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# Creative Hubs and the Cultural Divide: Exploring European Creative Collaborations

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**Abstract**

The economies generated within the creative and cultural sectors are playing an increasing role in international competition between territories. Collaborations and synergies between territories can create the right conditions for the overall growth of cultural economies and make the them more attractive and better performing. Building collaborative cultural policies is challenging due to the parties' differing attitudes, priorities, and resources. In this contribution, we have focused on the funds made available by the Framework Program of the European Commission dedicated to developing cultural and creative sectors. The analysis highlights the characteristics of a network of collaborations between partners of different cities. Our results show non-trivial features linked to the cultural-creative dimensions of cities. Findings unveil complex cultural-creative collaboration dynamics. Results show that effective collaborative policies require carefully balancing diverse attitudes.

**JEL classification numbers:** L82, R58, Z11
**Keywords:** Creativity, cities network, enabling environment.

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# 1 Introduction

The economic growth of territories is not solely dependent on traditional factors like infrastructure or industry; rather, amenities and cultural components play significant roles more and more ([6]). A lot of studies have demonstrated the positive correlation between cultural capital and economic outcomes([35], [15]). Culture is currently defined as a resource for the different geographical areas that want to relaunch themselves on the market ([13], [16], [11]). Territories with rich cultural heritage tend to experience higher levels of economic productivity and competitiveness ([32]). So culture plays a pivotal role in shaping a territories' strategic development, with the cultural ecosystem serving as a cornerstone for both driving and supporting innovation and progress ([18]). Numerous studies have highlighted the crucial role of cultural amenities, institutions, and activities in driving economic prosperity within urban centers ([4],[18]). Researchers suggest that the cultural and economic value of a territory are independently determined but one has an influence on the other because the peculiarities of local cultures affect economic activities and help to generate new innovative products and processes ([34], [8], [7]). Furthermore, the presence of a thriving arts and creative sector has been linked to broader economic spillover effects, including job creation, urban revitalization, and neighborhood regeneration. Pratt suggest, for example, that culture can stimulate innovation and economic growth ([28]) in cities under certain conditions: the abundance of education, services, and leisure activities in cities, coupled with their high population density and frequent interactions, fosters technological and social innovation, entrepreneurship, and creativity. Richard Florida's groundbreaking work, "The Rise of the Creative Class"([10]), underscores the pivotal role of cultural amenities in fostering innovation and economic development within urban centers. Cities boasting vibrant cultural scenes, as highlighted by Florida, tend to experience higher levels of entrepreneurship and job creation. The interplay between the cultural dimension of cities and their economic growth has been a subject of extensive scholarly investigation, yielding significant insights into urban development dynamics ([19]). Landry ([17]) argues that there are certain preconditions for a city to be able to make creativity a factor of urban regeneration. The author divides these factors between tangible ones, such as the presence of education and training institutions, and more intangible aspects, such as a system of values, ways of life, the

recognition of people with their own city. Additionally, cultural events and festivals play a significant role in stimulating economic activity, particularly in the tourism and hospitality sectors ([31]). Events like music festivals, film screenings, and culinary fairs not only draw visitors but also generate revenue, create employment opportunities, and stimulate local businesses. Similarly, research by Markusen ([20]) delves into the role of artists and creative clusters in shaping urban development. She highlight how concentrations of artistic talent and cultural institutions contribute to the revitalization of urban neighborhoods. Cultural capital encompasses not only tangible assets like historical landmarks but also intangible elements such as social networks, traditions, and creativity, which contribute to a city's distinctive identity and attractiveness. So culture is today an economic fact of very significant dimensions ([5]) and cultural production has consequently assumed a central position in the economic policy ([24]). In recent years, the importance of supporting cultural and creative sectors has gained recognition, leading to the development of targeted policies aimed at nurturing creativity and cultural expression ([32]). Often, sectors producing culture are located within large urban areas and this suggests that large cities seem to be more favored by innovation and creativity than smaller ones ([21]). Indeed, the contemporary creative economy tends to cluster in major global metropolises that serve as existing hubs for financial capital, investment, and influence, or possess substantial historical foundations in social and cultural amalgamation ([4]). Nevertheless, size alone is not an adequate explanation of the absolute and relative positive trend of creative and cultural economies in different cities ([33]). This is indicative of the fact that cities must have significant qualities that allow them to be able to generate innovation and creativity. For examples, cities with high quality social governance show a higher innovation production and an accelerated growth ([19]). Moreover, cultural districts and creative clusters often serve as catalysts for broader economic development, attracting investments and fostering synergies between cultural and commercial activities. These clusters not only generate economic value through cultural production but also enhance the attractiveness of cities as desirable places to live, work, and invest ([6]).

A critical aspect of cultural policy is ensuring equitable access to cultural participation ([3]). Cultural activities should not be the preserve of a privileged few; rather, they should be accessible to all segments of society. This requires

the implementation of initiatives that promote cultural education, encourage diversity in cultural representation, and remove barriers to participation for marginalized groups. Public investment in cultural infrastructure, such as museums, libraries, and theaters, plays a significant role in making cultural experiences available to a broader audience. Moreover, policies that support the digitization of cultural content can also enhance accessibility, allowing people to engage with culture in new and innovative ways.

However, the formulation of such policies is complex, involving a delicate balance between promoting innovation, ensuring sustainability, and safeguarding cultural diversity. According to Scott ([30]), the capacity of the city to produce culture is put to good use with respect to the new needs of creativity and innovation of the cultural economy when three orders of conditions are met, which are interconnected. The first condition is historical, and it refers to the existence of some previous cultural form, which led to the formation of communities of workers with the creative and artistic skills necessary for this production. These cultural skills were formed through the specific history of the city: they can derive from the circles of intellectuals and artists present in previous centuries, as well as from the productive activities in which the city has been specializing over time. Second, the city provides communities engaged in cultural industries with a set of institutions that support their functioning, innovative capacity and reproduction over time. Finally, these communities need cities because the city allows for a high amount of interactions and exchanges through which cultural as well as social capital circulates, accumulates and reproduces. These capitals are nourished and renewed through continuous direct contacts that pervade both work time and free time, through which information circulates. Montgomery ([25]), for example, argues that the creative cities network contributes significantly to the economic growth of the cities involved. Cities move from having a concentration of resources to a concentration of networks and circuits, where proximity to knowledge replaces proximity to resources.

