before 2018, with an emphasis on terminology definition.

3. Results

Following a comprehensive review of pertinent literature and information analysis pertaining to sustainable regional competitiveness, ten primary research factors were distilled from the publications (Table 1). These ten factors are namely the Economy, Labor Market, Poverty and Social Exclusion, Health, Educational Infrastructure, Environmental Considerations, Transport Infrastructure, Science and Technology, High-tech Industries, and Innovation. The results of our review for each of these indicators are presented below. Before the in-depth analysis of each factor, it became evident that all those factors are well-connected to each other, and they should be treated as such. Through our research and analysis, it became evident that these factors do not operate in isolation; rather, they interact and influence each other in complex ways. For example, the state of the economy can impact the availability of jobs in the labor market, which in turn affects poverty levels and social exclusion. Similarly, health outcomes can be influenced by environmental factors, access to education, and the presence of high-tech industries. Recognizing these interconnections is crucial for developing effective strategies to enhance sustainable regional competitiveness. All of these factors have a European dimension and primarily target all European countries. As mentioned in the "Methodology and Literature Research" section, this study is based on the latest developments on regional competitiveness and its factors. Therefore, the analyzed information comes from published articles between 2018 and 2023. However, it is important to note that all these articles also include information and data from years prior to 2018.

Table 1. The ten factors measuring competitiveness on the regional level.

Factors	Related References
(1) Economy	[26–53]
(2) Labor Market	[44–51,53–62]
(3) Poverty and Social Exclusion	[63–81]
(4) Health	[82–94]
(5) Education	[95–102]
(6) Environmental and Energy	[103–124]
(7) Transport	[125–131]
(8) Technology/Science and Digital Society	[132–145]
(9) High-tech Industry	[146–155]
(10) Innovation	[156–162]

3.1. Economy Factor

The concept of the "economy of the region" plays a central role in regional development, and competitiveness stands out as a crucial outcome of economic competition at the regional level [26]. Competitiveness encompasses indicators of both an economic and social nature, highlighting the multidimensional nature of regional development [27]. Scholars often focus separately on competitiveness and sustainable development, but integrating these two domains is essential for a comprehensive understanding [28].

Regional competitiveness is often defined as the capacity of a region to surpass GDP goals, particularly in industrialized countries where factors like innovation, education, institutions, social cohesion, and ecological ambition play a significant role [29]. Evaluating competitiveness requires both an input assessment, considering costs, productivity, economic structure, and capabilities, and an outcome assessment, defining a region's ability to deliver beyond GDP goals [30].

Some researchers use economic measures to evaluate the future share of national/regional economies in the global GDP [31]. GDP per working-age individual, defined as "foundational competitiveness", is considered to have two dimensions of prosperity: the ability to achieve high productivity and the ability to mobilize a high share of the available working force [32]. This approach facilitates the generation of a ranking of regions based on diminishing competitiveness and the estimation of trends in competitiveness evolution.

While GDP per capita is a pivotal metric for assessing the levels of development and affluence within a region, it has limitations in providing a holistic understanding of the comprehensive well-being and quality of life experienced by a region's residents [33]. Other determinants, such as education, healthcare, social welfare, environmental sustainability, and human development, play a significant role in configuring the life standards of residents across various global countries [34]. It is worth mentioning that the information we used in this research comes from all over the world and is not focused on specific countries or even specific broader geographical areas.

To cultivate a more encompassing and precise yardstick for regional competitiveness, there is an imperative to incorporate a broader spectrum of indicators that encapsulate economic prosperity as well as societal, environmental, and human development facets within a region [163]. Regional competitiveness, therefore, may be delineated as the efficacious stewardship of resources and capacities to realize an unbroken augmentation in both business productivity and the comprehensive well-being of the region's residents [35].

This comprehensive approach recognizes that regional competitiveness is a multidimensional concept encompassing economic prosperity, social well-being, and environmental sustainability [36]. While GDP per capita retains its pivotal status as a metric, a more thorough understanding of competitiveness necessitates the amalgamation of a wider array of indices [37]. This approach allows for a more even-handed and sustainable development strategy, attuned to the well-being of all residents within the region.

The competitiveness of an economy extends beyond considerations of GDP and productivity [38]. Enterprises must navigate political, social, and cultural dimensions, emphasizing the importance of establishing an environment characterized by efficient structures, institutions, and policies that actively foster competitiveness. This holistic perspective acknowledges the multifaceted nature of economic competitiveness and emphasizes the need to address various dimensions to ensure sustained economic vitality [39].

