

Circular Economy Concepts for Cultural Heritage Adaptive Reuse Implemented Through Smart Specialisations Strategies

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Abstract

Although concepts of circular economy are growing, circular economy design processes in the construction sector are as of yet neither advanced nor well-articulated, despite the fact that circular economy models could be applied very well in cultural heritage assets and in the construction sector in regions and cities. Policy and decision makers lack sufficient knowledge on the benefits of cultural heritage assets adaptive reuse, as well as tools for both implementing these actions and articulating them accordingly in policy instruments, such as smart specialisation and others.

A recently developed study at Uppsala University, on mapping European regions (NUTS entities) which recognise cultural heritage and culture as an integral part in their development strategies, offers a comparison of approaches according to economic and scientific domains as well as policy objectives, and shows that only a small percentage of regions consider cultural heritage as an asset for their growth.

The purpose of this paper is to lay a basis for a new, stronger complementarity between cultural heritage adaptive reuse practices and circular economy concepts through smart specialisation strategies and, in particular, specific economic domains, reviewing also approaches of different European regions towards these links within their strategic documents. Preliminary results show that cultural heritage is not adequately recognised as a potential for economic development within the economic domain associated with adaptive reuse and circular economy (mainly construction industry). This research aims to overcome a gap in the qualitative and quantitative data regarding this topic and to clarify how many regions and cities (NUTS entities) are oriented towards including cultural heritage as a part of their circular economy processes.

1 Background

Although concepts of circular economy are growing, circular economy design processes in the construction sector are as of yet neither advanced nor well-articulated, despite the fact that circular economy models could be applied very well in cultural heritage assets and in the construction sector in regions and cities. The concept of circular economy is rising in prominence in different sectors, in the academic world, among policy makers and consultants, but also in different fields, particularly those not initially linked with circular economy, i.e. fields beyond waste management, resource efficiency, low-carbon investments, etc. This connection opens up many niches of research for fields and sub-fields that could be linked and conformed with circular economy and be considered as resources for its implementation. We shall consider cultural heritage and its adaptive reuse as one of them. Considering the vast number of cultural heritage sites and building stock in Europe (e.g. only Brussels has between 15.000 and 30.000 unused buildings, 412 UNESCO World Heritage Sites are located in Europe, 143 World Heritage Cities are located in Europe, etc. all of which still represents only a small part of European cultural heritage building stock, mainly unused or not used to their full potential) this sub-field could be considered as one of the pillars of circular economy. There is a large and growing body of literature that investigates adaptive reuse and sustainability of buildings – such as the definitions of adaptive reuse; the interest in adaptive reuse of buildings as an alternative to demolition, for the benefit of the community; analyses of renovation processes in terms of quality of intervention and of investments, as well as of the impact on the environment. Some of them also consider adaptive reuse as a strategy towards conservation of cultural heritage.

However, links between the circular economy and the adaptive reuse of cultural heritage buildings have not been elaborated in recent literature nor incorporated in policy developments, despite the fact that various R frameworks¹ have been in use by academia as well as by practitioners for quite some time (Kirchherr et al., 2017). Complementing different potential policy links to circular economy, the European Circular Economy Action Plan encourages the concept of circular economy to be considered as a broader

1. The latest framework of 9Rs includes refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose, recycle, recover.

sustainable development strategy, that should also “support Member States and regions to strengthen innovation for the circular economy through smart specialisations” (European Commission, 2015). Therefore, it could be understood that Smart Specialisation strategies should be used as an instrument to identify links between the regional economic priorities, the circular economy and the cultural heritage adaptive reuse.

Recognition of cultural heritage in the European regions’ smart specialization strategies has not been treated in much detail by researchers either. Research on the subject has been mostly restricted to limited comparisons of various regional strategies, but not in an overall review giving a complete picture of the status in the whole of Europe in the context of circular economy.

2 Objectives

The objective of this research is to determine whether European regions consider cultural heritage as a potential component of their circular economy concepts through smart specialisations, providing qualitative and quantitative frameworks based on data available through various sources and platforms.

The research seeks to explore these relations by analysing the literature regarding these concepts, reviewing approaches of different European regions towards circular economy and smart specialisations linked to cultural heritage. The review aims to overcome a gap in the data reviews regarding this topic.

