

REGIONAL DISPARITIES AND THE PERCEPTION OF SUSTAINABILITY IN THE CZECH REPUBLIC

Ladislava Míková¹, Václav Friedrich¹ , Pavlína Forstová Kuráňová¹ 

¹Faculty of Economics, VSB – Technical University of Ostrava, 17. listopadu 2172/15, 708 00 Ostrava, Czech Republic

Abstract

The concept of sustainable development, formulated in the 1987 report of the World Commission on Environment and Development chaired by Gro Harlem Brundtland, is today widely accepted and provides a fundamental framework for environmental, economic, and social policies at both national and regional levels. Nevertheless, sustainability cannot be understood as a universally perceived concept, since its three pillars may be emphasised differently depending on the specific conditions of each region. This study focuses on the Czech Republic at the NUTS 3 level. It examines the extent to which regional disparities – in economic performance, social cohesion, and environmental quality – influence how sustainability is perceived by the population. The research is based on a questionnaire survey conducted among residents of individual regions, complemented by an analysis of statistical data from the Czech Statistical Office. The results indicate that different regions tend to prioritise different pillars of sustainability, with these variations reflecting local socioeconomic and environmental contexts. Such findings suggest that perceptions of sustainability are not homogeneous but shaped by region-specific conditions. The discussion also addresses the Parthenon, where pillars stand independently side by side, and the Venn diagram, which highlights their interconnectedness and mutual interdependence. The study concludes that effective sustainability policy must be sensitive to regional contexts and to the chosen interpretative framework.

Keywords: Sustainable Development, Regional Disparities, Perception of Sustainability, Regional Context, Sustainability Models

<https://doi.org/10.11118/978-80-7701-082-5-0209>

JEL Code: Q01, R11, I31

Introduction

Sustainability has emerged as a central theme of contemporary global discourse. It is commonly defined as the capacity to meet present needs without compromising the ability of future generations to satisfy their own (WCED, 1987). This concept integrates environmental, economic, and social dimensions and is increasingly conceived not simply as a policy goal but as a structural precondition for the long-term resilience of societies. Its salience is heightened by accelerating climate change, mounting pressure on natural resources, biodiversity loss, and the imperative to transition towards low-carbon and innovation-driven economic models (European Environment Agency, 2024).

The rationale for sustainability extends well beyond environmental protection. In the regional context, sustainable development implies the enhancement of competitiveness, increased capacity for innovation, and improved quality of life for local populations. A sustainable approach helps stabilise regional economies over the long term, supports the attraction and retention of investment – including green investment – and nurtures employment in emerging industries such as renewable energy, the circular economy, and eco-technologies (Gürler, 2024). Equally important, the social dimension of sustainability underscores the need for inclusive development that mitigates inequality, ensures access to education and healthcare, and strengthens social cohesion (Jordan *et al.*, 2024).

Regions undergoing structural change – especially those with a legacy of carbon-intensive industries – face challenges in this transition. Path dependencies in infrastructure, skills, institutional arrangements, and social expectations can create inertia against change. Yet such regions also offer fertile ground for experimentation: they can serve as innovation labs for just transition models, where new governance modes, alternative energy systems, and circular economy practices are tested. Recent scholarship emphasises that these transitions must be just – attentive to distributional justice (how costs and benefits are shared), procedural justice (who is included in decision-making), recognitional justice (respecting diverse identities and local knowledge), and restorative justice (addressing past harms) (European Environment Agency, 2024; Mangalagiu *et al.*, 2024).

Within the Czech Republic, the Moravian-Silesian Region offers a compelling case. Its industrial history – rooted in coal mining, metallurgy, and heavy engineering – has left deep environmental burdens: degraded air quality, contaminated soils, and ecological damage. Simultaneously, the region struggles with social challenges such as structural unemployment and outmigration from former industrial towns. Yet it is precisely this duality – legacy burdens and urgent needs for reinvention – that makes the region fertile ground for transformative strategies.

In recent years, the region has been mobilising around clean energy, circular economy approaches, digitalisation, and sustainable infrastructure. Key strategic frameworks (e.g. the RE:START programme and the Just Transition Plan) explicitly prioritise investment in research and development, retraining and upskilling of the workforce, remediation of contaminated sites, and the fostering of new, green economic clusters. This blend of remediation and innovation underscores a central tension: how to heal past damage while simultaneously building future capacity.

