COMMITMENT TO SUSTAINABLE DEVELOPMENT AND THE ROLE OF NATIONAL CULTURE

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Abstract. Sustainable development goals have gotten acute attention from researchers in the latest decades. Cultural matters are evident for sustainable development, but scientifically incorporating the importance of cultural dimensions remains a challenge. The purpose of the study is to find a link between cultural dimensions and sustainability goals. This study aims to use a compound cultural index to extend the CCI, by including the latest research results and suggesting a CCI covering six cultural dimensions identified in Hofstede's cultural model. H. Yeganeh, 2011, proposed the methodology for constructing a composite cultural index, but the author included only several cultural dimensions in CCI. The authors of this paper present the analysis of fifteen sustainable development goals (SDG) in the 27 European Union countries aiming to rank countries according to the contribution of national culture to sustainable development goals. The methodology was used for panel analysis and the constructed correlation matrix performed by the authors. The finding results prove a correlation exists with four sustainable development goals, although the direction differs– one has a positive link and three–negative one. Value of the paper – the authors created a compound cultural index CCI for sustainable development studies and extended the results delivered by other authors.

Keywords: Sustainable development goals, United Nations, Hofstede dimensions, European Union countries, compound cultural index.

JEL Classification: Q01, M14, M16.

Introduction

Often referred to as the United Nations Global goals, in 2015, 17 sustainable development goals were identified as the basis for maintaining world peace and ensuring human well-being. They have all been successfully integrated and recognized throughout the 27 European Union (EU) member states. All countries have prioritized the most pressing issues, such as hunger and poverty, creativity, technology, finance, and culture, which have become crucial and remain unthinkable (Pizzi et al., 2022). The role of culture in sustainable development is reflected in many of the objectives of the 2030 Agenda, which makes it very important for international cultural relations and external cultural policy at the EU Member State level (Vries, 2020).

There is a lot of research on sustainable development, which has become very popular in recent years.

However, when discussing the link between cultural dimensions and sustainability, there are limited transformative actions toward sustainable development (Adedeji et al., 2017). Not enough attention is contributed to the cultural dimension and how important they can contribute to sustainable development in economic, social, or environmental processes.

Existing scientific sources show that research on the impact of culture on sustainability is scattered across many disciplines. On the other hand, research shows a comprehensive presentation of the concept of culture and sustainability (Soini & Birkeland, 2014; Vries, 2020). Furthermore, in a global world, the importance of culture, knowledge, and the appreciation of the traditions and customs of other nations are becoming an integral part of everyday life in globalization time (Carolina, 2019).

National culture (NC) plays an essential role in the transition of societies to sustainable development (SD).

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Therefore, it should broadly analyze the impact of NC, considering the perspective of organizations (Piwowar-Sulej, 2021).

Achieving the goals of sustainability through the prism of culture requires new approaches that transcend disciplinary boundaries (De Beukelaer & Freitas, 2015). Incorporating the cultural dimensions scientifically is still a challenge (Abarca, 2021; Dessein et al., 2015).

With this study authors will reflect on the cultural dimension on of the agenda 2030, among European Union countries states. The most common research is conducted using the Hofstede cultural model of six dimensions (Han & Kim, 2019; Nagy & Konyha Molnárné, 2018).

The research objective is to use the compound cultural index (CCI) by including the latest research results and to suggest an extended CCI covering six cultural dimensions identified by Hofstede's cultural model in 27 European Union countries. To determine the weights of the dimensions, the authors used an international expert survey. The research method used in this study is Panel analysis and constructed correlation matrix.

The following research questions have been formulated to achieve the goal: (1) How many sustainable development goals correlate with the compound cultural index? (2) How much do Hofstede's cultural dimensions have in common with the sustainable development goals?

Paper sustains four parts. In the introduction part, the authors focus on the contribution of national culture to sustainable development goals. Then follows the literature background, presenting the national culture transitioning societies toward sustainable development and Hofstede's dimensions model. In the third section, the methodology is described. Finally, we continue with the research results, findings, discussion and conclusions.

The study had some limitation due to the data was not available for all sustainable development goals.

1. Literature review

1.1. The contribution of national culture to the goals of sustainable development

The countries of the European Union have long focused on sustainability policies.

Thus, in 2015, an important resolution was passed at the United Nations General Assembly, setting out seventeen adopted goals for a more sustainable future, oriented towards the regular monitoring of progress and implementation by 2030 (United Nations, 2022).