In order to reach this goal, the main questions addressed in this research is: what is the significance and representation of cultural heritage and/or culture through the occurrence of their respective terms in description of circular economy strategies and in smart specialisations strategies?

3 Research Methodology

The analytical framework of the study is built on the combination of qualitative and quantitative approaches used in the data analysis.

The first part of the research addresses, through literature review, the concept of circular economy (CE), circular economy in EU policy development, circular economy in regional policies, including smart specialisations. It involves a review of papers (indexed in Scopus) dedicated to circular economy, the presence of circular economy in the EU Policy

Development and in the EU Regional Policies explaining also the link with smart specialisations.

The second part of the research qualitatively identified and examined national and regional strategies related to the circular economy at the regional level in Europe (First assessment). This part analysed the understanding of circular economy implementation in regard to (non)existing relations with cultural heritage adaptive reuse at the European regional level by search of the following keywords in strategies: “cultural heritage”, “cultural”, “culture”, “creative”, “heritage”, “adaptive reuse”, “historic buildings”.

These first two parts identified contemporary tendencies in circular economy research and policy frameworks as well as limitations regarding its links with regional implementation, smart specialisations and cultural heritage adaptive reuse, both at the theoretical and the applied practical levels.

As the policy review revealed that circular economy should be considered as a broader sustainable development strategy which should also “support Member States and regions to strengthen innovation for the circular economy through smart specialisations” (European Commission, 2015), the third part of the research (Second assessment) quantitatively examines representation of cultural heritage in smart specialisations in European regions, through the Smart Specialisation Platform (S3P) and Eye@RIS3, (a dedicated online tool) within circular economy related economic domains and subdomains associated to adaptive reuse from the understanding of the first assessment.

The quantitative approach offers an explanation of the database and data search conducted from different sources in order to identify how many regions are linking culture and cultural heritage with their circular economy strategies. Smart Specialisations have been used for that identification. A database that offers "regional innovation strategies" (Smart Specialisation platform) has been analysed if strategies in certain economic domains related to adaptive reuse like "construction" included the terms "cultural heritage" or "culture", "cultural", "creative", "heritage", “adaptive reuse”. However, as the term “adaptive reuse” has not been mainstreamed in strategies, respective search has not

brought any results. 21 Economic Domains¹ are registered under the Statistical Classification of Economic Activities in the European Community. The research will show only the related ones, meaning, the ones in which “culture” and “cultural heritage” showed up as a priority for at least one region. Furthermore, the focus will be on domains that appeared in circular economy strategies (First assessment) related to adaptive reuse: E – Water supply, sewerage, waste management and remediation activities and F – Construction. Fig. 81 represents research methodology.

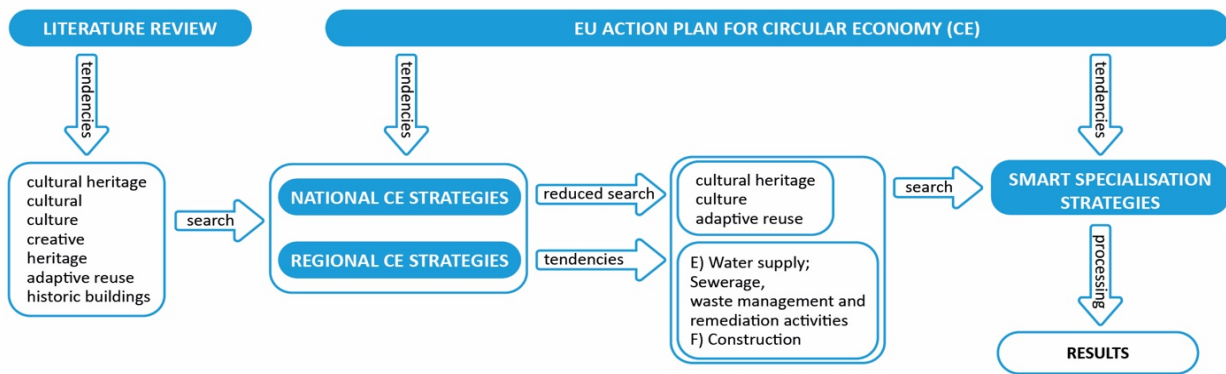


Fig. 81: Graphical representation of research methodology

4 Literature review

The concept of circular economy is rising in prominence in various sectors. As for the academic sector, this is indicated by the fast growth of peer-review articles on circular economy (Kirchherr et al., 2017). Also, many studies done by independent expert bodies