Cultural exchange programs, international collaborations, and the protection of cultural heritage from exploitation or destruction are essential components of a comprehensive policy framework ([29]). However, which characteristics can facilitate the construction of creative networks and according to which scheme this is formed has not yet been discussed in the literature. Furthermore, which

creative dimensions of a territory can push towards collaborative processes is a question that has not yet been answered. Giving this gap, this paper will add some empirical based evidence of actual dynamic of creative cities networks in relations to cities "cultural and creative" level. As creative cities network, we have focused on partnerships born inside projects funded by the Framework Program of the European Commission dedicated to the cultural and creative sectors developed in the period 2014-2020 (Creative Europe[4]).
The aim of this research is to highlight empirical evidence about the ability of the Creative Europe program to have created a network of project collaborations between territories with different characterizations and different creative and cultural levels. Within this research we used the index created and used in Europe to classify territories from a creative and cultural point of view (C3-index ([22])). In section 2, we present a brief review concerning the C3-index. In section 3, we introduce the Creative Europe program and method used to put in evidence the collaboration network that has developed within it. In section 4, we discuss about the network and the relations between this network and the components of the C3-index. Section 5 provides our concluding remarks. Cultural policy implications and suggestions for future research are also discussed.

# 2 The creative dimensions of a city: C3-index

In July 2017, the Joint Research Center (JRC) proposed a new benchmark tool designed and developed to define the creative potential of cities: The Cultural and Creative Cities Monitor ([22]). Its objective was to monitor and evaluate the performance of "Cultural and Creative Cities" in Europe on the basis of some quantitative indicators and qualitative information such as, for example, population, income and employment, creative infrastructures, etc. The Cultural and Creative Cities monitor, was created to help national, regional and local politics identify local strengths and opportunities and compare cities with similar urban centers using both quantitative and qualitative data aimed at promoting exchanges reciprocal between cities. The monitoring of cultural and creative cities provides a holistic measurement framework, in order to inform about policy-based development related to culture and creativity; therefore, not only provides a score but also allows cities to be compared with each other

[4]https://culture.ec.europa.eu/creative-europe

on the basis of specific indicators considering population, employment rate and wealth, to help local authorities interpret the results in the light of the performance of each city. The information collected for each city is classified into indicators that identify and characterize different aspects, these are then collected into three main components of the cultural and socio-economic vitality of a city:

- the cultural vibrancy that measures the cultural endowment of a city in terms of cultural infrastructures and participation in culture;
- the level of creative economy through the extent to which the cultural and creative sectors contribute to a city's economy in terms of employment, job creation and innovation;
- the ability of the city to create an environment capable of attracting creative talents and stimulating them by measuring the tangible and intangible assets that can help cities in this.

Figure 1 shows the graphic model that schematizes the structure of the different components. The final value of the Cultural and Creative Cities Index (C3-index) is then calculated as a weighted average of the values of the various first level indices: "Cultural Vibrancy" (40%), "Creative Economy" (40%) and "Enabling Environment" (20%). Similarly, the first level indices are built as a weighted combination of sub-indices that take into consideration different dimensions and data available from various databases (for a more in-depth discussion about the construction of the C3-index, please refer to the technical specifications contained in the guide available on the reference site[5]). The weights have been designed by a group of 15 professionals with experience in policy or research in the field of culture, creativity and urban development, at the international level.
In this study we will refer to the 2019 edition of the Creative Cities monitor ([23]) because it is temporally compatible with the Creative Europe programme, which is the cultural economic policy instrument on which we are focusing to analyse the aspects that favour the construction of collaborations.

[5]https://composite-indicators.jrc.ec.europa.eu/cultural-creative-cities-monitor/docs-and-data


Figure 1: **Graphic representation of the conceptual scheme of the components of the C3-index ([22]).**

The 2019 edition of the Creative Cities monitor project analyzed 190 cities in 30 European countries (in addition to the 27 European countries , Norway , Switzerland and the United Kingdom are included)[6]. Among the selected cities: 98 have been chosen to become European Capitals of Culture until 2023 ; 33 UNESCO Creative Cities and 59 cities that have hosted at least two international cultural festivals, at least starting from 2017 or 2018.

# 3 Network Data and Research Method

## 3.1 Creative Europe program

The European Union, focusing on the creative capacity of culture, has given life to the Horizon 2020 research and innovation program, aimed at giving vitality to the relationships between the different European cultures, ancient and

[6]https://publications.jrc.ec.europa.eu/repository/bitstream/JRC117336/citiesmonitor_2019.pdf

a emerging, to foster traditions and interactions through the use of digital technologies.

Within the research proposed, our attention has been paid to the projects that have been funded within the European Commission's Framework Program dedicated to the cultural and creative sectors developed in the period 2014-2020 (Creative Europe program[7]).

Through the Europe Creative Programme, international networks and platforms on the cultural supply chain and the culture economy have been secured to generate new and innovative cultural products, including works of fiction, animation, creative documentaries, audiovisuals and video games for cinema and film festivals.

Having recognized the strong impact of collaborations for the development of innovations in the cultural sector, with a budget of € 1.46 billion, Creative Europesupported:

- cultural sector initiatives, such as cross-border cooperation, platforms networking and literary translations;
- development, promotion, distribution of creative works of international scope and networking and training initiatives for professionals in the audio-visual industry;
- a trans-sectoral strand, which also includes a guarantee fund for cultural and creative industries active since 2016.

Creative Europe consists of two sub-programs: Culture sub-program and MEDIA sub-program.