In cooperation with a wide range of partners and stakeholders in the European Union, a regulatory mechanism based on a set of sustainable development goals of 100 indicators has been developed. According to the study, all 17 SDG goals true the five years were monitored with obvious progress indicators. Only the pandemic year 2020 had some negative influence. However, all 27 countries of the European Union have made excellent progress over the last five years towards achieving these goals (see Figure 1).
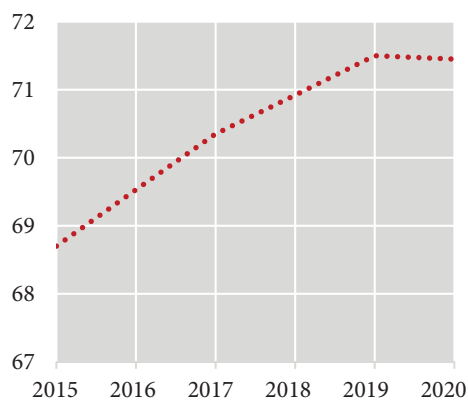
Figure 1. Sustainable development goals index score in the EU countries 2015–2020 (Sustainable Development Report, 2021)

Although there are economic and social challenges to achieving sustainability, Europe is well on its way to achieving the 2030 Agenda goals (Sustainable Development Report, 2021).

The importance of culture was first mentioned in the 2015 United Nations Assembly. Culture has been approved as an essential aspect of sustainable development. She contributes to many of the objectives and criteria set out in the SDG. Economic growth, environmental protection, jobs, promotion of gender equality, and more. After realizing all the achieved goals, the indirect contribution of culture to the bulls (Economic and Social Commission for Asia and the Pacific, 2013).

More than one hundred researchers from all European Union countries were conducting studies on different disciplines to provide the member countries with the instrument to integrate culture as one of the components of sustainable development. The research covered disciplines such as the social sciences, the humanities, the natural sciences, and, more importantly, cultural impacts, the benefits of which have been evident (Kangas et al., 2017; Vikmane & Laķe, 2021).

The sustainability concept is based on the three-pillar paradigm:

– economic,
– environmental,
– social (Asche et al., 2018).

The cultural element is called the fourth sustainability model (see Figure 2). Culture offers critical approaches to the world and system exploratory. It nourishes identifying and analyzing current and complex challenges that
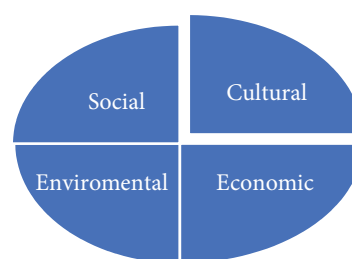
Figure 2. Four pillar paradigms of the sustainability concept (composed by the authors)

need understanding transversal and multidisciplinary responses. The cultural model is essential for transformative power in creating a sustainable future for all. It is a necessary element of sustainability value in creating collective thinking and merging communities (Abarca, 2021; Burford et al., 2013; Sabatini, 2019).

United Nations and the international community helping to:

- Integrate culture into programs on sustainable development;
- Spread the word about the importance of the cultural model;
- Spread the importance of cultural dimension in each country's development policies.

In 2017, the European Parliament emphasizes that culture is a transversal concern and a key source of development (Sabatini, 2019).

Cultural resources are an important way of achieving other development goals for the future. Integrating cultural factors into sustainable development policies and strategies must align with other international commitments (Soini & Birkeland, 2014). It recognizes the universality and interdependence of human rights. It also emphasizes the need to make culture an integral part of European action on sustainability. And given its role in "economic development, job creation, democracy, social justice and solidarity, cohesion and the fight against social exclusion" (Dessein et al., 2015; Vries, 2020).

The European Cultural Foundation for Sustainability must show leadership in the EU global debate around the 2030 Agenda. Ensuring that the fundamental capacities of culture to drive change are firmly enshrined in the SDGs (Cultural Foundation, 2022). Therefore, Culture Action Europe (CAE) calls on the EU institutions to integrate culture across all policy domains relevant to implementing the 17 SDGs to achieve a long-lasting impact throughout the 2030 Agenda. CAE supports the European Parliament 2017 recommendation included in its Report on EU action for sustainability, recognizing cultural institutions and organizations as innovators and models in sustainability concerning green processes. Therefore, culture is highly relevant for implementing the 17 SDGs (Culture Action Europe, 2022).