1. A- Agriculture, forestry and fishing; B - Mining and quarrying; C-Manufacturing; D-Electricity, gas, steam and air conditioning supply; E-Water supply, sewerage, waste management and remediation activities; F-Construction; G-Wholesale and retail trade; repair of motor vehicles and motorcycles; H-Transportation and storage; I-Accommodation and food service activities; J-Information and communication; K-Financial and insurance activities; L-Real estate activities; M-Professional, scientific and technical activities; N-Administrative and support service activities; O-Public administration and defence, compulsory social security; P-Education; Q-Human health and social work activities; R-Arts, entertainment and recreation; S-Other service activities; T-Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use; U-Activities of extraterritorial organisations and bodies

and companies have been made available recently. For example, some of the main consulting firms (Accenture, Deloitte, EY and McKinsey & Company) have published different reports on circular economy in the recent years (Kirchherr et al.; 2017, Gartner, 2016; Hestin et al., 2016; Hannon et al., 2016; Lacy et al., 2015). Furthermore, the concept of circular economy is now considered to be the one of the most interesting (Ellen MacArthur Foundation, 2014) among the prominent concepts which also focus on sustainable development, such as the green economy and the green growth concepts (UNEP, 2011; OECD, 2016).

A considerable amount of literature has been dedicated to the discussion regarding different concepts and definitions of a circular economy (Kirchherr et al.; 2017, Smol et al., 2017; Korhonen et al., 2018; Reike et al., 2018; Prieto-Sandoval et al., 2018). In the previous several years, scholars, but also policymakers and consultants have shown an increased interest in the concept.

A study was conducted on the analysis of 114 circular economy definitions (Kirchherr et al., 2017), giving a comprehensive and systematic investigation of the various definitions of circular economy. The study showed that the concept with so much traction is often used by various stakeholders, and that these can confound the concept since they frequently operate from significantly different standpoints (Gladek, 2017; de Vries and Petersen, 2009). Lieder and Rashid (2016, p.37) point out that “there are various possibilities for defining circular economy”, while Yuan et al. (2008, p.5) claim that “there is no commonly accepted definition of circular economy”.

Despite the attractiveness of the concept, scientists and other professionals have not reached a commonly accepted definition of circular economy (Kirchherr et al., 2017; Yuan et al., 2008). The controversy about scientific evidence on circular economy has been pointed out before, stating that “one interesting difference between circular economy and most of the other schools of sustainable thought is that it has largely emerged from legislation rather than from a group of academics who have split from one field and have started a new one” (Murray A. et al., 2015 p. 373).

The evidence for this is inconclusive, but further exploration is required of existing policy steps regarding circular economy concepts. It has been identified that, since 2014, the EU has actively supported the circular economy concept in several operational stages. The

European commitment to the implementation of circular economy is demonstrated in the fact that the concept started to grow into policy making in Europe in 2008, with the Directive 2008/98/EC on waste, and further in the Europe 2020 Strategy for smart, sustainable and inclusive growth for 2014–2020.

The European Parliament in 2014 took further steps for the EU by adopting the communication from the European Commission, “Towards a Circular Economy: a Zero Waste Programme for Europe” (COM 2014, 398) underlining the necessity of involving eco-innovation in order to, inter alia, boost recycling and prevent the loss of valuable materials; create jobs and economic growth; show how new business models can emerge; move us towards zero waste through eco-design and industrial symbiosis; and reduce greenhouse emissions and environmental impacts (Koellner et al. 2007). The European Commission launched in 2015 a set of general and material-specific actions to encourage the EU’s transition to a circular economy (COM 2015, 614).

