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Evolution and trends of creative cluster research: A systematic literature review and future research agenda

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Abstract

The geographical clustering of creative and cultural industries is a topic that has gone from being relatively obscure to mainstream in the academic literature over the past twenty years. Despite the abundance of literature, there have been few systematic attempts to survey the breadth and depth of the papers that have been published on this topic. This paper attempts to fill that gap by conducting a systematic literature review, including a much broader range of papers than previously reported. We review 355 papers on the topic of creative clusters and identify historical trends in geography, sector and journal, drawing upon bibliometric analysis. Moreover, we use a variety of computer-aided text analysis (CATA) techniques – including co-word, cluster, and correspondence analyses – to examine and systematise the thematic content of the academic discussion on creative clusters. We conclude that while the creative cluster literature has to date been very impactful, there are substantial gaps for policy-engaged, robust and comparative analysis that need to be addressed in order to drive the topic forward.

Key Words: creative industries; creative clusters; cultural industries; CCIs, cluster, systematic literature review, text mining.

Introduction

Over the past two decades, there has been a growing interest in creativity as a source of competitive advantage and as a key element in determining the growth, competitiveness and dynamism of places (Landry, 2000; Florida, 2002; Scott, 2014). The role of creativity in the economy has become increasingly prominent, giving rise to concepts such as 'creative economy', 'cultural and creative industries (CCIs)' and 'creative cities', which have drawn the increasing attention of scholars from cross-disciplinary fields and of policy makers across the world (UNCTAD, 2008). In the late 1990s, the UK Creative Industries Task Force of the Department of Culture, Media and Sports (DCMS) was established to assess the contribution of CCIs to the UK economy and identify policy measures for their development (Gross, 2020). Since then, policies to support creative inputs and outputs have gradually grown in popularity and are now widespread (Gong and Hassink, 2017), with key European and international institutions such as UNCTAD, UNESCO, World Bank, European Commission, and OECD recognising the importance of creativity to economic development.

There is general consensus that creativity is a social phenomenon characterised by networks of social relationships, which in turn makes geography and, more specifically, places particularly relevant. For example, the original DCMS definition of creative industries as 'those activities which have their origin in individual creativity' (DCMS, 1998) recalls the importance of individuals and, therefore by extension, of the surrounding social and cultural environment in promoting the growth of these particular industries. The definitions of 'creative milieu' (Landry, 2000), 'creative city' and 'creative class' (Florida, 2002) further emphasise the role of people, who concentrate in space due to several place-specific conditions, in contributing to economic success by means of creativity. As for other creative-related notions, there are multiple definitions of creative clusters. Some draw upon the traditional literature on clusters (Porter, 1990), emphasising the geographical proximity of creative firms embedded in a social and institutional ecosystem capable of cross-stimulating activities, boosting creativity and realising economies of scale (UNESCO, 2006; DCMS, 2008). Others focus more on creative individuals and on the importance of a stimulating environment offering diversity, freedom of expression and opportunities for social interactions (Florida, 2002; De Propris and Hypponen, 2008). Encompassing both these elements, Mateos-Garcia and Bakhshi (2016) define creative clusters as agglomerations of both creative businesses and workers that collaborate and compete with each other.

Despite its prominence in policy discourse, the notion of creative clusters has been weakly theorised. Creative clusters have been often treated as a subset of traditional business clusters and their growth explained through traditional agglomeration arguments. However, the 'creative' element of creative clusters makes them distinct from other industry concentrations, in that they produce not only economic but also social and cultural value. Moreover, due to the space-specific nature of many creative industries sectors (for example museums, galleries etc) and the distinct nature of creative workers, creative production and consumption practices both become deeply intertwined with place (LDA, 2005). As such, creative clusters draw upon a self-reinforcing mechanism of growth, where trust is nurtured in local communities to foster creative energies, social interactions, collaboration, and knowledge exchange. The resulting strong symbiosis between place, creativity and economy has made the

notion of creative clusters increasingly popular in local, regional and national planning strategies. Creative clusters have been regarded as important catalysers for innovation, job creation and growth in both advanced and developing countries, regions and cities across the world (Scott, 2008; Pratt, 2009). Moreover, they are seen as contributing to the image-making process of places, which in the contemporary economy has become an essential tool for attracting tourism, inward investment and talented people as well as for promoting economic development (Turok, 2003; Vanolo, 2008). However, their success cannot be simply measured by economic profits. For example, creative clusters are a powerful source of innovation that often remains 'hidden' when considering traditional indicators (Miles and Green, 2008; Bakhshi and Lomas 2017). Existing literature has identified agglomeration economies, spin-off formations and the institutional environment as the main drivers of these clusters. Consequently, strategies to support them have included a variety of initiatives such as workspace provision, business advice and training, funding and the development of physical and soft infrastructures (Bagwell, 2008). As the policy initiatives linked to creative clusters are numerous and varied, there is no strict consensus as to what makes a creative cluster successful, and policy makers have adopted this notion very flexibly (Pratt, 2004).

Over time, the ambiguity over definitions and the range of approaches introduced to classify and measure creative industries has encouraged scholars to carry out broad literature reviews to analyse the state of knowledge, clarify ambiguous creative-related concepts and identify avenues for future research. There is no lack of reviews of academic research on cultural and creative industries (Boggs, 2009; Flew and Cunningham, 2010; O'Connor, 2010; Berg and Hassink, 2014), cultural and creative economy (Gibson and Kong, 2005) and creative cities/class (Scott, 2006; Pratt, 2009; Markusen, 2014). However, despite the rising importance of creative clusters amongst academics, analyses of studies focusing on this notion have been carried out only recently. Branzanti (2015) examined the literature on the spatial concentration of creative activities focusing on localization economies. Gong and Hassink (2017) analysed previous academic research on the drivers that contribute to the spatial clustering of certain CCIs in the field of economic geography. Chapain and Sagot-Duvauroux (2018) presented a systematic literature review of cultural and/or creative clusters (CCCs), analysing the nature and evolution of the terminology and of research that has addressed this concept in the domain of social science.

The existing reviews on creative cluster research have examined particular aspects of the clustering of creative activities, such as drivers of spatial concentration, or have looked at studies focusing the search strategy on generic terms such as creative industries, clusters, districts, and quarters. By using such generic terms, we find that many specific instances of clustering at the sectoral or regional level have not been captured in previous studies.

To address this research gap, thus contributing to our understanding of creative clusters, this work expands the systematic analysis of previous studies to a broader concept of creative cluster, which we define as the geographic concentration of creative workers and/or creative businesses (Mateos-Garcia and Bakhshi, 2016). Studies on the topic were identified using a broad range of terms that refer to creative clusters in its wide meaning. The search strategy included keywords related to specific creative industries or workers (e.g., fashion, architect) and more generic words for creativity (e.g., cultural, bohemian) associated with a set of terms that refer to the idea of clustering (e.g., hub, city, destination). In doing so, we were able to capture a

wide range of studies that have dealt with the spatial concentration of creative industries and people, and to differentiate the analysis for each creative sector. Moreover, by focusing our analysis on the disciplines of Geography, Regional Urban Planning, Urban Studies, Economics, Management and Business, we concentrate our investigation on the main research outlets adopted by cluster scholars (Cruz and Teixera, 2010; Lu et al., 2018) whilst offering opportunity to compare across disciplines. A systematic analysis of the extensive literature on creative clusters contributes to showing the state of knowledge in the creative cluster field, investigating the current main limitations in academic research on the topic and speculating on the future research agenda.

2. Methodology

This report is the product of a systematic literature review. A systematic literature review differs from a traditional literature review, in that a systematic review employs a specific methodology to gather and synthesise large volumes of literature around a certain theme. The guiding principle of a systematic review is that it should employ an explicit, accountable and robust method of gathering and analysing literature (Gough et al., 2017). In practice, this entails: i) determining the scope of the review – what is to be included and excluded from the study, ii) determining the search strategy – how will relevant literature be gathered, and iii) determining the criteria by which the gathered literature will be analysed.

2.1. Scope

The aim of this report is to give an overview of academic work pertaining to creative clusters, which we define as the geographic concentration of creative workers and/or creative businesses (Mateos-Garcia and Bakhshi, 2016). In establishing the scope of the review, consideration was given to whether the term 'creative cluster' would, itself, capture the extent of work relating to such a definition. Consequently, it was decided that the scope of the review should include both work which explicitly referred to itself as pertaining to creative clusters and work which avoided the term but remained relevant to the concept. As such, the review is designed to incorporate i) work from a range of disciplines commonly adopted within-cluster research, ii) work which assesses creative clusters theoretically or empirically, iii) work which focuses on specific, multiple, or broad creative sectors, and iv) work which covers a range of geographic scales. Subsequently, the scoping strategy of this review offers a more comprehensive overview of creative clusters academic literature than has been previously achieved.

2.2. Search strategy

To capture all relevant academic literature, it was necessary to establish the range of terms that might indicate creative workers and/or businesses on the one hand and geographic concentrations of various scales on the other. In order to establish terms capable of capturing the breadth of literature we wished to assess, we began by

producing a list of synonyms for 'creative' and 'cluster', a list of creative sectors - based on the DCMS definition (DCMS, 2016) - and geographic scales or other terms that can be considered constituents of these categories (see Figure 1). Following Tranfield et al. (2003), initial terms were compiled based on prior scoping of the literature and consultation both within the research team and with knowledgeable outside parties. The review sought to identify work in which terms pertaining to both creativity and geography were present. As such, the search strategy located work where any 'creative' term appeared within three words of any 'cluster' term in a work's title, abstract or keywords. The strategy was further refined by examining search results for each grouping of words and excluding words which yielded very few appropriate results. After review and consultation, the keyword term 'creative class', which has drawn significant attention amongst international scholars over the last two decades, was also added to the search term list.

Figure 1. Search Strategy - Key terms

Search strategy			
Creative-related terms			Cluster-related terms
Creative area	Keywords		Keywords
General	Creative; Cultur*; Art*; Bohemian; Entertainment	AND	Cluster*; Agglomeration*; City; Cities; Quarter*; District*; Zone*; Destination*; Hub*; Concentration*; Place*; Milieu*; Network*; Location*; Geograph*; Accelerator*; Festival *
Advertising and marketing	"Public Relations"; PR; Advertising; Marketing		
Architecture	Architect*		
Crafts	Craft*; Potter*; Jewellery; Jewelry; Silversmith*; Goldsmith*; Maker*		
Design and designer fashion	Fashion; Design*; Clothing		
Film, TV, video, radio and photography	Film; Cinema; Movie*; Television; TV; Video; Radio; Broadcast*; Media; Multimedia; Photograph*; Animat*		
IT, software and computer services	Digital; Tech*; Game*; Gaming; Software; "Computer Consult*"; "Computer Program*"; Coding; Coder*		
Museums, Galleries and Libraries	Librar*; Archiv*; Heritage; Galler*; Studio*; Museum*; Exhibition		
Music, performing and visual arts	Music; "Audio Produc*"; Dance; Ballet; Theat*; Circus; Perform*		
Publishing	Publishing; Publisher*; Translat*; Newspaper*		

Source: Authors' own elaboration.
Notes: An asterisk denotes a 'wildcard' term, meaning that all derivations stemming from the same root will be searched (e.g., architect* = architect, architects, architectural, architecture).

The search strategy outlined above was applied to all articles written in English in the Web of Science (WoS) Core Collection database. We preferred WoS to the Scopus database because the former covers a larger number of articles with high impact, especially in areas of economics and business (Martín-Martín et al., 2019). Moreover, we decided to focus on papers in English as these works can circulate at international level and therefore be more influential in the academic literature on creative clusters. The search was conducted in May 2019 and then updated in January 2020 to include articles published up to the end of 2019. Due to the breadth of our search terms, the query initially produced a very large number of studies which were outside the scope of our research. As explained in the introduction, we decided to limit our results to those Web of Science categories that have been the main research outlets of cluster scholars: Urban Studies, Economics, Management, Geography, Regional Urban Planning and Business. This produced a base sample of 28,639 results.

After the base sample had been gathered, an initial round of exclusions was conducted to discard works which were clearly out of scope, based on review of each work's title, abstract, and key words. 27,800 articles were excluded at this stage as clearly being out of scope. Any work which was not clearly to be excluded or included was independently reviewed by a second researcher and each case subsequently discussed until consensus was reached. This resulted in 522 articles deemed to be potentially within scope. These articles were then read in full to confirm that each article did indeed focus on the geographic concentration of creative workers or businesses. After the full read round, a further 167 articles were deemed to be out of scope and therefore excluded, leaving a final sample of 355 articles for analysis.