In navigating the intricate landscape of regional competitiveness, it is crucial to recognize that the dynamics shaping economic vibrancy extend beyond traditional metrics [40]. Enterprises operate within a complex web of interrelated factors, including political stability, social inclusivity, and cultural richness. The development of an environment conducive to competitiveness demands strategic attention to efficient structures, robust institutions, and forward-thinking policies [41]. Successful regional competitiveness hinges not only on maximizing economic output but also on fostering an ecosystem that values diversity, innovation, and adaptability [42]. Embracing this holistic perspective enables regions to position themselves for sustained economic vitality, ensuring a resilient and flourishing

landscape that meets the diverse needs of its inhabitants while contributing to broader national and global objectives [43].

Proposition 1. *The present information indicates that economy, associated with GDP per capita, must encompass a broader spectrum of indicators, including education, healthcare, and environmental sustainability, to enrich a comprehensive regional factor.*

3.2. Labor Market Factor

The role of human capital in economic growth has been the subject of extensive research [54]. Nelson and Phelps (1966) were among the first to emphasize the impact of human capital on technology adoption and its subsequent influence on economic growth [55]. The concept of human capital was further developed by Romer (1986) and Lucas (1988), and subsequent studies, such as those by Barro (1991) and Aghion and Howitt (1998), have explored the relationship between human capital and economic growth [56].

In the context of regional economics, human capital endowment is considered a contributing factor to regional economic growth [57]. However, studies highlight the unequal or asymmetrical impact of human capital on competitiveness and growth. The effect of education on economic growth can vary among countries and regions, and its impact on regional wages and productivity is subject to disparities [58].

Recent developments in Spain and other Southern European countries suggest that the education level alone may not lead to higher growth rates and lower unemployment levels [59]. Instead, education should align with the economic structure of the region and meet market needs [44]. This underscores the importance of considering economic structures when assessing the impact of human capital on wages, household income, and overall economic growth.

Policy measures aimed at addressing unemployment and fostering a skilled labor force aligned with market needs are recommended [60]. Measures such as reducing structural unemployment, promoting lifelong learning, improving the quality of the education system, and addressing social inclusion and poverty control are essential for empowering the labor market and contributing to economic growth [45].

Unemployment and inactivity are significant challenges, exhibiting regional disparities influenced by economic structures, location factors, and labor force characteristics [46]. Long-term unemployment, rooted in various causes, requires a comprehensive understanding of economic, institutional, and behavioral factors. Regional resilience to youth unemployment varies, emphasizing the need for tailored plans addressing unique regional needs and disparities [47].

The labor market is influenced by regional disparities in GDP, unemployment, education, and well-being indicators [48]. The effectiveness of policies and institutions addressing long-term unemployment varies depending on economic dynamics, institutional frameworks, and individual behaviors. Tailored approaches considering diverse factors are necessary for effectively combating long-term unemployment and fostering sustainable economic growth [49].

Contrary to the traditional view, recent data challenge the notion that human capital alone guarantees economic stability and a swift recovery from crises [50]. Countries with relatively high levels of human capital may still experience critical levels of unemployment and weak economic growth [51]. This highlights the importance of considering factors beyond human capital, such as economic structures and market needs, in assessing regional competitiveness and growth.

While human capital is recognized as a key element of economic growth, its impact is complex and context-dependent [52]. Understanding the interplay of human capital with economic structures, regional dynamics, and market needs is crucial for formulating effective policies that contribute to sustainable economic growth and reduced unemployment [53].

In the face of evolving economic landscapes, fostering human capital should be coupled with strategic investments in technology, innovation, and entrepreneurship [61]. By aligning education and skill development with the demands of emerging industries, regions can enhance their competitiveness and adaptability to changing economic trends. The synergy between a well-educated workforce and forward-looking economic policies is integral to shaping resilient and thriving regional economies [62].

Proposition 2. *The latest information highlights that the labor market is influenced by regional disparities in GDP, unemployment, education, and well-being indicators. There is a pressing need to address youth unemployment disparities in the ever-evolving labor market.*

3.3. Poverty and Social Exclusion Factor

Social exclusion is a comprehensive concept encompassing various factors that can render specific groups in society vulnerable [63]. These factors include unemployment, limited access to education, childcare, and healthcare facilities, inadequate living conditions, and insufficient social participation, with a particular emphasis on labor market exclusion [64].

Recognized as a major concern for EU institutions, numerous instruments have been developed to counteract social exclusion [65]. A study aimed to evaluate the role of policy measures in combating social exclusion in the EU, distinguishing between national and supranational tools [66]. Social exclusion has been identified as a significant policy challenge in the 21st century, not only in the European Union, but also in various parts of the world [67,68].