Despite these steps, there was no approach defined to track its progress and screen its implementation. Consequently, it is crucial to foster monitoring frameworks on the levels of the EU, the Member States, the regional and the local levels, in order to be able to track the progress and results of the EU transition toward circular economy (Avdiushchenko, 2018). The European Commission launched a monitoring framework at the end of 2017, with the objective to observe the progress of circular economy implementation at the Member States level. The framework sets out four main monitoring areas: production and consumption, waste management, secondary raw materials, and innovations, containing ten indicators. This suggests that emphasis was mainly placed on resources and material matters at the EU Member States level.

However, there are no specific indicators dedicated to it in regional policy in Europe (Smol et al., 2017), although the concept of circular economy has become an accepted and much discussed topic among different stakeholders and sectors.

The generalisability of the policy framework on this issue is challenging and insufficient for observing in other areas that are contributing to the circular economy, such as social innovations, eco-innovations, sharing economy initiatives, the level of greening of the main economic sectors, new business models’ implementation, eco-design, and architecture initiatives (Avdiushchenko, 2018) recognised in the leading research on circular economy,

which could also be relevant at regional levels (McDowall et al., 2017; Prieto-Sandoval, 2018; Ranta, 2018). As previously mentioned, the European Commission's monitoring frameworks did not offer instruments for following implementation of circular economy concepts and effects at the local and regional level. At the same time, regional policies are one of the main strengths of the European Union development policy. The EU Cohesion Policy for 2014–2020 was dedicated to the circular economy as well, as significant funding was foreseen in the policy's investment framework for circular economy related innovation, resource efficiency, SME competitiveness, low-carbon investments and waste management (Commission of European Communities, 2016). Overall, it can be said that the main focus of the EU Cohesion Policy funds (the European Regional Development Fund, the Cohesion Fund, the European Social Fund, the EU Solidarity Fund, IPA) is greatly in line with the circular economy concepts and principles. Considering the role of regions in the EU policy, as well as the number of funds that are covering circular economy actions, the current study also spotlights the implementation of circular economy at the regional level. Even an EU action plan for the Circular Economy advocates that waste management should not be the only issue tackled within the concept of circular economy, but that it should rather be considered as a broader sustainable development strategy that also should "support Member States and regions to strengthen innovation for the circular economy through smart specialisations" (European Commission, 2015).

Smart specialisation approach is becoming a strategic instrument for identifying regions' opportunities for growth and development. It is a place-based approach and plays an important role in benchmarking regional competitiveness. To have a smart specialisation strategy has been thought of as a key factor in making investment choices. The EU Member States and regions recognised that supporting a limited number of well-identified priorities for knowledge-based investments and/or clusters could promote focusing on competitive assets and realistic growth capabilities, reinforced by a critical mass of action and entrepreneurial resources. An increasing interest in Smart Specialisation can be observed within the reformed Cohesion policy for the period of 2014-2020. Judging by recent developments, (the proposal for the Multiannual Financial Framework (MFF) 2021-2027 regarding the delivery and implementation of cohesion policy beyond 2020), the Smart Specialisation approach shall remain very significant in the Cohesion policy implementation.

Complementary to that, in the previous years, researchers have shown an increased interest in understanding emerging bottlenecks of the implementation of smart specialisation (Boschma, 2014; Capello, 2014; Capello, & Kroll, 2016; Kroll, 2015; Kroll, Dornbusch, & Schnabl, 2015; McCann & Ortega-Argilés, 2015). Several studies identified main challenges for smart specialisation-type policy approaches in general. One such challenge is that the diverse structure of governance in European Member States has led to a situation in which mandates for RIS3 processes and strategy implementation were assigned to a widely varying set of spatial levels of governance (Kroll, 2015; McCann, 2015). Another is that several Member States were less than inclined to support and promote new, bottom-up policy approaches, for various, in part quite differently motivated, reasons, while a number of Member States remain used to, and in favour of, the traditional top-to-bottom planning (Capello, & Kroll, 2016). Yet another challenge is that concrete capabilities play a role when it comes to evidence-based policy-making, broad-based consultations and the drafting of innovation strategies. Beyond a robust institutional environment and a general culture of good governance, all administrations need people to drive and execute processes of regional strategy-building successfully (Kroll, 2015). It is worth remembering that Foray's original concept envisages the EDP as something that emerges between relevant actors in particular, the emerging domains and – in well-functioning regional innovation systems – it can and will in principle occur without public intervention (Coffano & Foray, 2014; Foray, 2015).