2.3. Analysis

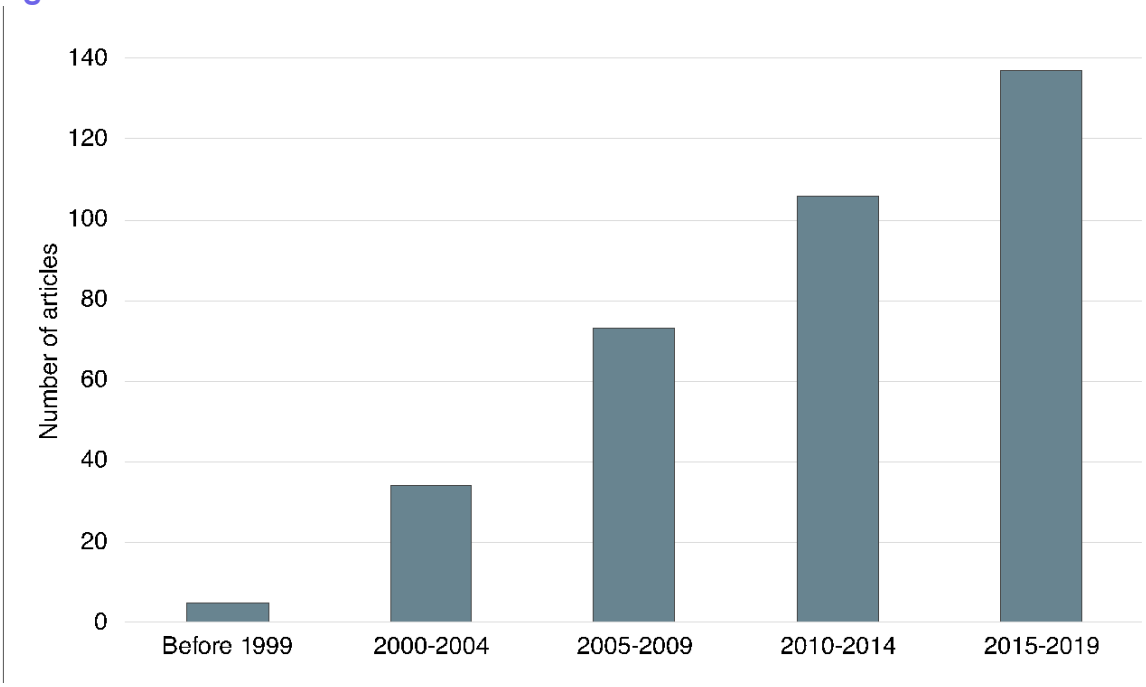
The 355 articles in the final sample were read in full and reviewers recorded details of each article's focus, geographic and sectoral scope and methodology. First, bibliographic information for each paper was also gathered through the Web of Science database, which was used to conduct bibliometric analysis, including journal and citation metrics. Second, a content analysis of the abstracts was performed using a variety of computer-aided text analysis (CATA) techniques, where term frequencies and statistical relationships between lexical units and between lexical units and selected variables (i.e., methodology, sector, continent, country) were used to extrapolate thematic patterns from textual data. The large dimension of the corpus of textual data confirmed the viability of this statistical approach. Through the computation of the TF-IDF (Term Frequency – Inverse Document Frequency), the software automatically selected 1,000 keywords, which were customised to ensure a good quality of the final sample (N=391, min. occurrences=10). A thematic analysis of abstracts was performed to explore the main themes emerging from the academic discussion on creative clusters and to analyse the different significance of these themes for each variable. Multidimensional scaling analysis (MDS) and correspondence analysis (CA) were adopted to graphically represent the relationship between keywords, thematic clusters and variables (see Appendix 1 for more details on methodology).

3. Findings

3.1. Papers, journals, thematic areas

The creative cluster literature has been growing substantially over time. Figure 2 shows the number of articles published by year over five-year periods form the 1990s to 2019. The first paper was published in 1986 (Christopherson and Storper 1986), followed by four other papers in the 1990s. The literature began to grow at approximately the same time as Richard Florida's books and papers began to emerge, peaking in 2010, and continuing to grow since, with 39 papers published in 2018 and 21 published in 2019 at the point when we ran our searches (in time the number could rise as journal articles published in 2019 are indexed).

Figure 2. Number of articles over time



Source: Authors' own elaboration.

3.2. Disciplines and Journals

Now we consider the disciplines that are being covered, and the journals in which creative cluster research has been published. The study of creative clusters is necessarily interdisciplinary, so we can use this to map the 'identity' of research that has been published. Within Web of Science each journal is categorised into one or more thematic areas (for instance, *Journal of Economic Geography* is in the geography as well as economics thematic areas, while *Regional Studies* is in environmental studies as well as regional & urban planning). By considering the thematic areas in which papers on creative clusters have been published, we gain an understanding of the most prominent disciplinary focus of extant work. These are presented in Table 1.

Table 1. Subject areas

Thematic area	Percentage
Geography	25.3%
Urban Studies	20.4%
Environmental Studies	18.0%
Regional & Urban Planning	14.2%
Economics	9.9%
Management	4.8%
Business	1.8%
Development Studies	1.7%
Other	3.9%
Total (n=355)	100.0%

Source: Authors' own elaboration.

The results above reflect our focus on these particular disciplines as the main disciplines publishing research on creative clusters. Unsurprisingly, journals classed as 'geography', 'urban studies', 'environmental studies', and 'regional and urban planning' make up the majority of papers published on this topic. It is also worthwhile to note that economics, management, business and development studies make up just over 15% of research in this area, suggesting that academic understanding of creative clusters is dominated by topics related to geography and regional studies rather than more economics and business-based approaches. Although we do not show these figures, the relative proportions of different disciplines remain broadly constant over time.

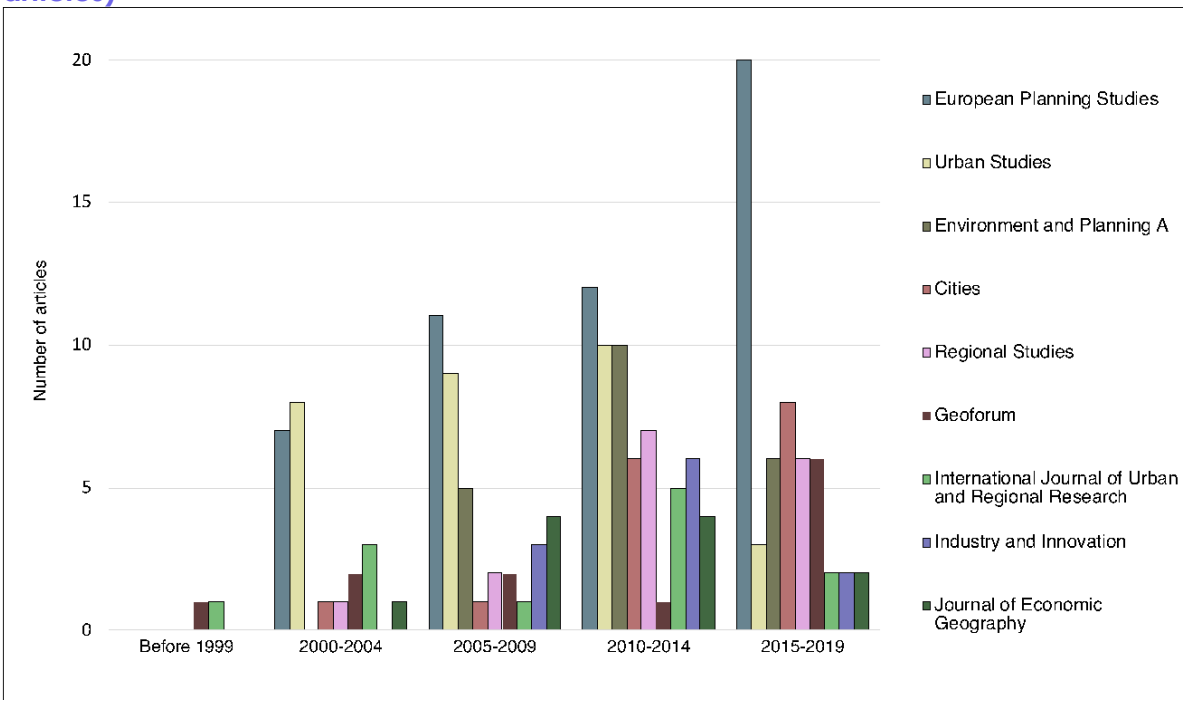
From the broader subject areas, it is possible to focus on the journals that have been publishing this research. Table 2 shows the number of articles by journal, and Figure 3 shows the trends in publication by the top journals in terms of number of articles over time. The table above shows that *European Planning Studies* has been by far the most prolific of journals publishing on the topic of creative clusters. Moreover, as shown in figure 3, its publication of creative clusters research has consistently increased over time. The other journals that have published more than 10 papers are: *Urban Studies*, *Environment and Planning A*, *Cities*, *Regional Studies, Geoforum, International Journal of Urban and Regional Research,* and *Journal of Economic Geography*. With only one exception (*Industry and Innovation*), these are all geography/urban studies/regional studies journals. Among the highest profile journals, *Environment and Planning A* has published substantially more papers on creative clusters topics than either *Journal of Economic Geography* or *Economic Geography*. Looking at the historical trends, *European Planning Studies, Cities,* and *Geoforum* have seen increased publishing on creative clusters topics, while the other journals have seen declines.

Table 2. Number of articles by journal

Journal	Articles	Percentage
European Planning Studies	50	14.1%
Urban Studies	30	8.5%
Environment and Planning A	21	5.9%
Cities	16	4.5%
Regional Studies	16	4.5%
Geoforum	12	3.4%
International Journal of Urban and Regional Research	12	3.4%
Industry and Innovation	11	3.1%
Journal of Economic Geography	11	3.1%
Australian Geographer	8	2.3%
Urban Geography	8	2.3%
European Urban and Regional Studies	7	2.0%
Journal of Urban Affairs	9	2.5%
Economic Geography	6	1.7%
Geografiska Annaler Series B-Human Geography	6	1.7%
Bulletin of Geography-Socio-Economic Series	4	1.1%
Journal of Urban Design	4	1.1%
Service Industries Journal	4	1.1%
Area	3	0.8%
Growth and Change	3	0.8%
Habitat International	3	0.8%
Innovation-Management Policy & Practice	3	0.8%
Journal of Planning Education and Research	3	0.8%
Local Economy	3	0.8%
Papers in Regional Science	3	0.8%
Other (<3 articles)	99	27.9%
Total	355	100.0%

Source: Authors' own elaboration.

Figure 3. Number of articles by journal over time (only journals with at least 10 articles)



Source: Authors' own elaboration.

While the above analysis has considered the number of articles, what is less clear is the impact of the articles that have been published. To this end, we explore citations data for the papers in our sample. Of the papers in the sample, the mean number of citations was 31, while the median was 12. The highest cited paper in our sample had 487 WoS citations, while a substantial number had no citations at all. In order to assess impact, we identified papers that were highly cited relative to other papers published in the same year and in the same discipline. As is common in the bibliometric literature, we categorised as highly cited those articles that received more citations than the top 10% of the articles in the same WoS thematic area and year of publication. Interestingly, while 'highly cited' papers are in the top 10% of their citation classes in year of publication, a total of 20% of our sample was highly cited, suggesting that research on creative clusters attracts proportionally twice as many citations as would be expected.

Table 4. Citations by journal

Journal	Number of articles	Average citations	Min citations	Max citations	% of highly cited articles
European Planning Studies	50	17.8	0	89	8.0%
Urban Studies	30	67.7	1	316	46.7%
Environment and Planning A	21	36.8	1	442	9.5%
Cities	16	16.8	1	66	18.8%
Regional Studies	16	32.2	1	106	43.8%
Geoforum	12	26.6	0	105	8.3%
International Journal of Urban and Regional Research	12	75.8	0	336	66.7%
Industry and Innovation	11	32.2	3	127	27.3%
Journal of Economic Geography	11	86.5	2	366	63.6%
Australian Geographer	8	23.8	0	53	0.0%
Urban Geography	8	13.9	0	39	0.0%
European Urban and Regional Studies	7	23.9	3	75	28.6%
Journal of Urban Affairs	9	82.4	2	487	44.4%
Economic Geography	6	101.2	19	199	66.7%
Geografiska Annaler Series B-Human Geography	6	90.2	0	282	50.0%
Bulletin of Geography-Socio-Economic Series	4	4.3	1	7	0.0%
Journal of Urban Design	4	10.3	0	17	0.0%
Service Industries Journal	4	8.8	4	17	0.0%
Area	3	24.3	3	42	0.0%
Growth and Change	3	10.3	2	15	0.0%
Habitat International	3	9.7	3	19	0.0%
Innovation-Management Policy & Practice	3	23.3	15	29	0.0%
Journal of Planning Education and Research	3	43.3	11	81	66.7%
Local Economy	3	2.0	1	3	0.0%
Papers in Regional Science	3	10.7	2	27	33.3%
Other (<3 articles)	99	13.4	0	116	12.1%
Total	355	31.4	0	487	21.7%

Source: Authors' own elaboration.

