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# Creativity and Sustainable Development: A Cross-National Quantitative Study

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**ABSTRACT:** This study examines whether creativity and cultural production are statistically associated with Sustainable Development Goal (SDG) performance and social transformation using a cross-national quantitative design across 108 economies. By merging international indicators from the WIPO Global Innovation Index 2023 and the Sustainable Development Report 2023, the research constructs a composite Social Transformation Score based on health, education, gender equality, reduced inequality, sustainable communities, and inclusive institutions. The statistical analysis reveals a strong positive correlation between creative outputs and social transformation ($r = 0.760, $p < 0.001$), which remains highly significant even after controlling for purchasing-power GDP per capita and population size ($B = 0.263, $p < 0.001$). Furthermore, a region-adjusted creative intensity model explains 85.2% of the variance in social transformation outcomes, with online creativity emerging as the strongest independent predictor among the disaggregated components. Crucially, these empirical findings show that arts, culture, and digital creativity drive societal progress rather than merely decorate it, offering robust evidence for policy planners. Ultimately, by establishing that creative capacity captures vital social value beyond economic wealth alone, the paper advocates for integrating cultural infrastructure, digital participation, and creative industries directly into national SDG strategies and international development monitoring frameworks.

**Keywords:** arts; culture; sustainable development goals; social transformation; quantitative analysis; WIPO Global Innovation Index.

## I. INTRODUCTION

Sustainable development is often measured through economic, environmental, institutional, and social indicators, yet mainstream SDG analysis often overlooks its cultural and creative dimensions. This gap matters because arts and culture shape how communities learn, communicate, participate, remember, innovate, and imagine collective futures. When development policy ignores cultural practices, it risks becoming technically measurable but socially detached from the meanings, identities, and capabilities through which communities actually transform.

This study responds to this problem by moving beyond purely conceptual or literature-based discussion. It treats creativity and cultural production as measurable development variables and examines their statistical association with SDG performance. This approach matters because the creative economy, cultural services, arts participation, digital creativity, and heritage-based practices increasingly connect to education, health, gender equality, inclusive cities, social cohesion, and institutional participation.

The research problem is therefore both conceptual and empirical. Conceptually, culture is recognized as important but remains weakly institutionalized in the SDG structure. Empirically, many discussions of arts and sustainable development rely on case narratives without testing whether countries with stronger creative-output indicators also show stronger social-development outcomes. This paper addresses that

limitation by merging two international datasets and estimating the relationship between cultural creativity and SDG-oriented social transformation.

The study covers evidence and data available up to 2023. It uses the WIPO Global Innovation Index 2023 to represent creativity and cultural production, and the Sustainable Development Report 2023 to represent national SDG performance. The analysis does not claim direct causality; rather, it identifies statistically observable associations and interprets them through a cultural-policy framework. The purpose is to show whether creativity operates as a measurable development correlate and how this evidence can strengthen the position of arts and culture in SDG research.

## II. LITERATURE REVIEW

Culture-based development research increasingly argues that arts, cultural participation, creative industries, and heritage should be treated as active components of sustainable development rather than symbolic or secondary policy areas. Cultural participation has been linked to regional development, creative-city performance, civic vitality, and broader social outcomes, although these benefits may also concentrate urban populations and create uneven access when cultural resources cluster in already advantaged places [1]. Cultural access also relates to well-being, with evidence showing that participation in cultural life can support mental health and strengthen the social conditions that shape quality of life [2]. These findings support positioning culture within the SDG agenda as a measurable social-development resource, especially because international cultural-policy coalitions argue that the current SDG framework underrepresents culture despite its relevance to education, inclusion, health, urban sustainability, and community resilience [3].

Empirical studies on arts engagement strengthen this argument by showing that cultural activity can influence health and well-being through emotional expression, social connection, cognitive stimulation, and community belonging. Recreational arts engagement has been associated with stronger mental well-being, suggesting that creative participation can function as a social determinant of health rather than merely as leisure [4]. Broader cultural-sustainability theory also explains why culture matters for development: culture works in development, for development, and as development because it shapes identities, values, meanings, and practices that make social transformation locally meaningful and durable [5]. Cultural policy research further shows that strategic cultural pathways can support sustainable development, including integrated planning, place-based cultural action, creative participation, and institutional support for cultural rights [6].

The arts-and-health literature provides one of the strongest foundations for connecting culture to SDG-oriented social transformation. Evidence from health and well-being research indicates that arts participation can contribute to prevention, health promotion, illness management, social connection, and psychological resilience [7]. Longitudinal evidence also links cultural engagement with reduced risk of depression among older adults, showing that cultural participation may produce benefits over time rather than only short-term emotional effects [8]. This health evidence justifies including SDG 3 in a broader Social Transformation Score because health depends not only on medical systems but also on social, cultural, and participatory environments.

Cultural heritage research adds another important dimension to the literature because heritage is directly connected to identity, memory, place, resilience, and intergenerational continuity. Studies on climate threats to cultural heritage show that heritage resources face increasing environmental risks, including flooding, temperature change, erosion, and extreme weather events [9]. At the same time, the arts are closely linked with social determinants of health, including social cohesion, community identity, participation, and equity [10]. Arts, crafts, and cultural production have also been discussed as practical tools for advancing SDG values because they support local livelihoods, cultural expression, education, and community-based creativity [11]. These perspectives show that arts and heritage should not be separated from sustainability policy because they influence both social well-being and resilience.