Smart Specialisation priorities in Europe are further associated with the Economic and Scientific Domains as well as EU Policy Objectives, based on the Eurostat's NACE2 sectorial codes and OECD categories, the Nomenclature for the Analysis and Comparison of Scientific Programmes and Budgets (NABS 2007). In the context of circular economy, these economic domains are: E) Water supply; Sewerage, waste management and remediation activities with subdomains; Water collection, treatment and supply, Sewerage, Waste collection, treatment and disposal activities; materials recovery, Remediation activities and other waste management services; and F) Construction with Subdomains - Construction of buildings, Civil engineering, Specialised construction activities.

5 First assessment - National and Regional Circular Economy Strategies

5.1 Data search of National and Regional Circular Economy Strategies

Although a circular economy monitoring tool has been set at the level of the EU, there have been circular economy related actions taking place not only at the EU level, but also at national and regional levels, which is of particular interest for the study. Different European countries and regions have developed their own guidelines and documents related to circular economy and its actions.

At the national level, the EU Member States have developed and adopted different strategic documents regarding circular economy, taking diverse approaches toward its understanding. Several countries developed their circular economy strategic frameworks, roadmaps or national plans¹ (Greece, Italy, Denmark etc.) while some countries integrate circular economy aspects into their national strategies through waste management² (Germany, Romania, Slovakia etc.), and Sweden does it through its bio-based economy.

However, regions and cities (NUTS 2 and NUTS 3) have rather identified their circular economy strategies³ instead of spreading circular economy actions through different plans.

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1. National Action Plan on Circular Economy of Greece; Roadmap towards the Circular Economy in Slovenia; Towards a Model of Circular Economy for Italy—Overview and Strategic Framework; Leading the Transition: Circular Economy Action Plan for Portugal; Circular Economy Roadmap of France: 50 Measures for a 100% Circular Economy; A circular economy in the Netherlands by 2050; Danish Circular Economy Strategy; Spain – Circular Spain 2030; Leading the Cycle – Finnish Road Map to a Circular Economy 2016-2025.
 2. German Resource Efficiency Programme II: Programme for Sustainable Use and Conservation of Natural Resources; Luxembourg's National Waste and Resources Management Plan.
 3. Extremadura 2030: Strategy for green and circular economy; Strategy for the Transition to Circular Economy in the Municipality of Maribor; Strategy of the Government of Catalonia: Promoting Green and Circular Economy in Catalonia; Circular Flanders Kick-off Statement; Making Things Last: A Circular Economy Strategy for Scotland; Northern Irish Region – Circular Economy Strategy; Regional Plan for Circular Economy, Brussels Capital Region; Roubaix's Circular Economy Route Map; Pääjät-Häme Roadmap toward a Circular Economy; London's Circular Economy Route Map; Circular Amsterdam, A vision and action agenda for the city and metropolitan area; White Paper on the Circular Economy of Greater Paris.

The search was performed by the following keywords in these national, regional and city strategic frameworks, roadmaps or national plans: “cultural heritage”, “cultural”, “culture”, “creative”, “heritage”, “adaptive reuse”, “historic buildings”.

5.2 Results regarding National and Regional Circular Economy Strategies

Although a small number of countries, regions and cities have officially adopted circular economy strategies and roadmaps, it should be taken into consideration that other national and local governments have also started implementing circular economy principles through other actions (a full list of good practices, European Circular Economy Networks and events is available at the European Circular Economy Stakeholder Platform – a joint initiative by the European Commission and the European Economic and Social Committee).

Circular economy became an umbrella assembling strategies, but also practical solutions at different levels regarding economic transformations. However, at regional levels circular economy is also directed at the green and bio-economic sectors, which implies that agriculture and biotechnology are prioritized, as is the case in Germany, Sweden and Portugal. On the other hand, some countries, such as Spain, France and Romania, integrate circular economy principles into their national strategies through waste management. Waste reduction and conversion is an essential part of circular economy; however, it should not be the only possible way to implement the circular model.