Table 4 shows the number of articles in each journal, along with average citations, minimum and maximum citations, and percentage of articles in that journal which were highly cited. While *European Planning Studies* has published by far the most papers on creative clusters, a quite low proportion of these papers have been highly

cited. By contrast, 46% of *Urban Studies* papers on creative clusters were highly cited, and 66% (or seven of the twelve published papers) of *International Journal of Urban and Regional Research* papers were highly cited. In line with our understanding of prestigious journals (the so-called Matthew effect (Merton 1965)), *Journal of Economic Geography* and *Economic Geography* both had over 60% of the papers published on creative clusters become highly cited, although *Environment and Planning A*, which also has a high impact factor, had a comparatively low rate of 12% of creative clusters papers becoming highly cited.

3.3. Research methods and data

We now turn our attention to the methods used in the research that has been published in these journals. We first consider the broad categories of qualitative research, quantitative research, mixed methods (e.g. qualitative and quantitative combined), and theoretical or conceptual. Table 5 shows the percentage of papers published using these research methods, as well as the percentage of these articles that eventually become highly cited.

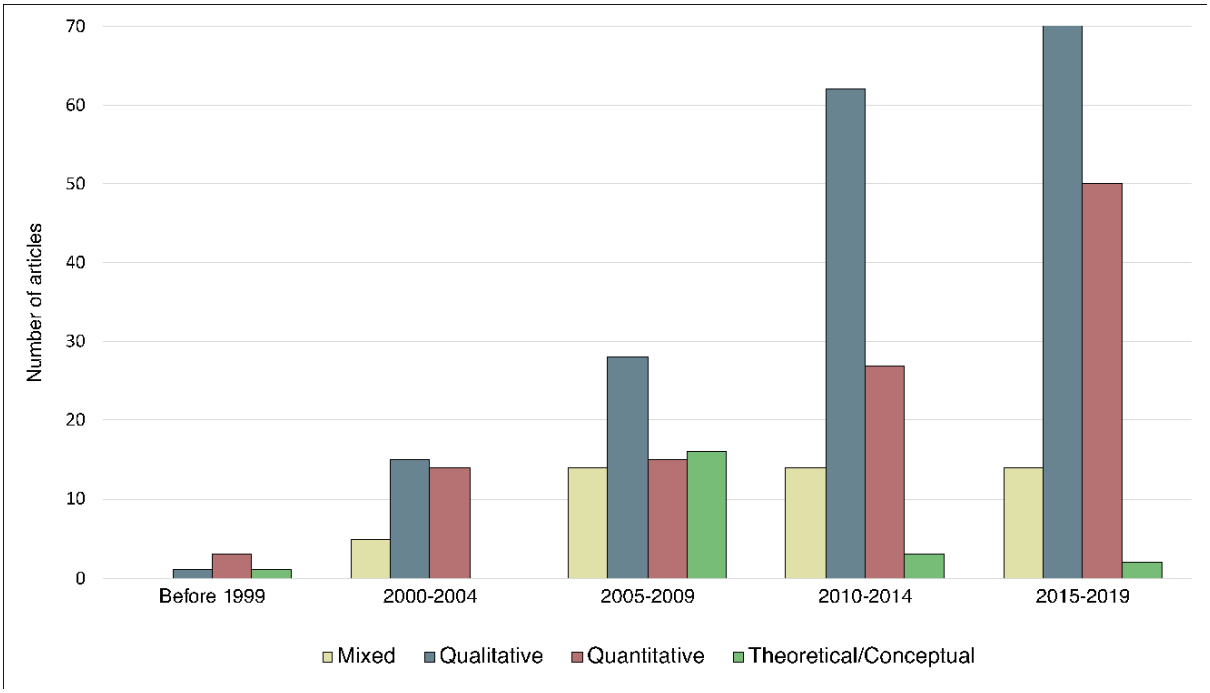
Table 5. Research design adopted by the reviewed articles

Research design	Articles	Percentage	% of highly cited articles
Qualitative	177	49.9%	21.5%
Quantitative	109	30.7%	16.5%
Mixed	47	13.2%	25.5%
Theoretical/Conceptual	22	6.2%	40.9%
Total	355	100.0%	21.7%

Source: Authors' own elaboration.

The table above shows that just under half of the papers in our sample were qualitative, while approximately 30% were quantitative, and the remainder were either mixed method or theoretical. Of the highly cited articles, quantitative and mixed-method papers were comparatively more likely to be highly cited, though both qualitative and theoretical papers were also above the 10% threshold to be highly cited. With this general figure in mind, Figure 4 shows how the research designs have changed over time.

Figure 4. Research designs as a share of total papers published



Source: Authors' own elaboration.

From Figure 3 we can see that the steady increase in qualitative studies has been accompanied by a proportionately rapid increase in quantitative studies since the early 2010s. Mixed method papers appear to have largely plateaued, while there is a slow decline in theoretical and conceptual papers.

We now turn our attention to a more detailed exploration of the methods and data that are used in these studies. Table 6 shows the type of analysis used in these papers. The number of articles using a particular type of analysis is higher than the overall sample size because a paper may use more than one of these approaches (for instance, a qualitative article could be based on a case study which may also be supported by spatial analysis and/or descriptive statistics). We observe that the most common approach in the study of creative clusters has been the case study. Descriptive statistics are generally more common than econometric analysis. A wide set of other methods are also used, ranging from the fairly common (such as network analysis) to the relatively unusual (such as the analysis of garments in Bide, 2019).

Table 6. Type of analysis

Type of analysis	Articles	Percentage
Case study	149	35.3%
Descriptive statistics	66	15.6%
Econometrics	58	13.7%
Mapping and Spatial analysis	48	11.4%
Other qualitative methods	36	8.5%
Narrative/Historical	26	6.2%
Theoretical/Conceptual	16	3.8%
Network analysis	12	2.8%
Other quantitative methods	11	2.6%
Total	422	100.0%

Source: Authors' own elaboration.
Notes: 'Other qualitative methods' includes other methodologies such as discourse analysis, mental mapping and garment analysis. 'Other quantitative methods' includes data envelopment analysis and agent-based modelling.

The above findings are further disentangled in Table 7, which considers the type of analysis conducted in qualitative, quantitative and mixed-method papers. While, qualitative studies are largely dominated by case studies, followed by narrative/historical analysis, quantitative studies are mostly using econometric methods, followed by descriptive statistics and mapping and spatial analysis. On the other hand, for mixed studies the most frequent type of analysis, with nearly the same percentage of cases, are descriptive statistics and case study.

Table 7. Type of analysis by research design

Research design	Type of analysis	Articles	Percentage
Qualitative	Case study	127	68.7%
	Narrative/Historical	24	13.0%
	Other qualitative methods	21	11.4%
	Descriptive statistics	7	3.8%
	Mapping	6	3.2%
Quantitative	Econometrics	55	41.0%
	Descriptive statistics	36	26.9%
	Mapping and Spatial analysis	30	22.4%
	Network analysis	8	6.0%
	Other quantitative methods	5	3.7%
Mixed	Descriptive statistics	23	29.5%
	Case study	22	28.2%
	Mapping and Spatial analysis	12	15.4%
	Other qualitative methods	9	11.5%
	Other quantitative methods	4	5.1%
	Econometrics	3	3.8%
	Network analysis	3	3.8%
	Narrative/Historical	2	2.6%
Theoretical/Conceptual	Theoretical/Conceptual	16	72.7%
	Other qualitative methods	6	27.3%

Source: Authors' own elaboration.

Table 8. Type of data

Type of Data	Articles	Percentage
Interviews	162	31.0%
Official data	87	16.7%
Other data	76	14.6%
Survey	53	10.2%
Observation/Ethnography data	38	7.3%
Historical/Archival data	35	6.7%
Industry data	21	4.0%
Policy documents/Grey literature	18	3.4%
Location data	17	3.3%
N/A	15	2.9%
Total	522	100.0%

Source: Authors' own elaboration.
Notes: 'Other data' include but not limited to qualitative data, planning documents, case studies, academic literature, auction records, focus groups, garments, news, magazines, mailing lists, websites, personal reflection, geotagged data and secondary data

.

Finally, for this part of our discussion, we consider in Table 8 the sources of data used. This is a difficult category to classify as the standards for reporting sources of data vary between journals, disciplines, and indeed over time. We can also see the prevalence of multiple data sources. Interviews remain the most prominent source of data reported, while official statistics are also commonly used. This figure shows more broadly the substantial variety of types of data used in this context.

3.4. Geographical areas and sectors

Now we consider the geographical areas studied in the papers in our sample, as well as the sectors on which the papers focused. Because the topic of creative clusters is very diverse, the level of analysis studied ranges from the micro-level (individual streets) to neighbourhoods, cities, regions, or entire nations. These are shown below in Table 9.

Table 9. Area level

Area level	Articles	Percentage
City/Town	199	56.1%
Sub-City	70	19.7%
Region/Province	47	13.2%
Other	20	5.6%
National	9	2.5%
Region/Province; Sub-City	2	0.6%
N/A	8	2.3%
Total	355	100.0%

Source: Authors' own elaboration.

The figures above show that the majority of the literature on creative clusters focuses either on cities or towns, or on particular sub-city geographies (neighbourhoods, etc). There are fewer papers that consider larger areas such as regions or nations. Yet while the data in Table 9 shows the research setting, they do not necessarily show the unit of analysis. For instance, one could do a study of workers within a city, so the city would be the research setting and workers would be the unit of analysis. Table 10 shows the unit of analysis seen in the studies in our sample. Again, a paper may have more than one unit of analysis.

Table 10. Unit of analysis

Unit of analysis	Articles	Percentage
Firm	101	25.9%
Cluster/district/quarter	90	23.1%
Individual	59	15.1%
City	50	12.8%
Other	38	9.7%
Policy	24	6.2%
Region	12	3.1%
Neighbourhood/street/zip code	9	2.3%
N/A	7	1.8%
Total	390	100.0%

Source: Authors' own elaboration.

Table 10 is particularly revealing as it shows the variety of topics covered within the literature. About one quarter of papers consider the cluster/cultural district/quarter as the unit of analysis itself. A similar number look at firms as the unit of analysis. Individuals (e.g. workers, artists, etc) make up about 15% of papers. Cities (as distinct from the cluster, which implicitly does not necessarily directly overlap with cities) make up about 15% as well. A smaller number of papers examine the implications of a particular policy or initiative, or very small geographical areas over time. With this said, the choice of methods used by researchers often reflects the topic being addressed, and Table 11 breaks down the unit of analysis by the methodology used in the studies in our sample.

Table 11: Units of analysis by methodologies used

Unit of analysis	Qualitative	Quantitative	Mixed	Theoretical / Conceptual	Total
City	48.0%	34.0%	6.0%	12.0%	100.0%
Cluster/district/quadrant	76.7%	8.9%	11.1%	3.3%	100.0%
Firm	27.7%	52.5%	18.8%	1.0%	100.0%
Individual	40.7%	39.0%	18.6%	1.7%	100.0%
N/A	14.3%	0.0%	0.0%	85.7%	100.0%
Neighbourhood/street	44.4%	44.4%	11.1%	0.0%	100.0%
Other	63.2%	21.1%	15.8%	0.0%	100.0%
Policy	75.0%	0.0%	8.3%	16.7%	100.0%
Region	25.0%	41.7%	25.0%	8.3%	100.0%

Source: Authors' own elaboration.

The figure above shows that studies having clusters as their units of analysis were predominantly using qualitative methods, while those focusing on firms used more often quantitative or mixed methods. Individuals were instead almost equally studied using qualitative and quantitative methods. These all reflect methodological challenges facing researchers, and the suitability of different units of analysis for various methods.