Research on creative industries expands the discussion from cultural participation to economic and innovation systems. Cultural and creative industries can respond to major societal challenges by generating new knowledge, skills, services, design practices, and participatory forms of innovation [12]. Heritage policy also connects cultural resources to climate action by emphasizing that cultural heritage is both vulnerable to

climate change and useful for supporting adaptation, memory, local knowledge, and community resilience [13]. The global sustainable development literature similarly stresses that transformation requires integrated systems thinking, social participation, institutional coordination, and policy action across sectors [14]. These studies support examining culture not only as an artistic field but also as part of broader transformation systems.

Heritage-focused SDG research shows that cultural heritage can contribute to sustainable development when it is integrated into policy guidance, urban planning, community participation, education, climate resilience, and inclusive governance [15]. Indicator-based studies also emphasize the need for measurable cultural-heritage tools to help policymakers assess heritage's multidimensional contribution to sustainable development [16]. Creative-economy research from international policy sources further shows that creative people, places, and industries contribute to employment, innovation, regional competitiveness, and social value [17]. Together, these studies justify the use of measurable creativity indicators in the present study because they show that culture can be translated into policy-relevant evidence without reducing it to purely economic output.

Studies linking cultural heritage with SDG targets argue that clearer policy alignment, stronger indicators, and more explicit recognition of culture in SDG implementation can harmonize heritage and sustainable development [18]. Green cultural-policy work also positions heritage as part of the climate transition, arguing that cultural institutions, historic environments, and heritage practices can support sustainability strategies when linked to environmental and social goals [19]. The Sustainable Development Report provides the SDG performance framework used to compare national progress across goals and countries [20]. In this study, such SDG indicators provide the outcome side of the empirical model, allowing culture-related creativity indicators to be examined in relation to broader social transformation.

Climate-change literature on cultural heritage further demonstrates that cultural assets face direct and indirect risks from environmental transformation, making heritage protection a sustainability priority rather than a separate cultural concern [21]. The scientific discourse on cultural sustainability also shows that culture has become an important analytical concept for understanding how values, identity, heritage, and everyday practices shape sustainable development [22]. Quantitative research on cultural value and SDG progress provides additional support for measuring the relationship between culture and development outcomes, especially when cultural value is treated as part of social and economic transformation [23]. Longitudinal arts-engagement studies also show that repeated and sustained participation in the arts can support well-being outcomes over time, reinforcing the argument that cultural participation can have durable social effects [24].

Urban cultural-policy literature emphasizes the role of cultural rights, participation, access, and local cultural planning in sustainable cities [25]. This matters for SDG 11 because sustainable communities need more than infrastructure; they also need identity, belonging, public participation, and inclusive cultural life. Creative economy research also shows that creative goods, creative services, digital production, and cultural industries are increasingly important in development policy because they connect culture with employment, innovation, trade, and knowledge production [26]. UNESCO's culture indicators provide a measurement-oriented framework for linking cultural resources to SDG monitoring, supporting the methodological logic of treating culture as a measurable development field [27]. UNESCO's policy work on creativity as a global public good further supports the argument that cultural and creative sectors require public investment, fair access, diversity, and institutional protection [28].

The formal SDG framework provides the global policy foundation for this study because the 2030 Agenda links sustainable development to health, education, gender equality, reduced inequalities, sustainable cities, peace, institutions, and inclusive partnerships [29]. However, culture is not treated as a separate SDG, creating a measurement gap for scholars and policymakers seeking to evaluate the role of arts, heritage, and creativity in social transformation. The Global Innovation Index provides internationally comparable creative-output indicators, including creative goods and services, cultural and creative exports, and online creativity [30]. These indicators allow researchers to examine whether countries with stronger creative performance also show stronger SDG-related social outcomes.

Overall, the literature shows that arts, culture, heritage, creative industries, and digital creativity contribute to sustainable development through several connected pathways: health and well-being, education, cultural rights, urban inclusion, climate resilience, innovation, employment, participation, and institutional transformation [1]–[30]. This body of work supports the present study's central argument: creativity should be treated as a measurable driver and correlate of SDG-oriented social transformation. By linking creative-output indicators with SDG performance, the study extends previous conceptual and policy-based discussions into a quantitative cross-national framework.