Viewed through a broader European lens, the Moravian-Silesian Region may function as a microcosm or “laboratory” of sustainability transformation. Comparative research demonstrates that regional transitions are rarely linear; they often involve phases of experimentation, setbacks, and socio-political negotiation. For instance, studies of post-fossil transitions in Germany highlight how embedding sustainability goals early in transition governance can shape long-term outcomes, though tensions remain between growth imperatives and ecological limits (Gürtler, 2024; Mey, 2024). Analyses of coal-dependent regions in the United States similarly document the socio-economic and environmental trade-offs of energy transition, with lessons for workforce retraining and community resilience (Oluoch *et al.*, 2025). Moreover, experiences from Poland illustrate drivers of economic diversification and social renewal (Pukowiec-Kurda, 2024). These insights reinforce the argument that the Moravian-Silesian Region, despite its industrial legacy, holds considerable potential to pioneer integrated and socially just approaches to sustainable transformation.

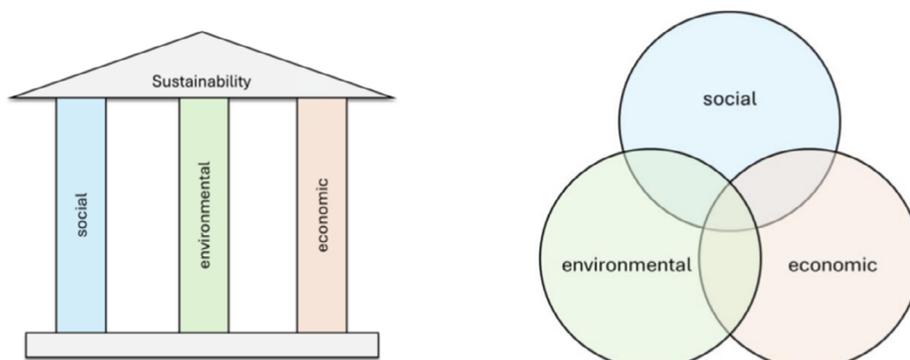
Theoretical Background of Sustainability

As Lord Kelvin famously noted, if we want to study something, we must first define it clearly and be able to measure it. This principle is particularly important in the case of sustainable development, which has become a key concept of modern society.

Sustainable development was first defined in the Brundtland Report of 1987 as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development, 1987/1991). This definition emphasises intergenerational responsibility and the interconnectedness of short-term and long-term objectives.

The basic framework for the study of sustainable development is the three-dimensional model encompassing economic, social, and environmental pillars (Emanuel *et al.*, 2011). These dimensions cannot exist in isolation – their imbalance may lead to the destabilisation of the entire system (Dyllick and Hockerts, 2002). On this basis, two main ways of visualising the relationship between the pillars are commonly used in the literature:

- The Parthenon model – the pillars stand independently side by side and jointly support the overall structure. This model stresses the relative independence of each dimension.
- The Venn diagram model – the three overlapping circles represent their interconnection and mutual dependence, highlighting that sustainable development emerges at the intersection of all three dimensions (Fig. 1).

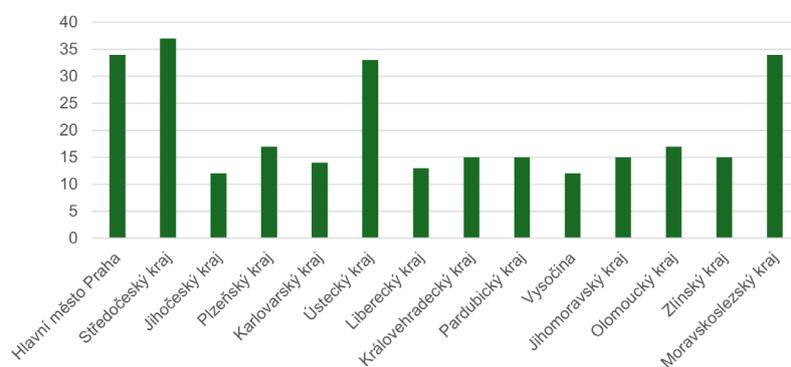


1: The Parthenon and the Venn diagram models of sustainability
Source: Purvis *et al.* (2019)

The intersections of these dimensions generate three distinct areas of sustainable development: equitable development (economic + social), viable development (economic + environmental), and bearable development (social + environmental). These relationships indicate that sustainability is not a static concept but rather a dynamic process, the final shape of which depends on the balance achieved among its individual pillars.