Now we consider the sectoral coverage of the literature. Table 12 shows the distribution of sectors studied by the papers in our sample. It is worth noting that our methodology includes searching for each of the specific sectors included in the DCMS creative industries definition, so this should allow us to capture the available literature on clustering or agglomeration within these sectors. We consider discussions of cultural industries to be separate from creative industries and treat it as such. Also, because the creative class literature is related to the creative cluster literature but tends to be sector agnostic in terms of how it is studied (that is, creative class papers

tend to explore the concentration of creative workers but not sectors), we class those papers separately.

Table 12. Sectoral coverage

Sector	Articles	Percentage
Creative industries/economy	92	25.9%
Cultural industries	60	16.9%
Creative City/Class	40	11.3%
Film, TV, video, radio and photography	44	12.4%
Design and fashion	33	9.3%
IT, software and computer services	30	8.5%
Music, performing and visual arts	27	7.6%
Crafts and jewellery	14	3.9%
Advertising and marketing	5	1.4%
Museums, galleries and libraries	2	0.6%
Publishing	1	0.3%
Architecture	1	0.3%
Multiple	6	1.7%
Total	355	100.0%

Source: Authors' own elaboration.

We see from the above table that about 33% of papers in our sample explored creative or cultural industries in a broad sense. About 11% of our sample addressed creative class topics (again, please note that these were topics that were 'opted-in' by our search criteria rather than being an explicit focus of our search). This means that more than half of the papers in the sample were sector-specific studies. The most common sector addressed is 'Film, TV, radio and photography', with 12.4% of the sample. 'Design and fashion' made up about 9% of the sample, followed by IT and software, and music, performing and visual arts with approximately 8% each. 'Crafts and jewellery', and 'Advertising and marketing' each had a few studies, while there were only one or two studies on clustering in museums, galleries and libraries, architecture and publishing. Only six papers focused on more than one specific sector, either in a comparative or exploratory fashion.

Next we consider the geographical areas covered in our sample of studies. The vast majority of our papers only looked at a single country, with only 13 papers (3.7%) comparing multiple countries. Table 13 and Table 14 illustrate the countries that are covered (note that multiple countries may have been studied in a single paper).

Table 13. Geographic coverage

Region / Continent	Articles	Percentage
Europe	168	47.3%
North America	64	18.0%
Asia	57	16.1%
Oceania	20	5.6%
N/A	17	4.8%
Multiple	13	3.7%
Central and South America	7	1.9%
Global	6	1.7%
Africa	3	0.8%
Total	355	100%

Source: Authors' own elaboration.

Table 14. Geographic coverage by country

Continent	Country	Percentage
Europe	UK	26.1%
	Germany	13.7%
	Italy	10.9%
	Spain	9.5%
	Netherlands	7.6%
	Sweden	5.7%
	Denmark	3.8%
	France	3.3%
	Ireland	3.3%
	Finland	2.8%
	Norway	2.8%
	Europe	1.9%
	Austria	1.4%
	Czech Republic	1.4%
	Hungary	1.4%
	Poland	0.9%
	Switzerland	0.9%
	Belgium	0.5%
	Malta	0.5%
	Portugal	0.5%
	Romania	0.5%
	Russia	0.5%
Africa	South Africa	100.0%

Continent	Country	Percentage
North America	USA	67.5%
	Canada	32.5%
Asia and Middle East	China	43.8%
	Taiwan	9.4%
	Japan	7.8%
	South Korea	7.8%
	Singapore	6.3%
	Turkey	6.3%
	Malaysia	4.7%
	India	3.1%
	Indonesia	3.1%
	Thailand	3.1%
	Hong Kong	1.6%
	Iran	1.6%
	Lebanon	1.6%
Oceania	Australia	91.3%
	New Zealand	8.7%
Central and South America	Uruguay	37.5%
	Mexico	25.0%
	Argentina	12.5%
	Brazil	12.5%
	Chile	12.5%

Source: Authors' own elaboration.

The tables above show that creative clusters have been studied in academic literature in 45 countries. Of the literature, nearly half has come from Europe. North America makes up 22% of the sample, and Asia makes up 15%. The USA, UK, Germany, China and Australia are among the countries that have been the most widely studied.

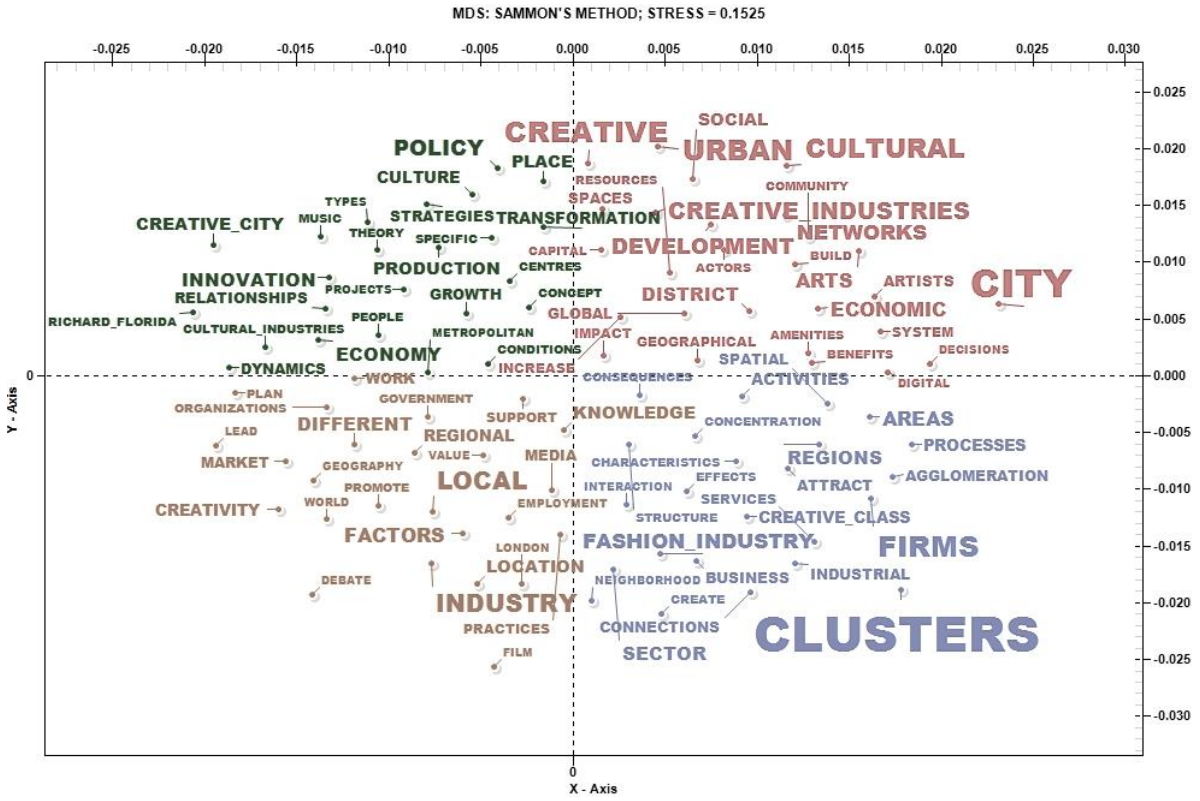
This chapter has discussed the context and subjects of the papers studied, but not necessarily the papers' content. The following chapter will explore the content of papers using text mining.

4. Text mining: A content analysis of creative cluster research

4.1. Key concepts and terminology

The first step for our text analysis is to understand the most important keywords. Figure 5 shows the output of Multidimensional Scaling (MDS) analysis, which graphically represents the significance and relationships amongst the most frequent 100 keywords within a space of reduced dimensions (See Appendix 1.2 for more details on MDS). The largest keywords are those recurring more often in the academic discussion on creative clusters, whereas their distance in the map corresponds to their thematic closeness (i.e., proximity within each sentence delimited by a full stop). The value of the stress index (0.15) shows a 'fair' goodness of fit between the input matrix and Sammon's map (Wickelmaier, 2003). It is possible to identify four macro-thematic clusters in this discussion. The upper-right quarter includes keywords focusing on creativity, cultural and creative industries, and the economic development of cities. The upper-left quarter is comprised of keywords associated with the idea of the creative city, creative class and related policy strategies. The bottom-right quarter focuses on the clustering of both firms and creative people in space. The remaining bottom-right quarter is mostly related to labour market and government support in the creative sector. The frequency of each keyword helps clarify which terms are the most commonly used in creative cluster research. Indeed, the keyword 'cluster' is the most adopted term for indicating the geographical concentration of creativity, followed by 'network', 'district', 'agglomeration', and 'concentration'. The term 'creative industries' prevails on 'cultural industries' and 'creative and cultural industries (CCIs)'. Moreover, there is a stronger focus on cities rather than regional or national context when discussing the spatial distribution of creativity.

Figure 5. Multidimensional scaling analysis: most occurring keywords and their relationships (co-occurrences)



Source: Authors' own elaboration.

Notes: It is important to emphasize that the above MDS output plots the proximity values of keywords, which are approximately equal to their original distances, in a two-dimensional map. The location and orientation of the coordinate axes, which represent the two dimensions, are completely arbitrary as there are many other positions for these objects in the map.

4.2. Thematic clusters and their relationships

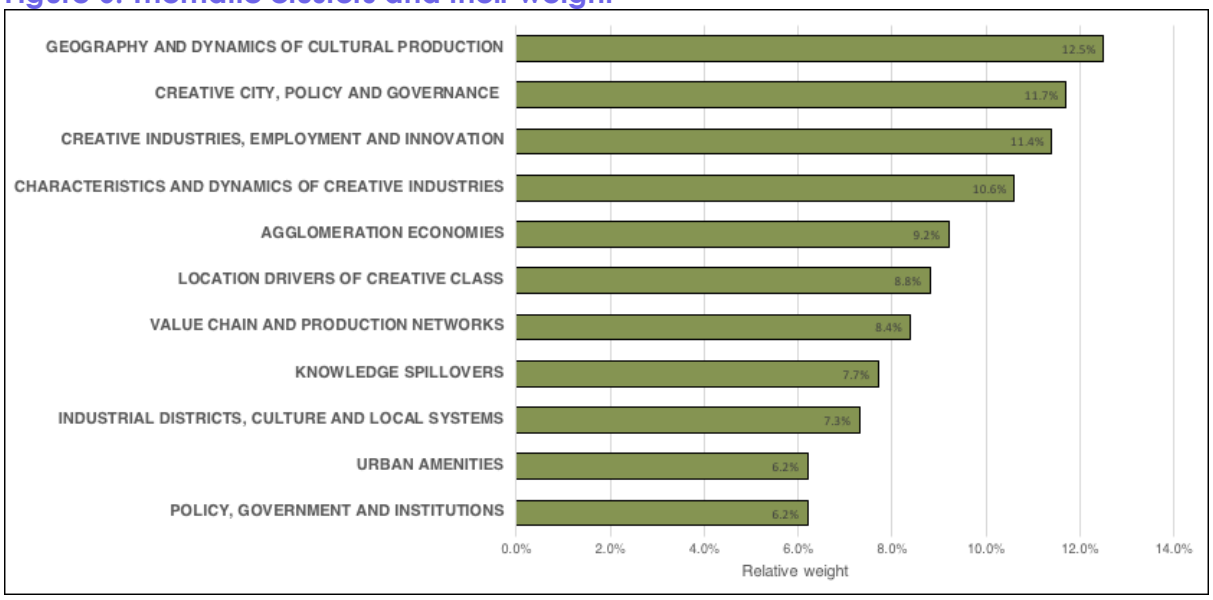
The clusters emerging from the thematic analysis are shown in Figures 6 and 7, including the clusters' relative weight and most representative keywords (See Appendix 1.4 for more details). The analysis identified eleven main themes addressed in the academic discussion on creative clusters. The most frequent theme is 'GEOGRAPHY AND DYNAMICS OF CULTURAL PRODUCTION' (12.5%), which includes keywords linked to the urban concentration of cultural industries, production and consumption (e.g., *urban, city, cultural, spatial, culture, areas, spaces, cultural industries, places, production, consumption*). This is followed by the thematic cluster 'CREATIVE CITY, POLICY AND GOVERNANCE' (11.7%), focusing on the role of policies in making place 'creative' to contribute to their development and regeneration (e.g., *policy, creative city, urban, city, creativity, development, strategies, local, political, regeneration, practices, policies, governance, actors, policy makers, promote, intervention*), and 'CREATIVE INDUSTRIES, EMPLOYMENT AND INNOVATION' (11.4%) including keywords on labour market and innovation-related activities in the industry

(e.g., *creative industries, creative, sector, economy, innovation, industry, firms, countries, employment, occupations, work, digital*).