**Table 1.** Comparison table.

| Citation | Author(s) and year | Main focus | Use in this study |
|---|---|---|---|
| [1] | Cerisola and Panzera (2022) | Cultural participation and creative-city outcomes | Supports the link between cultural participation, regional development, and social outcomes. |
| [2] | Crociata et al. (2014) | Cultural access and mental health | Connects cultural access with well-being indicators relevant to SDG 3. |
| [3] | Culture2030Goal Campaign (2022) | Culture as a missing SDG priority | Supports the argument that culture is underrepresented in SDG monitoring. |
| [4] | Davies et al. (2016) | Recreational arts engagement and mental well-being | Provides empirical support for arts participation as a social determinant of health. |
| [5] | Dessein et al. (2015) | Culture in, for, and as sustainable development | Provides the core cultural-sustainability framing for the study. |
| [6] | Duxbury et al. (2017) | Cultural policy pathways for sustainable development | Positions culture as both a sector and a strategic development pathway. |
| [7] | Fancourt and Finn (2019) | Arts, health, and well-being evidence | Justifies including health within the social transformation score. |
| [8] | Fancourt and Tymoszuk (2019) | Cultural engagement and depression risk | Supports links between cultural participation and mental-health outcomes. |
| [9] | Fatorić and Seekamp (2017) | Climate threats to cultural heritage | Shows why heritage protection is part of sustainable development policy. |
| [10] | Gordon-Nesbitt and Howarth (2020) | Arts and social determinants of health | Strengthens the health and social-equity interpretation of arts participation. |
| [11] | Gudowska (2020) | Arts, crafts, and SDGs | Links cultural production with practical SDG-oriented social value. |
| [12] | Gustafsson and Lazzaro (2021) | Creative industries and societal challenges | Supports the innovation and social-transformation role of creative sectors. |
| [13] | ICOMOS (2019) | Cultural heritage and climate action | Connects heritage governance with sustainability and resilience agendas. |
| [14] | Independent Group of Scientists (2019) | Global Sustainable Development Report | Provides broader scientific context for SDG transformation pathways. |
| [15] | Labadi et al. (2021) | Heritage and SDG policy guidance | Supports interpreting cultural heritage as an SDG implementation resource. |
| [16] | Nocca (2017) | Cultural heritage indicators for sustainable development | Supports the need for measurable cultural-development indicators. |
| [17] | OECD (2022) | Creative people, places, and industries | Supports the economic, regional, and policy role of creative industries. |
| [18] | Petti et al. (2020) | Heritage and sustainable-development targets | Supports harmonizing cultural-heritage evidence with SDG targets. |
| [19] | Potts (2021) | Cultural heritage green policy | Links cultural heritage, climate policy, and European sustainability practice. |
| [20] | Sachs et al. (2023) | Sustainable Development Report indicators | Provides the SDG performance data source used in the empirical model. |
| [21] | Sesana et al. (2021) | Climate-change impacts on cultural heritage | Supports heritage vulnerability as a sustainability concern. |
| [22] | Soini and Birkeland (2014) | Scientific discourse on cultural sustainability | Clarifies the theoretical development of cultural sustainability. |
| [23] | Streimikiene et al. (2019) | Cultural value and SDG progress | Supports quantitative thinking about culture and SDG achievement. |
| [24] | Tymoszuk et al. (2020) | Arts engagement and well-being over time | Adds longitudinal support for sustained arts engagement and well-being. |

| Citation | Author(s) and year | Main focus | Use in this study |
|---|---|---|---|
| [25] | UCLG Committee on Culture (2015) | Culture in sustainable cities | Supports cultural rights, participation, and urban sustainability. |
| [26] | UNCTAD (2022) | Creative economy development outlook | Supports the economic-development role of creative goods and services. |
| [27] | UNESCO (2019) | Culture indicators for SDG monitoring | Supports the measurement logic behind culture-related SDG indicators. |
| [28] | UNESCO (2022) | Creativity and culture as a global public good | Supports public-value interpretation of creative sectors and cultural policy. |
| [29] | United Nations (2015) | The 2030 Agenda for Sustainable Development | Provides the formal SDG framework that anchors the paper. |
| [30] | WIPO (2023) | Global Innovation Index creative indicators | Provides the creative-output data source used in the empirical model. |

## III. RESEARCH QUESTIONS, HYPOTHESES AND STUDY CONTRIBUTION

### *1. RESEARCH PROBLEM*

- The first research problem concerns the structural invisibility of culture within the SDGs. Although the 2030 Agenda recognizes cultural diversity and intercultural understanding, culture does not appear as a separate goal. This makes it difficult for policymakers to evaluate arts, cultural participation, heritage, and creative industries as active mechanisms of sustainable development rather than secondary activities.
- The second problem is methodological. Studies on arts and culture frequently provide strong qualitative arguments but limited statistical evidence. Without measurable analysis, it becomes difficult to demonstrate whether creative-output indicators have a systematic relationship with social-development outcomes across countries. This weakens the evidence base needed for international journals and policy-oriented research.
- The third problem concerns translation from cultural activity to social transformation. Creativity may influence SDG outcomes through education, health, gender voice, inclusive urban life, social cohesion, and civic participation. However, these pathways require a model that links cultural indicators to measurable SDG scores while acknowledging the limits of cross-sectional data.

### *2. RESEARCH AIM, QUESTIONS, AND HYPOTHESES*

This study aims to examine the statistical relationship between arts-and-culture-related creative indicators and SDG-oriented social transformation across countries.

- **RQ1**. What is the relationship between creative outputs and overall SDG performance?
- **RQ2**. Are creative outputs associated with a composite social transformation score based on health, education, gender equality, inequality reduction, sustainable communities, and inclusive institutions?
- **RQ3**. Which components of creative performance, including creative goods and services, online creativity, and cultural/creative exports, are most strongly associated with social transformation?
- **RQ4**. Does the relationship between creativity and social transformation remain significant after controlling for income level and population size?
- **RQ5**. How do regional patterns differ in creative intensity and SDG social transformation?
- **H1**. Creative outputs are positively associated with overall SDG Index performance.
- **H2**. Creative outputs are positively associated with the Social Transformation Score.
- **H3**. Online creativity and creative goods-and-services indicators are positively associated with social transformation after controlling for GDP per capita and population.
- **H4**. The creativity–social transformation relationship remains statistically significant after regional adjustment.

