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## QUANTIFYING THE IMPACT OF CULTURAL CAPITAL ON SUSTAINABLE DEVELOPMENT. EVIDENCE FROM POLISH VOIVODSHIPS

**Abstract.** Culture and the capital associated with it correspond to current scientific trends. An in-depth analysis of the source materials allowed us to conclude that there is an unquestionable need to quantify the special phenomenon of cultural capital and its role in socio-economic development. The aim of the study was, therefore, to determine the direction and strength of the relationship between the author's synthetic indices of cultural capital and sustainable development, including the identification of the components that most determine sustainable development at the regional level. This goal was achieved using a two-stage econometric analysis (dynamic and static panel regression with fixed effects; Granger causality test), in which detailed emphasis was placed on confirming the cause-and-effect nature of the relationships. The authors hope that the indicated conclusions could influence the more effective development of both phenomena and help the regions meet the requirements of global competitiveness.

*Keywords:* cultural capital; sustainable development; region; culture.

## **1. Introduction**

By conducting a historical analysis of the conditions and interdependencies between culture and the economy, it can be said that the last century is an example of how both of these dimensions are significant resources shaping economic and social changes. Therefore, representatives of science, following changes, attempt to describe emerging phenomena. This fact is reflected in the development of economic theories that try to understand and present what is happening in the modern economy. Therefore, in further consideration of the article, theories and their historical research references, as well as contemporary views on the discussed interdependence of both these dimensions, will be presented.

Therefore, the subject of interest of this article is the study of the impact of cultural capital as a source of sustainable development in Polish regions. Taking this into account, the article identifies two main trends to explore and analyze the selected scientific area. The first trend, cognitive in nature, involves a comprehensive qualitative review of the relevant literature, which enabled a critical analysis and helped shape the research framework. The research focused on the development of various concepts of cultural capital and a proprietary indicator, including the impact of this phenomenon on sustainable development. Aspects available in the literature on the subject were analyzed regarding the use of various proprietary methods that allow for the best estimation of cultural capital so that it is possible to constructively conclude what should be done to enable it to develop as best as possible and then generate added value for sustainable development at the regional level.

The second study stream is focused on research on the importance of cultural capital (CC) for sustainable development (SD) at the level of Polish regions. The article presents research on a new approach taking into account the author's CCI measurement index. The new approach to measuring CCI used research by the following authors: Bourdieu (1973); DiMaggio (1982); Teachman (1987); Crook (1997); De Graaf & De Graaf (2000); Sullivan (2001); Crociata (2020). The review of the literature on the subject would allow us to present the impact of the cultural capital index (CCI) on the sustainable development index (SD) in the further part of the analysis. The sustainable development indicator proposed in the study was developed after minor modifications based on the author's SD indicator, which was presented in the study by A. Sokół and A. Mempel-Śnieżyk (Sokół, Mempel-Śnieżyk, 2022). Based on the research presented in the literature, it was concluded that there are relationships between cultural capital and its

components and sustainable development in Polish regions. The following stages of analysis were adopted to verify the research hypothesis. The first one concerned the analysis of the CCI index and its components at the level of individual regions. The second stage is the analysis of the CCI and SD sub-indexes to confirm the relationships in the analyzed years (2011–2021). The basis for creating the presented measurable indicators and the subsequent econometric analysis was data presented by the Central Statistical Office (Statistics Poland). The analytical goal was achieved by applying a two-stage econometric analysis:

- a. primary, aimed at determining the direction and strength of the statistical relationship between the indices of cultural capital and sustainable development using two versions of panel regression with fixed effects;
- b. secondary, whose purpose was to confirm the cause-and-effect nature of the impact demonstrated at the previous stage of the analysis (Granger causality tests).

Then, the obtained results were analyzed through a thematic discussion and commentary on the research, identifying limitations and proposing further research directions.

The conclusion of the research carried out in the article is to obtain answers to the following questions: *Has there been any development of cultural capital measured by the author's indicator in the Polish regions in the analysed years? What scope of changes has occurred in the development of cultural capital? What impact do the individual components of the cultural capital index have on sustainable development in the studied regions?* Moreover, the research results make it possible to present recommendations for regions, indicating to what extent and in what areas they must consistently take action to create conditions conducive to the development of cultural capital and its impact on sustainable development. The article is structured as follows. After an introduction to the issue, the literature review presents definitional issues in the field of cultural capital and sustainable development, as well as conceptual approaches to the relationship between them. The next section (Data and methodology) presents the method of calculating the CCI and SD indices, the premises for selecting the econometric analysis method, and the form of the models. The “Results” section begins with a discussion and interpretation of the values of the CCI and SD indices obtained by Polish voivodships from a comparative perspective. Next, the results of the cause-and-effect analysis determining the role of CCI in shaping SD are presented. The article ends with conclusions containing the main findings of the study, its limitations, and recommendations.

## **2. Literature overview**

### **2.1. Cultural capital**

With the development of various views in the literature on the subject, representatives of the presented trend, recognizing the role of culture in socio-economic development – as mentioned above – try to indicate the possibilities of measuring it as capital in order to be able to assess its impact on the increase in the wealth of cities, regions, or countries. It should be noted that this article undertakes to study the issues of cultural capital (CC). The fact that there is a significant difference in the measurement of cultural evaluation indicators and cultural capital (CC) requires justification. Hence, further research work in this article is devoted to the measurement of cultural capital, and this will also be primarily discussed and examined.

Although there is a rich discussion on the concepts of cultural capital, there is no unified definition of cultural capital so far. It should be emphasized that cultural capital is a highly heterogeneous component of intangible assets at various levels and forms in all societies. Making a historical retrospection (which is important for this article because it constitutes the theoretical context for the method of defining this capital adopted by the authors of the manuscript), it must be said at this point that cultural capital enjoys a great interest in the sociological and economic literature thanks to the broad consensus reached by Bourdieu (1986). According to his theory, the city, the capital of culture, benefits mainly through educational investments, and the human perspective is expressed through cultural adaptability embodied in the process of using material resources, such as, for example, moral ethics or religion. Taking into account the ability of cultural capital to transform into economic capital, the cited author distinguished three states of this capital (Nirwana, 2018): (1) embodied, i.e. a specific type and specific level of cultural competence (e.g. taste), especially that which is recognized as legitimate culture and knowledge, competences and professional qualifications, (2) objectified, i.e. cultural goods possessed by an individual, the acquisition and use of which also requires appropriate competences, and (3) institutionalized, i.e. appropriate diplomas and certificates usually providing specific rights. Another researcher, Throsby (1999), concluded that cultural capital, next to human, physical, and natural capital, constitutes a separate category that has not only cultural but also economic value, pointing to its connections with economic growth. The cited author assigned to cultural capital all artefacts and cultural phenomena that may have market value. D. Throsby (2013) created an integral concept of cultural

capital, which also included cultural heritage, at the same time pointing out that ‘the material cultural capital inherited from the past can be regarded as something close to natural resources that have also been given to us as an inheritance’. Cultural capital, according to Tubadji and Nijkamp (2015), is the life attitude of most residents, including their tendency to take risks and the ability to accept opportunities and challenges.