Social exclusion is characterized as a dynamic and multidimensional process involving the separation of individuals and social groups from the rest of society [69,164]. Poverty is confirmed as a multi-faceted phenomenon with clear within-country variability, dependent on factors such as the urbanization level and, consequently, the cost of living [70]. The proposed measures aim to enhance the targeting of anti-poverty initiatives at the local, sub-national level in the EU.

The challenge of addressing social exclusion necessitates a collaborative effort involving various stakeholders, including governments at different levels and the private sector [165]. A comprehensive approach to community capacity development, integrating various dimensions of capacity building, is crucial for effective outcomes [166]. Achieving social inclusion requires a collective commitment from a range of stakeholders, with the social economy offering innovative solutions for inclusive economies [71]. Collecting multidimensional information encompassing economic, social, and political aspects is essential for effective policy planning, monitoring, and targeting to reduce group inequalities and enhance social inclusion [72]. This approach enables policymakers to identify vulnerable groups and tailor policies, accordingly, addressing intersecting challenges [73]. Furthermore, ongoing information collection facilitates the assessment of policy impact and necessary adjustments, ultimately promoting an inclusive and equitable society [74].

Measurement of social exclusion or inclusion typically focuses on specific domains such as poverty, labor market participation, education, health, access to services, and civic engagement [167]. Long-term unemployment is closely correlated with social exclusion, leading to poverty and potential social unrest, necessitating a multifaceted approach [75]. Educational reforms and institutional changes are essential in combating social exclusion [168]. Discrimination based on cultural, social, and racial identity can perpetuate exclusion, making institutional reforms crucial for breaking down barriers and fostering inclusivity [76]. An integrated strategy combining educational reforms and institutional changes can empower individuals and break the cycle of exclusion, contributing positively to society [77]. While regional differences in social exclusion and cohesion exist, they cannot be solely attributed to economic exclusion levels [169]. These complexities require a nuanced understanding, and equalizing indicators may entail profound transformations in institutional and political dimensions in the least developed economies [170]. However,

it is evident that social cohesion indicators are not solely products of economic exclusion levels and patterns [171].

The link between decentralization and poverty and social exclusion alleviation appears to be more consistent at the regional level [172]. Greater regional autonomy is associated with lower poverty and social exclusion, regardless of the quality of regional government. When regional governments have the capacity to design their independent policies, there tends to be a reduction in poverty and social exclusion, leading to overall improvements in well-being.

The Regional Policy of the European Union aims to promote job creation, foster economic growth, and pursue sustainable development in all EU regions [173]. While all EU regions receive funding through the Regional Policy, the distribution is not uniform, with less developed regions receiving more generous funding. The amount of funding received under the Regional Policy serves as a proxy for supranational tools [78].

The European Union emphasizes development strategies with a strong emphasis on job creation and poverty reduction [174]. However, the ideal economic conditions for generating high- and low-skilled employment and ensuring labor market inclusion in European Union regions remain unclear. A study assesses how key factors such as infrastructure, human capital, innovation, and the quality of government condition employment generation and labor market exclusion in European regions [79].

A broader coverage and a higher level of targeted support measures can make a more substantial contribution to poverty reduction [80].

Moreover, the adverse effects of incorrect political decisions on regional development may be highlighted concerning rural poverty and exclusion in the regions [81]. This suggests the need for a new practice of monitoring and focused reporting at the micro-regional level, close cooperation of regional development and social policy actors in regional planning, and a definite commitment of local decision-makers to reduce spatial inequalities and avoid further escalation of exclusion.

Proposition 3. *The findings suggest that the dynamics of employment and social exclusion vary depending on the conditions in a region. While higher innovation and education contribute to overall employment generation in some regional contexts, low-skilled employment experiences the most significant growth in regions with a better quality of government. The present information highlights the urgency of collaborative, multidimensional approaches to combat poverty and social exclusion.*

3.4. Health Factor

Health plays a pivotal role in economic theory, serving as a linchpin for a nation's economic well-being [175]. Extensive research consistently affirms the positive impact of health on economic aspects, including productivity, income, and overall growth [82]. Health disparities exist both between and within countries, stemming from geographical variations and gender differences [83]. Despite the global discourse on public health, there is a research gap on health inequalities and their impact on competitiveness, demanding immediate attention [84]. Public health holds a crucial place among economic indicators, intertwined with a nation's competitiveness [85].

Life expectancy stands out as a key health indicator, notably in less competitive economies like Croatia, Mexico, Poland, and Romania. Higher life expectancy enhances human capital competitiveness and elevates a country's standing, as seen in indices like the Global Competitiveness Index (GCI), which closely correlates with the Human Development Index (HDI), GDP, and gender equality [86]. These findings underscore the significance of life expectancy as a health and social indicator influencing a nation's competitiveness and overall progress [87]. Prioritizing improvements in life expectancy can positively impact global competitiveness and promote sustainable development.