### *3. STUDY CONTRIBUTION*

- Conceptual Contribution: It positions arts, culture, and creativity as measurable components of sustainable development and links cultural sustainability with Sustainable Development Goal (SDG) measurement through cross-national creative indicators.
- Methodological Contribution**:** It develops two analytical measures—the Creative Intensity Index and the Social Transformation Score—to enable empirical assessment of the relationship between creative activity and social transformation.
- Practical Contribution**:** It provides evidence to support policymakers, cultural institutions, and SDG planners in integrating arts, culture, creative industries, and cultural participation into development monitoring, funding priorities, and social-development strategies.

## IV. PROPOSED METHOD

### *1. METHODOLOGICAL LOGIC*

The proposed method is designed to test the relationship between cultural creativity and SDG-oriented social transformation through a measurable, reproducible, and policy-interpretable structure. The method assumes creativity becomes developmentally meaningful when expressed through cultural production, digital participation, creative goods and services, and institutional conditions that let communities convert cultural resources into social capabilities.

The model follows a three-stage analytical logic. First, creativity is operationalized through internationally comparable creative-output indicators. Second, social transformation is operationalized using selected SDG scores representing health, education, gender equality, inequality reduction, sustainable communities, and inclusive institutions. Third, we statistically test the relationship between the two dimensions and interpret it through a cultural-policy framework that recognizes the role of participation, cultural rights, access, and institutional support.

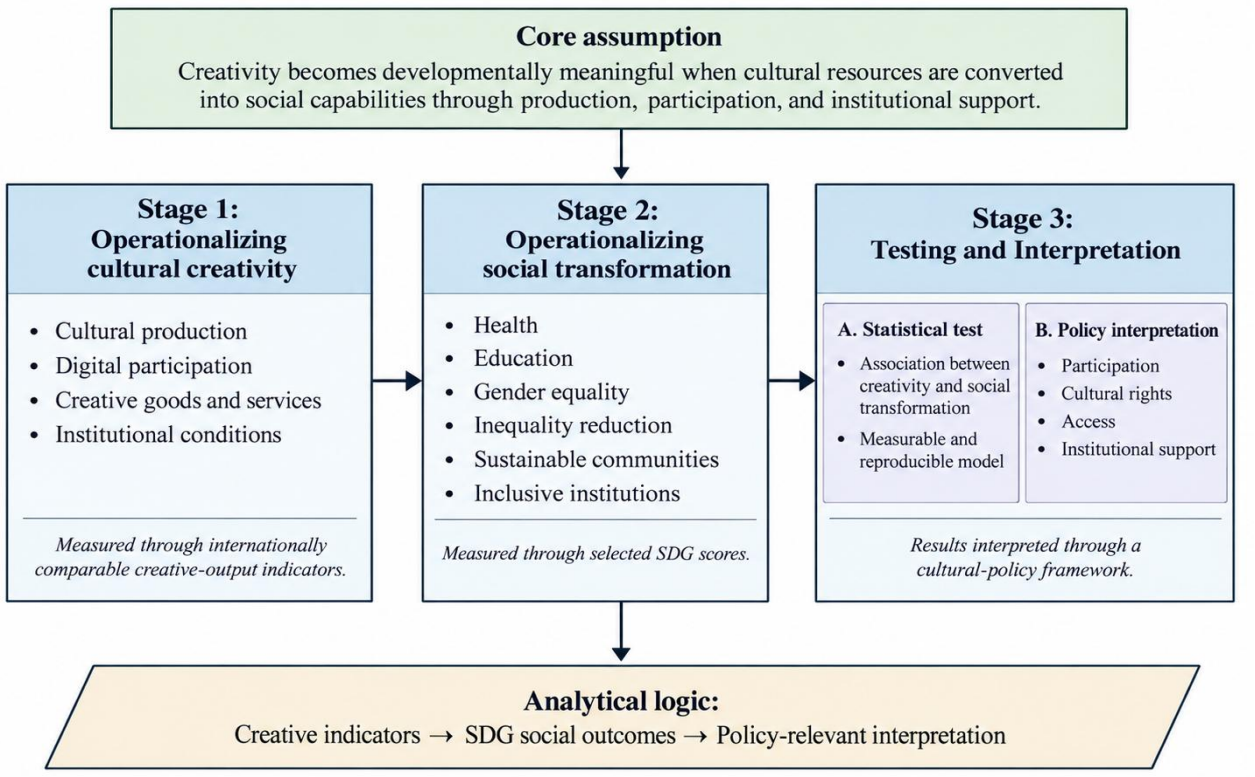



FIGURE 1. Methodological logic of the study.

The figure summarizes the three-stage logic used to operationalize cultural creativity, connect it with selected SDG social outcomes, and interpret the statistical relationship through a cultural-policy framework.

### *2. ANALYTICAL PROCEDURE*

The procedure contains five sequential steps. The first step is data identification, in which the WIPO Global Innovation Index 2023 is used to represent creative performance and the Sustainable Development Report 2023 is used to represent SDG outcomes. The second step is variable harmonization, where we match economy names and handle incomplete observations through complete-case estimation. The third step is index construction, where creativity and social transformation are converted into composite measures that can be compared across economies.

