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The Adaptive Reuse of Cultural Heritage in European Circular City Plans: A Systematic Review

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Abstract: A new movement in urban environmental policy, the circular economy (CE), aims to change how Europeans consume and produce materials and energy. Cities are taking up the CE challenge. This research inquires whether the infant CE programs in European cities include cultural heritage and adaptive reuse of cultural heritage (ARCH) buildings. ARCH buildings exemplify the central principal of the CE, which is a temporally long service life with multiple uses for several generations of users. In addition, culture and cultural heritage buildings are established drivers of socioeconomic development, urban landscape, and identity. Hypothetically, cultural heritage and adaptive reuse of cultural heritage (ARCH) buildings should be prominently included in European cities' CE programs, particularly those cities that are highly ranked on the 2019 European Cultural and Creative Cities Monitor (Monitor). To test this hypothesis, this study creates a novel dataset that profiles the existing circular city plans of 190 European cities included in the Monitor's ranking. Contrary to the hypothesis, just seven percent of cities in the dataset include cultural heritage. European cities are missing an opportunity to achieve their CE goals and preserve their unique identities as embodied in the built environment.

Keywords: circular economy; circular city; cultural and creative cities; sustainability; urban policy; adaptive reuse; heritage economics; buildings; Europe

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1. Introduction

The importance of cultural heritage to the economic and social development of urban areas is particularly important in Europe, as the population and the economy are increasingly centralized in urban areas [1–5]. At the same time, a new movement in urban environmental policy, the circular economy (CE), aims to change how Europeans consume and produce materials and energy. Cities are rapidly taking up the CE challenge. This article empirically examines the presence, strength, and integration of these two themes for 190 European cities.

The integration of CE and cultural heritage is embodied in adaptive reuse of cultural heritage (ARCH) buildings. ARCH buildings exemplify the central principal of the CE, which is a temporally long service life with multiple uses for several generations of users. The theoretical framing of CE with ARCH is enhanced by the Horizon 2020 project "CLIC: Circular models Leveraging Investments in Cultural heritage adaptive reuse", which includes the current work [6,7]. In addition, culture and cultural heritage buildings are established drivers of socioeconomic development, urban landscape, and identity strategies [8–12]. Therefore, the article focuses on ARCH in "circular city" plans. As cultural heritage buildings are the entry point to the study, the authors chose the 190 cities in 30 countries listed in the 2019 Cultural and Creative Cities Monitor [13] as the cultural heritage relevant boundary of the new dataset described herein that discerned the extent to which ARCH is included in circular city plans (CCPs) today. The context of the analysis is the current European policy for cultural heritage and CE, as described in Section 1.1.

As noted, the topic has garnered attention in academia, though no comparable European-wide study that addresses the research questions of the current work was identified during the study. There are other cross-cutting studies that provide an understanding of the CE policy development in Europe that have a different focus. The current work is a contribution to this literature. For example, a recent 2020 journal article provides a systematic review of research articles about CE initiatives in Europe [14]. In contrast, the current work analyses the actual CE plans that cities, regions, and nations have adopted, rather than research articles. The 2019 European Union report, "Circular Economy Strategies and Roadmaps in Europe: Identifying synergies and the potential for cooperation and alliance building", identified and analyzed 33 local, regional, and national CE plans [15]. This report notes the prevalence of building and construction in the plans, as does the current work. The current work advances upon this focus to investigate the rehabilitation and reuse of cultural heritage buildings in the plans. Further, the current work includes more CCPs than the 2019 report [15], because more were published in 2020 when the analysis was carried out. To the best of the authors' knowledge, this is the first published systematic literature review to evaluate European cultural and creative cities from the perspective of their CCPs.

1.1. European Policy Context

European Cultural Heritage Policy Context—Cultural heritage has been included in European policy since the period after World War II [16]. The European Parliament's decision to promote 2018 as the Year of Cultural Heritage evidences the rising policy positioning of cultural heritage [16]. Culture is a "crucial policy dimension when addressing issues such as attractiveness, innovation, and social cohesion needs" [17].

In 2006, KEA European Affairs published its report "The Economy of Culture in Europe", which was commissioned by the EU in order to measure and capture direct and indirect socio-economic impacts of the cultural and creative sectors (CCSs) within the European Union (EU). The report attempted to assess the possible contribution of the CCS to the Lisbon agenda concerning growth, competitiveness, jobs creation, sustainable development, and innovation [18]. Building on this informative mapping, in 2007, the European Commission adopted its first cultural agenda [19] and Eurostat published its first dataset of the CCS [20]. Since then, the CCSs are perceived as key drivers of growth and job creation in the EU [21].

Heritage economics considers cultural heritage assets as part of the cultural capital in an urban conservation context. A heritage asset is perceived as "an asset that embodies, stores, or provides cultural value in addition to whatever economic value it may possess . . . This capital stock gives rise over time to a flow of services that may be consumed or may be used to produce further goods and services" [22] In order to allow adaptation to contemporary needs and new functions, cultural heritage adaptive reuse entails certain levels of transformation [23,24]. The allocation of physical and human resources to preserve, maintain, and activate the heritage asset gives rise over time to a flow of goods and services, and this is exactly where adaptive reuse contributes to the creative economy. As stated by Ost [25], "Heritage conservation is the economic process of providing and investing additional resources in cultural capital to keep it generating cultural and economic values in the future".