If sustainable development goals are grouped under economic, social, and environmental goals in a cross-cutting way, culture plays an essential role in each of these parts (Burford et al., 2013).

1.2. The main essence of national culture

National Culture stands for people's behaviour, beliefs, and social norms. These are values firmly cherished in the nation (Apetrei et al., 2015).

Climatic values introduced in the nation's early years are firmly held and created to gradually experience changes from generation to generation. Thus, what is obtained in one social area may not be acceptable in another (Aldulaimi, 2018; Khan & Panarina, 2017). Nevertheless, this does not allow national culture's organizational

culture to be destroyed. However, in the scientific literature, authors differ the differences in national culture because of ethnicity, religion, languages, gender, and age (see Table 1).

Table 1. Dimensions of national culture (composed by the authors)

Dimensions of National Culture	Authors
Ethnicity	(Desmet et al., 2017; Khan & Panarina, 2017; Pereira Sartori Falguera et al., 2021; Yang et al., 2019; Zhukov & Zhukova, 2016) (Webber et al., 2013)
Religion	(Abdulla, 2018; Díez-Esteban et al., 2019; Mättö & Niskanen, 2019; Osewska et al., 2022; Storm, 2013)
Languages	(Braslauskas, 2021; Kavakli, 2021; Kuo & Lai, 2006; Modebadze, 2013; Sari et al., 2020; Villegas-Torres & Mora-Pablo, 2018; Zhan, 2016)
Gender	(Ahn & Cunningham, 2017; Francoeur et al., 2012; Giuliano, 2020; Parham et al., 2015; Pereira Sartori Falguera et al., 2021)
Age	(Hofstede, 2012; Kummer et al., 2012; Ortiz-marcos, 2022; Perry & Parlamis, 2006)

The literature reveals that 83 per cent of all mergers and acquisitions did not benefit shareholders, and over 50 per cent destroyed organizational values. Managing cultural differences is a consequence of crises between managers, employees, and managers from different countries of origin (Gjuraj, 2013).

In a globalizing world, culture plays an essential role in realizing work-related values, behaviours and attitudes towards each person in a given society (Zheng et al., 2021). However, cultural attitudes and values are not the same in all environments, and the fundamental difference in attitudes and values between different cultural institutions forces them to behave differently (Hameed et al., 2021; Sun & Liang, 2021).

1.3. Cultural model by Hofstede

The collaborative planning of mind is the process that distinguishes members of a group or class from other people describing the culture (Hofstede et al., 2010). Culture is a collective phenomenon shared with individuals from the same social environment, studied and spread over time, in the environment in which it exists (De Silva, 2013; Hofstede & Bond, 1984; Hofstede, 2001).

Until defining culture, he described culture manifestations through 4 factors that comprise the fundamentals of cultural differences: a) symbols (words, gestures, images), b) heroes (behavioural models), c) rituals (collective activities, lectures, ceremonies), and d) assets (Hofstede, 1980).

The study conducted by Hofstede in over 80 countries shows the need to understand the dynamic culture

of nations. It has been revealed that some national and regional cultural groups directly affect society's way of life, development, and time-resistant institutions.

Summarizing all essential differences in the paper, using data from the Hofstede website, six dimensions weights in 27 European countries are identified and presented in Table 2 (Hofstede Insights, 2022).

The model proposed by Hofstede is not the only one. More authors such as S.H. Schwartz, E.T. Hall, and F. Trompenaars investigated the topic and proposed models reflecting other dimensions. Authors focus on Hofstede's frameworks as he offers a compressive model that relies on large-scale studies and has received significant acceptance from researchers and practitioners worldwide (Kirkman et al., 2006)

1.4. Culture role in achieving Sustainable development goals

The new Agenda of the United Nations for 2030 includes 17 Sustainable Development Goals, which should

be considered in all world regions, countries and cities (United Nations, 2022). Although none of the 17 SDGs focuses exclusively on culture, the resulting Agenda includes several explicit references to cultural aspects. Cultural aspects play an essential role for the Agenda 2030 to be successful in the development of individual and collective cultural liberties, the safeguarding of tangible and intangible cultural heritages, protection and promotion of diverse cultural expressions, are core components of human and sustainable development (United Cities and Local Governments [UCLG], 2018) (see Table 3).

"|The Sustainable Development Goals, thus facilitating an understanding of how culture can contribute to the achievement of each of the 17 SDGs" (UCLG, 2018).