Education, a consistent factor in self-reported health, varies by region [88]. To understand mortality dynamics and health inequalities better, we must delve into specific conditions [89]. Access to healthcare services significantly influences health disparities,

primarily affected by geographical location and socio-economic status [90]. Financial barriers pose a substantial obstacle to healthcare access, especially after economic transitions [91]. Rural–urban divides exacerbate these inequalities, necessitating comprehensive strategies for mitigation [92]. In summary, the interplay of factors, including human capital, socio-economic development, and health, shapes a region's competitiveness and economic trajectory.

Ensuring great well-being is considered a fundamental right for everyone and plays a crucial role in economic development [93]. Good health enhances individuals' competence, creativity, and longevity. However, the financing and management of healthcare pose evolving challenges worldwide. The objective of fiscal decentralization is to bridge gaps by enabling each region to independently fulfill public facilities [94]. This initiative aims to boost economic growth and alleviate poverty within the framework of regional development.

Proposition 4. *The current information highlights the necessity for initiatives aimed at enhancing health infrastructures and services to play a more dynamic role in economic prosperity. Well-being spending is influenced by factors such as CO_2 emissions, urbanization, and unemployment, whereas trade openness and Gross Domestic Product (GDP) have adverse effects on health expenditure.*

3.5. Education Factor

The role of higher education in regional socio-economic development has been prominent for over two decades, especially in Western universities acting as catalysts for innovation and industrial clusters [95]. However, the evolving global landscape has transformed universities into integral components of worldwide research and education networks. Evaluating the impact of universities in less developed regions on regional development is a complex challenge that requires a comprehensive tool focusing on diverse indicators [96]. Recent research underscores the correlation between high-quality educational resources, such as mean years of school, and decreased unemployment, showcasing the pivotal role of education in economic growth.

The investment attractiveness of a regional market for educational services is foundational for its global competitiveness in an industrial context [97]. The close interrelation between the economy and the professional education system is crucial for the competitiveness of national and regional economies. Enhancing the management of the professional education system is key to creating conditions for social and economic system development [176].

The development of the education sector, particularly tertiary education, plays a vital role in regional competitiveness, influencing population settlement patterns [177]. In the context of globalization, higher education systems drive human capital quality, contribute to socio-economic development, and significantly affect economic competitiveness [98]. Higher education institutions, acting as research hubs, possess the capacity to drive innovation across economic sectors and enhance global competitiveness [99]. In the contemporary global "knowledge economy", higher education institutions contribute to the economic competitiveness of regions and nations through the delivery of quality higher education and engagement in innovation activities [100]. The relationship between higher education institutions and surrounding economies is mutually beneficial, fostering increased competitiveness.

An objective assessment of the contribution of higher education to the regional economy involves examining the relationship between personnel training and industrial specialization [101]. Consideration of factors such as admissions transparency and the migration patterns of university graduates adds depth to the assessment. Employing an integrated approach with quantitative indicators and sociological surveys enhances the accuracy of the evaluation, providing valuable insights into the role of higher education in regional competitiveness and economic growth [102].

Proposition 5. *The symbiotic relationship between education, innovation, and economic prosperity underscores higher education's pivotal role in fostering economic progress in the modern landscape. The current information emphasizes the need for educational and innovation investments to ensure lasting prosperity and competitiveness.*

3.6. Environment and Energy Factor

Contemporary environmental challenges stem from human–environment interactions during industrialization [103]. The link between economic development and environmental quality receives multidisciplinary attention [104]. Nations and regions aim to enhance competitiveness through renewable energy adoption for sustainable, low-carbon industrial progress [105]. This requires responsible use of renewable energy sources, efficient energy usage, and equitable access to sustainable energy [106]. Addressing climate change necessitates assessing resource-efficient, low-emission pathways by industries and institutions, both public and private [107,178].

Decoupling natural resource use and environmental impacts from economic growth is crucial to curb escalating resource consumption [179]. Environmental strategies involve preservation, management, and protective measures, promoting sustainable tourism and grassroots development [108]. Holistic, environmentally conscious decision making, supported by widespread environmental education and societal engagement, is essential. Collaboration across governance, academia, and public spheres is vital for a sustainable, eco-conscious future [109].

Studies highlight the adverse correlation between fine particulate matter (pm2.5) concentration and human health, emphasizing the urgency of mitigating airborne pollutants [110]. Urban planning and environmental management intersect through policies, population density regulation, land use controls, and transportation infrastructure design to curb air pollution emissions [111]. Localized policies have transformative power, fostering collective progress towards cleaner air and improved environmental health [112].