The fourth step is statistical estimation. Pearson correlation examines the strength and direction of bivariate relationships, while ordinary least squares regression with robust standard errors tests whether creative indicators remain significant after controlling for income and population size. The analysis adds regional adjustment to test whether the relationship persists across broad development contexts. The fifth step interprets the numerical results by linking them to policy mechanisms such as cultural access, creative participation, digital infrastructure, and institutional investment.

This proposed method strengthens the paper by avoiding treating culture only as a descriptive concept. Instead, it links cultural creativity to measurable social outcomes while remaining careful about the limits of cross-sectional data. The method is therefore suitable for a strong international journal structure because it includes operational variables, transparent model construction, statistical testing, policy interpretation, limitations, and reproducibility.

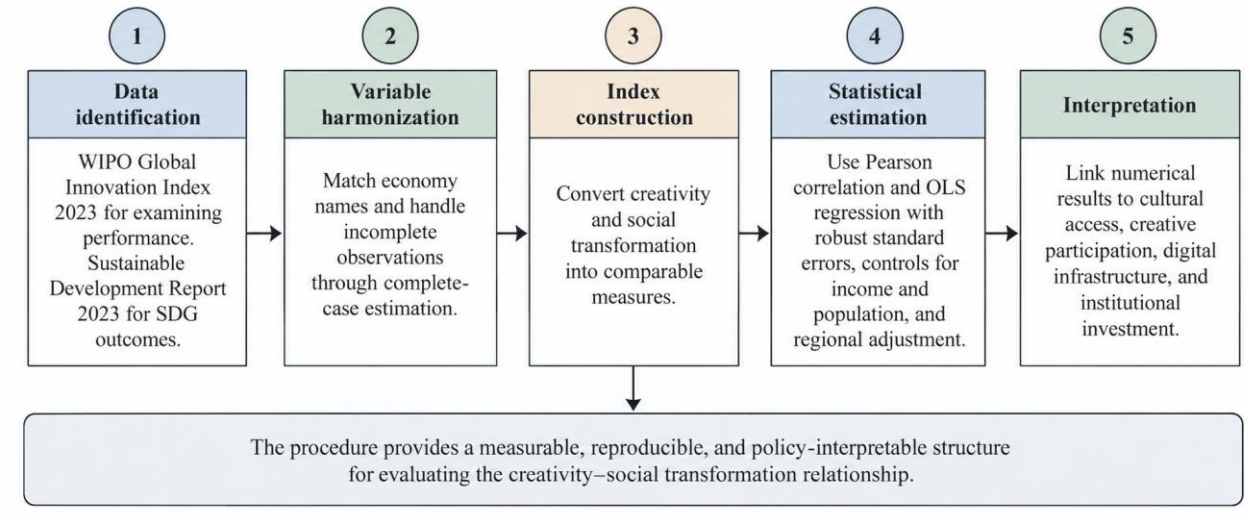



FIGURE 2. Analytical procedure of the study.

The figure presents the five-step analytical workflow from data identification and variable harmonization to index construction, statistical estimation, and policy interpretation.

## V. DATA AND METHODOLOGY

### *1. RESEARCH DESIGN*

The study uses a cross-sectional quantitative design supported by interpretation of the policy corpus. The empirical analysis merges WIPO Global Innovation Index 2023 indicators with Sustainable Development Report 2023 country scores. After listwise deletion of missing creative and SDG variables, the final fully

specified model includes 108 economies. The data structure allows the paper to examine whether economies with stronger creative-output indicators also tend to show stronger SDG social outcomes.

The unit of analysis is the economy/country. The design is appropriate because the research question concerns cross-national associations rather than individual attitudes or program-level effects. The study therefore does not require a survey or human-subjects data collection. Instead, it uses internationally comparable indicators from recognized open data sources and applies standard statistical procedures suitable for reproducible cross-national research.

## *2. DATA SOURCES AND VARIABLES*

**Table 2.** Data sources and analytical roles.

| Data block | Source | Variables used | Role |
|---|---|---|---|
| Creativity indicators | WIPO Global Innovation Index 2023 | Creative outputs, creative goods and services, cultural/creative services exports, creative goods exports, online creativity | Independent variables |
| SDG outcomes | Sustainable Development Report 2023 | Overall SDG Index score and SDG goal scores | Dependent variables |
| Controls | WIPO economy profile variables | Purchasing-power GDP per capita and population | Control variables |
| Policy interpretation | WHO, Culture2030Goal, UN GSDR, UNESCO/UN policy sources up to 2023 | Arts-health evidence, cultural policy, social transformation and SDG interconnections | Contextual triangulation |

## *3. VARIABLE CONSTRUCTION*

The study uses two constructed indices. The Creative Intensity Index aggregates five WIPO creative indicators, while the Social Transformation Score aggregates six SDG goal scores directly related to social transformation. Both indices are interpreted on a 0-100 scale, where higher values indicate stronger performance.

$$CSI_i = (CO_i + CGS_i + CCSE_i + CGE_i + OC_i)/5$$

- Equation 1. Creative Intensity Index

CO = creative outputs; CGS = creative goods and services; CCSE = cultural and creative services exports; CGE = creative goods exports; OC = online creativity.

$$STS_i = (SDG3_i + SDG4_i + SDG5_i + SDG10_i + SDG11_i + SDG16_i)/6$$

- Equation 2. Social Transformation Score

The composite score captures health, education, gender equality, inequality reduction, sustainable communities, and inclusive institutions.

$$STS_i = beta_0 + beta_1\, CO_i + beta_2 \ln(GDPpc_i) + beta_3 \ln(POP_i) + epsilon_i$$

- Equation 3. Baseline regression model

The model estimates the relationship between creative outputs and social transformation after controlling for income and population size.