The authors Zheng et al. (2021) separate SDGs into environmental, sustainable and economic SDGs, where SDGs 3-5, SDG10 and SDG16 are environmental; SDGs 6-7 and SDGs 12-15 are social and SDGs 1-2, SDGs 8-9, SDG11 and SDG17 are economic ones (Zheng et al., 2021).

Table 2 Cultural model by Hofstede in 27 EU countries (Composed by the authors)

Dimensions	Characteristics	Countries of the European Union
Power distance	The reception level defines the power distance. The term "institutions" refers to key elements of society, such as family, school, community, and "organization" refers to different jobs. A high index indicates that the hierarchy is clearly defined and indisputable. A low index shows that employees have equal power.	**Low power distance**: Austria Denmark Estonia Italy Latvia Lithuania Finland Sweden Hungary Germany Netherlands Luxembourg. **High power distance**: Belgium Bulgaria Czech Republic Greece Spain Croatia Poland Malta Portugal France Romania Slovenia Slovakia.
Individualism Versus Collectivism	Individualism shows individualism and self-care. Collectivism values personal interdependence. Maintain social harmony consensus with others.	**Individualism**: Belgium Ireland Austria Czech Republic Estonia Spain Italy Latvia Malta France Finland Sweden Hungary Germany Slovakia Netherlands Luxembourg Denmark Poland Lithuania. **Collectivism**: Bulgaria Greece Croatia Portugal Romania Slovenia.
Masculinity versus Femininity	This dimension measures how Culture values gender roles—male cultures: men as conquerors, and women as gentle instigators of the home fireplace. The dominance of women's culture in the country reduces these gender differences.	**Masculinity**: Belgium Ireland Austria Czech Republic Greece Italy Poland Hungary Germany Slovakia Netherlands Luxembourg. **Femininity**: Bulgaria Denmark Spain Croatia Lithuania Malta Portugal Latvia France Romania Slovenia Finland Sweden Estonia.
Uncertainty avoidance versus Tolerance of uncertainty	Avoiding uncertainty will affect tolerance of ambiguities and trust in opponents that indicate strange behaviour and the need for structure and ritual in negotiated procedures. Uncertainty is tolerant.	**Uncertainty avoidance**: Belgium Austria Bulgaria Lithuania Czech Republic Estonia Greece Spain Italy Croatia Poland Malta Portugal Slovenia France Romania Finland Hungary Germany Slovakia Netherlands Luxembourg Latvia. **Uncertainty tolerant**: Ireland Denmark Sweden.
Long term orientation Versus Short term orientation	Long-term orientation – countries value long-term relationships and cooperation for future benefits. Short-term orientation means special respect for traditions and the fulfilment of commitments, more important than future plans.	**Long-term orientation**: Belgium Austria Bulgaria Czech Republic Estonia Italy Croatia Latvia Lithuania France Romania Sweden Hungary Germany Luxembourg Slovakia Netherlands. **Short-term orientation**: Ireland Denmark Greece Spain Slovenia Malta Portugal Finland.
Indulgence versus Delimited	The indulgence dimension affects the atmosphere of the negotiations and the rigour of the protocols.	**Indulgence**: Bulgaria Czech Republic Estonia Spain Italy Croatia Latvia Poland Lithuania Denmark Greece Portugal France Romania Slovenia Hungary Germany Slovakia. **Delimiting**: Ireland Belgium Austria Malta Finland Sweden Luxembourg Netherlands.

Table 3. Sustainable development goals (composed by the authors (source: Sustainable Development Report, 2021)

Goal Number	Sustainable development goal definition	Importance for culture
1	No poverty	Cultural services and the same opportunities must be guaranteed to all people, regardless of gender, wealth or vulnerability
2	Zero hunger	Health policies related to local customs are assessed
3	Good health and well being	Fostering traditional knowledge involves the conservation of genetic resources
4	Quality education	It is essential to include a cultural approach in schools. Ability to know other languages and culture
5	Gender equality	Increasing women's rights working in a project
6	Clean water and sanitation	Knowing helps to manage water consumption properly
7	Affordable and clean energy	Creative people can be involved in educating and raising awareness about energy production
8	Decent work and economic growth	It is important to provide jobs where people can contribute to disseminating knowledge about national cultures, such as working in the tourism sector.
9	Industry. Innovation and infrastructure	It is crucial to develop an infrastructure that can provide an opportunity for the development of culture
10	Reduced inequalities	Memories can contribute to the development of culture. Therefore, increased migration should include intercultural dialogue involvement of people in cultural elements, regardless of their race, origin or religion
11	Sustainable cities and communities	Most cultural factors can lead to the exploitation of cultural heritage elements in cities and their accesses. Public spaces are used to develop cultural activities.
12	Responsible consumption and production	Products from local production should be valued more
13	Climate action	Involve professionals in nurturing and raising awareness about climate change
14	Life below water	Preserve the tradition associated with coastal ecosystems
15	Life on land	It is important to incorporate and value local tradition and knowledge when implementing cultural factors
16	Peace, justice and strong institutions	To enable people to participate in the development of the nation's cultural policy
17	Partnerships for the goals	International development strategies aim to integrate cultural aspects