In this article, the understanding of the concept of cultural capital should be related to the historical connotations of the formulation of its first contents, the importance of which can be found in the space of social education. Still, in this study, we point to its significance in the context of economic development as well. Taking into account the adopted research context, the authors assumed that cultural capital is the accumulation of the cultural value of human work expressed specifically in the form of wealth and at the same time is the sum of cultural resources, including cultural products, cultural opportunities and cultural institutions (Xing and Chi, 2021). This understanding ensures that cultural capital is a basic asset in human life and an important component driving social and economic life, as well as the development of creativity and innovation. It is therefore one of the most important driving forces in the development of competitiveness. It should be noted that cultural capital is related to (Kim and Kim, 2009; Robbins, 2005; Cochrane, 2006; Dalziel et al., 2009):

- 1) cultural well-being that exists in individuals within a community group in which they can participate in cultural life and express themselves creatively and freely;
- 2) cultural life, which includes art, language, film, history, heritage and tradition, sports and recreation, spirituality and emotional connection, as well as their place of residence;
- 3) social, ethical, intellectual, scientific, artistic, and technological manifestations;
- 4) people’s adaptation to the environment in which they live;
- 5) development of human civilisation.

It is worth noting here that the statistical tools created in scientific studies do not allow for a clear description, understanding, and, above all, capture of the multidimensional nature of cultural capital. However, since the 1970s, increasingly new research concepts in this area have become the subject of in-depth experimental research (Ortega-Villa and Ley-Garcia, 2018, after: Montalto et al., 2019; Xing and Chi, 2021). Moreover, it should be emphasized that over the last two decades, much effort has been put into standardizing statistics on the issues presented in this article at the international level in order to be able to make comparisons at the na-

tional or international level. As an example, studies prepared by UNESCO (UNESCO, 2012a, UNESCO, 2012b, after: Montalto et al. 2019) or Eurostat (European Commission, 2012) may serve as an example. In recent years, the following studies have been devoted to the problem of measuring cultural capital: Bourdieu (1973); DiMaggio (1982); Teachman (1987); Crook (1997); De Graaf and De Graaf (2000); Sullivan (2001); Crociata (2020). Moreover, it was also gradually incorporated into a broader measurement framework related to the measurement of innovation, territorial competitiveness, and sustainable development (Duxbury and Jeannotte, 2015, after: Montalto et al., 2019).

The analysis of scientific papers shows that the issues are of an empirical nature. The operationalization of the concept of cultural capital (CC) remains insufficiently researched at the level of measurement procedures. Moreover, there is no single correct way to measure and achieve cultural capital. The structure of the cultural capital index adopted for measurement in this article was developed on the basis of the literature on the subject indicated below. For example, Bourdieu (1973) studied cultural capital and its connections with individual educational outcomes); DiMaggio, (1982), who, based on the work of Bourdieu, operationalized cultural capital as participation in cultural activities representing high social status, such as visiting museums and theaters or listening to classical music. Crociata (2020) also studied cultural participation, which can be seen as an investment activity with an uncertain return related to the development and active use of the capacity to engage more intensively in cultural experiences that contribute to the accumulation of a certain type of cultural capital. According to the cited author, participation in culture increases material cultural capital in the form of demand for new goods and cultural content. It contributes to the increase in the stock of intangible cultural capital through social reinforcement of culturally significant activities and practices. The construction of the index also takes into account the research of Sieben and Lechner (2019), who comprehensively assessed the measurement properties of two items measuring past and current objectified cultural capital through the number of books in the household, the respondent's family of origin, and the respondent's current household, respectively.

The analysis of the literature on the subject and the research mentioned above allowed us to isolate the following components, creating the cultural capital index (CCI), which was adopted for the study in the following article. These are:

- average monthly household expenditures for cultural activities (per inhabitant) (CCI<sub>1</sub>);

- public library borrowers (per 1000 inhabitants) (CCI<sub>2</sub>);
- theatre-goers (per 1000 inhabitants) (CCI<sub>3</sub>);
- cinema viewers (per 1000 inhabitants) (CCI<sub>4</sub>);
- number of cultural and educational events (per 100 000 inhabitants) (CCI<sub>5</sub>);
- number of employees in the cultural sector (per 1000 inhabitants) (CCI<sub>6</sub>);
- book collection in public libraries (per 1000 inhabitants) (CCI<sub>7</sub>).

In this regard, it is worth noting that cultural capital indicators can be defined as a measurable aspect of environmental, economic, or social systems, useful for monitoring changes in the characteristics of systems relevant to the continuation of human life and the social-economic well-being of the environment. In fact, the integration of the dimensions of cultural capital implies the implementation of complementary and coordinated activities in various areas, which result in socio-economic growth. The scientific argument in this article aims to identify indicators for measuring cultural capital (which has already been indicated in this part of the study and the empirical analysis of the obtained research results (presented in data and methodology), which is an attempt to verify these indicators.

## **2.2. Cultural capital and sustainable development**

The foundations of sustainable development were laid in the early 1990s through Community law and scientific and research programs in the field of environmental protection. From a global governance perspective, sustainable development can be traced through a series of United Nations conferences, beginning even before the WCED 1987 – the UN Conference on the Human Environment held in Stockholm in 1972 (Ward, 2012), along with the adoption of key documents. The starting point for the contemporary discussion on sustainable development is primarily the work of the World Commission on Environment and Development (WCED). This commission published the ‘Our Common Future’ report in 1987, also known as the Brundtland report, according to which ‘sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (*‘Our Common Future’ report, 2023*). Brundtland’s definition has a clearly anthropocentric character, which is expressed by placing humans and their needs at the center of attention (Speed, 2006; Kuciaba and Wysocka, 2010; Ganowicz-Bączyk, 2016). The historical pathway leading to the establishment of the Sustainable Development Goals is presented in Table 1.

**Table 1**

**Genesis of building SDGs**

| Event                                                                                                                              | Place, Year                          | Actions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The United Nations Conference on Environment and Development (UNCED), also known as the 'Earth Summit'                             | Rio de Janeiro, Brazil, 1992         | More than 178 countries adopted Agenda 21, a comprehensive plan of action to build a global partnership for sustainable development to improve human lives and protect the environment.                                                                                                                                                                                                                                                                                                   |
| Millennium Summit                                                                                                                  | New York, 2000                       | The Summit led to the elaboration of eight Millennium Development Goals (MDGs) to reduce extreme poverty by 2015.                                                                                                                                                                                                                                                                                                                                                                         |
| World Summit on Sustainable Development                                                                                            | South Africa, Johannesburg, 2002     | The Johannesburg Declaration on Sustainable Development and the Plan of Implementation reaffirmed the global community's commitments to poverty eradication and the environment, and built on Agenda 21 and the Millennium Declaration by placing more emphasis on multilateral partnerships.                                                                                                                                                                                             |
| United Nations Conference on Sustainable Development (Rio+20)                                                                      | Rio de Janeiro, Brazil, in June 2012 | Member States adopted the outcome document "The Future We Want" in which they decided, inter alia, to launch a process to develop a set of SDGs to build upon the MDGs and to establish the United Nations High-level Political Forum on Sustainable Development (HLPF). The Rio +20 outcome also contained other measures for implementing sustainable development, including mandates for future programmes of work in development financing, small island developing states, and more. |
| Open Working Group                                                                                                                 | 2013                                 | The General Assembly set up a 30-member Open Working Group to develop a proposal on the SDGs.                                                                                                                                                                                                                                                                                                                                                                                             |
| UN Sustainable Development Summit                                                                                                  | New York, 2015                       | The General Assembly began the negotiation process on the post-2015 development agenda. The process culminated in the subsequent adoption of the <i>Transforming Our World: the 2030 Agenda for Sustainable Development</i> , with 17 SDGs at its core.                                                                                                                                                                                                                                   |
| The first SDG Summit – the High-level Political Forum on Sustainable Development (HLPF) under the auspices of the General Assembly | New York, 2019                       | It resulted in the adoption of the Political Declaration, "Gearing up for a decade of action and delivery for sustainable development". World leaders called for a decade of action to deliver the SDGs by 2030 and announced accelerated actions they are taking to advance the agenda. The General Assembly endorsed the Political Declaration on 15 October 2019.                                                                                                                      |