## *4. STATISTICAL PROCEDURES*

We conducted the analysis using standard statistical procedures, including data cleaning, variable construction, Pearson correlation analysis, ordinary least squares regression, robust standard errors, descriptive statistics, and graphical diagnostics. The results can be reproduced in common statistical programs because the model uses standard cross-sectional regression procedures.

Robust HC3 standard errors were used to reduce sensitivity to heteroskedasticity. Missing values were handled through listwise deletion for model estimation. This produced a conservative sample because several creative indicators have incomplete country coverage. The models are interpreted as associational, not causal, because the design is cross-sectional and some creative indicators reflect the most recent available year used in the 2023 WIPO database rather than a single uniform calendar year.

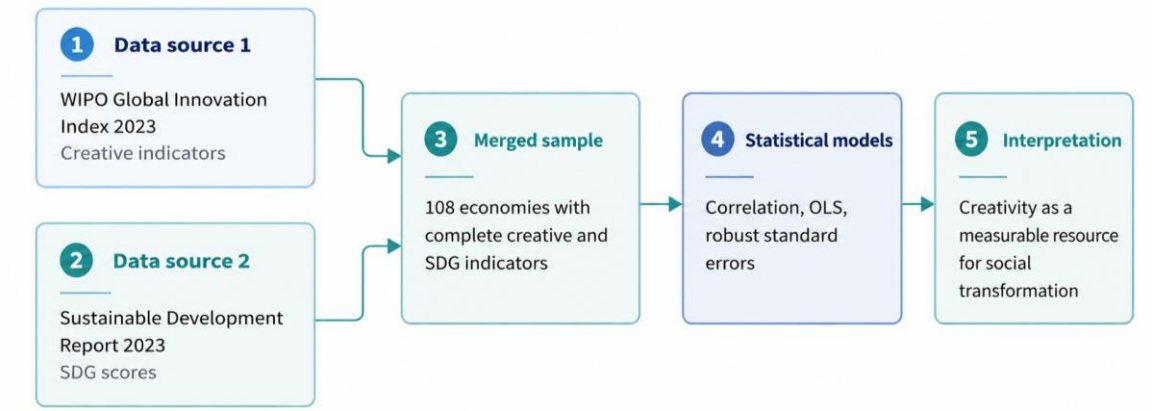



FIGURE 3. Empirical design of the study.

The figure shows how the paper moves from international data sources to a merged analytical sample, statistical modeling, and policy interpretation.

## VI. RESULTS

### *1. DESCRIPTIVE RESULTS*

The merged dataset contains 131 economies appearing in both the WIPO and SDR sources, with 108 economies retained in the fully specified models after missing-value treatment. The mean SDG Index score in the analytical sample is 71.55, while the mean Social Transformation Score is 73.28. Creative indicators display greater dispersion than SDG outcomes, suggesting that cultural and digital creativity is unevenly distributed across countries.

**Table 3.** Descriptive statistics of key variables.

| Variable | N | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| SDG Index score | 108 | 71.55 | 8.57 | 48.31 | 86.76 |
| Social transformation score | 108 | 73.28 | 14.09 | 40.35 | 95.05 |
| Creative outputs score | 108 | 28.70 | 16.42 | 0.20 | 68.52 |
| Creative intensity index | 108 | 22.06 | 15.06 | 0.39 | 58.38 |
| Creative goods and services score | 108 | 18.23 | 15.61 | 0.09 | 62.20 |
| Online creativity score | 108 | 29.85 | 20.91 | 0.06 | 87.23 |
| Cultural and creative services exports score | 108 | 16.09 | 20.80 | 0.00 | 100.00 |
| Creative goods exports score | 108 | 17.43 | 26.41 | 0.00 | 100.00 |
| Log GDP per capita (PPP) | 108 | 9.96 | 1.08 | 6.76 | 11.86 |
| Log population | 108 | 9.55 | 1.65 | 5.92 | 14.17 |

### *2. CORRELATION ANALYSIS*

The correlation results show a strong positive association between creative outputs and the Social Transformation Score ($r = 0.760$, $p < .001$). The Creative Intensity Index is also strongly associated with social

transformation (r = 0.741, p < .001), while online creativity shows the strongest bivariate relationship among the creative components (r = 0.802, p < .001). These findings support H1 and H2 at the bivariate level.