2. Methodological approach

Over the last twenty years, organizational studies have shown a growing interest in culture through various conceptual structures and methods. The research method used in this study is Panel analysis and constructed correlation matrix.

For this paper, we focus on Hofstede's frameworks as he offers a compressive model that relies on large-scale studies and has received significant acceptance from researchers and practitioners worldwide (Kirkman et al., 2006). Cultural values remain stable and change slowly over the years. Even if the dimension indices of some countries change over time, their relative position remains the same. Hofstede's advantage over alternative models is based on quantifiable, understandable, and accessible cross-border comparisons, a repeatable and acceptable cultural taxonomy that supports international business research (Dębczyńska, 2018; Fang et al., 2017; Guo et al., 2018; Lee & Herold, 2016; Masuda et al., 2020).

To determine the weights of the dimensions, the authors used an expert survey (Kizilaslan, 2006). They interviewed ten experts from various foreign countries who assessed the importance of the six Hofstede dimensions of culture in the international working environment (see Table 4). The consistency of the experts' decisions was checked using a compliance factor. Sum of points awarded by experts:

$$c = \sum_{j=1}^{r} c_{ij} \left(i = 1,...,m \right) = 211, \qquad (1)$$

where m is the number of alternatives; r – number of experts.

The coefficient of conformity W is calculated according to the following formula (Eq. (2):

$$W = \frac{S}{S_{max}} \ , \text{ when } \ S = \sum_{i=1}^{m} (c_i - \bar{c})^2, \qquad (2)$$

where S is the sum of the deviations, which gives the difference from the mean square, S_{max} is the sum of the deviations in the ideally agreed case, $\bar{c}$ is the overall average calculated:

$$\bar{c} = \frac{1}{2} r \left(m + 1 \right) = \frac{1}{2} \cdot 10 \cdot \left(6 + 1 \right) = 35 , \qquad (3)$$

where $S = 560$.

Table 4. The expert evaluation of Hofstede's dimensions (composed by the authors)

Indicator	Name	Experts										Sum of rankings	Deviations from the mean	Indicator weights	Average value
		1	2	3	4	5	6	7	8	9	10				
1	Power distance	5	1	5	6	5	6	6	2	1	2	39	18	0.186	9.657
2	Individualism	4	5	4	3	6	4	1	4	4	5	40	27	0.190	9.905
3	Masculinity	1	4	1	4	4	2	5	5	5	6	37	4	0.176	9.162
4	Uncertainty avoidance	6	6	6	5	1	5	4	6	6	4	49	204	0.233	12.133
5	Long term orientation	2	2	2	1	2	3	3	3	3	1	22	167	0.105	5.448
6	Indulgence	3	3	3	2	3	1	2	1	2	3	23	141	0.110	5.695
Sum		21	21	21	21	21	21	21	21	21	21	210	560	1	52

Several deviations are in an ideally agreed case:

$$S_{max} \frac{r^2 m (m^2 - 1)}{12} \frac{100 \cdot 6 \cdot (36 - 1)}{12},$$

when $W = \dfrac{S}{S_{max}} = \dfrac{560}{1750} = 0.32.$ (4)

We calculate the value of the coefficient of equation x^2 as follows:

$$x^2 = Wr(m-1) = 0.32 \cdot 10 \cdot (6-1) = 16.01. \quad (5)$$

The random number x^2 is divided by x^2 with the degrees of freedom α of the level of significance chosen for $ν = m - 1$ (in practice, α is usually equal to 0.05 or 0.01). The expert estimates are consistent, with a calculated value of x^2 bigger than x_{kr} (taken from the distribution tables with $ν = 6 - 1 = 5$ degrees of available and a significance level of α = 0.05 and equal 14.79).