In a symposium of urban planning, predictive modeling, and collaboration, optimism prevails, driven by informed policies and collective aspirations [180]. Effective air pollution control strategies hinge on accurate source attribution and responses to emission changes, with future socioeconomic developments and climate policies pivotal for air quality enhancement [113]. Global air quality indices offer insights into the sustainability of climate policies, facilitating the evaluation of their impact on global and regional air quality [114].

Sustainable innovation strategies have been taken very seriously by the European Union (EU), which aims to reduce energy consumption and environmental pollutant emissions [115]. Environmental/energy innovation is crucial for achieving Sustainable Development Goal (SDG) 9 and transitioning to green energy production, a basic pillar of today's energy policies at the regional and national level [116]. Driving forces behind environmental innovation include factors like environmental taxation, carbon pricing policy, budget allocation for renewable energy development, regional authority, financial development, and globalization [117].

The global focus on energy transition, particularly the emphasis on renewable energy, is a key strategic concern [118]. Policies at national and regional levels are crucial for promoting the development of renewable energy. The EU prioritizes sustainable innovation, efficiency, and environmental protection, aiming for technological advancements and supporting decision making for regional sustainability, energy conservation, and emission reduction [119].

Policymakers worldwide face the significant challenge of transitioning to a low-carbon economy [120]. In the European Union (EU), aggressive greenhouse gas reduction targets align with the goal of promoting green growth at both national and regional levels. This commitment is evident in a recent transformative policy shift, introducing the smart specialization research and innovation strategy (RIS3) for national and regional development [121].

Policy responses for regional energy transitions are organized by leveraging crises as pivotal moments [122]. These responses are further examined within specific themes, including the energy transition originating from coal regions, the energy transition aligned with the green growth agenda, and the energy transition intensified by multiple crises.

Recognizing the socio-material aspects of renewable energy enables a nuanced analysis of how institutions, governance, and infrastructure impact energy transitions and policy effectiveness at local and regional levels [123]. The examined regions enhanced their institutional and governance capacity, employing targets, energy visions, and spatial planning to facilitate the deployment of renewable energy [124].

Proposition 6. *The present information highlights the need for informed policy elaboration and collaborative actions in the realms of environment and energy for a greener, healthier, and sustainable future. It highlights the need for further research to understand the interplay between economic policy uncertainty and environmental pollution. To foster environmental/energy innovation effectively, countries should consider decentralizing policymaking, encouraging private sector budgets for renewable energy, and regulating globalization appropriately.*

3.7. Transport Factor

Infrastructure, a foundation for economic growth, significantly influences regional competitiveness [125]. The state of transportation infrastructure, including structure, connections, technical specifications, and quality, depends on expenditure and modal structure. Recent research on transportation has focused on sustainability and environmental aspects. High-quality transport infrastructure is crucial for the efficient functioning of the economy, facilitating safe and prompt transportation of goods and services [126]. It serves as the cornerstone of socio-economic growth, attracting investors and enhancing living standards.

Transport systems and spatial patterns of mobility are discussed in relation to competitiveness, drawing from the debate between economists Paul Krugman and Michael Porter [181]. Connectivity, including transport and ICT infrastructure, is a key determinant of regional economic competitiveness. The transport sector shapes economic well-being and development [182], preventing setbacks and economic burdens [183]. Enhancing accessibility, through inter-regional transport arteries, is crucial for sustainable regional growth [184]. Transport infrastructure is the bedrock of economic expansion, ensuring the smooth flow of goods, ideas, and services [127]. Transport is a fundamental catalyst for sustainable regional development, influencing economic, social, and ecological dimensions [128]. Investments in road networks can bolster regional GDP and have cascading positive effects [129]. Different types of transport infrastructure yield diverse economic impacts [185].

The core challenge is to foster a state stance in economic development, creating conducive conditions for socio-economic progress by enhancing the quality of transport services [130]. The objective is to reduce societal costs dependent on transport and elevate the competitiveness of the domestic transport system [131]. Recognizing transport as a fundamental element supporting the economy and driving economic growth is essential.