The Culture sub-program, with a budget of € 454.8 million, was aimed at all operators in the cultural and creative sector and co-financed:

- cultural cooperation projects involving organizations from different countries of Europe;
- literary translation projects to promote European literature;
- networks of at least 15 existing European organizations that support the capacity of the European cultural and creative sector to operate trans - nationally and to adapt to change by creating innovative products;

[7]https://culture.ec.europa.eu/creative-europe

- platforms of at least 10 members promoting emerging artists and stimulating the promotion of cultural and artistic works in Europe.

The MEDIA sub-program, on the other hand, with a budget of € 818 million, supported the European film and audiovisual industry innovation capacity by co-financing the following activities:

- continuous training of professionals;
- development of works for the European and international market (fiction, animation, creative documentaries) and video games;
- television programming;
- access to markets;
- international co-production funds;
- festival;
- theatrical and online distribution;
- network of cinemas;
- audience development.

Through the database of projects financed by Creative Europe it is possible to find information on the project ideas developed, on the partnerships that have carried out the various activities, the geographical location of the various partners and other information. From the database[8] we extracted the data of 4450 projects: Table 1 and Table 2 respectively show the distribution of projects by number of countries involved in any project (for example we found 21 projects in which are involved partner from 10 different countries) and the total number of projects for each country (for example there are 945 projects in which is involved almost one partner from France).

[8]https://culture.ec.europa.eu/creative-europe/projects/projects-lists

Table 1: **Dimension distribution**

| Number of countries | Freq. | Number of countries | Freq. |
|---|---|---|---|
| 1 | 3415 | 10 | 21 |
| 2 | 168 | 11 | 12 |
| 3 | 264 | 12 | 15 |
| 4 | 235 | 13 | 2 |
| 5 | 133 | 14 | 4 |
| 6 | 76 | 15 | 4 |
| 7 | 52 | 16 | 1 |
| 8 | 33 | 17 | 1 |
| 9 | 23 | Tot | 4450 |

Table 2: **Country distribution**

| Country | n | Country | n | Country | n |
|---|---|---|---|---|---|
| FR | 945 | SI | 238 | HU | 161 |
| DE | 695 | SE | 227 | FI | 159 |
| IT | 542 | HR | 225 | NO | 159 |
| BE | 498 | CZ | 222 | BG | 138 |
| ES | 455 | EL | 209 | LT | 118 |
| UK | 453 | PT | 201 | EE | 91 |
| NL | 384 | AT | 198 | LV | 88 |
| PL | 320 | RS | 194 | IS | 47 |
| DK | 280 | RO | 164 | CY | 32 |

## 3.2 Creative Europe cities collaboration network

The first step of our analysis consisted in recording all the projects financed and from these identify all the cities where the various members of the partnerships were located. Being interested in collaborations between territories, we have excluded all projects developed by partners all located in the same territory, in particular we refer to city's geographic dimension by using NUTS classification[9]: so we were able to build two complete lists: on the one we have the projects and on the other cities. Through a matrix representation, we can place the projects on various columns and cities on the rows, each time a partner of the p-th project is located in the i-th city the relative element of the matrix $\beta_{ip}$ takes value 1, otherwise it assumes the value 0 (see Table 3). This allowed us to build a so-called bipartite network between projects and cities as schematized in Fig. 2 in which the numbered nodes represent the projects while the labeled nodes represent the cities. From the bipartite network it was possible to reconstruct the network of the various project collaborations between the different cities. In order to take into account the different dimensions of the partnerships, it was decided to appropriately "weight" the link between the cities through the method proposed by Newman ([26]) and widely used in literature.

[9] Regulation (EC) No 1059/2003

**Table 3: Matrix representation of bipartite network between cities and projects**

| $\beta$ | $project_1$ | $project_2$ | ... | $project_p$ | ... | $project_m$ | $Tot_{project}$ [1] |
|---|---|---|---|---|---|---|---|
| $city_1$ | $\beta_{11}$ | $\beta_{12}$ | ... | $\beta_{1p}$ | ... | $\beta_{1m}$ | $tot_{city_1}$ |
| $city_2$ | $\beta_{21}$ | $\beta_{22}$ | ... | $\beta_{2p}$ | ... | $\beta_{2m}$ | $tot_{city_2}$ |
| ... | ... | ... | ... | ... | .... | ... | ... |
| $city_i$ | $\beta_{i1}$ | $\beta_{i2}$ | ... | $\beta_{ip}$ [2] | ... | $\beta_{ip}$ | $tot_{city_i}$ [3] |
| ... | ... | ... | ... | ... | .... | ... | ... |
| $city_n$ | $\beta_{n1}$ | $\beta_{n2}$ | ... | $\beta_{np}$ | ... | $\beta_{nm}$ | $tot_{city_n}$ |
| $N_{cities}$ [4] | $N_1$ | $N_2$ | ... | $N_p$ [5] | ... | $N_m$ | |

[1] $Tot_{project} = 1146$ total number of projects in which are involved partners from two or more different cities.

[2] $\beta_{ip} = 1$ if at least one partner of the p-th project is located in the i-th city, otherwise $\beta_{ip} = 0$.

[3] $tot_{city_i}$ = total number of project in which at least a partner is located in the i-th city.

[4] $N_{cities} = 265$ total number of cities.

[5] $N_p$ = number of cities in which are located partners of p-th project.

In the case of research collaborations, to studying the network in scientific articles, Newman define the weight of interaction betweentwo collaborators $i$ and $j$ as

$$w_{ji} = \sum_p \delta_i^p \delta_j^p / (n_p - 1) \tag{1}$$

where the index $p$ runs on all research collaborations (scientific articles), $\delta_i^p$ ($\delta_j^p$) is 1 if the $j$-author has contributed in article $p$ and 0 otherwise, and $n_p$ is the number of authors of article $p$.