| Event                                                                 | Place, Year    | Actions                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The second SDG Summit (HLPF) Acceleration and Accountability Platform | New York, 2023 | To review progress and accelerate the implementation of the 2030 Agenda for Sustainable Development. <i>Documents</i> : “Times of Crisis, Times of Change: Science for Accelerating Transformations to Sustainable Development” (Global Sustainable Development Report (GSDR) 2023); Report: ‘Progress towards the Sustainable Development Goals: towards a rescue plan for people and planet’. |

Source: The 17 Goals, 2023; SDG the Summit, 2023; Documentation, 2023.

The idea of sustainable development (SD) assumes achieving goals in three most important areas: economic (services, household needs, agriculture growth, industrial growth, efficient use of labour), social (equity, participation, social mobility, cultural preservation, empowerment), and environmental (biodiversity, natural resources, ecosystem integrity, carrying capacity, clear air and water) (Sokół and Mempel-Śnieżyk, 2022). This requires a holistic approach due to the interconnections and dependencies between these areas. The multiplicity of these relationships and the difficulty in their quantification mean that knowledge about the effects of sustainable development policy is incomplete. These pillars were established in the Sustainable Development Congress in Johannesburg (2002) and have been developed further by scientists (Soint and Birkeland, 2014). Those three areas, domains, or pillars are widely described in the literature (Kates et al., 2005; Hasna, 2007; Elliott, 2013; Kordestani et al., 2015; Sachs, 2015; Purvis et al., 2019). However, since the beginning of the 21<sup>st</sup> century, scientists and policymakers have been calling for missing pillars that could link or be as important as those three. In the literature, additional pillars such as institutional (Spangenberg et al. 2002; Turcu 2012), cultural (Soini and Birkeland 2014), and technical (Hill and Bowen 1997; Purvis et al., 2019) are mentioned. At the beginning of the century, the voice of international institutions and scientists proposed the addition of the dimension of culture to policies aiming at sustainable development. UNESCO defines culture as the set of distinctive spiritual, material, intellectual, and emotional features of society or a social group that encompasses not only art and literature but lifestyles, ways of living together, value systems, traditions, and beliefs.” (*UNESCO, Universal Declaration on Cultural Diversity, 2001*). The Executive Bureau of UCLG (United Cities and Local Governments), approved the Policy Statement “Culture is the Fourth Pillar of Sustainable Development” on 17 November 2010, in the framework

of the World Summit of Local and Regional Leaders – 3<sup>rd</sup> World Congress of UCLG, held in Mexico City (*Culture, the fourth pillar of sustainability, 2021*). The mission of the Committee for 2011–2013 was ‘to promote culture as the fourth pillar of sustainable development through the international dissemination and the local implementation of Agenda 21 for culture’. The document calls on cities and local and regional governments around the world to (a) develop a solid cultural policy, and (b) include a cultural dimension in all public policies. The document is rather an advocacy document that promotes culture to become a specific pillar or dimension of sustainable development, fully interconnected with, and as important as, the other three.

Culture increasingly appears in documents as the fourth pillar or dimension. James P. et al. introduced the concept of 4 domains that together are useful for giving a complex sense of the whole of social life. The four domains were chosen as primary in the Circles approach – economics, ecology, politics, and culture. Culture is defined as a social domain that emphasizes practices, discourses, and material expressions. Culture is ‘how and why we do things around here’. Under each domain, there are seven perspectives. Under the culture domain, the following perspectives are listed: 1. Identity and Engagement, 2. Creativity and Recreation, 3. Memory and Projection, 4. Beliefs and Ideas, 5. Gender and Generations, 6. Enquiry and Learning, 7. Wellbeing and Health (James et al., 2015).

In the literature, culture is already well described, and placing the 4<sup>th</sup> pillar of SD is essential (Hawkes, 2001). K. Nurse presents the concept of placing culture at the center as a key element of sustainable development. People’s identity is shaped by the environment in which they live and how it is perceived. Culture shapes what we understand by development and determines how people function in the world (Nurse, 2006). Astara O. H. (2014) expresses the role of culture in cultural heritage. What is recognized as a powerful asset for Europe, as a non-renewable resource, is unique and can’t be replaced. The impact is in creating and enhancing social capital, which has social and economic impacts and contributes to environmental sustainability. The outcomes of putting culture among pillars are obvious: a) Preserving cultural heritage is a motivation to take action to reduce CO<sub>2</sub> emissions and prevent the effects of global warming. b) Taking care of cultural heritage creates jobs in related industries (e.g., gastronomy, art, building renovation), especially in tourism. c) Cultural heritage influences social well-being through a sense of belonging and common goals. In the literature, three roles of culture in sustainability development can be found. Dessein, J., Soini, K., Fairclough, G., and Horlings, L. described (1) Cul-

ture in, (2) Culture for, and (3) Culture as Sustainable Development. Culture in – is the 4<sup>th</sup> pillar of SD, culture for SD – culture mediating between the three pillars, seen as a guide for other pillars, and culture as the foundation and structure for sustainable development, by recognizing that culture is at the root of all human decisions and actions (Dessein et al., 2015). There is no doubt about the significant role of culture in SD in the literature; however, there are difficulties in quantifying it due to the lack of comparable and relevant criteria. Culture acts as a social binder in the community, broadens its horizons, and strengthens the dialogue of openness to difference. Participation in cultural activities promotes creativity and innovation in all fields of operation, improves quality of life, and prevents social exclusion (Bervar and Trnavčević, 2019). The discussion about the role and place of culture is still present in literature and documents. Gijs de Vries (2020) published a report about culture in SD. The number of policy documents confirms the enormous role of culture. Vries analyzed the policy documents, Agenda 2030, and culture is part of them. For Europe, culture is essential and at the heart of Europe's identity; it contributes to prosperity, social cohesion, and the well-being of Europeans, and it reinforces Europe's image and influence in the world. Between Culture and SDGs, mutual positive feedback, the Sustainable Development Goals provide pathways for culture to flourish, but culture also helps to drive the SDGs (Vries, 2020).