European Circular Economy Policy Context—Creating and maintaining value for future generations is at the heart of European sustainability policies, including CE. CE has become a policy priority in Europe owing to its apparent utility in addressing global environmental challenges [26–29]. There are numerous, and at times contentious, definitions and typologies of CE [30–32]; for clarity, the authors apply the Foster (2020) description of CE as follows [33].

> *"Circular Economy is a production and consumption process that requires the minimum overall natural resource extraction and environmental impact by extending the use of materials and reducing the consumption and waste of materials and energy. The useful life*

> *of materials is extended through transformation into new products, design for longevity, waste minimization, and recovery/reuse, and redefining consumption to include sharing and services provision instead of individual ownership. A CE emphasizes the use of renewable, non-toxic, and biodegradable materials with the lowest possible life-cycle impacts. As a sustainability concept, a CE must be embedded in a social structure that promotes human well-being for all within the biophysical limits of the planet Earth."*
>
> Foster (2020)

Since 2015, the CE concept has expanded its reach into official policies at the EU, National, and city levels [34–40]. The March 2020 Circular Economy Action Plan [41] announced the new Circular Cities and Regions Initiative of the European Commission [42]. In October 2020, the European Commission stated that circular building renovations are essential for reaching climate targets and "are an expression of cultural diversity and history" [43]. Thus, led by strong political and financial commitments of the EU, a growing number of European cities are implementing their own circular city plans (CCPs). These have various names; for example, circularity strategy, circular economy vision, and circular economy actions plans. For the purpose of this study, they are collectively called CCPs. The CCPs reflect current governance priorities at different scales—national, regional, and municipal. They are meant to jumpstart local, regional, and national sustainable development through CE policies. The CCPs are a compelling qualitative dataset that offers a window into the CE aspirations of European cities today; therefore, they are the subject of the authors' hypothesis formulation and research questions.

1.2. Hypothesis, Objective and Research Questions

The hypothesis of this study is a theoretically-based statement about an empirical fact that is tested [44]. The authors formulated the hypothesis given the following: (1) the European policy context concerning cultural heritage; (2) the policies encouraging cities to develop CCPs to implement CE; and (3) considering the influence of the extensive research literature linking ARCH and CE (as described above). Hypothetically, cultural heritage and ARCH buildings should be prominently included in European cities' CE programs, particularly those cities that are highly ranked on the European Cultural and Creative Cities Monitor (Monitor). Stated differently, "If a highly ranked city on the Monitor has a CCP, then its CCP will address buildings and ARCH". The null hypothesis is, "A highly ranked city on the Monitor with a CCP will not address buildings and ARCH (no effect)". To test this hypothesis, this study creates a new dataset that profiles the 190 European cities included in the 2019 Monitor.

The objective of this study is to test empirically the hypothesis that buildings, cultural heritage, and ARCH are explicitly included in Europe's new CCPs. Each research question addressed in this study connects the theory as expressed in the hypothesis to an empirical (quantitative) test of the sample CCPs, thereby ensuring validity [44].

1. Which European cities score highly on the Cultural and Creative Cities Monitor and have implemented a CCP? This question hones in on the cities (settings) of greatest relevance to the hypothesis.
2. Which circular city plans include the built environment? Establishing the link between CE and buildings is a prerequisite for addressing ARCH in CCPs.
3. Which circular city plans include cultural heritage/adaptive reuse of cultural heritage buildings? This question, like the first two, is an operationalization of the hypothesis that can be quantified.

The remaining sections of the paper summarize the research methods and data in Section 2, present and discuss the results in Section 3 and offer concluding remarks in Section 4.

2. Data and Methods

In general, the study is a policy analysis. Specifically, it is a systematic literature review that applies thematic qualitative content analysis (TQCA) of the CCPs' contents to test the authors' hypothesis described in the introduction. This study follows a standard quantitative analysis strategy as described by [44]. The authors formulated a hypothesis and quantified the qualitative data using an empirical research technique, TQCA, in which rules for analyzing (coding) the dataset are set and carried out [45].

The boundary of the data analysis is the 190 European cities listed in the 2019 Cultural and Creative Cities Monitor, the publicly available dataset of 29 indicators that are used to rank the "cultural vibrancy, creative economy, and enabling environment" of 190 European cities [13]. Although alternative methods to evaluate cultural impact are suggested [17], the Monitor is selected because it is a credible source for data. Publicly available CCPs were sought out for all of the cities in the dataset with internet searches. The research identified 156 official and unofficial CCPs that were accessible between June and December 2020. Table 1 presents the list of cities analyzed. Figure 1 presents the geographic distribution of the cities in the study. Not all of the CCPs are government documents because there are many CE initiatives in public discourse today. For example, Zero Waste Scotland and Zero Waste Lithuania; initiatives such as Circular Futures in Austria; public and private networks like Circular Economy Switzerland; Polish Circular Hotspot; and not-for-profit initiatives like Depot, Share, and Lend resources in Leipzig. Finally, the authors are aware of CE initiatives in cities that are not in the Monitor that include cultural heritage adaptive reuse. For instance, the city of Roubaix in France launched a call for zero waste projects that would be temporarily housed at the abandoned historic monument, Clares Monastery. These and other "proof-of-concept" projects are breaking new ground for CE, but do not fit the scope defined for the current dataset.