In this paper, the formula (1) was used to measure the weight of tie between two cities by taking into account the number of collaborations in projects. In our case, we can define the weight of interaction between two cities $i$ and $j$ as

$$w_{ji}^{cities} = \sum_p \beta_{ip} \beta_{jp} / (N_p - 1) \tag{2}$$

where the index $p$ runs on all projects, $\beta_{ip}$ ($\beta_{jp}$) as defined in Table 3, and $N_p$ is the number of cities in which are located all partner of projects $p$. We obtain a network, as outlined in Fig. 3, in which we can assign for any link between two cities a value by using equation (2).

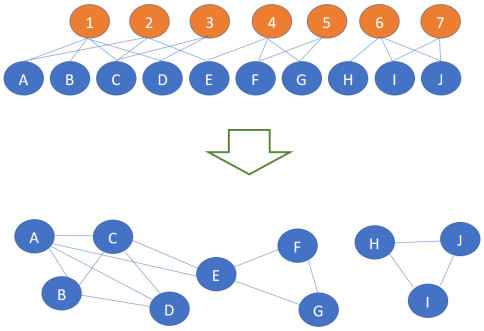


Figure 2: **In the upper part it is showed the scheme of the bipartite network in which the numbered nodes represent the projects while the labeled nodes represent the cities. In the diagram below, the network of cities obtained from the previous one.**

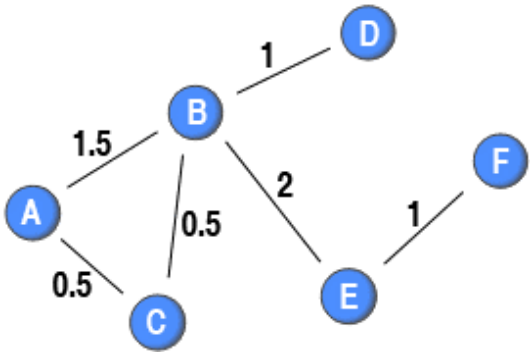


Figure 3: **Example of cities weighted network.**

In a weighted graph, the natural generalization of the degree $k_i$ of a node $i$ (i.e. number of ties with other nodes) is the node strength $s_i$ ([2]; [36]; [27]), defined as:

$$s_i = \sum_j w_{ij} \tag{3}$$

The strengths integrate the information on the number (degree) and the weights of links incident in a node. The normalization factor $(N_p - 1)$ in equation (2) causes the strength $s_i$ of node $i$, be equal to the number of projects in which at least one of partners belongs to city $i$ and there is at least one other partners from a different city.

Fig. 4 shows the network obtained by following the procedure described above. The nodes of the network represent the different cities and the size of each

node is proportional to its strength value as defined in equation (3). The ties between the various nodes (cities) represent the link between the cities and the thickness of the line is proportional to the value of weight as defined in eq (2) .

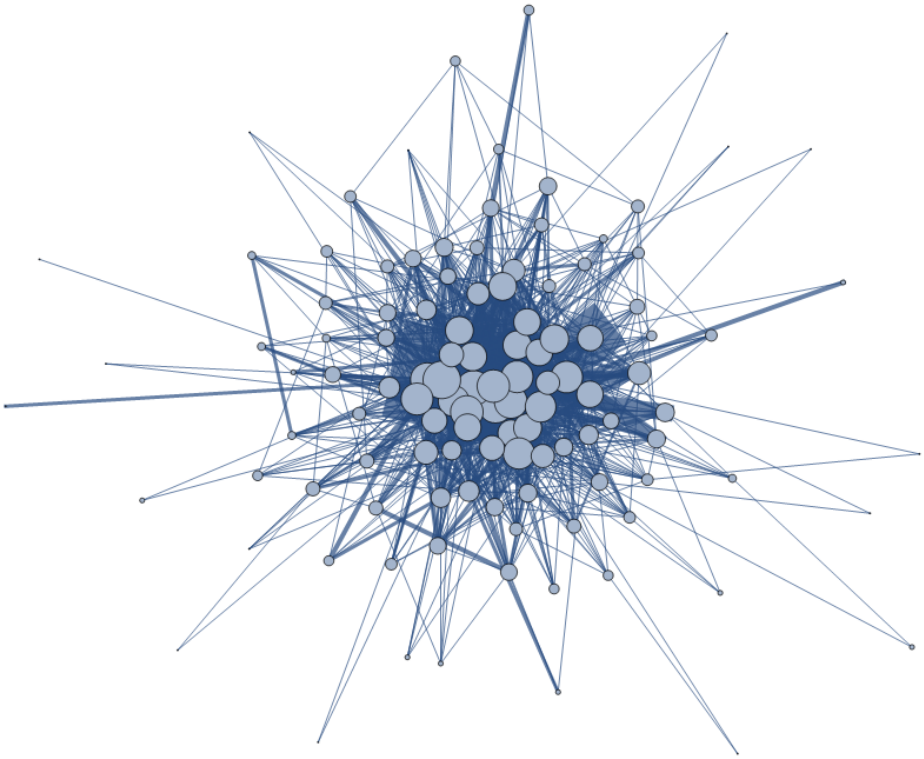

Figure 4: **Cities Weighted Network of creative project collaboration. Size of each node is proportional to its strength value as defined in equation (3), thickness of ties is proportional to the value of weight as defined in eq (2).**

# 4 Results and Discussion

## 4.1 Network characteristics

At first appearance, due to the high number of nodes (cities) and links, the network appears quite chaotic and with a random distribution of links. In the case of random network we can assume that the probability of two vertices being connected is random and uniform ([14]). In this case, with a random distribution of weights among the node and in case of which weights are inde-

pendent on the topology, the strength (as defined in equation 3) of a node with a degree (i.e. the number of nodes with which it is linked) $k$, is $s(k) \simeq \langle w \rangle k$ where $\langle w \rangle$ is the average weight ([2]). On the contrary, in the case in which the weight of a tie between nodes is related to an "affinity" of node's own characteristics and there is a correlation of weights on the topology, we obtain in general $s(k) \simeq Ak^{\alpha}$ with $\alpha > 1$ ([12]; [1]). Most real networks exhibit preferential connectivity, i.e. the probability with which a vertex connects to the other vertices is not uniform, but there is a higher probability to be linked to a vertex that have similar characteristics ([9]). In social networks, for example, individuals tend to be connected with other individuals with similar characteristics and often show community structure. The node strength of network showed in Figure 4 as function of node's degree shows a non-linear trend (see Figure 5), so the network seems exhibit non random features but some kind of affinity between the nodes (cities) may have influenced the attack mechanism.