A search performed by the keywords “cultural heritage”, “cultural”, “culture”, “creative”, “heritage”, “adaptive reuse”, “historic buildings”, showed the results that “reuse” is the term has been used the most, but mainly in the context of “reuse of building materials”, “material reuse”, “waste reuse”, “reuse by enabling reallocation of materials”. Even Amsterdam city, which manages the Seventeenth-Century Canal Ring Area of Amsterdam inside the Singelgracht designated as the UNESCO World Heritage Site, does not mention the word “cultural heritage” or “adaptive reuse” in context of “historic buildings” in their document “Circular Amsterdam, A vision and action agenda for the city and metropolitan area”.

On the other hand, the “Regional Plan for Circular Economy, Brussels Capital Region” implemented through four sectors (construction, resource and waste, logistics, retail business), in its construction sector clearly recognises “making use of the building stock –

urban mining” as one of the main strengths, as well as “occupying empty buildings” and “building conservation”. In Brussels, with between 15.000 and 30.000 buildings standing empty and with increasing numbers of people looking for an affordable place to live or to carry out a wide variety of activities, the local government renovates these buildings and makes them temporarily available for social initiatives, with the idea to bring about a proliferation of urban activities and a laboratory illustrating creative potential which can intermix social, economic and charitable activities, while also accommodating cultural gatherings.

Päijät-Häme region in Finland included circular economy in its regional innovation strategy for smart specialisation, thus defining circular economy as a priority sector for the region, but still not including cultural heritage as a part of its implementation.

No other region mentioned “cultural heritage adaptive reuse” in the context of their circular economy strategies and its understanding mainly remains in domains “Constructions” and “Waste management”.

6 Second assessment - Smart Specialisation Strategies

6.1 Database of the Smart Specialisation Platform (S3P) and Data search with Eye@RIS3 – second level

With the aim to facilitate gathering data and managing strategy development and implementation of RIS, the European Commission has set up the Smart Specialisation Platform (S3P) and dedicated an online tool, Eye@RIS3, where European regions and countries provide their innovation related information. The Eye@RIS3 database represents a summary of country-specific and region-specific documents on smart specialisation strategies in order to prioritise investments, increase productivity, stimulate knowledge-driven growth and seek out potential partners for collaboration.

The database is structured according to the Eurostat nomenclature of the NUTS regions Classification of Territorial Units for Statistics, (NUTS - for the French Nomenclature d'Unités Territoriales Statistiques), created by the European Union for referencing the administrative divisions of countries. Each NUTS entry, country or region consists of priorities as described in their RIS3s, containing a brief description. These description fields range from very short (sentence or two) to extensive ones covering well-explained

activities and goals. In addition, where available, detailed RIS3s documentation of smart specialisation can be found. The S3/R&I priorities in Europe are further associated with the Economic and Scientific Domains as well as EU Policy Objectives, based on the Eurostat's NACE2 sectorial codes and OECD categories, the Nomenclature for the Analysis and Comparison of Scientific Programmes and Budgets (NABS 2007) and the so-called "Societal Grand Challenges" identified in Horizon2020, as well as and the headline policies in the Innovation Union Flagship Initiative, respectively.

This research uses data containing 1.394 priorities and 243 NUTS entities in total, covering the EU-28 and their regions, as well as 8 non-EU countries with their 22 non-EU regions, representing a relevant official source of information with sufficient amount of data for data analysis purposes and for objectivity of results.

Although the Eye@RIS3 has been created for non-statistical purposes primarily, this paper uses available information for data analysis to uncover what is the significance and representation of cultural heritage and/or culture through the occurrence of their respective terms in smart specialisations strategies and to what extent they relate to economic domains and subdomains associated to circular economy. A search performed for the term "adaptive reuse" has not brought any results.