Table 1. List of cities and countries included in the dataset. European Cultural and Creative Cities Monitor 2019 (alphabetical order).

List of Cities and Countries Included in the Dataset					
Aarhus (DK)	Debrecen (HU)	Las Palmas (ES)	Namur (BE)	Seville (ES)	Wrocław (PL)
Amersfoort (NL)	Dresden (DE)	Lecce (IT)	Nantes (FR)	s-Hertogenbosch (NL)	York (UK)
Amsterdam (NL)	Dublin (IE)	Leeds (UK)	Naples (IT)	Sibiu (RO)	Zagreb (HR)
Antwerp (BE)	Dundee (UK)	Leeuwarden (NL)	Nicosia (CY)	Sintra (PT)	Zaragoza (ES)
Athens (EL)	Edinburgh (UK)	Leiden (NL)	Nitra (SK)	Sofia (BG)	Zurich (CH)
Avignon (FR)	Eindhoven (NL)	Leipzig (DE)	Norrköping (SE)	Split (HR)	
Baia Mare (RO)	Espoo (FI)	Leuven (BE)	Norwich (UK)	Stavanger (NO)	
Barcelona (ES)	Essen (DE)	Liège (BE)	Nottingham (UK)	Stockholm (SE)	
Basel (CH)	Faro (PT)	Liepāja (LV)	Nuremberg (DE)	Stuttgart (DE)	
Bergen (NO)	Florence (IT)	Lille (FR)	Odense (DK)	Szeged (HU)	
Berlin (DE)	Frankfurt (DE)	Limassol (CY)	Olomouc (CZ)	Tallinn (EE)	
Bern (CH)	Galway (IE)	Limerick (IE)	Osijek (HR)	Tampere (FI)	
Bilbao (ES)	Gdansk (PL)	Limoges (FR)	Oslo (NO)	Tartu (EE)	
Birmingham (UK)	Geneva (CH)	Linz (AT)	Ostend (BE)	Terrassa (ES)	
Bochum (DE)	Genoa (IT)	Lisbon (PT)	Ostrava (CZ)	The Hague (NL)	
Bologna (IT)	Ghent (BE)	Liverpool (UK)	Paris (FR)	Thessaloniki (EL)	
Bordeaux (FR)	Glasgow (UK)	Ljubljana (SI)	Parma (IT)	Timișoara (RO)	
Bradford (UK)	Gothenburg (SE)	Lleida (ES)	Patras (EL)	Torun (PL)	
Braga (PT)	Granada (ES)	Łódź (PL)	Pécs (HU)	Toulouse (FR)	
Bratislava (SK)	Graz (AT)	London (UK)	Perugia (IT)	Trento (IT)	
Bremen (DE)	Groningen (NL)	Lublin (PL)	Pesaro (IT)	Trieste (IT)	
Brescia (IT)	Guimarães (PT)	Lund (SE)	Pilsen (CZ)	Turin (IT)	
Brighton & Hove (UK)	Győr (HU)	Luxembourg (LU)	Plovdiv (BG)	Turku (FI)	
Bristol (UK)	Hamburg (DE)	Lyon (FR)	Porto (PT)	Umea (SE)	
Brno (CZ)	Hannover (DE)	Maastricht (NL)	Poznan (PL)	Uppsala (SE)	
Bruges (BE)	Heidelberg (DE)	Madrid (ES)	Prague (CZ)	Utrecht (NL)	
Brussels (BE)	Helsinki (FI)	Mainz (DE)	Presov (SK)	Valencia (ES)	
Bucharest (RO)	Iasi (RO)	Malmo (SE)	Pula (HR)	Valletta (MT)	
Budapest (HU)	Kalamata (EL)	Manchester (UK)	Ravenna (IT)	Varna (BG)	
Burgos (ES)	Karlovy vary (CZ)	Mannheim (DE)	Riga (LT)	Veliko Tarnovo (BG)	

Table 1. *Cont.*

List of Cities and Countries Included in the Dataset				
Cagliari (IT)	Karlsruhe (DE)	Maribor (SI)	Rijeka (HR)	Venice (IT)
Cluj-napoca (RO)	Katowice (PL)	Marseille (FR)	Rome (IT)	Veszprém (HU)
Coimbra (PT)	Kaunas (LT)	Matera (IT)	Rotterdam (NL)	Vienna (AT)
Cologne (DE)	Klaipeda (LT)	Milan (IT)	Saint-Étienne (FR)	Vilnius (LT)
Copenhagen (DK)	Kortrijk (BE)	Mons (BE)	Salamanca (ES)	Warsaw (PL)
Cordova (ES)	Košice (SK)	Montpellier (FR)	San Sebastián-Donostia (ES)	Waterford (IE)
Cork (IE)	Krakow (PL)	Munich (DE)	Santiago (ES)	Weimar (DE)