The coefficient of agreement of the opinions is 0.32 (its value is 16.01 and is higher than the critical value of 14.79) and shows that the expert decisions are sound. That means that criterion weights (expert calculations) can be used for analysis (Podvezko, 2008). Finally, the criteria weights are included in the system. The criterion, pursuing uncertainty, attracted the most significant interest from experts.

As culture is a complex concept, the practical approach is to identify some of its key features that can analyze cultural differences. This approach involves reducing culture to explicit, ethical constructs called "cultural aspects". Although cultural dimensions are relatively suitable tools for assessing cultural characteristics, some studies use cross-border comparisons requiring a single composite index that can quantify all cultural dimensions. If the broad concept of culture could be reduced to several dimensions, then these dimensions could be reduced to one composite indicator by the same logic. The main idea is to create a single tool that can quantify all cultural traits.

The Kogut-Singh Cultural Distance Index (1988) is one of the most commonly used indicators in international business (Kogut & Singh, 1988; Yeganeh, 2011, 2013). It has received significant recognition in disciplines as diverse as international management, marketing, finance and accounting (Yeganeh, 2011). The cultural distance index is a convenient indicator that can be integrated into statistical analysis. Cultural distance Kogut and Singh (1988) defined national-cultural distance as the degree to which the cultural norms of one country differ from those of another. The authors constructed cultural distance as a composite measure based on the deviation of the six Hofstede national culture scales. All cultural aspects will be summed up to create an ICC, and weighting is necessary when multiple actors are combined into one indicator.

If culture "C" has "n" dimensions of "D", CCI can be represented as follows (Eq. 2):

$$CCI = \left\{ \sum_{i=1}^{n} \frac{\alpha D_1}{SD_1} + \frac{\beta D_2}{SD_2} \cdots + \frac{\lambda D_n}{SD_n} \right\}, \quad (6)$$

where CCI – stands for cultural index; $D_1 \ldots D_n$ – cultural dimensions; $SD_1 \ldots SD_n$ – standard deviation of cultural dimensions; a, b, l – are weights of every cultural dimension.

3. Data analysis

All countries in the European Union are resolutely pursuing the SDG goals set by the United Nations. As a result, the cultural indicator becomes a new and significant four-pillar paradigm of the sustainability concept.

The authors conducted an expert survey of cultural indicators based on the cultural dimensions of the Hofstede model (www. cultural compass by Hofstede.com). To

Table 5. Correlation matrix (composed by the authors)

CCI		CCI	SDG1	SDG2	SDG3	SDG4	SDG5	SDG6	SDG7	SDG8	SDG9	SDG10	SDG11	SDG12	SDG13	SDG16	SDG17
CCI	Corr.coef.	1															
	Probability																
SDG1	Corr.coef.	−0.361	1														
	Probability	0	–														
SDG2	Corr.coef.	−0.058	−0.289	1													
	Probability	0.251	0	–													
SDG3	Corr.coef.	0.168	−0.581	0.165	1												
	Probability	0.001	0	0.001	–												
SDG4	Corr.coef.	−0.259	0.226	−0.246	0.087	1											
	Probability	0	0	0	0.087	–											
SDG5	Corr.kof.	0.103	−0.195	0.293	0.189	−0.389	1										
	Probability	0.042	0	0	0	0	–										
SDG6	Corr.coef.	−0.348	0.705	−0.176	−0.710	0.127	−0.075	1									
	Probability	0	0	0.001	0	0.012	0.141	–									
SDG7	Corr.coef.	−0.392	0	0.657	−0.041	−0.189	0.460	0.175	1								
	Probability	0	0.998	0	0.416	0	0	0.001	–								
SDG8	Corr.coef.	0.145	−0.525	0.339	0.133	−0.271	0.379	−0.141	0.363	1							
	Probability	0.004	0	0	0.009	0	0	0.005	0	–							
SDG9	Corr.coef.	0.171	−0.635	0.406	0.529	−0.259	0.437	−0.452	0.403	0.566	1						
	Probability	0.001	0	0	0	0	0	0	0	0	–						
SDG10	Corr.coef.	−0.201	0.782	−0.139	−0.210	0.211	−0.087	0.385	−0.032	−0.421	−0.280	1					
	Probability	0	0	0.006	0	0	0.085	0	0.526	0	0	–					
SDG11	Corr.coef.	−0.221	0.652	−0.039	−0.824	−0.147	−0.076	0.645	0.125	−0.360	−0.595	0.270	1				
	Probability	0.000	0	0.442	0	0.004	0.135	0	0.014	0	0	0	–				
SDG12	Corr.coef.	0.526	−0.428	−0.092	0.682	−0.003	0.236	−0.477	−0.323	0.179	0.340	−0.026	−0.649	1			
	Probability	0	0	0.071	0	0.954	0	0	0	0	0	0.607	0	–			
SDG13	Corr.coef.	0.027	0.149	−0.078	−0.508	0.106	−0.356	0.253	−0.079	0.033	−0.084	0.040	0.303	−0.291	1		
	Probability	0.597	0.003	0.122	0	0.036	0	0	0.118	0.518	0.098	0.437	0	0	–		
SDG16	Corr.coef.	0.072	0.294	−0.197	−0.074	0.296	−0.093	0.162	−0.225	−0.011	−0.052	0.453	−0.004	0.204	0.295	1	
	Probability	0.156	0.000	0	0.145	0	0.067	0.001	0	0.832	0.305	0	0.944	0	0	–	
SDG17	Corr.coef.	−0.301	0.368	−0.168	−0.326	0.032	−0.108	0.212	−0.009	−0.224	−0.415	0.241		−0.282	−0.041	0.108	1
	Probability	0	0	0.001	0	0.532	0.034	0	0.865	0	0	0	0	0	0.421	0.033	–