The role of culture as an enabler and driver of sustainable development has been confirmed lately by a Resolution adopted by the UN General Assembly on 17 December 2021. Globalization and Interdependence: culture and sustainable development, The final Declaration of the G20 meeting in 2022 in Bali (*Resolution adopted by the UN General Assembly, 2021*), Declaration for Culture at UNESCO World Conference on Cultural Policies and Sustainable Development – MONDIACULT 2022. The last-mentioned document, adopted by 150 States, affirms culture as a “global public good”. According to UNESCO data, the cultural and creative sector is one of the most powerful engines of development worldwide (*MONDIACULT 2022: States adopt historic Declaration for Culture, 2023*). This year's document is Implementing the SDG Stimulus – the Sustainable Development Report 2023 (Sachs et al., 2023). The Report is at the halfway point of the 2030 Agenda and the last seven years to accelerate action to achieve the SDGs. Quoting ‘the world must devote an increased portion of current output to building up sustainable capital assets for the future, and must deploy such assets effectively. Sustainable capital assets are long-lasting capital resources that can enable the world to meet the agreed goals of economic well-being,

social justice, and environmental sustainability.’ The concept of capital assets arises. Development practitioners have identified eight major kinds of capital assets (Sachs et al., 2023): 1. Human capital. 2. Infrastructure. 3. Natural capital. 4. Innovation capital. 5. Business capital. 6. Social capital. 7. Urban capital. And the final 8. Cultural capital means appreciation of the diversity of cultures, value systems, languages, the traditional knowledge systems of Indigenous peoples, and artistic expressions. It is clearly stated that those assets are complementary; one missing capital causes problems in another area, e.g., a society cannot function peacefully if there is a breakdown of social capital. A city cannot function without water. There is no hope of achieving global food security for more than eight billion people unless Earth’s natural capital is protected. And there is no hope for global peace unless there is respect for and investment in cultural capital and cultural diversity (Sachs et al., 2023).

### **3. Data and methodology**

#### **3.1. Calculation of the CCI and SD indices**

Both phenomena of interest – cultural capital and sustainable development were quantified through the composite indices developed by the authors based on the secondary data derived from the Polish Central Statistical Office’s (currently – “Statistics Poland”) database. The calculation of the indices was made at the regional level, in relation to 16 Polish voivodships in the timeframe of 2011–2021. As the components included were expressed in a variety of units, for the sake of aggregation, the original data was uniformly rescaled into the  $\langle 0, 1 \rangle$  range through the min-max transformation technique, and calculated as<sup>1</sup>:

$$(1) \quad v' = \frac{v - \min_a}{\max_a - \min_a}$$

where  $v$  denotes the initial value  $v$  in the original dataset,  $v'$  – the transformed value of  $v$  in the new dataset, and the  $\min_a$ ,  $\max_a$  refer to minimal and maximal values of an attribute “a” in the original dataset. The final, aggregate “Cultural Capital Index” (henceforth – CCI) and the “Sustainable Development” index (SD) for a given entity (voivodship) in a given year were calculated as the simple average of their sub-indices. It is worth noting that the new, rescaled values of CCI and SD indices are exclusively sample-specific, as they describe the relative position of a unit in comparison to other entities within the sample.

### **3.2. Inferential analysis**

After obtaining the CCI and SD indices, they were utilized in the inferential analysis, which consisted of two stages:

- a. the primary inferential analysis, intended to establish the statistical association between the CCI and SD (in a single regression approach), as well as the CCI's sub-indices (in a multiple regression approach);
- b. the secondary inferential analysis, which aims to confirm the existence and direction of causal relationships detected in the previous stage of the investigation.

Besides the longitudinal nature of the dataset, the choice of the method of the primary inferential analysis method was mostly determined by:

- a. a small sample size (with 16 cross-sectional units and 11 annual observations), which excludes the possibility of investigating the units separately;
- b. cross-sectional dependence between the units, confirmed by the Pesaran et al. (2008) Lagrange multiplier test;
- c. significant correlation values of the entity-specific error term ( $\mu_i$ ) and the matrix of independent variables ( $X$ ).

Given the abovementioned properties, the relationship between CCI and SD was examined with the use of a dynamic panel bootstrap-based, bias-corrected fixed-effects (LSDV) estimator, building on the work of Everaert and Pozzi (2007). The “dynamic” aspect of the estimation lies in the inclusion of the autoregressive component (a lagged dependent variable) in the set of predictors, alongside the exogenous ones. For the first-order dynamic panel model, as employed further in the study, the inferential relationship for an entity  $i$  in a time period  $t$  can be presented as (Everaert and Pozzi, 2007, 1163):

$$(2) \quad y_i = \gamma y_{i,t-1} + X_i\beta + \mu_i + \varepsilon_i$$

where  $i = \{1, \dots, 16\}$ ;  $t = \{1, \dots, 11\}$ ;  $y_i$  denotes the dependent variable (SD),  $X_i\beta$  the vector of strictly exogenous explanatory variables (CCI in a single regression approach; CCI<sub>1</sub>-CCI<sub>7</sub> in a multiple regression approach) along with their coefficients;  $\mu_i$  is the time-invariant, entity-specific error term (allowed to be correlated with the  $X_i$ ) and the  $\varepsilon_i$  refers to the idiosyncratic error. To simplify the interpretation of the obtained  $\beta$  coefficients, both dependent and independent variables underwent the natural-log transformation.

For confirmatory purposes, we also employed a simpler, non-dynamic variant of the fixed effect model, where the only modification constitutes the unconventional (bootstrap) standard errors calculation method. In this

case, the relationship between the variables can be expressed as (Stata-Corp, 2023, 489):

$$(3) \quad y_i = \alpha + X_i\beta + \mu_i + \varepsilon_i$$

where  $\alpha$  denotes the constant term (intercept), and the rest of the explanations are analogous to those stated previously.

Finally, two sets of pairwise Granger causality tests were employed to rule out the possibility of reverse causation, where the region's level of development might directly result in higher cultural participation rates:

- a. the panel Granger non-causality test developed by Juodis et al. (2021), which allows for small sample sizes, cross-sectional dependence, and cross-sectional heteroskedasticity in the errors (Xiao et. al., 2023, 231);
- b. the Dumitrescu and Hurlin (2012) approach to Granger causality test with less optimal properties, used for confirmatory purposes.

Under the proposed approach, the causality is determined based on the predictive utility of the regressor's past values. More specifically, a variable  $x$  is considered to "Granger-cause" a variable  $y$  if the variable  $y$  can be predicted more efficiently using past values of both  $x$  and  $y$  rather than through the past values of  $y$  alone (Xiao et al., 2023, 230). Considering the following, the underlying dynamic panel data model of the lag order  $K$  (Lopez and Weber, 2017, 973):

$$(4) \quad y_{i,t} = \alpha_i + \sum_{k=1}^K \gamma_{ik}y_{i,t-k} + \sum_{k=1}^K \beta_{ik}x_{i,t-k} + \varepsilon_{i,t}$$

the null hypothesis (assuming no causality) will be defined as:

$$(5) \quad H_0 = \beta_1 = \dots = \beta_K = 0$$

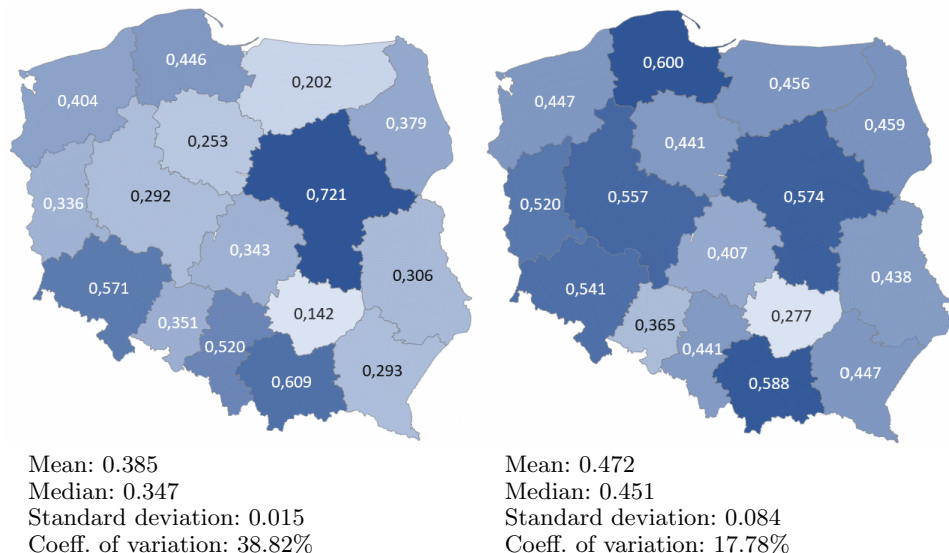
The occurrence of causality (from  $x$  to  $y$ , in a Granger sense) requires the rejection of the null hypothesis (Eq. 5), which will be justified with the  $p$  values less than 0.1.

## 4. Results and Discussion

### 4.1. Analysis of the main CCI and SD indices

At the end of the research period (2021), the values of the cultural capital index (CCI) were characterized by both a lower average value and greater spatial diversity compared to the SD indices (Figure 1). In terms of cultural capital, Mazowieckie Voivodship was clearly ahead, maintaining the

**Figure 1. The values of the CCI and SD indices obtained at the end of the research period (2021)**



Source: Own calculations, based on the data derived from the Polish Central Statistical Office.

highest levels of the CCI index throughout the entire research period (2011–2021). The lack of an analogous, clear leader is noticeable in relation to the sustainable development index – it is worth emphasizing the relatively low score of the leader of the ranking (Pomorskie Voivodship), indicating the existence of precisely defined, specific development gaps in the case of each Polish voivodship. Importantly, in the context of this empirical study, the values of the CCI and SD indices are clearly correlated. This is confirmed by high, positive values of the Pearson correlation coefficient of 0.65 for 2021 and 0.67 for the average over the entire study period (2011–2021).

The study confirmed the importance of Mazowieckie, Małopolskie and Dolnośląskie Voivodships, indicated as dominant in many studies in the development of cultural potential (*Kreatywne miasta*, 2009). This situation can be justified by the fact that in these voivodships the so-called creative class, which is indicated as the group of people who are most involved in activities for culture. The above results emphasize how extremely important a process taking place in the modern economy is the still strong tendency to accumulate cultural capital in selected world metropolises and how important it is to try to explain the reasons why only selected areas are the centers of its accumulation.

**Table 2**

**The extended presentation of the CCI indices obtained at the end of the research period (2021)**

| Voivodship          | CCI <sub>1</sub> | CCI <sub>2</sub> | CCI <sub>3</sub> | CCI <sub>4</sub> | CCI <sub>5</sub> | CCI <sub>6</sub> | CCI <sub>7</sub> | CCI   | SD    |
|---------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------|-------|
| Dolnośląskie        | 1.000            | 0.277            | 0.444            | 0.807            | 0.712            | 0.374            | 0.384            | 0.571 | 0.541 |
| Kujawsko-Pomorskie  | 0.289            | 0.000            | 0.253            | 0.397            | 0.151            | 0.033            | 0.652            | 0.253 | 0.441 |
| Lubelskie           | 0.397            | 0.694            | 0.000            | 0.000            | 0.521            | 0.009            | 0.520            | 0.306 | 0.438 |
| Lubuskie            | 0.459            | 0.109            | 0.364            | 0.210            | 0.265            | 0.033            | 0.908            | 0.336 | 0.520 |
| Łódzkie             | 0.463            | 0.546            | 0.154            | 0.345            | 0.171            | 0.151            | 0.568            | 0.343 | 0.407 |
| Małopolskie         | 0.170            | 1.000            | 0.432            | 0.483            | 1.000            | 0.600            | 0.577            | 0.609 | 0.588 |
| Mazowieckie         | 0.837            | 0.670            | 1.000            | 1.000            | 0.002            | 1.000            | 0.535            | 0.721 | 0.574 |
| Opolskie            | 0.485            | 0.473            | 0.271            | 0.010            | 0.297            | 0.077            | 0.847            | 0.351 | 0.365 |
| Podkarpackie        | 0.000            | 0.500            | 0.002            | 0.177            | 0.431            | 0.000            | 0.940            | 0.293 | 0.447 |
| Podlaskie           | 0.141            | 0.134            | 0.311            | 0.153            | 0.803            | 0.113            | 1.000            | 0.379 | 0.459 |
| Pomorskie           | 0.570            | 0.457            | 0.482            | 0.795            | 0.570            | 0.244            | 0.000            | 0.446 | 0.600 |
| Śląskie             | 0.681            | 0.619            | 0.360            | 0.648            | 0.196            | 0.459            | 0.677            | 0.520 | 0.441 |
| Świętokrzyskie      | 0.032            | 0.043            | 0.090            | 0.006            | 0.000            | 0.124            | 0.697            | 0.142 | 0.277 |
| Warmińsko-Mazurskie | 0.161            | 0.155            | 0.090            | 0.210            | 0.384            | 0.054            | 0.364            | 0.202 | 0.456 |
| Wielkopolskie       | 0.329            | 0.311            | 0.134            | 0.584            | 0.047            | 0.057            | 0.585            | 0.292 | 0.557 |
| Zachodniopomorskie  | 0.175            | 0.097            | 0.248            | 0.341            | 0.995            | 0.227            | 0.746            | 0.404 | 0.447 |

Source: Own calculations, based on the data derived from the Polish Central Statistical Office.

Consistent with the above trend of centralization of cultural capital in large urban centers, the lowest CCI value was achieved in the regions of eastern Poland. Against this background, the results of the study relating to the SD index are interesting. They indicate that Mazowieckie Voivodship is only in third place with an index value of 0.574, followed by Małopolskie Voivodship (0.588) and Pomorskie Voivodship (0.600). The latter, although in the analysis of individual culture sub-indices, was only in the top three twice, at the same time recorded high values of sub-indices “close to the podium”, except for CCI<sub>7</sub>. However, the lowest SD value was characteristic of Świętokrzyskie Voivodship (0.277), which was in the top three of the lowest values five times, taking into account the seven culture sub-indices examined. From the point of view of changes observed in 2021 compared to 2011, in the context of CCI, the largest increase occurred in Lubelskie Voivodship (0.08), and the largest decrease in the Opolskie Voivodship (−0.14). These changes can be described as minor. At the same time, it should be added that in six out of sixteen voivodships, there was