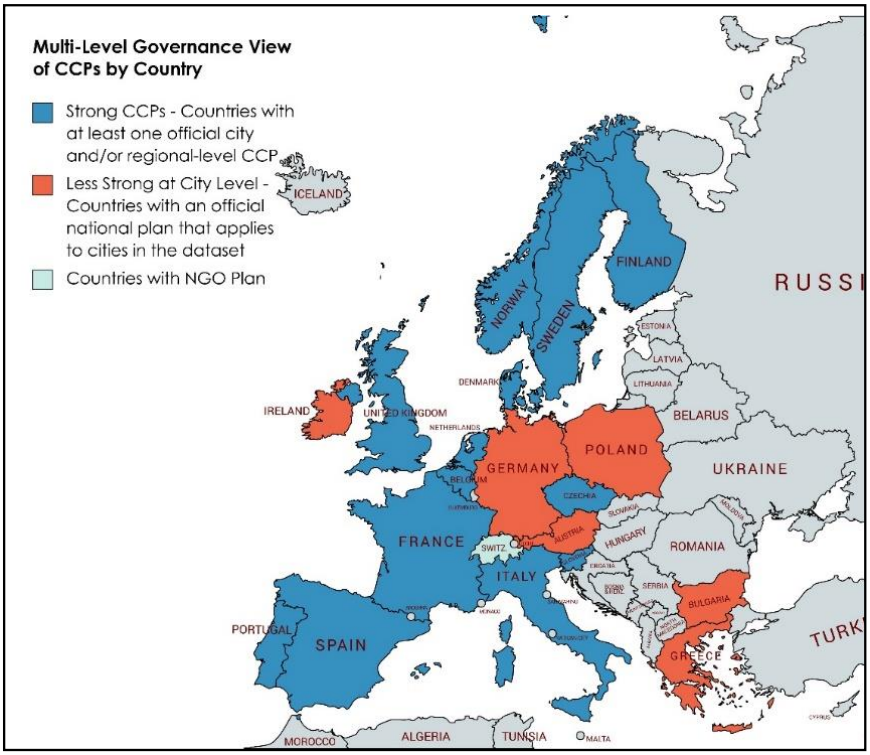

Figure 1. Geographic representation of circular city plans (CCPs) by country (created with https://mapchart.net/ (accessed on 25 January 2021)). NGO, non-governmental organization.

Using the TQCA method, the researchers read and evaluated the documents per Schreier's guidance for TQCA, and decision rules were applied to the text as shown in Tables 2 and 3 [46]. First, each CCP listed in [39] was read and evaluated by a colleague; subsequently, the full 190 cities of the Monitor were researched, read, and evaluated by each author independently. The authors discussed their findings and resolved any inconsistencies together. The analysis was conducted using a Microsoft Excel spreadsheet (version 2016) to record the coding of each CCP.

The authors judged the strength of each CCP based on the predetermined decision rules. In order to answer the research questions discussed in the Introduction, the CCP content was read for text discussing buildings, construction, culture, cultural heritage, built heritage, renovation, rehabilitation, and the like. In addition, the governmental level, territorial level, and official/unofficial status of the plans were determined. In a final step, the collected qualitative data were transformed to a numerical scale for analysis and ranking.

Table 2. Decision rules for indicator coding of circular city plan (CCP) text. ARCH, adaptive reuse of cultural heritage.

	Indicator Name	Description	Decision Rule
1	Jurisdiction/ Governance Level	Whether the CCP is targeted to the national, regional, cluster, or city level.	Direct statement that the plan goes beyond the geographical border of the city. Otherwise assumed that all plans are for territory within city boundary.
2	Official/Unofficial	Whether the CCP is developed, adopted, or endorsed by the government as an official strategy or is the document developed by a non-governmental organization (NGO), such as an advocacy group or Chamber of Commerce.	Its author, foreword, discussion of budgeting, and/or reference to official adoption/signature by elected officials show the endorsement or adoption of a CCP document by the government as an official strategy. The government may be the author or sponsor of the document and its official seal is on the document. Unofficial documents are written by NGOs and are not endorsed by the government. Whether or not the document is available on an official government website also indicates if it is official or unofficial.
3	Built Environment	Is the built environment addressed within the existing circular agenda?	More than passing mention necessary. A specific strategy or data analysis present.
4	Cultural Heritage	Is cultural heritage and/or ARCH specifically addressed within the existing circular agenda?	The text indicates inclusion for cultural heritage and/or ARCH.

Table 3. Numeric scale for scoring the significance of the CCPs.

Multi-Level Governance Scale	Official Government Circular Economy/Circular City Plan	Official General Sustainability/Resource or Waste Plan	NGO Circular Economy Plan
City	100	50	10
Regional/cluster	75	25	10
National	50	25	10

To illustrate how these categories were implemented when coding the text, the following examples are provided below.

Indicator 1: Jurisdiction/Governance Level

Requirement: Text in the plan that defines the jurisdiction of the plan.

Example: Brussels plan is for the regional area, not for the city limits. "The objectives assigned to the Regional Circular Economy Program cannot be achieved if special attention is not given to its implementation and the resulting governance. In fact, the program will be led by three Ministers and will bring together no less than 13 partner administrations that will need to be coordinated" [47].

Indicator 2: Official/Unofficial

Requirement: Text indicating statement of authorship, endorsement, and/or adoption by the government.