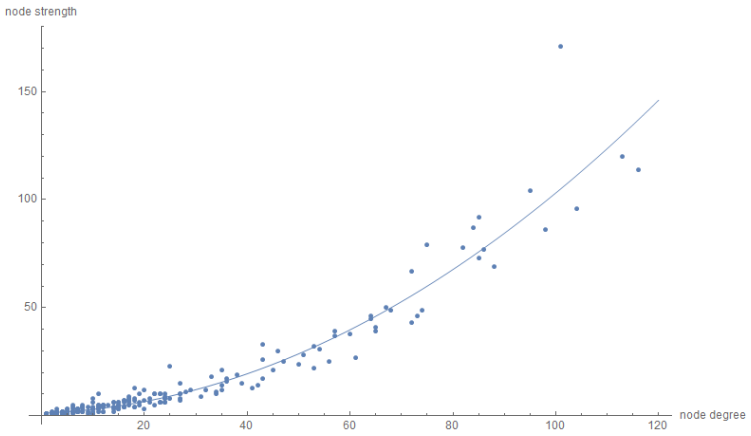


Figure 5: **Node strength $s_i$ as function of node degree $k_i$. Line represent best-fit function** $s^(k) = 0.026\, k^{1.79}$

We can define the average nearest neighbors strength of a node i as:

$$s_{nn,i} = \frac{1}{k_i} \sum_{j=1}^{N} a_{ij} s_j \tag{4}$$

where the sum runs on the nodes, $k_i$ is the number of ties of i-th node and $a_{ij}$ is the element of adjacency matrix of network in Figure 4 ($a_{ij} = 1$ if cities $i$ and $j$ are linked and 0 otherwise).

The network in Figure 4 can be classify as s-assortative if $s_{nn,i}$ increase as $s_i$ increase, whereas it's referred to as s-disassortative when $s_{nn,i}$ decrease as $s_i$ increase.
If we introduce into the equation 4 the weight of links as defined in equation 2 we can derive a weighted average nearest neighbors $s^W_{nn,i}$ of a node $i$ as ([2]):

$$s^W_{nn,i} = \frac{1}{s_i} \sum_{j=1}^{N} w_{ij}^{cities} s_j \tag{5}$$

This is the local weighted average of the nearest neighbor strength, according to the normalized weight of the connecting edges $w_{ij}/s_i$.
$s^W_{nn,i}$ thus measures the effective affinity for a node (city) to connect neighbors with high or low strength according to the magnitude of the actual interactions. Indeed, $s^W_{nn,i} > s_{nn,i}$ when the edges of a node $i$ with the larger weights are pointing to the neighbors with larger $s$, and $s^W_{nn,i} < s_{nn,i}$ in the opposite case. In Fig. 6, both the $s^W_{nn,i}$ (blue) and the $s_{nn,i}$ (orange) are plotted as function of $s_i$. As can be seen, while the same constant trend seems to be maintained, the values of $s^W_{nn,i}$ are systematically higher than those of $s_{nn,i}$.

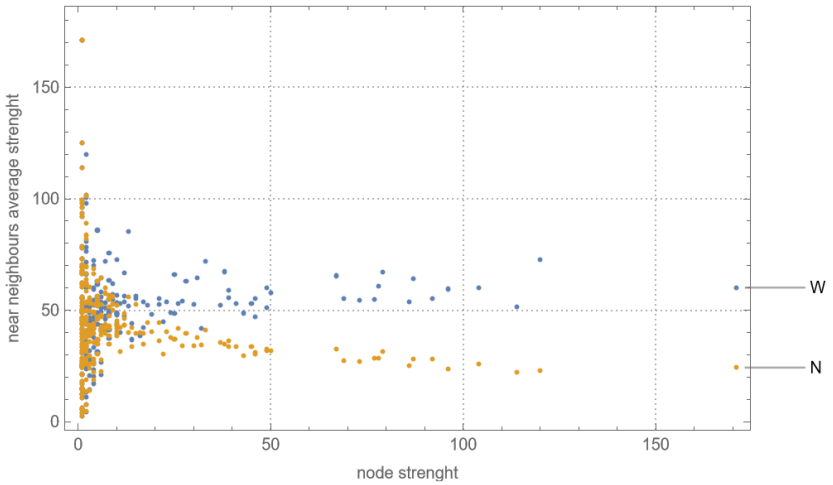


Figure 6: **Comparison between $s_{nn}$ (orange) and $s^W_{nn}$ (blue) as function of $s$ for all nodes (cities)**

This result confirms that, in the dynamics of partnerships, heavier links are created towards nodes (cities) with a greater propensity to develop projects.