'CHARACTERISTICS AND DYNAMICS OF CREATIVE INDUSTRIES' (10.6%) and 'AGGLOMERATION ECONOMIES' (9.2%) are two other important themes addressed in creative cluster research. While the former addresses more generally the idea of clustering of creative industries (e.g., *cluster, industry, support, video game, media, economy, sector, digital, firms, technology, capabilities, growth, resources*), the latter focuses more on agglomeration economies (e.g., *firms, location, factors, agglomeration, creative industries, areas, services, cluster, industrial, patterns, concentration, locate, tendency*). This is followed by the theme 'LOCATION DRIVERS OF CREATIVE CLASS' (8.8%) discussing the migration of creative individuals and their driving factors (e.g., *creative class, attract, Richard Florida, creative, people, factors, regions, place, growth, human capital, location, areas, bohemian, professionals, work, concentration, talent, diversity, artists, income, migration*). Other scholars address the theme of 'VALUE CHAIN AND PRODUCTION NETWORKS' (8.4%), exploring the division of value and production connections along global value chains (e.g., *networks, firms, global, production, market, processes, world, connections, structure, international, value, products, produce, complex*).

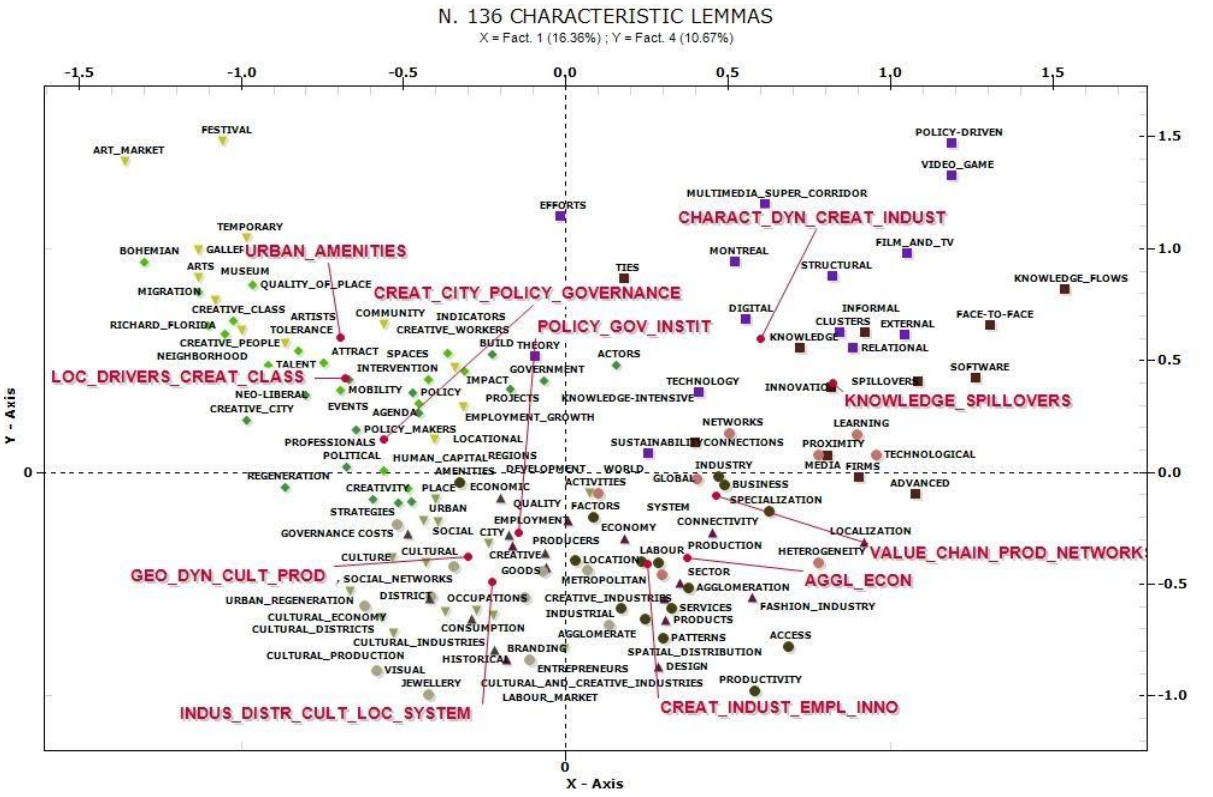
Another theme that emerged from the analysis is 'KNOWLEDGE SPILLOVERS' (7.7%), which focuses on new ideas, innovation and processes that arise from the clustering and networking of creative people and firms (e.g., *firms, knowledge, innovation, networks, connections, mechanism, information, interaction, proximity, activities, system, advanced, benefits, external, externalities, knowledge flows, spillovers, facilitate, cooperation, face-to-face, informal*). Some papers instead address the more traditional idea of industrial districts and local systems with a focus on culture. This cluster - 'INDUSTRIAL DISTRICTS, CULTURE AND LOCAL SYSTEMS' (7.3%) – includes keywords such as *district, industrial, local, economic, development, system, economy, market, Italy, transformation, conditions, historical, institutional, institution, cultural districts,* and *traditional*. The two last thematic clusters have the same weight in the academic discussion. The former, 'URBAN AMENITIES' (6.2%), focuses on the conditions for attracting creative people and firms (e.g., *arts, spaces, artists, community, urban, district, build, resources, museum, galleries, festival, opportunities, amenities, events, life, street, drivers, landscape*). The latter, 'POLICY, GOVERNMENT AND INSTITUTIONS' (6.2%), seems to address the role of institutions and government in defining policy initiatives to foster urban and regional economic development by means of creativity (e.g., *development, creative industries, city, regions, urban, policy, efficiency, growth, governance, cultural and creative industries, organisations, trajectory, plan, promote, creative economy, institutional, urban development, initiatives, public, sector, government, policy makers, bottom-up*).

Figure 6. Thematic clusters and their weight



Source: Authors' own elaboration.

Figure 7. Correspondence analysis: relationship between thematic clusters and keywords

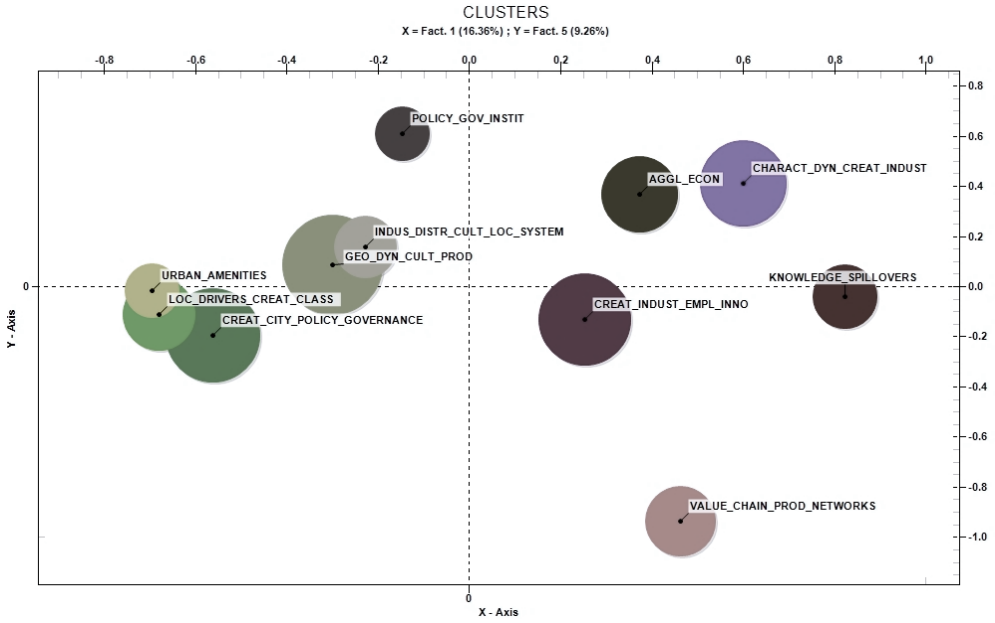


Source: Authors' own elaboration.
Notes: Factor 1 and 4 were deemed the best summary variables for the relationships between thematic clusters and keywords (See Appendix 1.3 for more details).

Figure 8 provides a graphical representation of the relationships between thematic clusters. The geographic space of correspondence analysis is composed of two factors, which together accounted for 26% of the total variation (See Appendix 1.3 for

more details). Some thematic clusters, such as those on policies, production networks, knowledge spillovers and urban amenities/location drivers, are closer to factorial poles, thus representing the boundaries of the academic discussion on creative clusters. The first factor, which explains the most thematic variability (16.36%), separates articles on creative cities (negative pole) from those on the characteristics and agglomeration of creative industries (positive pole). In particular, 'URBAN AMENITIES', 'LOCATION DRIVERS OF CREATIVE CLASS', and 'CREATIVE CITY, POLICY AND GOVERNANCE' share the highest number of keywords and, therefore, are themes that tend to be addressed more closely in the same abstract and, more generally, in the academic debate on creative clusters. These clusters are also in close proximity to the themes 'GEOGRAPHY AND DYNAMICS OF CULTURAL PRODUCTION' and 'INDUSTRIAL DISTRICTS, CULTURE AND LOCAL SYSTEMS', showing that the discourse on creative city and creative class is more associated with the dynamics, characteristics and geography of culture rather than of creative industries. It is interesting to highlight that the discourse on 'POLICY, GOVERNMENT AND INSTITUTIONS' is closer to these themes rather than to creative industries and related topics. Indeed, the theme 'CHARACTERISTICS AND DYNAMICS OF CREATIVE INDUSTRIES' tends to be discussed together with 'AGGLOMERATION ECONOMIES' and, to a lesser extent, with 'KNOWLEDGE SPILLOVERS' and 'CREATIVE INDUSTRIES, EMPLOYMENT AND INNOVATION'. The second factor, which explains 9.26% of thematic variability polarises the theme 'POLICY, GOVERNMENT AND INSTITUTIONS' from those on 'VALUE CHAIN AND PRODUCTION NETWORKS'. This indicates that these themes are discussed separately in the academic debate on creative clusters.

Figure 8. Correspondence analysis: thematic clusters and their relationships

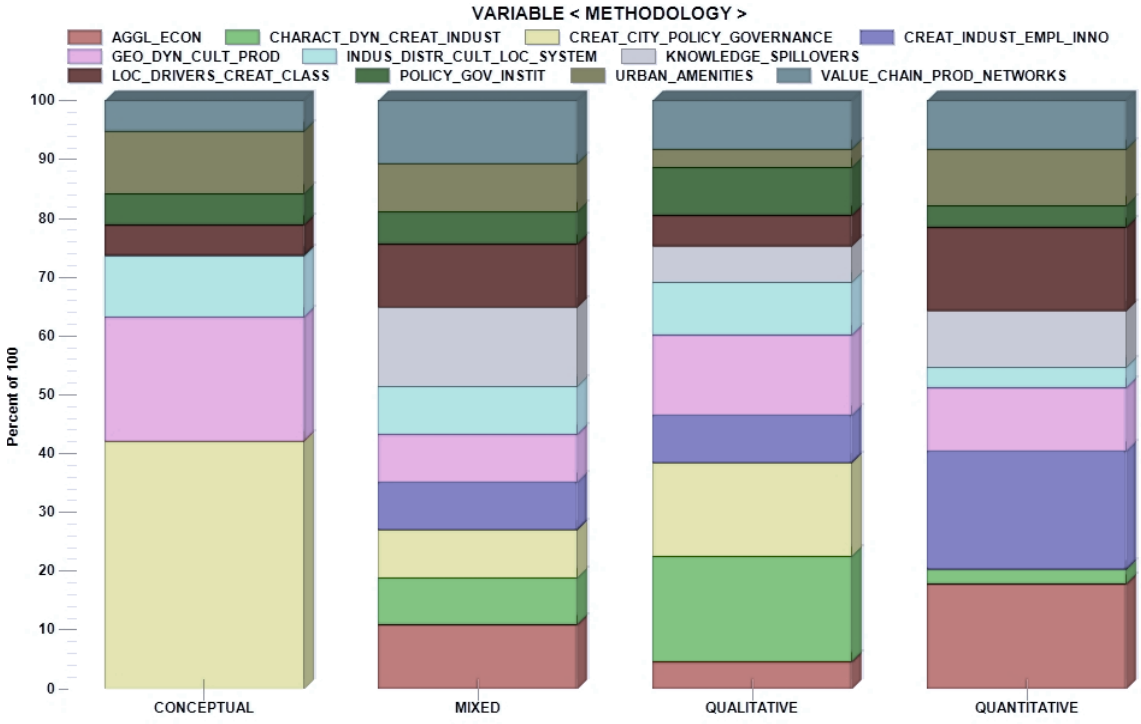


Source: Authors' own elaboration.
Notes: Factor 1 and 5 were deemed the best summary variables for the relationships between thematic clusters and keywords (See Appendix 1.3 for more details).