With the aim to improve data analytics capabilities, the entire database of the Smart Specialisation Platform has been downloaded and further processed in a spreadsheet. Each list entry of the database consists of: NUTS code, Region/Country Name, Description, Economic Domains, Scientific Domains and Policy Objectives. The search was performed within the description column in the spreadsheet and two different levels of search were used. The first and the most restrictive level used the "cultural heritage" keywords in a refined search. The second level used a mix of keywords "cultural", "culture", "creative", "heritage" and "adaptive reuse" as the database has shown inconsistency in using "cultural heritage" across priorities. After each of the second level keywords search was completed, priorities were combined and duplicates were removed. This implies that only the first level of search shows explicit use of "cultural heritage", while the second level search includes a broader and extended field of "culture" and "cultural heritage". Therefore, two levels of searches produced two lists of priorities, the shorter first level list and the longer second level list (titled "cultural heritage/culture priorities" in **Fig. 82-85** below). Furthermore, another relevant analysis for this research was to understand

the importance of cultural heritage per country/region (named as “cultural heritage/culture regions” in **Fig. 82-85** below). This necessitated the creation of another two lists, grouping priorities into regions, according to the respective region's recognition of the importance of its cultural heritage so that it identifies it as part of its priorities. In total, four lists were created.

6.2 Results regarding Data search with Eye@RIS3

In order to estimate representation, and therefore the importance, of cultural heritage, through the occurrence of their respective terms in description, for other three categories: the economic domain, the scientific domain and policy objectives, different analyses and corresponding metrics were performed in a broader study. However, this paper presents only the results related to the economic domains and subdomains associated to circular economy and adaptive reuse, according to terms identified in the first assessment of the research, which are the Economic Domain E – Water supply; Sewerage, waste management and remediation activities (with subdomains Water collection, treatment and supply, Sewerage, Waste collection, treatment and disposal activities; materials recovery, Remediation activities and other waste management services) and the Economic Domain F – Construction (with Subdomains – Construction of buildings, Civil engineering , Specialised construction activities).

The first set of analyses (still second assessment) examined the impact of cultural heritage, culture and adaptive reuse by means of its presence in the description part of regional priorities under smart specialisations, and by and its direct relation to the Economic Domains selected for the implementation of priorities. This made it possible to quantify the presence and importance of cultural heritage and culture for each of the domains and subdomains through occurrence of their respective terms. Results of the first set of analyses, shown in the **Fig. 82** and **Fig. 83** contain only the main economic domains items within related priorities (related ones i.e. the ones in which “culture” and/or “cultural heritage” showed up as a priority for at least one region). As expected, this analysis shows a clear linkage between the wider term of culture and cultural heritages and the economic domain R - Arts, entertainment and recreation. A notable difference appeared when using only "cultural heritage" keyword search, where the percentage dropped to around 15%. The other two economic domains: N - Administrative and support service activities and I –

Accommodation and food service activities, show notably higher importance of wider search criteria, with percentages around 30%. This could be attributed to the direct connection of these domains with cultural activities that require physical presence and logistics, such as tourism.

However, when using restrictive keywords, the search gives average percentages hardly going above 10%, as is the case in the first three domains mentioned. Average values across domains for "cultural heritage" could perhaps indicate that the term has not been adequately recognised in any other than primary domains. This is especially true for the domain F – Construction, the domain mainly linked to circular economy principles, that has 5% for wider and 2% for restrictive keywords.

Such a low percentage can highlight how cultural heritage is under-evaluated in construction market and not linked to adaptive reuse of cultural heritage in case of Europe under smart specialisations. Another visible aspect across all domains is a highly constant and proportional drop when comparing regions to priorities. This can be a result of much higher number of priorities per region and of priorities in total.