Example: The document "Amsterdam Circular 2020–2025 Strategy" is available on Amsterdam's own website under the header "Policy". The document is signed by the foreword is signed by "Marieke van Doorninck, Deputy Mayor for Spatial Development and Responsibility". Therefore, the authors determine that the document is official government policy for the city of Amsterdam [48].

Indicator 3: Built Environment

Requirement: Text in the plan that addresses the construction sector, buildings, or building renovation or similar.

Example: Paris Circular Economy Plan [49].

The plan dedicates two specific sections to the built environment. The headers in the document illustrate its CE focus. The first is related to the recovery of materials (from construction and public works) for which the plan delineates four intervention areas. The second is dedicated to eco-design of venues and events as follows.

1.1. Recycling of products of funerary monument dismantling;
1.2. Recycling of road materials;
1.3. Recovery of materials during large-scale renewal works;
1.4. Digital inter-departmental exchange platform;
2.1. Green space eco-design reference;
2.2. Charter of eco-responsible events

Indicator 4: Cultural Heritage/ARCH

Requirement: Text in the plan that address cultural heritage building renovations, ARCH, or similar.

Example: The city of Porto under Axis 1: Promote sustainable production and consumption, features the project of materials bank under which cultural heritage is mentioned as follows on page 15:

"Service of the Porto City Council to enhance the city's heritage and promote the circular economy that consists of the collection and donation of construction materials (. . . pilasters, cornices, iron railings and tiles) . . . The existence of the Materials Bank avoids the accumulation of materials, safeguards the heritage and is a deterrent to major works (for example, it allows the replacement of a reduced number of tiles instead of a new facade). It encourages the maintenance of the city's identity while raising citizens' awareness of the opportunities (financial, environmental, and cultural) of applying the principles of the circular economy" [50].

The authors applied two rules to score the significance and strength of CE for a city. First, a strong plan is not generic. It focuses on the implementation of CE for the city and is developed or approved by the municipal government. Vice versa, a plan that is broad, including a wider geographic area (regional or national) that is not developed and approved by the municipal governments, indicates less significance to city policy, e.g., strength. For example, a national policy may not be taken up in the budget and policy of the local municipality. Second, CE plans that are developed by NGOs are considered weaker than official plans as they have no determining influence or link to policy. Table 3 provides the numeric scoring scheme used by the authors to score the CCPs. The authors acknowledge that there may be exceptions to the scoring rules. However, for the purpose of transparency and methodological reliability and validity, the authors applied the same decision rules and scale for all cities, even if an exception could be argued.

The main limitations of this method are that the authors may inadvertently exclude a CCP for two possible reasons. First, CE is quickly expanding as a municipal governance strategy; therefore, additional documents may be published after the present analysis is complete. Second, although the researchers are multi-lingual, potential linguistic barriers may have hindered identifying plans, identifying or translating them into English for analysis. Despite these potential limitations, this article presents the first comprehensive CCP dataset to be published. An additional consideration is that the dataset analysis and results includes the United Kingdom. The United Kingdom exits the European Union on 1 February 2021, which is after the data were collected for this article.

In summary, the rationale for data selection, data sources, and the methods of the analyses are well documented.

3. Discussion of Results

3.1. Overview of the Literature Review of CCPs

The 190 cities were ordered according to the Monitor index ranking them from the highest to the lowest score. According to the Monitor, Paris has the highest score (65.95) and Patras the lowest (10.05). Ordering the cities helped investigate if highly performing

cities in terms of cultural and creativity are seizing the opportunity of enacting circularity and, specifically, whether cultural heritage is part of their circular plans.

The literature review establishes the governance level at which CCPs have been developed in Europe. The literature review indicates that, out of the 190 cities examined, 22 cities developed their own official local plans, 23 were part of a regional plan, and 104 cities were part of a national plan. Cities with national plans are the largest cluster, at 55 percent of the sample. The research did not identify a plan for 34 cities at any of the governance levels. Table 4 presents an overview of the broad literature review results.

Table 4. Overview of literature review of circular city plan results.

Strength of Circular City Plan Categories of the Index Scoring Scheme (Scoring Appears in Parentheses)	**Number**	**Percentage of Cities Researched**
Official Circular Economy/Circular City Plan for the city (100)	22	12%
Official Regional Circular Economy Plan (75)	23	12%
Official National Circular Economy Plan or city-level resource/waste plan relevant to CE (50)	104	55%
Official National Resource or Waste Plan mentioning or directly relevant to CE (25)	2	1%
NGO Circular Economy Plans at all levels (10)	5	3%
No plan identified (0)	34	18%
Total Cities Researched	**190**	

An observation of the data is that national plans and strong city plans are linked. All 22 cities with official local CCPs are in the 21 countries with official national CE strategies. The researchers identified and examined the following strategies: Belgium; Bulgaria; Czech Republic; Denmark; Finland; France; Germany; Greece; Ireland; Italy; Luxembourg; Netherlands; Norway; Poland; Portugal; Scotland; Serbia; Slovenia; Spain; Sweden; and the United Kingdom. The researchers note that an Austrian CE study, "Circular Economy Gap Report for Austria", is produced by an NGO and is not adopted by the government as policy. The structure of the plans vary; however, they all include CE proposals. Some are titled CE strategies, others are titled as resource efficiency plans (i.e., Germany) or waste management plans (Bulgaria and the Czech Republic). Norway has a competitive strategy that includes CE. National-level strategies tend to be more detailed and set key actions to achieve specific goals.