**Table 4.** Pearson correlation matrix.

| Variable | Social transformation score | SDG Index score | Creative outputs score | Creative intensity index | Creative goods/services score | Online creativity score | Log GDPpc |
|---|---|---|---|---|---|---|---|
| Social transformation score | 1.00 | 0.93 | 0.76 | 0.74 | 0.71 | 0.80 | 0.87 |
| SDG Index score | 0.93 | 1.00 | 0.75 | 0.70 | 0.69 | 0.73 | 0.83 |
| Creative outputs score | 0.76 | 0.75 | 1.00 | 0.89 | 0.82 | 0.82 | 0.76 |
| Creative intensity index | 0.74 | 0.70 | 0.89 | 1.00 | 0.95 | 0.81 | 0.74 |
| Creative goods/services score | 0.71 | 0.69 | 0.82 | 0.95 | 1.00 | 0.77 | 0.69 |
| Online creativity score | 0.80 | 0.73 | 0.82 | 0.81 | 0.77 | 1.00 | 0.76 |
| Log GDPpc | 0.87 | 0.83 | 0.76 | 0.74 | 0.69 | 0.76 | 1.00 |

FIGURE 4. Correlation heatmap of creativity and SDG indicators**.**

Positive correlations dominate the relationship between creative indicators, income, and social SDG outcomes, with online creativity and creative outputs showing particularly strong links to social transformation.

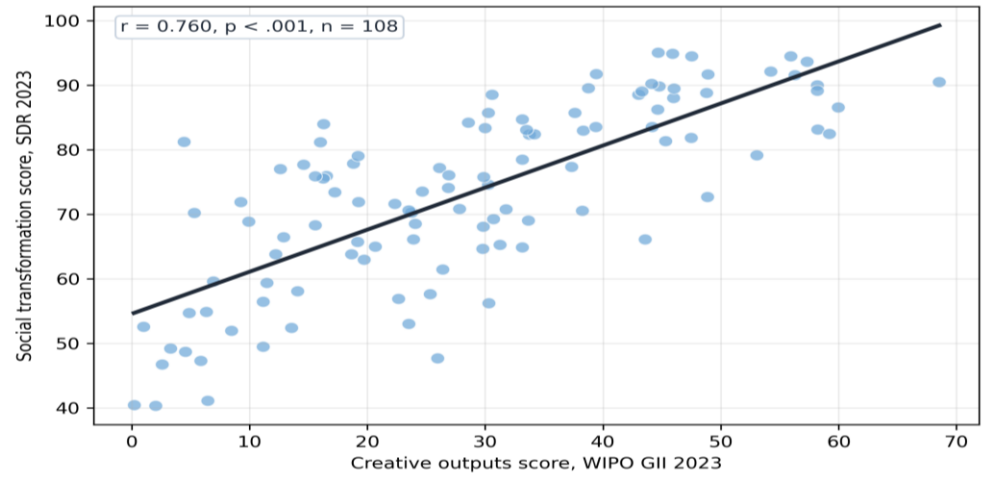



FIGURE 5. Creative outputs and social transformation.

The fitted line indicates a positive cross-national association between creative outputs and the composite social transformation score.

### *3. REGRESSION RESULTS*

The regression results confirm that creative indicators remain statistically significant after controlling for other factors. In Model 1, creative outputs alone explain 55.7% of the variation in SDG Index scores. In Model 2, the creative-output coefficient remains significant after adding GDP per capita and population. Model 3 shows that creative outputs significantly predict the Social Transformation Score after controlling for GDP per capita and population. Model 5 further indicates that the Creative Intensity Index remains significant after regional adjustment.

**Table 5.** Regression results for creativity and SDG social transformation.

| Model | Dependent variable | Key predictor | B | Robust SE | p | $R^2$ | N |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| M1 | SDG Index | creative outputs | 0.390 | 0.034 | <.001 | 0.557 | 108 |
| M2 | SDG Index | creative outputs | 0.158 | 0.066 | 0.017 | 0.719 | 108 |
| M3 | Social transformation | creative outputs | 0.263 | 0.072 | <.001 | 0.805 | 108 |
| M4 | Social transformation | online creativity | 0.206 | 0.053 | <.001 | 0.827 | 108 |
| M4 | Social transformation | creative goods services | 0.111 | 0.079 | 0.159 | 0.827 | 108 |
| M4 | Social transformation | cult creative services exports | -0.072 | 0.030 | 0.018 | 0.827 | 108 |
| M4 | Social transformation | creative goods exports | 0.015 | 0.032 | 0.640 | 0.827 | 108 |
| M5 | Social transformation | Creative intensity index | 0.165 | 0.064 | 0.010 | 0.852 | 108 |

FIGURE 6. Robust coefficient estimates for creative indicators.

The plot compares key creativity coefficients across the social transformation models; confidence intervals that do not cross zero indicate statistically significant predictors.

### *4. REGIONAL PATTERNS*

Regional comparison shows that Europe and North America have the highest average creative-intensity and social-transformation scores, while Sub-Saharan Africa has the lowest average scores in both dimensions. The gap does not mean that creativity is absent in lower-income regions; rather, it reflects limitations in measurable creative industries, digital infrastructure, formal exports, and internationally reported indicators. This distinction is important because informal cultural production and living heritage may be socially powerful but statistically undercounted.