Note: Abbreviation: Corr. Coef. – Correlation coefficient.

identify criteria weights needed to perform correlation matrix (see Table 4). The calculations were performed to show the Coefficient of Consensus that the expert decisions are sound. That means that criterion weights (expert calculations) can be used for analysis (Podvezko, 2008). Finally, the criteria weights are included in the system.

The correlation of 15 sustainable development goals with a compound cultural index was tested to identify relationships. The results of these tests are presented in Table 5. However, due to the lack of data for SDG13 and SDG14 in European Union 27 countries, the links between the compound cultural index and sustainable development goals are not researched.

The authors detected that the compound cultural index links with SDG1, SDG6, SDG7, SDG12 and SDG17, which are described in Table 6. However, the relationship with these pairs has a probability lower than 0.1.

Table 6. Explanation of indicators for sustainable development goals (composed by the authors)

Sustainable development goal	Indicator	Unit of measure
Goal1-No property	SDG1. People at risk of poverty or social exclusion	%
Goal6-Clean water and sanitation	SDG6. Population having neither a bath, nor shower, nor indoor flushing toilet in their household	% of population
Goal7-Affordable and clean energy	SDG7. Share of renewable energy in gross final energy consumption	%
Goal12-Responsible consumption and production	SDG12. Resource productivity and domestic material consumption	GDP divided by domestic material consumption, Eur per kg
Goal17-Partnerships for the goals	SDG17. Share environment taxes in total tax revenues	%

The compound cultural index has a positive impact on SDG12 – the goal of responsible consumption and production and negative impact on other goals:

– SDG1 – the goal of no poverty, i.e., people at risk of poverty or social exclusion;
– SDG 6 – the goal of clean water and sanitation, i.e., reduction of the population which is not having primary sanitation conditions at their home;
– SDG7 – the goal of affordable and clean energy. From the correlation matrix, we see that the main link of SDG7 is with SDG5, which shows the share of women in senior management positions. The result shows that the first business with the highest energy consumer should reach a higher share of women leading businesses;

– SDG17 – the goal of partnership for the goals. From the correlation matrix, we see that the main link of SDG17 is with SDG1 and SDG11. The first shows that people at risk of poverty or social exclusion have to be minimized, and the second SDG11 shows overcrowding rate in sustainable cities, which means the possibility to pay higher environmental taxes is strongly linked with the reduction of overcrowding rate.

The results show that the compound cultural index constructed for Hofstede dimensions used most often for business questions responds very well to some population-related with sustainable development questions.

The study has some limitations:
– The data was not available for all sustainable development goals.
– From 15th the sustainable development goals, only one-third of them have a relationship with cultural dimensions. For example, SDG10, which shows the degree of people at risk of poverty or social exclusion in cities, has a solid link with SDG1, but the link with the compound cultural index is low. We could say that the link is weak because other factors influence this relationship.
– The constructed framework for researching link with SDG4 representing early leavers from education and training is not suitable due to the different focus of Hofstede dimensions. Instead, different cultural frameworks from other authors could be used for research.