The national strategies can spur or improve regional and city plans. For example, the "Stockholm City Plan" is a local sustainability plan that broadly discusses CE. In general, it focuses on the city's environmental program where circularity is incorporated under a resource-smart Stockholm perspective. The national CE plan for Sweden of November 2020 is more targeted; therefore, it could inform a more detailed CE plan for Stockholm. Finland has pursued a multi-level approach, with a national plan, regional plans, and a city plan for its capital Helsinki. Likewise, the 21 existing national plans can be downsized for additional cities in Europe.

The results show that only 12 percent of the 190 cities in the Monitor have an official CE or circular city plan and 12 percent have an official regional plan. The existence of a city-focused or regional plan indicates that the municipal government is taking action on circularity. The hypothesis suggests that the existing political and policy emphasis on CE is likely to be followed by cities funding and supporting ARCH projects, evidenced in CCPs. According to the authors' scoring of the plans identified, the geographic focus of the plan and the topic of the plan indicate its "strength" in terms of reflecting the interests and actions of both governmental and non-governmental actors. Therefore, the results

show that 24 percent, 45 of the dataset of 190 European cities, have a strong commitment to implementing CE as of December 2020.

The level of strong commitment to implementing CE stands at 24 percent, which indicates that the European Union political and policy initiatives described in the introduction (Section 1) are taking hold at the local level. However, as the initiatives began around 2015, 24 percent in five years could be seen as a rather slow pace, particularly given the ambitious key actions of the 2020 EU Circular Economy Action Plan. Figure 1 provides a geographic view of the multilevel governance of the CCPs by country. The data illustrate that the cities ranked in the Monitor provide a broad geographic sample of European cities. As shown, the CE policy movement within the sample is more prevalent in Western Europe. Some of the Nordic cities, Iberian cities, United Kingdom cities, Italian cities, and the Czech city in the sample have strong plans (shown in blue). Central European, Irish, Greek, and Bulgarian cities in the sample are included in national level governance plans, and thereby are considered less strong (shown in red). In Switzerland an official plan was not identified; however, some Swiss cities are included in an NGO plan. Please note that Figure 1 is from the CCP analysis perspective; therefore, an official national plan and city plan can both be in place, as is often the case. In addition, as shown by Figure 1, the majority of territory in the European Union is covered by a CE plan. As Table 4 clarifies, 79 percent of the territories (city/regional/or national) included in the dataset have an official CE plan of some kind, which is a positive outcome for the continued uptake of the CE.

3.2. Research Questions

Following the overview of the CCPs literature review results above, this section presents and discusses how the literature review of the CCPs directly addresses the three research questions and additional findings that improve our understanding of the implementation of CE for ARCH today. For better comparison, the research results are often categorized as the top 20 or top 50 cities in a given category.

Table 5 provides the summary results of the study. The names of the top 20 ranked cities of the Monitor appear in the first column. The second column is the cities' place in the Monitor scoring. The third column provides the scoring of the CCPs or if they exist at all on the 0 to 100 scale provided in Table 3 in the description of methods (Section 2). The fourth and fifth columns indicate whether the CCP references the built environment and/or cultural heritage using a binary scale; one hundred for yes and zero for no.

Table 5. Summary of results for the top 20 ranked cities of the Monitor (numerical scale).

Cities	Monitor Ranking	Circular Plan/Road Map/Initiative/Strategy/Other	Built Environment within the Circular Plan (Yes or No)	Cultural Heritage within the Circular Plan (Yes or No)
Cities	**Unit code**	**ind.02**	**ind.03**	**ind.04**
Paris (FR)	1.00	100	100	100
Zurich (CH)	2.00	10	100	0
Bern (CH)	3.00	10	100	0
Copenhagen (DK)	4.00	100	100	0
Lisbon (PT)	5.00	50	100	100
Basel (CH)	6.00	10	100	0
Stockholm (SE)	7.00	100	100	0
Luxembourg (LU)	8.00	25	100	100
Munich (DE)	9.00	50	100	0
Dublin (IE)	10.00	50	100	0
Geneva (CH)	11.00	10	100	0
Stuttgart (DE)	12.00	25	100	0
Amsterdam (NL)	13.00	100	100	0
Lund (SE)	14.00	50	100	0
Weimar (DE)	15.00	50	100	0
Florence (IT)	16.00	50	100	0
Heidelberg (DE)	17.00	50	100	0
Glasgow (UK)	18.00	100	0	0
London (UK)	19.00	100	100	0
Dresden (DE)	20.00	50	100	0

The top ranked cites of the Monitor are the collective benchmark for culture. A top ranking on the Monitor means that a city has "the presence and attractiveness of cultural venues and facilities (cultural vibrancy), the capacity of culture to generate jobs and innovation (creative economy), and the conditions enabling cultural and creative processes to thrive (enabling environment)". Understandably, top-ranked Monitor cities are considered fertile grounds for ARCH and testing the hypothesis of this study.