Proposition 7. *The information highlights the need for well-planned strategies and infrastructure investments in transportation, to drive sustainable development and economic growth. It is also highlighted that while stimulating the economy is a primary policy objective, the decision-making process lacks a solid foundation. Transport studies and political geography attempt to elucidate the intricate relationship between transport and the economy.*

3.8. Technology/Science and Digital Society Factor

In recent data, a primary objective of the European Union (EU) has been to promote increased investment in research to enhance competitiveness [132]. Research and development (R&D) are defined by the OECD as systematic efforts to expand knowledge and its applications. R&D expenditures and intensity indicators are widely regarded as pivotal

factors for growth, productivity, and competitiveness by policymakers and innovation analysts [186]. The rapid development of the information and communication technologies (ICT) sector has driven significant global societal and employment changes. The integration of ICT into innovation systems is crucial for the overall competitiveness of economic regions and national economies [133]. High-tech industry development plays a key role in regional and industrial competitiveness, underpinning a nation's innovation potential.

With the progress and development of science and technology, the wave of digital civilization characterized by digitalization and networking has brought about a major change in economic development, society, and lifestyle [134]. Public and private entities worldwide recognize the transformative power of innovation, prompting them to allocate resources to R&D. Governments support innovative endeavors through financial assistance, catalyzing groundbreaking discoveries [135]. This collaboration between public and private sectors fosters an ecosystem where innovation thrives, driving societal progress [136]. In this symposium on investment, innovation emerges as a linchpin, embodying the potential of human ingenuity. As budgets are allocated, a promise unfolds; the pursuit of knowledge and innovation shapes society's trajectory, propelling it toward promising horizons. Human resources in science and technology, along with indicators like patents, publications, and R&D expenditures, describe a region's research and innovation potential [137]. Human capital, complementing R&D investment, is essential for continuous idea generation and knowledge expansion [138]. Knowledge-based industries demonstrate direct positive effects of monetary investment on R&D outcomes.

Empirical analysis reveals a positive interplay between innovation and R&D across sectors, with business R&D exerting the most significant influence [187]. Private enterprise plays a pivotal role in driving progress through innovation, emphasizing the importance of market forces and industry expertise [188]. These results suggest that fostering intersectoral collaboration between business, public, and higher education R&D is crucial. This partnership can accelerate progress, channeling collective efforts toward shared growth and prosperity. This analysis underscores the interdependence of innovation and R&D, emphasizing the importance of nurturing these connections [139]. Public investment in R&D acts as the foundation for a nation's innovation prowess, but policy frameworks, human capital, and market access also play pivotal roles [140,141]. This holistic approach paves the way for an innovative future where ideas flourish, powered by knowledge, enterprise, and collective determination.

Adopting a quadruple helix approach is essential for effective policy implementation, underscoring the importance of public policies that enhance collaboration among key stakeholders in the ecosystem [142]. This includes active participation from the research community, industry, public sector, and citizens. The emphasis should be on fostering strong connections, promoting technology transfer and dissemination, building trust among stakeholders, enhancing absorptive capacity, and facilitating business access to resources and financing [143]. Consequently, the design of public policies should be geared towards supporting innovation within firms, striking a balance between regional cooperation's exploration and exploitation.

Government policies in the realm of science and technology wield influence on regions, particularly through the concentration of research and development (R&D) activities [144]. However, it is crucial to recognize that government policies often overlook the regional ramifications of science and technology policies and industrial policies. These effects may have enduring consequences, especially for regions with less competitive economies [145]. Acknowledging and addressing these regional impacts is pivotal for ensuring the long-term success and competitiveness of all areas.

Proposition 8. *The current information underscores the essential link between R&D, innovation, and economic progress towards a sustainable tech-savvy future, where technology, science, and digital society unite to drive progress and growth.*

3.9. High-Tech Industry Factor

High-tech industry, a transformative force, profoundly influences nations [146]. Marked by continuous technological advancement and capital consolidation, it underscores the paramount importance of innovation for a competitive edge [147]. Innovation plays a pivotal role in propelling progress within an environment that thrives on pioneering concepts, given the fleeting lifecycles of high-tech products [148]. In this ever-evolving landscape, innovation reigns supreme, propelling advancements where audacious ideas take center stage. Operating on a perpetual trajectory of evolution, the high-tech sector adapts to the fluidity of change, a testament to human ingenuity with technologists as visionary architects of transformation [189]. This human capital, enriched with specialized skills and forward-thinking vision, emerges as the primary driving force behind a nation's competitive prowess.

This narrative highlights the symbiotic interplay between high-tech products, innovation, and human capital, collectively forging the economic destinies of nations [190]. Recognizing that innovation thrives on individual brilliance, nations invest vigorously in nurturing technologists, fostering growth, and encouraging unfettered creativity [149,150]. This intricate tapestry of innovation, technology, and human endeavor constructs an economic landscape where progress becomes a tangible and sustainable reality [151].