**Table 3**

**Changes in CCI and SD indices observed between the first (2011)  
and the last (2021) research periods ( $X_{2021}-X_{2011}$ )**

| Voivodship          | CCI <sub>1</sub> | CCI <sub>2</sub> | CCI <sub>3</sub> | CCI <sub>4</sub> | CCI <sub>5</sub> | CCI <sub>6</sub> | CCI <sub>7</sub> | CCI   | SD    |
|---------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|-------|-------|
| Dolnośląskie        | 0.50             | -0.36            | 0.12             | 0.16             | 0.33             | -0.09            | -0.17            | 0.07  | 0.06  |
| Kujawsko-Pomorskie  | -0.08            | -0.20            | -0.18            | 0.08             | -0.06            | -0.08            | -0.05            | -0.08 | -0.01 |
| Lubelskie           | 0.19             | 0.03             | 0.00             | -0.09            | 0.18             | 0.01             | 0.25             | 0.08  | 0.02  |
| Lubuskie            | 0.06             | -0.53            | 0.18             | -0.16            | -0.29            | -0.14            | 0.14             | -0.10 | 0.06  |
| Łódzkie             | 0.05             | 0.07             | -0.11            | 0.02             | 0.03             | -0.07            | -0.08            | -0.01 | -0.06 |
| Małopolskie         | -0.19            | 0.00             | 0.00             | -0.02            | 0.21             | 0.00             | 0.09             | 0.01  | 0.04  |
| Mazowieckie         | 0.00             | -0.05            | 0.00             | 0.00             | 0.19             | 0.00             | 0.02             | 0.02  | 0.00  |
| Opolskie            | -0.04            | 0.01             | 0.09             | -0.10            | -0.70            | -0.19            | -0.08            | -0.14 | 0.01  |
| Podkarpackie        | -0.11            | -0.01            | -0.02            | 0.15             | -0.09            | -0.15            | -0.06            | -0.04 | 0.03  |
| Podlaskie           | -0.07            | 0.13             | 0.00             | -0.03            | 0.30             | -0.03            | 0.12             | 0.06  | 0.03  |
| Pomorskie           | -0.06            | 0.29             | -0.13            | 0.16             | 0.39             | -0.08            | 0.00             | 0.08  | 0.01  |
| Śląskie             | 0.17             | -0.26            | -0.06            | 0.01             | -0.01            | -0.18            | -0.04            | -0.05 | 0.01  |
| Świętokrzyskie      | 0.03             | -0.11            | -0.10            | 0.01             | -0.57            | -0.01            | 0.07             | -0.10 | -0.03 |
| Warmińsko-Mazurskie | -0.04            | -0.25            | -0.12            | 0.03             | -0.21            | -0.04            | -0.24            | -0.12 | 0.03  |
| Wielkopolskie       | 0.07             | -0.08            | -0.05            | 0.10             | -0.14            | -0.07            | -0.04            | -0.03 | 0.03  |
| Zachodniopomorskie  | -0.16            | -0.26            | 0.04             | 0.01             | 0.39             | -0.07            | -0.24            | -0.04 | 0.00  |

Explanatory notes (to both tables): the aggregate index of Sustainable Development (SD); the aggregate Cultural Index (CCI); average monthly households' expenditures for cultural activities (per inhabitant) (CCI<sub>1</sub>); Public libraries borrowers (per 1000 inhabitants) (CCI<sub>2</sub>); Theatre-goers (per 1000 inhabitants) (CCI<sub>3</sub>); Cinema viewers (per 1000 inhabitants) (CCI<sub>4</sub>); number of cultural and educational events (per 100 000 inhabitants) (CCI<sub>5</sub>); number of employees in cultural sector (per 1000 inhabitants) (CCI<sub>6</sub>); book collection in public libraries (per 1000 inhabitants) (CCI<sub>7</sub>).

Source: Own calculations, based on the data derived from the Polish Central Statistical Office.

an increase in the index – apart from the already mentioned Lubelskie Voivodship, these were: Pomorskie Voivodship, Dolnośląskie Voivodship, Podlaskie Voivodship, Mazowieckie Voivodship and Małopolskie Voivodship. In the case of the SD index, in 2021 compared to 2011, the Lubuskie and Dolnośląskie Voivodships recorded the largest increase in the SD index value, which for each of them amounted to 0.06, while the largest decrease occurred in Łódzkie Voivodship (-0.06) and the Świętokrzyskie Voivodship (-0.03). Moreover, a decrease occurred in the Kujawsko-Pomorskie Voivodship (-0.01), while the Zachodniopomorskie and Mazowieckie Voivodships recorded no changes in SD in the period under study.

## 4.2. Analysis of the CCI sub-indices

After discussing the CCI index in its aggregated version, it is worth taking a closer look at the individual sub-indices of cultural capital, presented in Tables 2 and 3. The first of this type of indicator, CCI<sub>1</sub> (average monthly households' expenditures for cultural activities, per inhabitant), reached the highest value in Dolnośląskie, Mazowieckie Śląskie i Pomorskie Voivodships. The lowest CCI<sub>1</sub> values were recorded in the following voivodships: Podkarpackie, Świętokrzyskie, and Podlaskie. Also, the changes that occurred between CCI<sub>1</sub> in 2021 and CCI<sub>1</sub> in 2011 show that the largest increase was recorded in Dolnośląskie Voivodship, while the largest decrease occurred in Małopolskie Voivodship. This state of affairs can be attributed to the significant investments that have been made in Dolnośląskie Voivodship in recent years. The capital of the region has become one of the few places in Poland to be the European Capital of Culture (*Creative City Network, UNESCO, 2016; Wrocław (Poland) and San Sebastian (Spain) are the European Capitals of Culture in 2016*). Broadly understood initiatives related to the development of culture are promoted (*Top UNESCO World Heritage Sites In Poland That Are A Must-Visit, 2022*). In terms of expenditure on culture, their largest share in this voivodship is also understandable, because within the studied voivodship there is the largest concentration of the creative class in Poland (Karasek and Dermoł, 2015; Janc, et al., 2020). The creative class is indicated as the group of people who are able to generate the most innovations, including: through participation in culture. A kind of flywheel is being created in these regions, determining the development of the regions, and thus of the whole of Poland. Only the second place, as shown by the above analysis, went to Mazowieckie Voivodship, which may be a bit of a surprise. It turns out that the regions in which the most famous cities are located, i.e. Warsaw (*UNESCO World Heritage, Palace of Culture and Vistula in Warsaw! #places, 2023*), are recognized as cities of culture with an international reach, such as Małopolskie Voivodship (*Kraków – Creative Cities Network, 2021*) or Mazowieckie Voivodship, did not take the highest places in the comparison. It would seem that Mazowieckie Voivodship in particular, due to its significant potential as the country's capital, would rank first. Not only this argument would be crucial. A significant number of enterprises, including innovative enterprises, are concentrated in Mazowieckie Voivodship. Hence, the number of people working in the cultural and creative sector is also at a significantly high level. Unfortunately, the lowest CCI<sub>1</sub> values were still recorded in the following voivodships: Podkarpackie, Świętokrzyskie and Podlaskie. The justification for this situation should be sought in the state of development of these regions in Poland. These regions

are also characterized by poor economic growth and high unemployment compared to Poland, hence the growing values of this sub-index are so visible compared to the other CCI indices. These are poor regions with a significant unemployment rate and a significant migration of people to regions with a higher level of social well-being and greater employment opportunities (Miszczuk and Wesołowska, 2012; Hub, Szymeczek, 2020; Danowska-Prokop, et al., 2022). Moreover, the demographics of the regions are mainly older people of post-working age (Jagódka and Snarska, 2023). This means that the percentage of income allocated to culture is small.