3.2.1. Which European Cities Score Highly on the Cultural and Creative Cities Monitor and Have Implemented a CE Plan?

The literature review of CCPs clarifies that CE and rich cultural heritage have not been conjoined in policy across the board in Europe. For the dataset of Monitor cities, only 24 percent were judged as having strong CCPs. These 22 cities are not all highly ranked by the Monitor. They range between rank 1 and 146; see Table 5. Does the general result of low saturation of strong CCPs hold for cities that are highly ranked for cultural heritage?

Notably, of the highest ranked (top 20 cities) of the Monitor, six (30% of the top 20) have a strong (local or regional) CCP. These cities are Paris, Copenhagen, Stockholm, Amsterdam, London, and Helsinki. The remaining 170 cities ranked below the top 20 by the Monitor comprise 16 strong CCPs (a 9.4 percent incidence rate). What is the potential explanation for the higher incidence of strong CCPs among the highly ranked cultural cities? The majority of cities in the dataset do not have strong CCPs. The authors venture an explanation. This small group of cities have strong CCPs because they are all capitals and the most populous municipalities in their respective countries. Therefore, they are not outliers, but flagships. The literature review results establish that cities that are highly ranked for culture are more likely to have a strong CCP than lower ranking cities of the Monitor.

A note about statistical significance. The descriptive statistics about the top 20 cities yield the modest conclusion that these cities are "more likely" to have a strong CCP and the authors offer a possible explanation for this occurrence. As some readers are interested in a statistical significance analysis data, we compared the larger sample of the CCP scoring of the first 95 cities of the Monitor with that of the last 95 cities of the Monitor. The *p*-value of the *t*-test is .03 with a stated alpha of .05, thus there is some evidence that cities with a higher score on the Monitor are more likely to have strong CCPs.

3.2.2. Which CE Plans Include the Built Environment?

The built environment is most comprehensively recognized within the CCPs reviewed in this study. Nearly all CCPs (99%) include information on the territories' built environment. As shown in Table 6, the sample yielded 155 plans that included the built environment, which is 82 percent of the sample. The main issue addressed for the built environment is building and demolition waste reuse. Buildings as material banks is a common theme. The few plans that do not have a specific sector on the circular management of building and construction still include municipal waste reduction aspirations. Reducing C&D waste is a significant issue for many European cities.

Table 6. Prevalence of the built environment in CCPs.

Number that Include Built Environment in Plans	Percentage of Cities in the Sample
155	82%

3.2.3. Which CE Plans Include Cultural Heritage and Adaptive Reuse of Cultural Heritage?

The cultural heritage and ARCH discussions in the CCPs stand in stark contrast to the more detailed and widespread discussions of buildings. A minority of CCPs explicitly identified cultural heritage in general or ARCH in particular. In general, the text on the topic found in the CCPs is brief; see Table 7. Only 13 (7%) of the dataset are part of a plan that raises the issue of cultural heritage and ARCH.

Table 7. Prevalence of cultural heritage and ARCH in CCPs.

Number That Include Cultural Heritage of All Plans	Percentage of Cities in the Sample
13	7%

As described by Table 8, the 13 cities are diverse and span the Monitor rankings from 1st place to 175th place. The majority are national CCPs. Of the 20 cities highest ranked for culture, only three—Paris, Lisbon, and Luxembourg—mention cultural heritage in their CCPs. Paris presents the most detailed and elaborated plans for renovating and reusing cultural heritage buildings among all cities. Next are Brighton and Hove, Bristol, and Porto. These cities are ranked between 21st and 50th place for culture by the Monitor. Seven additional cities in this cluster are ranked below 50th place by the Monitor. A low seven percent saturation of cultural heritage in CCPs confirms that there is a major gap in CE practice today.

Table 8. Cities that include cultural heritage and ARCH in CCPs.

Cities	Monitor Ranking	Multi-Level Governance Level
Paris (FR)	1.00	City
Lisbon (PT)	5.00	National
Luxembourg (LU)	8.00	National
Bristol (UK)	27.00	City
Brighton & Hove (UK)	31.00	City
Porto (PT)	50.00	City
Nottingham (UK)	63.00	Regional
Faro (PT)	90.00	National
Coimbra (PT)	98.00	National
Sintra (PT)	118.00	National
Bradford (UK)	132.00	City
Guimarães (PT)	152.00	National
Braga (PT)	175.00	National

3.3. Summary of Results

This study began with the alternative hypothesis that cities that are highly ranked for culture would reflect their cultural bounty in their CE strategies by explicitly tackling buildings and ARCH. This hypothesis was generated from the comprehensive and growing literature verifying that urban buildings are significant generators of waste streams and consumers of energy. Based on the investigation of CCPs for 190 cities, the descriptive evidence and statistical significance test lead to one conclusion. The null hypothesis (no effect of high cultural ranking) cannot be rejected (the test of the first 50 percent compared to the last 50 percent of cities ranked by the Monitor is a p-value of .4). There is not sufficient evidence to accept the alternative hypothesis.