4.3. Thematic clusters by methodology, sector and geographical area

Now we consider some of the variables discussed in the previous chapter as they relate to these clusters. The below figures (9, 10 and 11) show the relative weight of each cluster by methodology, sector and geographical area. In other words, it shows the percentage of abstracts addressing each topic when adopting different methodologies or studying diverse sectors and geographical areas. Unsurprisingly, conceptual/theoretical papers are those that have addressed more the theme of creative class and cultural production (Figure 9). Conversely, papers adopting quantitative methodologies (e.g., econometrics, descriptive statistics, mapping and spatial analysis) have focused more on agglomeration economies, creative industries and employment and innovation, as well as on locations drivers of creative individuals. Papers drawing upon qualitative methods (e.g., case study, narrative/historical) have studied more the characteristics and dynamics of creative industries together with policy-related themes. Lastly, publications with mixed methodologies have the highest percentage of themes on knowledge spillovers and value chains and production networks.

Figure 9. Relative weight of thematic clusters by methodology

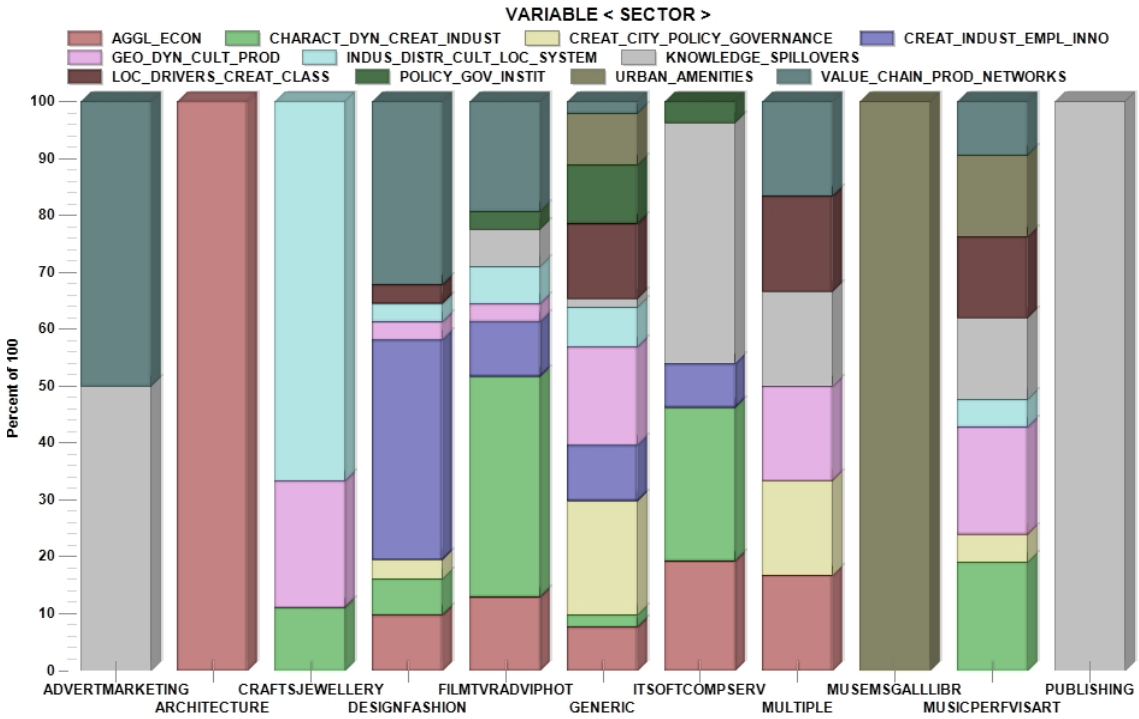


Source: Authors' own elaboration.

The majority of articles focusing on the sector 'film, TV, video, radio and photography', which represents the most studied sector in this field, look at the characteristics and dynamics of creative industries (Figure 10). 'Design and fashion', which is also a popular industry in this type of studies, has drawn more the attention of scholars on creative industries, employment dynamics and innovation, as well as on global value

chains and production networks. 'IT, software and computer services' has been the more popular subject of studies on knowledge spillovers and agglomeration economies. 'Music, performing and visuals arts' is the most heterogeneous sector in terms of themes addressed. Scholars studying 'crafts and jewellery' have mainly looked at traditional industrial districts, local systems and cultural production. The remaining sectors are still under-researched industries in the academic discussion on creative clusters. However, the few available academic publications on 'publishing' (0.3% of total publications), 'museums, galleries and libraries' (0.6%) and 'architecture' (0.3%) focus respectively on knowledge spillovers, urban amenities, and knowledge spillovers/value chain and production networks. Articles looking at the geography of culture and creativity more generally (without a focus on a specific sector), representing 54.1% of total articles, have favoured themes related to creative class, creative cities and cultural production.

Figure 10. Relative weight of thematic clusters by sector

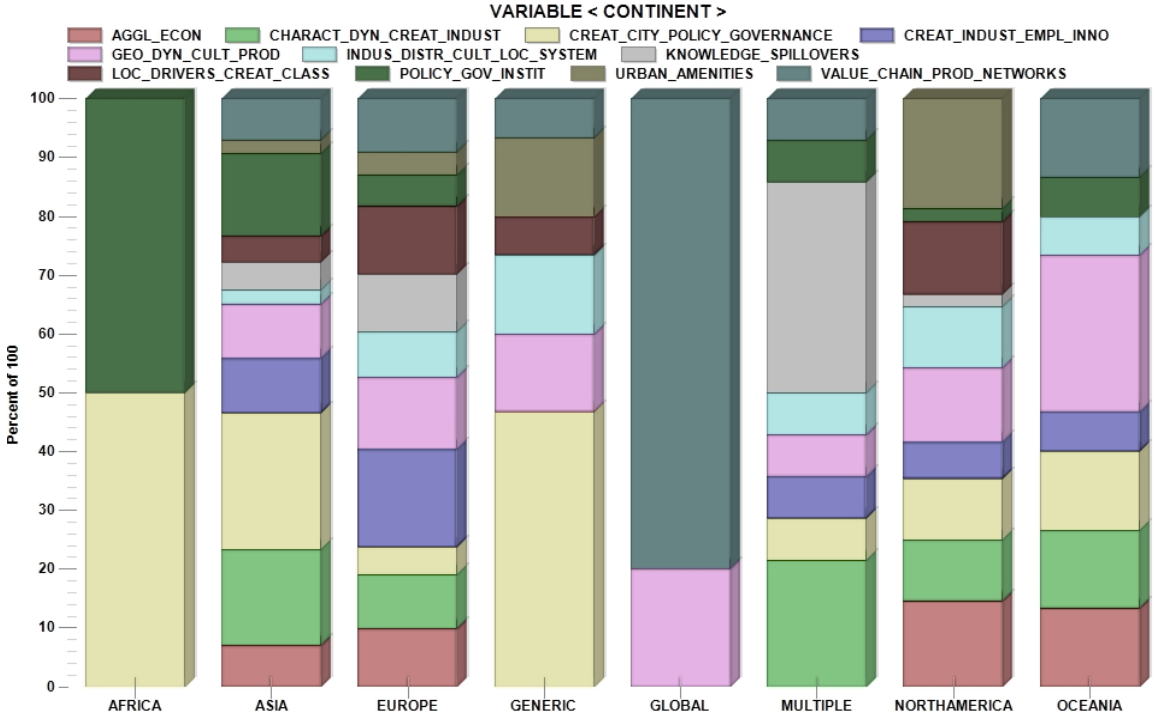


Source: Authors' own elaboration.

Turning our attention to the geographical area under investigation (Figure 11), Europe – the most studied continent in creative clusters research (47.3% of total articles) – shows the most heterogeneous composition of themes addressed, with the highest percentage of papers on creative industries, employment and innovation. As concerns the North American context (18%) we observe a higher percentage of studies on urban amenities, location drivers of creative class and agglomeration economies. Moreover, while the Asian context (16.1%) has been mostly the subject of studies on creative cities, policies, governance and institutions, Oceania (5.6%) has drawn a great deal of attention from academics in relation to the geography and dynamics of cultural production. Papers focusing on two or more countries (3.7%) have looked more at knowledge spillovers or characteristics and dynamics of creative

industries. The African context, which only represents 0.8% of total studies on creative clusters, has mostly been studied in terms of creative cities, policies, governance and institutions. The few studies (1.7%) with a global scope (without a focus on one or more geographical areas) have mostly examined the division of value across global production networks and, to a lesser extent, the spatial distribution of culture.

Figure 11. Relative weight of thematic clusters by geographical area (continent)



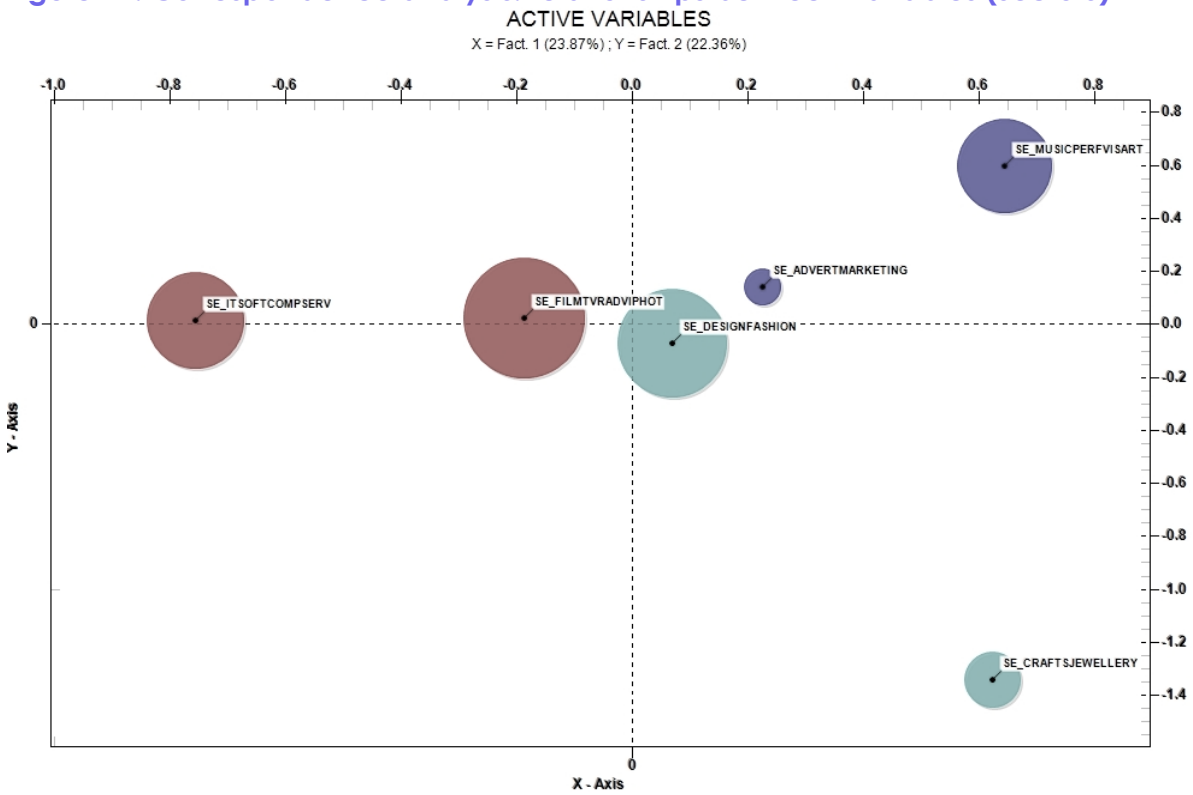
Source: Authors' own elaboration.