Then, the results of the next 4 sub-indices were reviewed: CCI<sub>2</sub> (public libraries borrowers, per 1000 inhabitants; theater viewers (per 1000 inhabitants) (CCI<sub>3</sub>); cinema viewers (per 1000 inhabitants) (CCI<sub>4</sub>); the number of cultural and educational events (per 100,000 inhabitants) (CCI<sub>5</sub>). The four sub-indices mentioned above will constitute the so-called participation in culture. According to Crociata (2020), participation in culture increases material cultural capital in the form of demand for new goods and cultural content. It contributes to the growth of the stock of intangible cultural capital through the social reinforcement of culturally significant activities and practices. Crociata (2020) points out that cultural participation has a “*significant impact on social regeneration (Everingham, 2003), networking and cohesion (Hutter, 1996), well-being (Grossi et al., 2012), recycling (Crociata, 2015), energy saving (Quaglione, 2017), consumption of organic food (Agovino, 2017), sustainable transport (Quaglione, 2018), with benefits that go beyond the circle of actors involved*”.

When reviewing detailed data on the four sub-indices constituting participation in culture, it should be noted that the leading regions in this respect are: Mazowieckie Voivodship and Małopolskie Voivodship. The worst results were observed in the regions belonging to the eastern part of Poland. The research results obtained in the article confirm the previous statements. Mazowieckie and Małopolskie Voivodships are the cradles of Polish culture. These are areas where a significant number of the creative class, and therefore also artists, are gathered. Their number is also related to the number of cultural institutions such as museums, theaters and galleries. Moreover, this state of affairs was influenced by historical factors and economic geography, which resulted in Poland's development dualism, centered around the East-West axis (Jagódka and Snarska, 2023). The changes that have occurred in the areas of the analyzed indicators over the 10 years studied are very interesting. Namely: in 2021, compared to 2011, the largest increase in the value of CCI<sub>2</sub> occurred in Pomorskie Voivodship, and the largest decrease was recorded in Lubuskie Voivodship; the largest change in the period under

study concerned the Lublin Voivodship – the value of the CCI<sub>3</sub> index in 2021 increased compared to 2011, while in Kujawsko-Pomorskie Voivodship, there was the largest decrease in the value of this index at that time; the largest increase in the value of the CCI<sub>4</sub> index in the analyzed period concerned the Lower Silesian Voivodship, while the decrease occurred in the Lubuskie Voivodship; CCI<sub>5</sub> sub-index the largest change in the CCI<sub>5</sub> value during the examined period concerned Pomorskie and Opolskie Voivodships. The positive changes indicated can be justified by managed support and promotion of cultural development in all areas of European Union countries and regions, with particular emphasis on underfunded areas in the discussed area. For example, one EU document states: *‘The 2018 European Agenda for Culture, the European Commission recognizes that cities and regions across the EU are at the forefront of culture-led development and constitute natural partners for experimentation, anticipating trends and exploring models of social and economic innovation.* This last aspect is also highlighted in the Council of the European Union’s Cultural Work Plan 2019–2022 (*European Culture & Creativity*, 2023).

Mazowieckie, Małopolskie, and Śląskie Voivodships took the lead again from the point of view of the next sub-index examined, which was the number of cultural sector employees (per 1000 inhabitants), defined as CCI<sub>6</sub>. The lowest value was recorded in the Podkarpackie Voivodship, followed by the Lubelskie Voivodship, Kujawsko-Pomorskie Voivodship and Lubuskie Voivodship. This situation is determined by the number of cultural institutions in given regions. Despite the above-mentioned positive changes, unfortunately, leaders still lead in terms of their potential and cultural development. The last of the examined sub-indices CCI<sub>7</sub> (book collection in public libraries, per 1000 inhabitants) had the highest value in the Podlaskie, Podkarpackie, and Lubuskie Voivodships, while the lowest in Pomorskie, Warmińsko-Mazurskie and Dolnośląskie Voivodships.

#### 4.3. Inferential analysis

The empirical analysis confirmed the hypothesis assuming the positive impact of culture on sustainable development – both at the stage of panel regression modelling and the Granger causality tests. Under both employed estimation techniques, the aggregate CCI index turned out to be a highly significant predictor of the SD levels, with the p values less than 0.001 (Table 4). According to the results obtained, the 1% increase of the CCI resulted in approximately 0.15 to 0.19% increase in the SD. More importantly, the direct causal effect of cultural participation on the region’s development was confirmed by both Granger causality tests, with slightly less conclusive results obtained through the Dumitrescu and Hurlin approach (Table 5).

**Table 4**

**The results of the panel FE regression estimation**

|                              | DYNAMIC BIAS-CORRECTED FE<br>(with 1000 bootstrap replications) |       |         | NON-DYNAMIC FE<br>(with 10 000 bootstrap replications) |       |         |
|------------------------------|-----------------------------------------------------------------|-------|---------|--------------------------------------------------------|-------|---------|
| Variable                     | $\beta$                                                         | t     | p value | $\beta$                                                | z     | p value |
| SINGLE REGRESSION APPROACH   |                                                                 |       |         |                                                        |       |         |
| L.(Ln(SD))                   | 0.500                                                           | 6.01  | 0.000   | —                                                      | —     | —       |
| Ln(CCI)                      | 0.152                                                           | 5.54  | 0.000   | 0.189                                                  | 5.34  | 0.000   |
| MULTIPLE REGRESSION APPROACH |                                                                 |       |         |                                                        |       |         |
| L.(Ln(SD))                   | 0.579                                                           | 5.13  | 0.000   | —                                                      | —     | —       |
| Ln(CCI <sub>1</sub> )        | 0.007                                                           | 0.67  | 0.507   | 0.011                                                  | 1.12  | 0.265   |
| Ln(CCI <sub>2</sub> )        | 0.009                                                           | 0.92  | 0.358   | 0.017                                                  | 1.07  | 0.284   |
| Ln(CCI <sub>3</sub> )        | 0.016                                                           | 1.59  | 0.114   | 0.017                                                  | 1.89  | 0.059   |
| Ln(CCI <sub>4</sub> )        | 0.013                                                           | 2.06  | 0.041   | 0.011                                                  | 2.16  | 0.031   |
| Ln(CCI <sub>5</sub> )        | 0.016                                                           | 2.27  | 0.025   | 0.023                                                  | 2.34  | 0.019   |
| Ln(CCI <sub>6</sub> )        | −0.008                                                          | −0.59 | 0.557   | −0.022                                                 | −1.61 | 0.107   |
| Ln(CCI <sub>7</sub> )        | 0.012                                                           | 0.31  | 0.759   | 0.067                                                  | 1.02  | 0.309   |

Explanatory notes (to all tables): the aggregate index of Sustainable Development (SD); the aggregate Cultural Index (CCI); average monthly households' expenditures for cultural activities (per inhabitant) (CCI<sub>1</sub>); Public libraries borrowers (per 1000 inhabitants) (CCI<sub>2</sub>); Theatre-goers (per 1000 inhabitants) (CCI<sub>3</sub>); Cinema viewers (per 1000 inhabitants) (CCI<sub>4</sub>); number of cultural and educational events (per 100 000 inhabitants) (CCI<sub>5</sub>); number of employees in cultural sector (per 1000 inhabitants) (CCI<sub>6</sub>); book collection in public libraries (per 1000 inhabitants) (CCI<sub>7</sub>).