Today, high-tech enterprises encompass organizations deeply immersed in producing, researching, developing, and servicing high-tech products [191]. The global expansion of high-tech industries significantly contributes to social productivity and overall national strength [152]. The sector's focus on science and technology serves as a linchpin in regional development, with a robust knowledge infrastructure fueling continuous innovative endeavors [192]. Empirical evidence underscores the positive correlation between regional GDPs per capita, the workforce engaged in science and technology, tertiary education prevalence, and scientific and technological activities. These correlations highlight the transformative impact of prioritizing human resources in science and technology on regional economic development [153].

Recommended policies involve enhancing regional innovation capacity through comprehensive efforts on both the demand and supply sides, fostering increased investment from both private and public sectors [154]. Additionally, promoting integrated technology and industrial policy by encouraging innovation expenditure within mainstream industrial policy programs is crucial. These policy adjustments aim to harmonize conflicting directions, fostering collaboration among stakeholders, and strengthening regional innovation capacity for sustained growth [155].

Proposition 9. *The current information emphasizes the additional development of the high-tech industry as a high priority to the regional authorities towards a desired sustainable future, and targeted measures should be taken in a local and regional context. The analysis reveals strong complementarities among business, education, and government spending on research and development (R&D), juxtaposed with divergent paths of technology/innovation and industrial policies.*

3.10. Innovation Factor

To foster sustained economic development in less privileged regions, regional policy should prioritize innovation [193]. Trade and investment integration offer a dual opportunity: expanding market horizons for domestic enterprises and catalyzing productivity and innovation through exposure to international competition, infusion of expertise, and cutting-edge technology. However, it is crucial to note that smart specialization often overlooks the vital role of public research in entrepreneurial ecosystems, hindering efforts to bridge research and innovation gaps among EU member countries [156].

Effective governance of state-owned enterprises and strategic export promotion play a pivotal role in cultivating entrepreneurial ecosystems, strengthening the export capabilities of small and medium enterprises (SMEs) and overall competitiveness [157]. SMEs, as drivers of domestic economic growth, face challenges such as reliance on labor-intensive in-

dustries, limited R&D capabilities, and insufficient financial support. The resource-intensive nature and prolonged timelines of research and development necessitate consistent financial inflows, prompting SMEs to explore external financing avenues [158].

The success of R&D relies on the open exchange of knowledge across diverse sectors [159]. While the majority of R&D funding in the EU comes from the business sector, higher education institutions and government sectors, despite contributing smaller shares, exhibit greater resilience to economic fluctuations. Member states with higher GDP per capita host a larger number of innovative enterprises, often engaging in collaborative ventures [160]. Despite the paramount importance of innovation, certain EU countries face challenges in strengthening their presence, as evidenced by plateauing patent applications to the European Patent Office since 2008.

A practical approach to address this challenge is to encourage regions to develop Regional Innovation Strategies [161]. These strategies should focus on promoting public, private, and inter-firm cooperation, creating institutional conditions for more efficient use of scarce resources in innovation promotion. This entails larger and more effective spending in the innovation field through regional policy [162].

Proposition 10. *The present information underscores the additional innovative actions that should be taken in all phases of the innovation process using and implementing all the relevant innovation management tools and techniques*.

A key limitation of this scoping review is the reliance on short-term studies, which restricts the available literature for discussing the findings. Nevertheless, the chosen review type was considered the most suitable for the current topic.

4. Discussion

In this research, we review and analyze the ten major factors which can describe, in the most comprehensive way, regional competitiveness. This analysis has delivered ten propositions for each factor. The information presented in the article underscores the complexity of regional development/competitiveness, highlighting the need for a multidimensional approach beyond economic metrics like GDP per capita. While GDP remains a crucial indicator, the findings suggest that it must be complemented with factors such as education, healthcare, environmental sustainability, and innovation to truly capture a region's prosperity. One significant aspect revealed by the information is the interplay between education, innovation, and economic prosperity. Higher education becomes a key foundation for fostering innovation, which in turn drives economic progress. Thus, investing in education becomes paramount for ensuring lasting competitiveness and prosperity in the modern landscape.

Moreover, the article emphasizes the pressing need to address disparities in the labor market, particularly concerning youth unemployment. Regional variations in GDP, unemployment rates, education levels, and well-being indicators significantly influence employment dynamics and social inclusion. Collaborative efforts are required to mitigate these disparities and promote inclusive growth. Furthermore, the literature analysis highlights the importance of health infrastructure and services in contributing to economic prosperity. However, it also reveals a complex relationship between health expenditure and factors such as CO_2 emissions, urbanization, and trade openness. This necessitates informed policymaking and collaborative actions to balance economic growth with public health priorities effectively.