4.4. Thematic proximity of creative cluster research by sector and country

Figure 12 provides a graphical representation of the thematic relationships between groups of articles on those creative sectors studied in more than 2 publications: 'film, TV, video, radio and photography' (12.4% of total articles), 'design and fashion' (9.3%), 'IT, software and computer services' (8.5%), 'music, performing and visual arts' (7.6%), 'crafts and jewellery' (3.9%), and 'advertising and marketing' (1.4%). Figure 13 enriches the analysis by showing the most recurring keywords in abstracts within each different creative sector. The geographic space of correspondence analysis is composed of two factors, which together accounted for 46% of the total variation. The first factor, which explains 23.87% of thematic variability, separates abstracts focusing on 'music, performing and visual arts' from those looking at 'crafts and jewellery' pointing out that scholars tend to focus on different themes and concepts when researching these two industries. The former seems to look more at creative individuals (e.g., *artists, musicians, arts, creative city, artistic*), whereas the latter focuses more on traditional industrial districts, heritage and manufacturing processes (e.g., *organisational, industrial, historical, district, manufacturing, governance, quarter*). The second factor, which explains 22.36% of thematic variability, separates

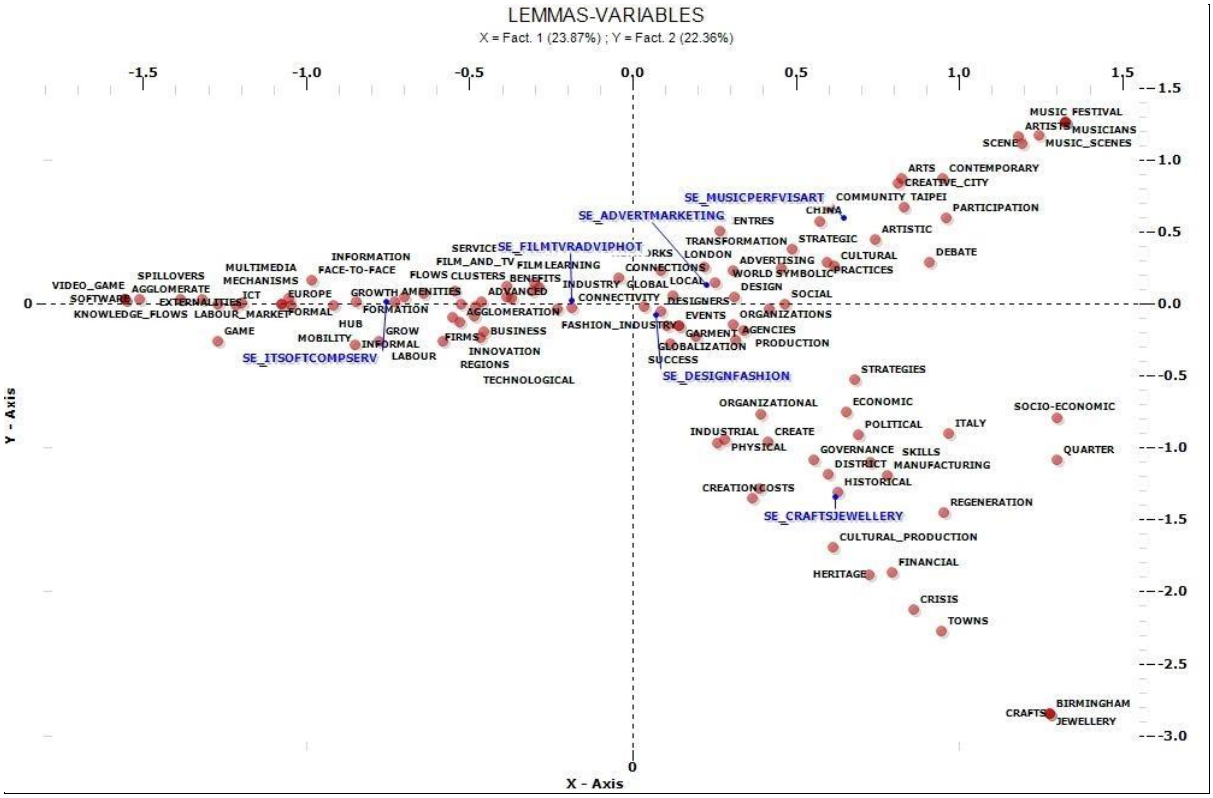
these two clusters from 'IT, software and computer services', which has a major focus on knowledge spillovers (e.g., *knowledge flows, spillovers, formal, face-to-face, mechanism)*. 'Film, TV, video, radio and photography' is located in close proximity with 'design fashion' and 'advertising and marketing', which share a high number of abstracts addressing the issue of the division of value across global value chains and production networks (e.g., *connectivity, global, connections, networks, globalizations*).

Figure 12. Correspondence analysis: relationships between variables (sectors)



Source: Authors' own elaboration.

Figure 13. Correspondence analysis: relationships between variables (sectors) and keywords

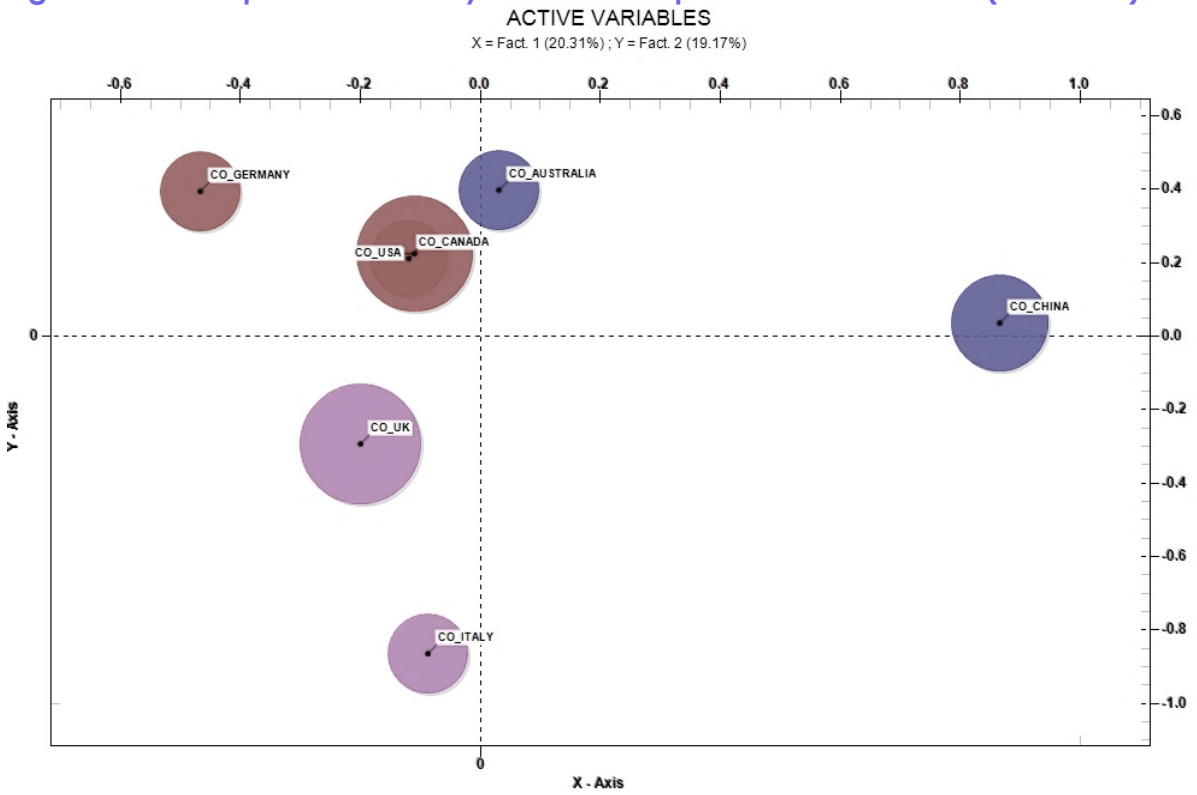


Source: Authors' own elaboration.

Figure 14 shows the thematic relationships between articles focusing on countries that have been the subject of more than 5% of total publications on creative cluster research: UK (12.1%), USA (11.5%), China (7.9%), Germany (6.2%), Canada (5.9%), Italy (5.4%), and Australia (5.4%). More details on these clusters are provided by Figure 15, which displays their most characteristic keywords. The geographic space of correspondence analysis is composed of two factors, which together account for 39% of the total variation. The first factor, which explains 20.31% of thematic variability, separates abstracts focusing on Germany, USA, Canada, Australia from those looking at the UK and Italy. In particular, the US and Canada are represented by overlapping circles, which indicate their close thematic proximity. The first group of abstracts about the US focuses on urban amenities, music, and arts (e.g., *arts, artists, galleries milieu, neighbourhood, galleries, music, bohemian, market, musicians*). The second group of abstracts about Canada is more centred on creative individuals (e.g., *talent, musicians, community, quality of life, facilitate*). These clusters are in close proximity to articles dealing with the Australian geographical context, which is more centred on creative cities, creative economy, videogame and multimedia industries (e.g., *quality, creative economy, creative city, community, videogame, multimedia, place, identity*). Germany and Italy seem to be addressed by scholars in the more diverse thematic way. The former is mostly characterised by keywords related to the attraction of creative people, as well as on media, music and film and TV sector (e.g., *professionals, amenities, Richard Florida, creative class, migration, media, music-scene, film and tv*). The latter has a major focus on districts, manufacturing, and more traditional industries as well as culture (e.g., *cultural districts, museum, manufacturing, productive, jewellery, fashion industry, quarter, cultural, skills, design, evolutionary*).

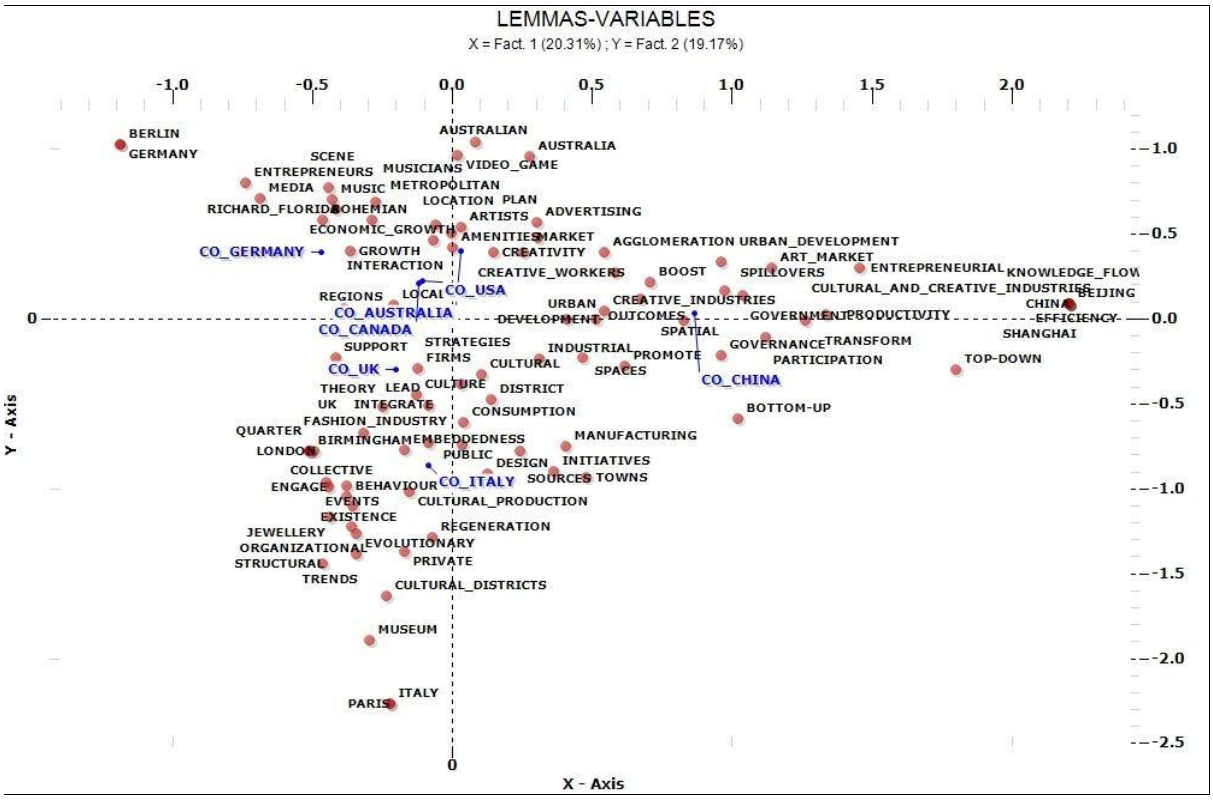
The UK, which is the country thematically closer to Italy, has a majority of abstracts on creative occupations (e.g., *quarter, digital, firms, occupations, skills, street, employment*). The second factor, explaining 19.17% of variability, separates China, which has drawn most of scholars' attention on policy-related issues (e.g., *Shanghai, urban and development, efficiency, top-down, urban, spatial, productivity, governance, bottom-up*), from the rest of countries.