Methodology

Empirical data were collected through a structured questionnaire survey conducted in August 2025 across all fourteen NUTS-3 regions of the Czech Republic. The survey targeted the general adult population and yielded 283 valid responses. Among respondents, 42% were men ($n = 119$) and 56% were women ($n = 159$), while 1.8% did not disclose gender. Regarding educational attainment, 11% had completed primary education ($n = 32$), 60% secondary education ($n = 169$), and 29% tertiary education ($n = 82$). Fig. 2 illustrates the distribution of survey respondents across the fourteen regions of the Czech Republic, presenting the absolute number of participants from each region.



2: Number of survey respondents by region of the Czech Republic

Source: Author's processing

The survey instrument (see Appendix) comprised twelve structured questions together with an attitudinal section. Four of the questions captured key demographic information such as age, gender, level of education, and employment status. A further six questions probed respondents' perspectives on sustainability and sustainable development. In addition, participants evaluated 30 attitudinal statements using a five-point Likert scale. These statements – ten representing each of the three fundamental pillars of sustainability – were developed through a combination of literature review, artificial-intelligence-assisted selection, and online research. To minimise order effects, the items were presented in random sequence in line with established guidelines for Likert scale design (Likert, 1932; Friedrich, 2017).

To uncover patterns in the data, exploratory statistical techniques were applied. For categorical variables, both absolute and relative frequencies were calculated, providing a clear picture of how answers were distributed across demographic characteristics (e.g. gender, age group, education) and across attitudinal items, including preferences for different sustainability models.

Responses to the Likert-scale items were processed by calculating an individual mean score for each of the three sustainability pillars – environmental, economic, and social. These means were subsequently transformed into percentages so that the relative importance respondents attributed to each pillar could be expressed and compared quantitatively.

For every region, the mean percentage share of each pillar (E, S, G) was computed. To identify the dominant pillar, the dimension with the highest mean share in a region was recorded. The balance index was defined as the difference between the maximum and minimum pillar values; a lower index indicates a more even distribution of the three dimensions. Regions with a balance index below 5% were considered balanced.

Two analytical frameworks were applied to classify regions:

- Venn diagram method – a multi-dimensional approach distinguishing overlapping categories such as sustainable, just, bearable, viable, and economic.
- Parthenon method – a simplified typology distinguishing only balanced, economic, and environmental categories.

Based on theoretical concepts of sustainable development and knowledge of Czech regional characteristics, four hypotheses were formulated:

- H1. Industrially oriented regions (Karlovy Vary, Ústí nad Labem, Moravian-Silesian) exhibit a significantly higher share of the economic pillar than other regions.

- H2. Some regions display balanced representation of all three pillars (balance index < 5%).
- H3. The Venn diagram method provides a more nuanced classification of regions than the Parthenon method.
- H4. The environmental pillar is dominant only exceptionally and has a lower relative weight than the economic or social dimensions.

The research hypotheses were evaluated based on the exploratory analysis results. Considering that the data consisted of relative frequencies, Pearson's χ^2 goodness-of-fit test was applied first and, where appropriate, supplemented with post hoc comparisons of relative frequencies. All statistical procedures were carried out in Microsoft Excel with the support of the Real Statistics Resource Pack add-in (Zaiontz, 2025).

Results

The analysis demonstrated pronounced regional variation in the weight assigned to the three sustainability pillars. On average, the environmental pillar accounted for 29.9% (standard deviation, SD = 6.36), the social pillar for 31.6% (SD = 0.93), and the economic pillar for 38.4% (SD = 6.78). Whereas the social dimension showed remarkable stability across all regions, both the environmental and especially the economic dimensions exhibited substantial variability. The smallest environmental share was recorded in the Karlovy Vary Region (16.6%), while the South Moravian Region reached the highest value (39.8%). For the economic pillar, values ranged from 28.0% in South Moravia to 53.0% in Karlovy Vary.