Another critical aspect discussed is the role of transportation infrastructure in driving sustainable development and economic growth. Additionally, this article underscores the development of high-tech industries and targeted measures at the local and regional levels to harness the potential of technology and innovation for economic progress. It calls for informed policies, collaborative actions, and strategic investments across sectors to

foster inclusive growth, environmental sustainability, and technological advancement for a brighter future.

This paper sets the basis for further research on the multi-interconnection of these factors. In the next phase, comprehensive questionnaires will provide insights from individuals and organizations within less developed regions, offering a nuanced view of these dynamics. There is a strong need for the elaboration of a method which could be relied upon, regarding qualitative and quantitative factors, and which can evaluate regional competitiveness. The method should give the freedom of choosing the most appropriate factors with the purpose of making a good decision. This is very important to the regional governments, in order to assess regional competitiveness and compare their policies with those of other regions, to the business community, to achieve investments plans, and to academics, who can use it to better understand and analyze how regions compete in the market.

5. Conclusions

Regional competitiveness is vital for prosperous and sustainable communities. Key factors like the economy, labor market dynamics, educational infrastructure, technological advancements, and scientific progress are crucial for overall well-being in less developed regions. Elements such as poverty, social inclusion, healthcare accessibility, environmental sustainability, transportation, digital societies, high-tech industries, and innovation play pivotal roles in driving economic progress.

However, achieving inclusive growth remains a persistent challenge. Striking a balance between economic development and environmental sustainability is crucial. Sustainable low-carbon industrial development, harnessing renewable energy, and robust climate change mitigation are at the forefront. Policies influencing air quality, considering factors like population density and land use, are pivotal for sustainable development.

Innovation, fueled by robust research and development (R&D) and a skilled workforce, is the driving force behind economic growth. Collaborations among businesses, public institutions, and higher education foster innovation. Challenges persist, demanding incentives for collaboration, enhanced technological competencies, and knowledge exchange.

Regional development is a complex symphony:

- Well-planned investments in transportation, and the essential link between R&D, innovation, and economic progress. Economy factors should be expanded to include education, healthcare, and environmental sustainability parameters.
- To reduce social exclusion and promote an inclusive society, multidimensional approaches are a necessity. There is a need to address youth employment differences in the labor market.
- Health's vital role in economic prosperity underscores the importance of healthcare access and life expectancy. Collaborative, multidimensional approaches together with improving health infrastructures and services to improve poverty and social exclusion are critical.
- Higher education, research, and development (R&D), and innovation are essential for regional competitiveness, and more targeted funding is crucial. Investments in education and innovation are required to improve prosperity and competitiveness.
- More informed policies and collaborative actions are necessary for a greener, healthier, and more sustainable future, and there is a strong interconnectedness between economic, social, and environmental factors in shaping a prosperous society.
- Economic growth and employment opportunities should be based on tailored policies addressing unemployment disparities. Special attention should be paid to the growth of the high-tech industry, which drives permanently sustainable and economic progress and global competitiveness.
- Regional policies for balancing economic development with environmental sustainability should involve regional actors and society. Collaborative regional efforts, well-coordinated strategies, and infrastructure investments are essential in the face of global competition.

These findings highlight critical factors for a region's competitiveness. The research highlights how economic, social, and environmental factors intertwine to shape successful societies, forming a fundamental understanding of regional competitiveness. However, it is crucial to acknowledge the limitations of this study. While we assessed and evaluated research spanning from 2018 to 2023, our analysis is limited to studies published in English, potentially excluding valuable insights from the non-English literature. Additionally, our study focused on the 10 key factors, according to the literature findings. There might be other relevant factors that might contribute to regional competitiveness which were not considered in this research.

From the analysis in this paper, the complex indexes were broken down into several easily understandable and less complex pieces (factors) by establishing priorities. From this research point of view, regional competitiveness is regarded as a matter of decision, in which all factors of influence should be analyzed in order to identify the best method to improve the regional competitiveness level. Regional competitiveness is a complex puzzle, and to ensure prosperity, we must continue exploring and understanding these dynamics while crafting holistic, sustainable, and innovative solutions. The collective well-being of society, environmental health, and economic dynamism depend on our commitment to this ongoing journey.

The study sets the basis for further research on the multi-interconnection of these factors. In the next phase, comprehensive questionnaires will provide insights from individuals and organizations within less developed regions, offering a nuanced view of these dynamics. There is a strong need for the elaboration of a method which could be relied upon, regarding qualitative and quantitative factors, and which can evaluate regional competitiveness. The method should give the freedom of choosing the most appropriate factors with the purpose of making a good decision. This is very important to the regional governments, in order to assess regional competitiveness and compare their policies with those of other regions, to the business community, to achieve investments plans, and to academics, who can use it to better understand and analyze how regions compete in the market.

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