Figure 14. Correspondence analysis: relationships between variables (countries)



Source: Authors' own elaboration.

Figure 15. Correspondence analysis: relationships between variables (countries) and keywords



Source: Authors' own elaboration.

5. Discussion

Starting from the mid-80s, an increasing number of scholars have published work on creative clusters. In particular, over the last decade, literature on this topic has grown considerably. Richard Florida's work (2002) 'The Rise of the Creative Class' has represented a significant turning point in the academic research on the geographies of creativity, contributing to the rising interest of scholars in understanding and defining the nature and function of creative clusters as a means of regenerating cities, regions and countries across the world. The growing importance of this concept in the academic literature has made the identification of the state-of-the-art on the topic crucial to identify the current status of research and possible future areas of investigation for scholars. To fill in this gap, this report sheds light on research trends on creative clusters over the last three decades. In doing this, we hope to move the literature on creative clusters forward by identifying advancements achieved and major areas left behind in this stream of research.

Our findings show that, unsurprisingly, this literature has mostly concentrated within the academic fields relating to 'geography', 'urban studies', 'environmental studies' and 'regional and urban planning', with fewer studies being conducted in economics, business and management, and development disciplines. Consequently, the vast majority of academic publications on topics relating to creative clusters are published

in the journals addressing these fields. From the perspective of identifying future agendas for research, it seems likely that further exploring the interface of these latter areas with the topic of creative clusters is likely to be a fruitful endeavour, particularly from the perspective of generating findings that may inform business practices and policies for supporting businesses, employees, and others in creative ecosystems.

Moreover, there is also scope for expanding the range of conceptual models and empirical methods used to study creative clusters. To date, more than half of the papers on creative clusters have adopted qualitative research methods. Quantitative, mixed and theoretical/conceptual papers account together for the remainder of works. Notwithstanding a rapid increase since the early 2010s, quantitative methodologies are still less widespread in creative cluster research. This is influenced by the intersection between discipline, journal and research focus. We find that while qualitative papers have focused more on studying the characteristics and dynamics of creative industries, quantitative articles have mostly examined agglomeration economies, employment and innovation in the creative sector. Theories on creative class and cultural production have been the more popular subject in conceptual and theoretical work. Amongst the methods and data used, the case study has been the most widely adopted, followed by descriptive statistics, econometrics models, and mapping and spatial analyses. We note that few of the studies we considered from our sample met the thresholds for robustness that is now expected for data feeding into public policy (for instance for inclusion in What Works Centre topic reviews). One additional factor contributing to the relative lack of quantitative studies can be explained by the existing difficulties in measuring creative industries (Creigh-Tyte, 2005; Bakhshi, 2015). This is mainly due to the ambiguity around the term creativity and the consequent lack of a transparent method for classifying creative sectors. The Standard Industrial Classification (SIC) and its international equivalents are not still fully calibrated to capture some of the specialist activities that are part of the creative industries. For example, it is not possible to separate the creative industry 'fashion design' from the broader category 74.10 'Specialised Design Activities' and many manufacturing-related codes of which is part with a reasonable degree of accuracy. The same occurs for other creative sectors such as Video Games and Crafts and Design, which are not fully captured by traditional classification methods. The lack of a widely accepted method for classifying creative industries, which also results in the large variety of classifications in different countries, has perhaps encouraged the execution of qualitative research.

In terms of sectoral coverage, about 40% of the papers in our sample explored creative or cultural industries in a broad sense, whereas papers on the creative class accounted for about 11%. Therefore, approximately half of the papers in the sample were sector-specific studies, with 'film, TV, radio and photography', 'fashion design', 'IT and software', and 'music, performing and visual arts' being the most studied industries. Very few papers have been published on the clustering of museums, galleries and libraries, architecture and publishing. 'IT and software', 'music, performing and visual arts' and 'crafts and jewellery' are sectors analysed by scholars in the more diverse thematic way. Conversely, 'film, TV, radio and photography', 'fashion design', and 'advertising and marketing' are more similar in terms of themes addressed in the academic discussion on creative clusters. Given the heterogeneity across creative industries sectors, it is surprising that we did not find more comparative work, and this too could be an area for future development.

The majority of the literature on creative clusters focus on cities or particular sub-city geographies with fewer papers on larger geographical areas such as regions and nations. In terms of units of analyses adopted, some papers look at clusters/districts/quarters of creative firms or individuals, whereas others focus more on these creative agglomerations within particular cities. A smaller number of papers examine the implications of a particular policy or initiative, or very small geographical areas over time. Studies on creative clusters have mainly focused on single countries, and again we see a lack of comparative analyses. Moreover, whilst papers have looked at 45 different countries, nearly half of these belong to Europe. A lower but still significant amount of studies has analysed the geography of creative activities in North America and Asia. The UK, Germany, USA, China and Australia are among the countries that have been the most widely studied, perhaps reflecting the strong uptake of creative industries policies in these contexts. In particular, while USA, Australia and Canada are in close proximity in terms of thematic variability, Italy, Germany and China are addressed by scholars in a more diverse way.

To summarize findings from text mining, the majority of articles have focused on the urban agglomeration of cultural industries, production and consumption, a theme which is thematically close to creative city-related policies, location drivers of the creative class and urban amenities, as well as industrial districts and local systems. Another group of work has examined the characteristics and dynamics of creative industries, together with agglomeration economies, knowledge spillovers as well as employment and innovation. The role of institutions and government in defining policy initiatives to foster urban and regional economic development is a theme equidistant between the two groups of articles above. This stresses the importance of policy discourse in the study of clustering of culture, creative industries and individuals. Another theme included in creative cluster research is related to the division of value and production connections along global value chains. While articles examining the sector 'film, TV, radio and photography' have a focus on the characteristics and dynamics of creative industries, those looking at 'fashion design' have explored more employment and innovation in the sector. The sector 'IT, software and computer services' has mostly drawn the attention of scholars interested in knowledge spillovers, whereas 'music, performing and visual arts' is the sector addressed in the more thematically heterogeneous way. Lastly, scholars examining different geographical areas have focused on different themes: Europe on employment and innovation in the creative industries, North America on urban amenities, Asia on creative city-related policies, and Oceania on cultural production.

6. Conclusion

The growing importance of creative cluster research is in line with the recent acknowledgement of creativity as a key element for the development, growth and revitalising of cities, regions and countries across the world. The growing awareness of the importance of creativity to economic competitiveness has encouraged an increasing number of scholars to investigate the drivers of growth in creative environments and, more specifically, the role of creative agglomeration as a way of contributing to local economic development. This paper has highlighted five major areas of improvement in creative cluster research. First, as for the more traditional research on industrial clusters, studies on creative clusters have been mostly included within economic geography, urban planning, and regional and environmental studies. Therefore, we perceive a value in approaches addressing this concept from

an economics and business/management perspective to understand these typologies of agglomerations from other standpoints and potentially highlight new elements significant to their formation and economic contribution. Second, our findings have highlighted the dominance of qualitative research on this topic. While these studies have clear value, more quantitative approaches (particularly those with high levels of robustness) are needed to provide the evidence that policymakers seek to justify investment in creative cluster policies. However, this requires first the development and implementation of a robust method for classifying creative sectors that can be shared between academics and policy makers across countries. Our third suggestion for future research relates to the lack of comparative studies and the focus on single cases, often primarily based in Europe. Advancements in defining more accurate and internationally shared methodologies of classification would contribute to facilitate cross-country comparative analyses. Moreover, the development of such methodologies would help identify creative sectors and could therefore promote studies in geographical areas of the world that currently lack a national classification adapted to these types of industries. Fourth, more sectoral analyses are needed to cover those creative industries that have been poorly investigated in creative cluster research such as advertising and marketing, publishing, architecture and museums, galleries, and libraries. We have also identified a research gap in comparative sectoral analyses, which could be filled with future research. Finally, while around 18% of papers in our review have engaged with policies aimed at making places more 'creative' and at fostering urban and regional economic development by means of cultural production, we have identified a lack of papers examining policy instruments that may best encourage agglomeration of creative firms. As creative industries move to a more prominent place in economic debates, robust evidence is required to justify new policies, which unfortunately appears in large part to be missing in the literature we have reviewed.

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Appendix 1

1.1. Corpus dimension

The final corpus of textual data, which consists of 355 abstracts, was formed by N=56,368 total number of words regardless of how often they are repeated (i.e., word-tokens) and V(N)=6,386 total number of distinct words (i.e., word-types). While word-tokens refer to the corpus dimension, word-types indicate the vocabulary dimension. Moreover, hapax legomena (V=2,984 words) represents the number of word-types that occur only once in the whole corpus of tweets. Since a statistical approach makes sense only with large corpora with lexical variety and richness, two measures are useful to verify whether textual data are sufficiently large to statistically process data: the Type/Token Ratio obtained dividing the vocabulary dimension by the corpus dimensions (TTR=V(N)/N) and the hapax percentage (V/V(N)) calculated dividing the hapax legomena by the vocabulary dimension V(N). With the TTR lower than 20% and the hapax percentage lower than 50%, it is possible to state the consistency of a statistical approach (Bolasco, 1999). The value of these indicators in our final corpus of tweets (TTR = 11.3 % and Hapax = 46.7%) confirmed the viability of a statistical approach.

1.2. Multidimensional scaling analysis

MDS is a technique for both multivariate and exploratory analysis. The final output is a spatial configuration of objects, where the distance among them corresponds to their proximity (i.e., similarity or dissimilarity). More specifically, the size of objects (keywords in our analysis) corresponds to the number of occurrences, whereas the distance amongst them relates to co-occurrences, which are defined as the number of elementary contexts (i.e., every sequence of words interrupted by full stop and carriage return) where each keyword co-occurs with another. Co-occurrences were computed using the Cosine coefficient association index (Salton and McGill, 1983). This coefficient was used to compute proximity values included in the similarity matrices, which are the input tables used for MDS. The Sammon's algorithm (Sammon, 1969) was applied to reduce the high-dimensional space represented by similarity matrices to a low dimensional space of the MDS map. This method was used to measure the degree of correspondence between the MDS map and similarity matrices: the lower the level of stress, the higher the goodness of fit.

1.3. Correspondence analysis

CA is a factorial analysis technique plotting data in a space of reduced dimension defined by extracted summary variables or factors that explain their variability. Each factor, which can be interpreted as a spatial dimension represented by an axis line whose centre is the value '0', develops towards negative and positive ends and has the property of summarising the information on the relationship between the data. Factors can be considered as classification principles that serve to find a pattern in the complexity of data by reducing the space dimensions where data can be represented. In terms of interpretability of CA, clusters, variables and lemmas placed on opposite ends (factorial poles) are different from each other.

1.4. Thematic analysis

Thematic analysis was performed in two steps. First, a dictionary of categories was created through the a) construction of a document (elementary contexts) per word matrix; b) data analysis by a probabilistic model that uses the Latent Dirichlet Allocation and the Gibbs Sampling (Alpha=0.05; Beta=0.01), and c) description of themes by means of the probability of their characteristics words, either specific or shared by two or more themes. In this phase, the software allows the user to select the number of themes to be obtained and the number of co-occurrences within the context units. We selected 15 themes to make co-occurrences patterns more consistent and a minimum of 2 co-occurrences. However, we discarded four clusters that were redundant and of difficult interpretation. We then labelled each team following an in-depth analysis of the characteristic keywords of each cluster. Second, a type of co-occurrence analysis and comparative analysis were performed to analyse these themes. The former included the following steps: a) normalisation of the seed vectors corresponding to the 'k' categories of the dictionary used; b) computation of Cosine similarity and of Euclidean distance between each 'i' document and each 'k' seed vector; assignment of each 'i' document to the 'k' category for which the corresponding seed is the closest. The latter included the following steps: d) filing of the obtained partition; e) construction of a contingency table lexical units x clusters (n x k). chi square test applied to all the intersections of the contingency table; and g) correspondence analysis of the contingency table lexical units x clusters.