## 4.2 C3-index components impact on cities strength

In order to understand if the topology of the network in Fig. 4 depends on some cultural dimensions of the cities themselves, we decided to use in this paper the dimensions of the C3-index to catch the possible cultural related characteristics of the cities. In our analysis, as said before, we have decided to use 2019 edition ([23]) of the index because it refers to assessments made in a period of time compatible with the launch of the first calls for ideas of the Creative Europe program and which therefore can effectively give a picture of the characteristics of the so-called " creative cities" at that time.
Unfortunately, the values of the C3-index and its components are not available for all the cities in the network; furthermore, some cities for which C3-index values are available are not present in our network for various reasons (for example because they do not belong to the European circuit), we therefore carried out the analysis only for those cities for which we had the availability of data (114 cities). This condition clearly requires caution in interpreting data that could be affected by this data-imposed selection bias.
A log-linear regression was then performed between the strength of a city, as defined in eq (3), and the three core-components of the C3-index ("Cultural Vibrancy", "Creative Economy" and "Enabling Environment". See Fig. 1), i.e.:

$$\log s_i \propto \sum \alpha_{comp_i} C3_{comp_i} \tag{6}$$

The use of a Log-Lin model allows to analyze the effects of the various components in terms of contributions that they can bring to the magnitude of the variable $s$ which clearly depends on the analyzed time window and on the total number of projects. In this sense, a regression constant ($Strengh_{t_0}$) captures the reference amplitude of $s$, while the regression parameters $\alpha_{comp_i}$ measure the effects of the various components.
As a control variable we entered the economic size of the city which is conceivable to have a positive effect; in our analysis we used the same scheme that is proposed in the C3-index database, choosing the classification by GDP per capita (GDP-PPP): we can hypothesize that the higher the value of the city's GDP-PPP, the greater the number of projects should be.
Futhermore, as an additional control, we have decided to include the number of patents (n-brev) filed by inventors residing in cities belonging to our net-

work; this measure is expected to capture and cleanse any potential inherent inclination of the city towards general innovation processes. To do this, we referred to the European Patent Office database and collected data related to all patents filed within the same identified time frame.
The regression results are shown in the Table. 4. All regression parameters, as seen from the z-statistics, were significantly different from zero.

Table 4: **Results of regression.**

| | Estimate | Standard Error | z-Statistic |
|---|---|---|---|
| $Strengh_{t_0}$ | 0.933688 | 0.169289 | 5.51536[2] |
| GDP-PPP[1](> 45.000€) | 0.926139 | 0.166751 | 5.55402[2] |
| GDP-PPP[1](35.000€ - 45.000€) | 0.903213 | 0.154397 | 5.84993[2] |
| GDP-PPP[1](27.000€ - 35.000€) | 0.639966 | 0.154952 | 4.130[2] |
| GDP-PPP[1](19.000€ - 27.000€) | 0.484589 | 0.158611 | 3.05521[2] |
| n-brev | -0.000304127 | 0.0000400758 | -7.5888[2] |
| Cultural Vibrancy | -0.0148434 | 0.00232064 | -6.39624[2] |
| Creative Economy | 0.0486066 | 0.0022426 | 21.6742[2] |
| Enabling Environment | 0.0204438 | 0.00326097 | 6.26924[2] |

[1] GDP-PPP < 19.000€ is the reference class.

[2] All values are significant at 0.1% p-value level.

The results of regression analysis show how the "strength" of a city within the network of collaborations for the development of cultural-creative projects is effectively (significantly) influenced by all of C3-index components. Not only that, the regression results also confirm the growing impact of GDP per capita. Regarding the control variable n-brev, it appears to have a significant but negative impact: this leads us to believe that in this case, there is an endogenous effect on the propensity to innovate collaboratively, which is limited when there is a high internal innovation capacity. It is interesting to note also that the sign of the Cultural Vibrancy component is negative, this can be read as a proxy of the tendency for cities, where there is a high cultural system, not to need to search for opportunities to finance and ground their creative initiatives outside of its context.
In other words, both of the negative sign could be linked to a strong relationship between internal demand for new creative products and internal capacity

to self-innovate: only, in cases where there is a low level of internal demand that is not able to guarantee the sustainability of production or low capacity to self-innovate, the system makes use of external resource. In the latter case, clearly, the greater the cultural production capacity and the greater the search for external cooperation, as confirmed by the positive sign of the Creative Economy component.

In this case, Governments can play a pivotal role by making available an additional economic resources that fosters creativity and supports the commercialization of cultural products. This can include tax incentives, grants, and the establishment of creative hubs or clusters where artists, entrepreneurs, and cultural organizations can collaborate and thrive. These external resource act as catalysts for the development of innovative ideas, promote collaboration, and direct innovation towards strategic objectives, ultimately contributing to the economic and social progress of societies. However, prudent and transparent management of such resources is crucial to maximize their positive impact. In fact, the regression results suggest that the Enabling Environment also plays a role in the development of innovative creative projects. When people have faith in their government, they are more likely to invest in creative endeavors with the belief that their efforts will be rewarded fairly. Also, governments that promote diversity and inclusivity contribute to a more vibrant creative landscape. Furthermore, human capital (that is another of the sub-component of Enabling Environment) encompassing a person's knowledge, skills, education, and experiences, serves as the foundation upon which creativity can flourish. Human capital provides the tools and resources needed to unlock and express creativity, while creativity, in turn, enhances the value of human capital by driving innovation and problem-solving. Recognizing and nurturing this relationship is essential for fostering both individual and societal growth and development. It underscores the importance of investing in education, diversity, lifelong learning, and a culture that values and rewards creative thinking.

# 5 Conclusion

Cities are often seen as epicenters of creativity, drawing diverse populations and cultures together. The urban environment provides a rich tapestry of experiences, ideas, and resources that stimulate creativity.

Creative cities are involved in a virtuous circle in which they can attract to them cultural-creative industries on the basis of cultural infrastructures they

make available, promoting economic development, innovation and creativity. It's necessary that cities have an open and stimulating social system, which makes it possible to attract and retain new different types of talents and to give them the opportunity to express their creative and economic potential to the maximum. Urban environments serve as vibrant canvases for creativity, where cultural diversity, networking opportunities, and a rich infrastructure stimulate imaginative thinking.

However, they require significant resources, and often, businesses or individuals may not have access to such resources to realize their creative ideas. The need for public funding to stimulate and support creative and innovation is a crucial issue in the contemporary world. Public funding provides an opportunity to experiment and develop new ideas, especially in high-uncertainty sectors as creative ones. These initial funds can be crucial in overcoming early hurdles. Creative people can benefit from grants, subsidized loans, or direct government investments to initiate projects that would otherwise go unrealized. However, it is essential that public funds are managed effectively and efficiently, with adequate control mechanisms to ensure the responsible use of public resources. Furthermore, it is important that public funding is made available fairly and accessible to a wide range of actors and territories to avoid the risk of power concentration. Also, Public funding programs often require partnerships between businesses, research and academic institutions.