**Table 6.** Regional averages of creative and SDG outcomes.

| Region | N | Creative intensity | Creative outputs | Social transformation | SDG Index |
|---|---|---|---|---|---|
| Europe | 38 | 33.02 | 40.01 | 85.08 | 79.29 |
| Northern America | 2 | 40.89 | 48.88 | 84.48 | 77.21 |
| South East Asia, East Asia, and Oceania | 13 | 30.18 | 36.50 | 77.79 | 72.40 |
| Northern Africa and Western Asia | 13 | 17.98 | 26.81 | 73.93 | 71.29 |
| Latin America and the Caribbean | 14 | 14.22 | 21.34 | 68.52 | 70.84 |
| Central and Southern Asia | 7 | 10.67 | 20.20 | 66.73 | 67.06 |
| Sub-Saharan Africa | 21 | 6.96 | 10.40 | 53.02 | 58.62 |

FIGURE 7. Regional averages of creative intensity and social transformation.

The regional pattern shows that measurable creative intensity and social transformation tend to move together, although development context and data coverage remain important.

### *5. TOP CREATIVE-OUTPUT ECONOMIES*

The highest creative-output economies are mostly high-income and innovation-intensive countries. Their strong performance does not imply that creativity is only a high-income phenomenon; it suggests that international datasets are more likely to capture formal creative outputs, digital creativity, and creative exports where cultural industries and statistical systems are highly developed.

**Table 7.** Top ten economies by creative outputs score.

| Economy | Region | Creative outputs | Creative intensity | Social transformation | SDG Index |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| Switzerland | Europe | 68.52 | 50.70 | 90.49 | 80.54 |
| United Kingdom | Europe | 59.96 | 52.07 | 86.54 | 81.65 |
| Malta | Europe | 59.19 | 50.70 | 82.45 | 75.53 |
| Republic of Korea | South East Asia, East Asia, and Oceania | 58.23 | 41.23 | 83.16 | 78.06 |
| France | Europe | 58.20 | 36.51 | 89.13 | 82.05 |
| Germany | Europe | 58.18 | 40.83 | 89.97 | 83.36 |
| Sweden | Europe | 57.30 | 52.18 | 93.66 | 85.98 |
| Netherlands | Europe | 56.29 | 51.40 | 91.57 | 79.42 |
| Denmark | Europe | 55.91 | 41.10 | 94.46 | 85.68 |
| Luxembourg | Europe | 54.21 | 53.21 | 92.12 | 77.65 |

## VII. DISCUSSION

The findings empirically support the argument that arts, culture, and creativity are not peripheral to sustainable development. The strong positive association between creative outputs and SDG outcomes suggests that cultural and creative capacities are linked with broader social-development systems. Countries with higher creative-output scores tend to perform better on health, education, gender equality, inequality reduction, sustainable communities, and inclusive institutions.

The regression models show that income alone does not explain the relationship. As expected, GDP per capita strongly predicts social transformation, but creative outputs and creative intensity remain significant after controlling for income and population. This means that creativity appears to capture more than wealth alone. It may reflect innovation capacity, expressive freedom, cultural infrastructure, digital participation, institutional openness, and societies' ability to turn ideas into social and economic value.

Online creativity matters most in the component model. This result suggests that digital cultural production may bridge creative expression and social development. Online creativity can expand access, allow new forms of participation, support youth engagement, and create channels for education, public communication, and community mobilization. However, digital creativity also depends on infrastructure, skills, and platform access, which explains why it is unevenly distributed across regions.

The negative coefficient for cultural and creative services exports in the multivariate component model should not be interpreted as evidence that such exports harm social transformation. The bivariate correlation is positive, but the coefficient turns negative after we include online creativity, creative goods and services, income, and population. This pattern likely reflects suppression effects and overlap among creative-economy indicators. Therefore, the safer interpretation is that online creativity has the clearest independent relationship in the disaggregated model, while export variables require more detailed sector-level data.

The regional results highlight a major methodological issue in cultural-SDG research: many forms of culture are undercounted. Living heritage, informal arts, community rituals, oral traditions, local creative practices, and non-market cultural participation may be highly important for social transformation but weakly represented in international economic datasets. Therefore, researchers should combine the statistical results with qualitative evidence and policy analysis rather than using them as the sole measure of cultural value.

## VIII. CONCLUSION

This study developed an empirical paper on arts, culture, and the Sustainable Development Goals by merging WIPO Global Innovation Index 2023 creativity indicators with Sustainable Development Report 2023 SDG scores. The results show that creative outputs and creative intensity are strongly associated with SDG-oriented social transformation. The relationship remains statistically significant after controlling for GDP per capita and population, and it also persists in a region-adjusted model.

The findings strengthen the argument that arts and culture should not be treated as decorative or supplementary elements of development. Creativity appears as a measurable development resource

connected to health, education, gender equality, inclusive communities, and institutional quality. The strongest independent component in the disaggregated model is online creativity, suggesting that digital cultural production may be especially relevant for future SDG-oriented cultural policy.

The study also shows that measurement matters. International datasets capture formal creative outputs better than informal cultural participation, which means that many culturally rich societies may be statistically undervalued. Therefore, the main conclusion is balanced: creativity is empirically associated with stronger SDG social outcomes, but future cultural-SDG research must improve measurement systems so that community arts, heritage, cultural rights, and non-market cultural participation are also visible in development statistics.

## Author Contributions

The author conducted the conceptualization, methodology, data analysis, investigation, writing, review, editing, and final approval of the manuscript.

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## Data Availability

The dataset will be available from the author upon reasonable request.

## Conflicts of Interest

The author declares no conflict of interest.

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