Source: Own calculations, with the use of Stata 18BE software.

The rather indisputable – based on the previous results – the statistical link between culture and sustainable development on a general (aggregate) level could not be observed in relation to the CCI sub-indices. Despite the statistical significance of three variables under the fixed effects regression estimation, the causal positive impact on SD was only exerted by cultural and educational events, as confirmed cohesively by both Granger causality tests employed (Table 3). Even in this case, the strength of the impact attributable to a single type of cultural activity was small, as 1% change in the CCI<sub>5</sub> index resulted in approximately 0.02% change of SD. Similarly to the previous approach, the current observations of the SD index (SD<sub>t</sub>) could be most efficiently predicted by its directly preceding values (SD<sub>t−1</sub>) with the value of *beta* coefficient exceeding 0.50<sup>2</sup>. This indicates that sustainable development is to some extent an autonomous process – a self-

**Table 5**

**The results of the Granger causality testing procedures.  
Direction of causality: CCI to SD**

| Direction of causality:<br>CCI to SD | JUODIS, KARAVIAS, SARAFIDIS<br>(2021)<br>(with 10000 bootstrap replications) |         | DUMITRESCU AND HURLIN<br>(2012)<br>(with 2000 bootstrap replications) |         |
|--------------------------------------|------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------|---------|
| Variable                             | Coef.                                                                        | P value | Coef.                                                                 | P value |
| Ln(CCI)                              | 0.270                                                                        | 0.007   | 2.127                                                                 | 0.084   |
| Ln(CCI <sub>1</sub> )                | 0.006                                                                        | 0.623   | − 0.292                                                               | 0.745   |
| Ln(CCI <sub>2</sub> )                | 0.053                                                                        | 0.221   | 1.529                                                                 | 0.247   |
| Ln(CCI <sub>3</sub> )                | 0.011                                                                        | 0.608   | 1.044                                                                 | 0.206   |
| Ln(CCI <sub>4</sub> )                | − 0.031                                                                      | 0.321   | 2.668                                                                 | 0.119   |
| Ln(CCI <sub>5</sub> )                | 0.050                                                                        | 0.011   | 2.690                                                                 | 0.055   |
| Ln(CCI <sub>6</sub> )                | 0.049                                                                        | 0.154   | − 0.688                                                               | 0.471   |
| Ln(CCI <sub>7</sub> )                | − 0.072                                                                      | 0.745   | 1.295                                                                 | 0.325   |

Source: Own calculations, with the use of Stata 18BE software.

**Table 6**

**The results of the Granger causality testing procedures.  
Direction of causality: SD to CCI**

| Direction of causality:<br>SD to CCI | JUODIS, KARAVIAS, SARAFIDIS<br>(2021)<br>(with 10000 bootstrap replications) |         | DUMITRESCU AND HURLIN<br>(2012)<br>(with 2000 bootstrap replications) |         |
|--------------------------------------|------------------------------------------------------------------------------|---------|-----------------------------------------------------------------------|---------|
| Variable                             | Coef.                                                                        | P value | Coef.                                                                 | P value |
| Ln(CCI)                              | 0.621                                                                        | 0.020   | − 0.287                                                               | 0.767   |
| Ln(CCI <sub>5</sub> )                | 5.221                                                                        | 0.000   | 1.263                                                                 | 0.202   |

Source: Own calculations, with the use of Stata 18BE software.

accelerating mechanism, progressing without the interference of additional external factors.

Interestingly, the results of the reverse causality test under the Juodis et al. (2021) approach (Table 6) suggest the existence of positive feedback loops between SD and cultural participation. A bi-directional causal relationship implies that a culturally induced increase in the region's socio-economic development will result in bigger cultural involvement, which, in turn, generates additional developmental gains. The larger absolute values of coefficients obtained in the secondary variant of test (SD to CCI – Table 6), the reverse causational impact is even stronger than the primary one.

## **Summary**

The idea of cultural capital (CCI) and sustainable development (SD) as research categories are extremely popular. This inspires researchers to identify new scientific areas and contribute to the development of this issue. Their use may result in the knowledge contained therein deepening the empirics obtained from analytical research. The analysis of the literature on the subject and the various approaches to cultural capital and sustainable development in regions presented therein showed that there is no single methodology adopted by researchers. This may be related to different approaches to data collection in individual countries, the lack of statistical data, and the fact that global indicators do not reflect the individuality of individual countries and regions. This article proposes the creation of a cultural capital index (CCI), which is presented as the result of comparative research of the studied group, i.e. voivodships of Poland. The examined CCI indicator provides important information about the level of cultural capital in individual regions of Poland and the changes occurring in the period under study (i.e. in 2010 and 2021) (Figure 1; Table 2 and Table 3). The indices adopted for the study were created based on a theoretical review and based on the indices proposed in the countries of Central and Eastern Europe. The main CCI index included 6 sub-indices and was used to analyze and compare cultural capital for Polish regions and its role in shaping sustainable development (SD).

The aim of the article was to examine the role of cultural capital in shaping sustainable development in Poland in 2011–2021. This goal was achieved using a two-stage econometric analysis (static and dynamic panel regression with fixed effects, Granger causality test), designed to reliably confirm the causality of the impact of cultural capital on sustainable development. The results of regression in a dynamic approach (more precisely – the statistical significance of the lagged variable SD) indicate that sustainable development is, to some extent, an autonomous process – a self-reinforcing mechanism, progressing without the intervention of additional external factors. Despite the above, which is unanimously confirmed by all analysis methods, cultural capital played an important role in shaping the sustainable development of Polish voivodships, which allows us to finally confirm the research hypothesis put forward by the authors. What is worth emphasizing is that the positive statistical relationship is two-sided, which suggests the existence of favorable feedback loops multiplying the effect of pro-development activities. This impact is strongest at the highest level of aggregation – in relation to individual channels of this impact (CCI sub-

indices), a clear cause-and-effect relationship (positive impact of CCI on SD) was confirmed only in the case of cultural and educational events. This confirms the theory of Bourdieu (1986), emphasizing the key role of educational investments in shaping the development of the region.

However, it is worth keeping in mind that the lack of individual impact of CCI sub-indices may result from the long-term nature of the relationship, extending even beyond the 11-year study period, determined by data availability. The short length of the SD time series is one of the main limitations of the study, which, apart from the inability to determine long-term dependencies (so important for development processes), led to a significant reduction in the sample size and made it impossible to conduct an individual econometric analysis for each voivodship. The second limitation was the previously mentioned bilateral nature of the relationship between CCI and SD, and even the ambiguous conceptual separation of both phenomena, making it difficult to determine the “pure” share of cultural capital in the process of regional development. The issues of a relatively small sample size and determining the causality of the CCI impact were addressed using a rigorous analytical approach. With the availability of appropriate data, an attempt to determine the long-term (and/or delayed) impact of cultural capital on sustainable development may be the subject of further research.

## N O T E S

<sup>1</sup> In cases of variables conceptually negatively affecting the sustainable development (e.g. long term unemployment rate), the expression on the right side of the equation was further subtracted from one.

<sup>2</sup> The association did not apply to the lags of the higher order, i.e. SDt-2, SDt-3, etc.

## R E F E R E N C E S

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