Collaboration within cultural policies fosters a more vibrant, inclusive, and dynamic cultural ecosystem. It allows diverse stakeholders to work together toward common goals, maximizing the impact of cultural initiatives and benefiting society as a whole. These collaborations are crucial for pooling resources, knowledge, and expertise to promote cultural diversity, preserve heritage, and foster creativity.

Starting from the data extracted from the database of international projects financed within Europa Creative, our analysis shows that the ability of a city to attract investments and develop collaborative projects depends on the cultural and creative level of the city. The topology of the collaboration network highlights that the cities tend to create stronger links with the cities with high C3-index values.

Small "cultural economies" are drawn to larger ones due to several key factors that drive creative exchange, economic growth, and cultural visibility.

One of the main attractions is the access to opportunities. Larger cultural economies often have better funding mechanisms, including grants, sponsorships, and public investments in the arts. For artists and cultural entrepreneurs from smaller economies, gaining entry into these bigger markets can provide them with the financial support and visibility needed to develop their projects. Additionally, the professional networks in larger economies are vast and offer collaboration possibilities with well-established artists, producers, and cultural institutions.

Our results show also that in promoting more effective collaborations in the cultural sector, an "enabling environment" encompasses the social, economic, and political conditions that either support or obstruct cooperation. While such an environment can enhance partnerships, it can also introduce obstacles restricting inclusivity and equal participation. One major obstacle is social inequality. In societies where wealth and resources are unevenly distributed, marginalized groups may lack the necessary means to engage in cultural collaborations. Their perspectives may be silenced or underrepresented, reducing the diversity and richness of cultural exchanges. Access to education is another crucial element. People from disadvantaged backgrounds may not have access to quality education, leaving them without the skills or knowledge to participate meaningfully in cultural initiatives. This educational gap can perpetuate exclusion and stifle the growth of creative industries. Lastly, political instability can undermine the creation of an enabling environment. In areas affected by political conflict or weak governance, efforts to promote cultural collaboration may be overshadowed by pressing socio-political crises, limiting the resources and focus available for fostering partnerships. These barriers collectively constrain the potential of an enabling environment, diminishing its capacity to facilitate broad and equitable cultural collaboration.

Another driving factor is the cultural exchange. Small cultural economies are often eager to participate in cross-cultural dialogues, and larger economies serve as hubs for global interaction. Artists and cultural workers from smaller economies may migrate or establish connections with these larger centers to gain exposure to new ideas, techniques, and trends. This exchange can lead to innovation and the blending of cultural traditions, enriching both the smaller and larger economies.

However, our results show that a high level of internal "demand" for culture,

capable of ensuring a sustainable economic level, can represent an alternative on international cooperation for large cultural economies. The our analysis showing a tendency for key nodes in the network to collaborate more frequently with each other highlights a clear pattern: large cities with robust cultural economies are more likely to form stronger ties among themselves. This clustering effect suggests that major cultural hubs tend to prioritize partnerships with other influential cities, reinforcing their dominance in the cultural sector. Such collaborations may provide mutual benefits, enhancing their global influence, but they also risk marginalizing smaller cities or regions with less cultural capital, creating an uneven distribution of opportunities and resources within the broader network of cultural exchange. Also large cultural economies are less inclined to collaborate with smaller economies because they possess the resources, infrastructure, and networks to be largely self-sufficient. As a result, they can produce, promote, and distribute cultural products independently without relying heavily on external partnerships. Additionally, larger economies often focus on their own cultural output, which tends to be more commercially viable and globally recognized. They may prioritize projects with high revenue potential or significant international exposure, which can make collaborations with smaller, less influential economies seem less attractive or necessary. Ultimately, the capacity to function independently can lead larger cultural economies to prioritize their interests, limiting the opportunities for cross-economy collaboration. This suggests that there is a non-trivial dynamic in the creation of partnerships between "cultural markets" where there are greater opportunities for the development of new proposals.

So, building collaborative cultural policies between small and large cultural economies is challenging due to the differing attitudes, priorities, and resources of the involved parties. The differing goals and expectations of the two sides can create friction. Larger economies might view collaborations as less beneficial or too resource-intensive, while smaller economies may feel overshadowed or marginalized in joint ventures. Additionally, power imbalances can complicate negotiations, with larger economies having greater influence over decision-making and agenda-setting.

Effective collaborative policies would require careful balancing of these diverse attitudes. They must ensure mutual benefit, promote equity, and respect cultural differences while aligning both parties' interests. This complexity makes

it difficult to create sustainable and productive partnerships between small and large cultural economies. Further investigations are therefore necessary, in our opinion, to try to better understand what the best configuration of public financing is in this sector to promote collaborations and networks. To mitigate challenges in balancing attitudes and priorities across territories in collaborative projects, policymakers could establish standardized frameworks that promote clear communication and equitable decision-making. Additionally, implementing shared goals and measurable outcomes can help align priorities and foster mutual accountability. Flexible funding models, which allow for adjustments based on individual territories needs, can also reduce friction. Regular dialogues and workshops could further enhance collaboration by fostering understanding and trust among different stakeholders involved in these joint initiatives. In this context, the "Creative Europe program" should prioritize inclusivity by providing targeted support to smaller or less-known cities with limited cultural infrastructure. It can achieve this by establishing specific funding streams or incentives for these cities to engage in external collaborations. Additionally, offering mentorship programs and capacity-building workshops would help equip local cultural actors with the skills needed to leverage partnerships effectively. Simplifying the application process and ensuring transparent criteria would make funding more accessible to underrepresented areas. By fostering networks that connect smaller cities with larger, more established cultural hubs, the program can help level the playing field and ensure equitable access to cultural funding.