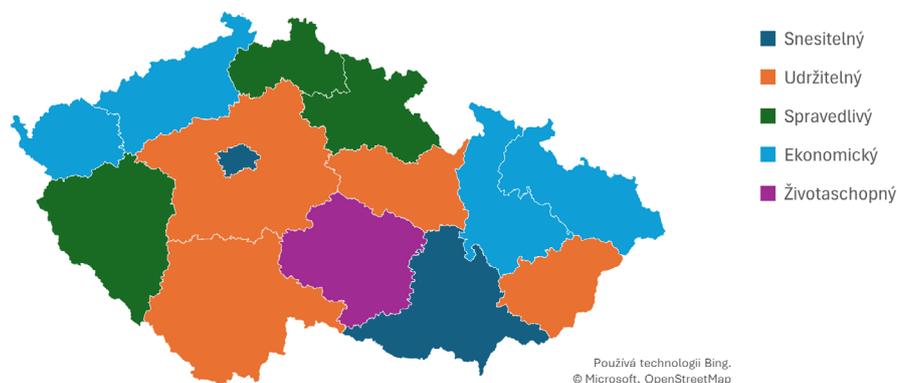
Classification by dominant pillar further highlighted the primacy of economic factors. Ten of fourteen regions (71.4%) were economically dominant, four (28.6%) were environmentally dominant, and none were led by the social pillar. A chi-square goodness-of-fit test confirmed that this distribution differs significantly from an even allocation ($\chi^2 = 10.86$, $p = 0.0044$). These findings are consistent with hypothesis H1, which anticipated strong economic orientation in industrial areas, and hypothesis H4, which expected the environmental dimension to play only a marginal role.

To examine the internal equilibrium of the three pillars, a balance index was calculated for each region. Across the country, the mean index reached 11.65%, reflecting an overall imbalance. The Central Bohemian Region displayed the most even structure (difference of only 1.6% between the highest and lowest pillar), whereas Karlovy Vary showed the greatest disparity (36.4%). Only four regions – Central Bohemian, South Bohemian, Pardubice, and Zlín – recorded a balance index below 5%, qualifying as nearly balanced and thus confirming hypothesis H2.

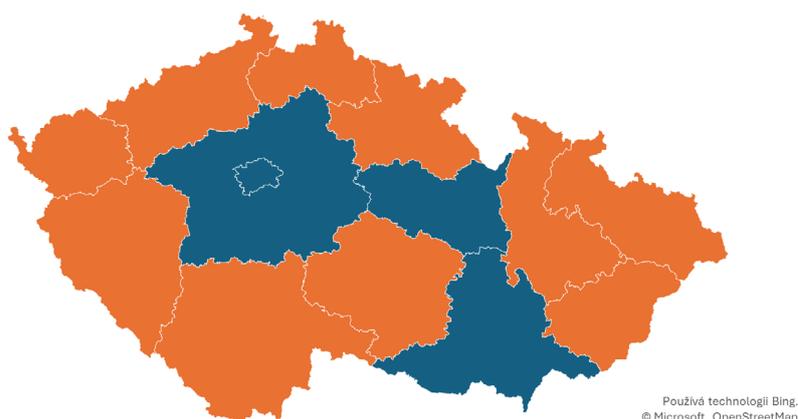
Comparison of the two analytical approaches offered further insights. The Venn diagram method allocated the regions into five nuanced categories (sustainable, economic, just, bearable, viable), whereas the Parthenon method reduced them to three broad groups (balanced, economic, environmental). The level of consistency between the two typologies, expressed by Cohen's $\kappa = 0.53$, represents moderate agreement. This outcome supports hypothesis H3, demonstrating that the Parthenon method yields a more streamlined overview, while the Venn diagram provides a finer and more differentiated classification of regional sustainability profiles. The Venn diagram model provided a more detailed regional typology by distinguishing categories such as sustainable, just, bearable, viable, and economic.

Fig. 3 illustrates the spatial distribution of these categories across the Czech Republic. Compared with the Parthenon approach, which groups regions only into balanced, economic, and environmental, the Venn model reveals a more nuanced pattern and highlights intermediate forms of sustainability.