4. Discussion

In 2015, the 17 sustainability goals set by the European Union must be achieved and monitored for fifteen years. It is very important to evaluate each time without leaving anything aside. The concept of national culture can be difficult to interpret and embed in the goals of sustainable development due to the different definitions (UCLG, 2018). In this study, the authors differ the differences in national culture because of ethnicity, religion, languages, gender and age. However, cultural attitudes and values are not the same in all environments, and the fundamental difference in attitudes and values between different cultural institutions forces them to behave differently. It is important to emphasize the importance of the cultural dimension in achieving sustainability goals, as their understanding and ability to adapt flexibly can help them adapt to local policymaking (Yang et al., 2019).

Culture Action Europe (CAE) calls on the EU institutions to integrate culture across all policy domains relevant to implementing the 17 SDGs to achieve a long-lasting impact throughout the 2030 Agenda (Culture Actione Europe, 2022).

A group of 15 authors in 2021 researched the importance of culture in achieving sustainable development goals (Zheng et al., 2021). However, they did research the

cultural dimension of Hofstede, individualism-collectivism, and did not identify any significant links with SDG stating that Hofstede's model is closely linked with economically sustainable development goals. Instead, they figured out that the Schwartz model, linked to personal values, is more related to environmental and socially sustainable development goals (Pizzi et al., 2022).

The results of research conducted in 2016 in this area have shown the different links between sustainable development goals that arise between sectors and cultural factors (Nilsson et al., 2016).

We extended the research by using the compound cultural index and collected data from the Hofstede website (Hofstede Insights, 2022), six dimensions weights in 27 European Union countries to conduct the study. Authors focus on Hofstede's frameworks as he offers a compressive model that relies on large-scale studies and has received significant acceptance from researchers and practitioners worldwide (Hofstede, 2011; Kirkman et al., 2006). The results show that the compound cultural index constructed for Hofstede dimensions used most often for business questions responds very well to some population-related with sustainable development questions.

Due to the study limitations, the models of other authors, S.H. Schwartz, E.T. Hall, F. Trompenaars, were not presented in the theoretical part of the paper.

Further research directions could be named such as:
– The investigation of links with other sustainable development goals.
– The investigations of defined links in other world countries located outside European Union boundaries.
– The investigation of other frameworks of cultural dimensions constructed by S.H. Schwartz, E.T. Hall, F. Trompenaars and others could be used for further research.

Conclusions

Sustainable development goals have received much attention from scientists in recent decades. Cultural matters are obvious to sustainable development, but scientifically incorporating the importance of cultural dimensions is still a challenge. Existing scientific sources show that research on the impact of culture on sustainability is scattered across many disciplines. On the other hand, research shows a comprehensive presentation on culture and sustainability.

The concept of sustainability is based on a three-pillar paradigm: economic, environmental, and social. The element of culture in this paradigm is the fourth component of sustainability. Because culture offers critical approaches to the world and exploring the system, it encourages identifying and analyzing current and complex challenges that require cross-cutting and multidisciplinary responses. Therefore, the cultural model is crucial. It is a necessary element of the value of sustainability in building collective thinking and connecting communities. The

importance of culture, the knowledge of the traditions and customs of other nations, is becoming an integral part of everyday life in the global world. National Culture stands for people's behaviour, beliefs, social norms. These are values that are firmly cherished in the nation.

The importance of culture was first mentioned in 2015 at the United Nations Assembly. Culture has been approved as an essential aspect of sustainable development. She contributes to many objectives and criteria set out in the sustainable development goals. Integrating cultural factors into sustainable development policies and strategies must align with other international commitments. The cultural element is called the fourth model of sustainability. He is essential for transformative power in creating a sustainable future for all and a necessary element of sustainability value.

In most cases, culture and its components are only analyzed based on qualitative research methods. In our study, we used mathematical measurement methods to evaluate the impact of cultural indicators on sustainability indicators.

In this study, we focused on cultural values and their importance in achieving the goals of the SDS. We used the six dimensions of culture identified in Hofstede's cultural model as one of the most widely used and cited sources in the scientific literature. We have expanded the Culture Index to include the latest research and have proposed a Culture Index covering 15 sustainable development goals. Fifteen Sustainable Development Goals (SDGs) have been revised in the 27 countries of the European Union to break them down according to the contribution of national culture. The authors performed a panel analysis and constructed a correlation matrix.

The results prove a correlation exists with four sustainable development goals, although the direction differs–one has a positive link and four–negative ones.

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