Finally, the C3-index may not encompass all aspects of these complex interactions. Future research could address these gaps by introducing supplementary metrics to assess the quality of collaboration, cultural impact, and interdisciplinary integration. Expanding the C3 index in this manner would offer a more holistic understanding of how different cultures engage and collaborate across various contexts.

# References

[1] L. A. N. Amaral, A. Scala, M. Barthélemy, and H. E. Stanley. Classes of small-world networks. *Proc. Natl. Acad. Sci. USA*, 97:11149, 2000.

[2] A. Barrat, M. Barth´elemy, R. Pastor-Satorras, and A. Vespignani. The architecture of weighted complex networks. *Proc. Natl. Acad. Sci. USA*, 101:3747, 2004.

[3] E. Belfiore. Is it really about the evidence? argument, persuasion, and the power of ideas in cultural policy. *Cultural Trends*, 2022.

[4] N. Boccella and I. Salerno. Creative economy, cultural industries and local development. *Procedia - Social and Behavioral Sciences*, 223:291–296, 2016. ISSN 1877-0428.

[5] B. Coate and R. Hoffmann. The behavioural economics of culture. *Journal of Cultural Economics*, 46:3–26, 2022.

[6] R. Domenech and B. Molina. The impact of cultural and creative industries on the wealth of countries, regions, and municipalities. 2023.

[7] R. Domenech and V. Soler-Marco. Creative service industries and regional productivity. *Papers in Regional Science*, 96(2):261–279, 2017.

[8] R. Domenech, B. De-Miguel-Molina, and J. L. Hervas-Oliver. Creative service business and regional performance: Evidence for the european regions. *Service Business*, 7:381–398, 09 2012.

[9] S. Dorogovtsev, J. F. Mendes, and A. Samukhin. Structure of growing networks with preferential linking. *Physical review letters*, 85:4633–6, 11 2000.

[10] R. Florida. *The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life*. 01 2002.

[11] N. Garnham. From cultural to creative industries. *International Journal of Cultural Policy*, 11(1):15–29, 2005.

[12] R. Guimera and L. A. N. Amaral. Modeling the world-wide airport network. *The European Physical Journal B*, 38(2):381–385, 2004.

[13] P. Hall. *Cities in Civilization: Culture, Innovation, and Urban Order*. Weidenfeld & Nicolson, 1998. ISBN 9780297842194.

[14] F. Harary. *A seminar on graph theory*. Courier Dover Publications, 2015. ISBN 9780486805146.

[15] J. Howkins. *The Creative Economy: How People Make Money from Ideas*. Penguin Global, 2002.

[16] M. Keane. Understanding the creative economy: A tale of two cities' clusters. *Creative Industries Journal*, 1(3):211–226, 2009.

[17] C. Landry. *The Creative City: A Toolkit for Urban Innovators*. Taylor & Francis Group, 2012. ISBN 9781849772945.

[18] M. Lazzeroni, N. Bellini, G. Cortesi, and A. Loffredo. The territorial approach to cultural economy: New opportunities for the development of small towns. *European Planning Studies*, 21(4):452–472, 2013.

[19] M. Markatou and E. Alexandrou. Urban system of innovation: Main agents and main factors of success. *Procedia - Social and Behavioral Sciences*, 195:240–250, 2015. ISSN 1877-0428. World Conference on Technology, Innovation and Entrepreneurship.

[20] A. Markusen. Urban development and the politics of a creative class: Evidence from a study of artists. *Environment and Planning A: Economy and Space*, 38(10):1921–1940, 2006.

[21] H. Mommaas. Cultural clusters and the post-industrial city: Towards the remapping of urban cultural policy. *Urban Studies*, 41:507–532, 03 2004.

[22] V. Montalto, C. Moura, and M. Saisana. *The Cultural and Creative Cities Monitor - 2017 Edition*. Publications Office of the European Union, Luxembourg, 2017.

[23] V. Montalto, C. Moura, F. Panella, V. Alberti, and M. Saisana. *The Cultural and Creative Cities Monitor - 2019 Edition*. Publications Office of the European Union, Luxembourg, 2019.

[24] V. Montalto, P. Sacco, and M. Saisana. Cultural, creative, and sustainable cities: Assessing progress and measurement perspectives. *Sustainability*, 14:4246, 04 2022.

[25] J. Montgomery. *The New Wealth of Cities: City Dynamics and the Fifth Wave (1st ed.)*. Routledge, 2017.

[26] M. E. Newman. Scientific collaboration networks. network construction and fundamental results. *Physical review E*, 64(1):016131, 2001.

[27] J.P. Onnela, A. Chakraborti, K. Kaski, J. Kertesz, and A. Kanto. Dy- namics of market correlations : Taxonomy and portfolio analysis. *Physical Review E*, 68(5):056110, 2003.

[28] A. Pratt. Cities, innovation and creativity. *The Sage Companion to the City*, pages 138–153, 01 2008.

[29] G. Santoro, S. Bresciani, and A. Papa. Collaborative modes with cultural and creative industries and innovation performance: The moderating role of heterogeneous sources of knowledge and absorptive capacity. *Technovation*, 92-93:102040, 2020. ISSN 0166-4972.

[30] A. Scott. The cultural economy of cities. *International Journal of Urban and Regional Research*, 21:323–339, 06 1997.

[31] A. Scott. The cultural economy: Geography and the creative field. *Economy*, 2017.

[32] M. Shiach and T. Virani. *Cultural policy, innovation and the creative economy: Creative collaborations in arts and humanities research.* Springer, 2016.

[33] J. Simmie. Innovation and clustering in the globalised international economy. *Urban Studies*, 41:1095–1112, 05 2004.

[34] D. Throsby. Cultural capital. *Journal of cultural economics*, 23(1):3–12, 1999.

[35] D. Throsby. *Economics and Culture.* Cambridge University Press, 2000.

[36] S.H. Yook, H. Jeong, A.-L. Barab´asi, and Y. Tu. Weighted evolving networks. *Physical review letters*, 86(25):5835, 2001.