Taken together, these results indicate that Czech regions continue to frame sustainability chiefly through economic development goals. The social dimension remains relatively uniform, and the environmental



3: Sustainability in Regions – Venn Diagram Model
Source: Author's processing



4: Sustainability in Regions – Dominant Pillar
Source: Author's processing

pillar – though important – plays a complementary and less dominant role. Furthermore, the choice of classification method substantially affects how regional sustainability patterns are interpreted and may consequently influence strategic planning and policy formulation.

The analysis revealed that the economic pillar dominates in most Czech regions, while the environmental pillar prevails only in a few. Fig. 4 illustrates this spatial distribution of the dominant pillar (Environmental vs. Economic), supporting hypotheses H1 and H4.

Discussion and Conclusion

The findings underscore that the perception of sustainability in the Czech Republic is strongly shaped by the historical, economic, and socio-cultural context of individual regions. The predominance of the economic pillar in ten out of fourteen regions indicates that regional development strategies and policy frameworks remain largely growth-oriented. This pattern reflects the country's industrial heritage and the long-standing importance of energy-intensive sectors such as heavy manufacturing and mining. Karlovy Vary, Ústí nad Labem, and the Moravian-Silesian Region – all with a deep industrial legacy – recorded the highest economic scores, fully supporting hypothesis H1. These results illustrate how past economic specialisation continues to shape present sustainability profiles. By contrast, the environmental pillar emerged as dominant in only four regions, a finding consistent with hypothesis H4 and pointing to the still limited influence of ecological considerations in regional decision-making. The South Moravian Region stands out as a noteworthy exception, where environmental factors play a comparatively stronger role. This may be linked to its economic structure emphasising agriculture, viticulture, and landscape-oriented development policies, as well as to long-term investments in environmental protection and ecosystem services. Similar, though less pronounced, patterns can be found in regions with extensive protected areas or tourism-based economies, where natural heritage is a critical development asset.

The social pillar displayed relatively low variability across the country ($SD = 0.93$), suggesting that core social infrastructure – such as education, healthcare, and social services – is comparatively well distributed among the regions. This stability indicates that regional disparities in sustainability are driven primarily by environmental and economic factors rather than by social inequalities. From a policy perspective, this finding is encouraging, as it implies that a basic level of social cohesion and quality of life is maintained nationwide, providing a solid foundation for further sustainability initiatives.

Analysis of the balance index added another layer of insight. Only four regions – Central Bohemian, South Bohemian, Pardubice, and Zlín – achieved a nearly equal representation of the three pillars (index < 5%). This observation confirms hypothesis H2, demonstrating that fully balanced sustainability remains the exception rather than the norm in the Czech regional context. These balanced regions could serve as models of integrated development, offering practical lessons for other areas seeking to reconcile economic growth, social well-being, and environmental stewardship. The comparison of analytical approaches provides further evidence for hypothesis H3. The Venn diagram method yielded a more detailed, multidimensional assessment by distinguishing additional intermediate categories such as “just” or “viable”. By contrast, the Parthenon method reduced complexity to three principal types (balanced, economic, environmental), presenting a clearer but less nuanced picture. The only moderate agreement between the two approaches (Cohen's $\kappa \approx 0.53$) highlights how methodological choice can substantially influence the classification of regions and,

consequently, policy conclusions. This reinforces the need for researchers and policymakers to be explicit about the analytical tools they use and to consider how different frameworks might lead to different strategies.

These findings have several practical implications. First, they call for regional development strategies with stronger emphasis on environmental sustainability, particularly in industrialised regions where economic imperatives still dominate. Concrete measures could include investments in renewable energy, circular economy projects, and ecological restoration of former industrial sites. Second, the identification of balanced regions underlines the importance of integrating all three pillars of sustainability into strategic planning. The examples of the Central Bohemian, South Bohemian, Pardubice, and Zlín Regions illustrate that such integration is possible and can provide a competitive advantage in attracting green investment and improving residents' quality of life. Third, the methodological comparison underscores that the choice of analytical framework – whether favouring simplicity and communication (Parthenon) or nuance and depth (Venn) – has tangible consequences for policy design and evaluation.