Although the data did not support the author's hypothesis, the literature review institutes the first state-of-the-art concerning the circular economy and the adaptive reuse of cultural heritage as incorporated in European circular city plans. In summary, the analysis of the data confirms the following discoveries:

- The top 20 ranked cultural cities are more likely to have strong CCPs. Statistically, the top 50 percent of the Monitor ranking is more likely to have strong CCPs than the bottom 50 percent.
- The 22 cities in the dataset with strong CCPs are located in the 21 countries that also have national CE strategies.
- The EU policy emphasis on the circular economy is now widespread—79 percent of the city territories reviewed are included in an official CE plan at some administrative level.
- The largest cohort of cities in the dataset (55%) have only national CE strategies.

- The majority of territories in the sample recognize that the built environment is pivotal for CE—nearly all CCPs include buildings.
- There is no statistical evidence that cities of the top 50 percent of the Monitor ranking address cultural heritage buildings in the CCP more than the bottom 50 percent.
- Very few cities address cultural heritage buildings in their CCPs—only seven percent.

3.4. Discussion: Evidence-Based Policy Implications

The data point out eight cities that have an "unclaimed" advantage. The cities score well for culture (top 50) and already have city-level CCPs in place that include buildings (Copenhagen, Stockholm, Amsterdam, London, Helsinki, Oslo, Prague, and Barcelona). As several of these cities are leaders in the European CE movement (i.e., Amsterdam and Helsinki) and the authors are aware of many adaptive reuse of existing and historic buildings in these cities, it came as a surprise that the plans do not include text directly about cultural heritage. For example, the Amsterdam CCP has a clear perspective on adaptively reusing existing buildings and even proposes a procurement strategy. It states, "The City will first determine whether there is an alternative to purchasing new buildings and infrastructure or otherwise meeting a demand, for example by extending the useful life of existing buildings or reusing municipal asset" [48]. Further, the Amsterdam CCP links building renovation and carbon reduction, similar to several other cities in this cohort, as shown here, "Circular renovation contributes to reducing the carbon footprint of buildings. The reuse of materials and sustainable re-designation of buildings contributes to the energy transition and the goal of a CO_2 neutral social housing stock in 2050" [44]. Activating strategies for ARCH is a natural progression of the policies defined in the Amsterdam CCP. It could be that the public English-language CCPs of this cohort are summarizations that simply do not include ARCH, although specific strategies for ARCH exist. Nevertheless, the authors flag these cities' opportunity to highlight ARCH for stakeholders. This cohort should explicitly discuss the future of cultural heritage buildings, sites, and zones in their CCPs and resulting policies.

Based on the evidence, the authors recommend that the European Commission continues to raise awareness about the benefits and necessity to bring ARCH into CCPs in line with the Green Deal's "renovation wave". The current low levels of ARCH in CCPs combined with the high level of historic building stock is problematic for sustainable urban development in Europe. Renovating existing buildings, including historic ones, seeks to improve environmental performance. The environmental impacts most often stated in the ARCH literature are reducing greenhouse gasses and C&D wastes, increasing energy and water efficiency, and maintaining embodied energy [51]. Preservation of cultural heritage buildings is a sensitive topic in many cities. However, it will not be possible to carry out the EU Green Deal's proposed wave of circular renovation of existing buildings without strategizing how cultural heritage buildings will be effected. The European Commission and national governments must highlight ARCH and encourage stakeholder participation and debate at the local level on the multiple values of historic building adaptive reuse and how they could contribute to the circularity agenda.

4. Conclusions

This article aims to shed light on the convergence of ARCH and CE at the city level in Europe today. The analysis systematically reviews CCPs and determines their territorial boundaries and inclusion of cultural heritage, buildings, and ARCH. The research is timely, concrete, and practical for the growing European circular city movement.

The study concludes that most European city governments in the culture-focused dataset have not recognized or capitalized on the synergies and opportunities that arise from integrating ARCH with CE. The results indicate that European cities that are highly ranked for their overall 'cultural vibrancy', 'creative economy', and 'enabling environment' according to the Monitor still fail to address cultural heritage and ARCH as a relevant and strategic CE issue.

The authors conclude that a practice gap rather than a research gap exists. Many city governments have yet to recognize and build on the synergies and opportunities that a CE perspective, including ARCH, offers. This identified gap in CE practice is inherently risky for cities and Europe. First, cities risk stalling renovations of historic buildings, which could lead to their dilapidation and loss. Second, cities risk failing to achieve desired environmental outcomes, particularly greenhouse gas reductions and energy inefficiency improvements, if ARCH is not prioritized now. Third, CE in Europe risks being limited to a technocratic and industrial approach. ARCH allows citizens who use buildings to live, work, and relax to connect with CE. This study highlights the risks and opportunities of ARCH for circular cities with significant cultural resources.

A synergistic perspective of CE and ARCH would safeguard Europe's patrimony in the form of built cultural heritage, vibrancy, and unique urban identities, and assist cities in meeting their sustainability goals. Policymakers need evidence-based information and advice to navigate the rapidly evolving policy environment. To this end, the authors will expand the article's dataset, incorporating new CCPs as they emerge. Future research directions based on the analysis of CCPs include investigating CE policy instruments set out in the plans and their effectiveness. The next step of this research is to identify cities that do particularly well at addressing ARCH, so their advancements can inform others.

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