Finally, some limitations should be acknowledged. The analysis is based on aggregate regional data, which may obscure internal variability and local specificities within regions. Municipal-level data or finer spatial units could capture intra-regional differences, such as contrasts between urban centres and rural peripheries. Moreover, the present study offers a cross-sectional perspective. Future research could adopt a longitudinal design to examine temporal dynamics, thereby revealing whether regional sustainability profiles are stable, converging, or diverging over time. Incorporating additional qualitative insights – such as expert interviews or participatory assessments – would further enrich the understanding of how policies, institutions, and community practices shape sustainability outcomes.

Acknowledgements

This research was supported by the Student Grant Competition, Faculty of Economics, VSB–Technical University of Ostrava (project SP2025/050: “Diversity of Sustainable Development: Interaction of Economic, Social and Environmental Aspects”). Additional support was provided by the European Union through the project REFRESH – Research Excellence for Region Sustainability and High-tech Industries (No. CZ.10.03.01/00/22_003/0000048), funded by the Operational Programme Just Transition.

References

- DYLLICK, T., HOCKERTS, K. 2002. Beyond the business case for corporate sustainability. *Business Strategy and the Environment*. 11(2), 130–141. <https://doi.org/10.1002/bse.323>
- EMANUEL, R., ADAMS, J. N., VYAS, D. 2011. Sustainability: Three pillars and four E's. *Journal of Sustainability Education*. 2(1), 1–8.
- EUROPEAN ENVIRONMENT AGENCY. 2024. *Delivering Justice in Sustainability Transitions*. European Environment Agency. [Accessed: 15 December 2025] <https://www.eea.europa.eu/publications/delivering-justice-in-sustainability-transitions>
- FRIEDRICH, V. 2017. *Postojové a hodnotící škály v marketingu a managementu: Vybrané statistické metody a aplikace*. SAEI. Vol. 46. Ostrava: VŠB–TU Ostrava.
- GÜRTLER, K. 2024. What role for sustainability in post-fossil regional transition? *Journal of Environmental Policy & Planning*. 26(6), 575–591. <https://doi.org/10.1080/1523908X.2024.2389837>
- JORDAN, J., TENZING, J. 2024. *Social Foundations of a Just Coal Transition*. World Bank. [Accessed: 15 December 2025] <http://hdl.handle.net/10986/42538>
- LIKERT, R. 1932. A technique for the measurement of attitudes. *Archives of Psychology*. 140, 5–55.
- MANGALAGIU, D. et al. (Eds.). 2024. Exploring transition in coal- and carbon-intensive regions. In: *Positive Tipping Points Towards Sustainability*. Springer Climate. Cham: Springer, pp. 135–160. https://doi.org/10.1007/978-3-031-50762-5_7
- MEY, F. 2024. From grey to green? Tipping a coal region incrementally. *Global Environmental Change*. 82, 102836. <https://doi.org/10.1016/j.gloenvcha.2024.102836>
- OLUOCH, S., PANDIT, N., HARNER, C. 2025. Socio-economic and environmental trade-offs of sustainable energy transition in Kentucky. *Sustainability*. 17(15), 7133. <https://doi.org/10.3390/su17157133>
- PUKOWIEC-KURDA, K. 2024. From coal to tourism: A game-changer in the sustainable transition process. *Journal of Tourism Futures*. 10(3), 454–468.
- PURVIS, B., MAO, Y., ROBINSON, D. 2019. Three pillars of sustainability: In search of conceptual origins. *Sustainability Science*. 14, 681–695. <https://doi.org/10.1007/s11625-018-0627-5>

- WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT. 1987. *Our Common Future*. Oxford: Oxford University Press.
- WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT. 1991. *Our Common Future* (Czech ed.). Praha: Academia.
- ZAIONTZ, C. 2025. *Real Statistics Using Excel*. Version 9.4.5. Computer software. [Accessed: 15 December 2025] <https://www.real-statistics.com>

Contact information

Ladislava Míková: ladislava.mikova.st@vsb.cz

Václav Friedrich: vaclav.friedrich@vsb.cz,  <https://orcid.org/0000-0003-0076-5233>

Pavčina Forstová Kuráňová: pavlina.forstova.kuranova@vsb.cz,  <https://orcid.org/0000-0001-9964-6191>