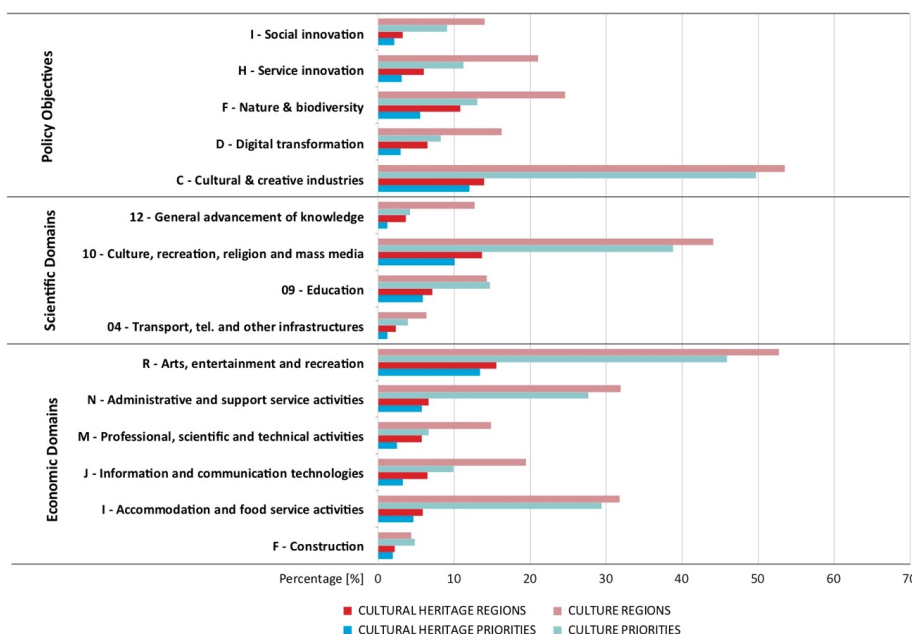


Fig. 82: Culture and cultural heritage presence in related number of regions and priorities under economic domains of smart specialisations

Narrowing down from main economic domains to the economic sub-domains mostly related to the circular economy, the same is reflected. The Fig. 83 shows Economic sub-domains of the economic domain F – Construction, with a small peak in F.43 – Specialised construction activities, only for wider keywords, which could imply that "culture" in general is more linked to specialised construction activities than "cultural heritage", a notion that definitely shows underestimation of cultural heritage and its relatively poor perception of importance and inclusion into circular economy sub-domains of smart specialisations, while “adaptive reuse” completely remains excluded.

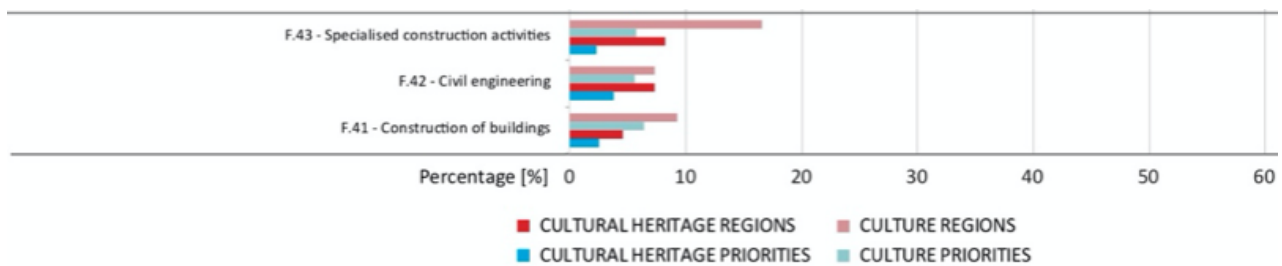


Fig. 83: Culture and cultural heritage presence in related number of regions and priorities under construction economic sub-domain of smart specialisations

The second set of analyses to examine the presence and importance of "cultural heritage" and "culture" in overall economic domains through occurrence of their respective terms. Results of those economic domains containing keywords are shown on Fig. 84. The 6 economic domains shown represent 14% of a total of 41 domains/objectives under smart specialisations. The rest of the economic domains are not presented, as their percentages are equal to zero. When counting the number of regions and priorities containing a wider keyword search, we find that "culture" is mentioned in 80 regions and 103 priorities, which represents 33% and 7% of the total respectively. When the search is restricted to only "cultural heritage", the number of regions and priorities falls to 24 and 26 respectively. Their percentages also fall to 10% and 2% of the total number of regions and priorities respectively. Since this time the comparison is conducted on the total number of domains and the total number of regions and priorities, and not just those associated with the cultural heritage, a significant drop in percentages is recognisable. Exceptions are, like in the analysis 1, in the economic domain R - Arts, entertainment and recreation. However, this peak is applicable only for wider search keywords and when taking into account regional distribution.

Nevertheless, the importance and the overall distribution of percentage is in the range from 5% to 15% for "culture" and from 3% to 9% for "cultural heritage" on the regional level, while again the Construction sector may neglect cultural heritage adaptive reuse and evaluate it at barely a few per cents.

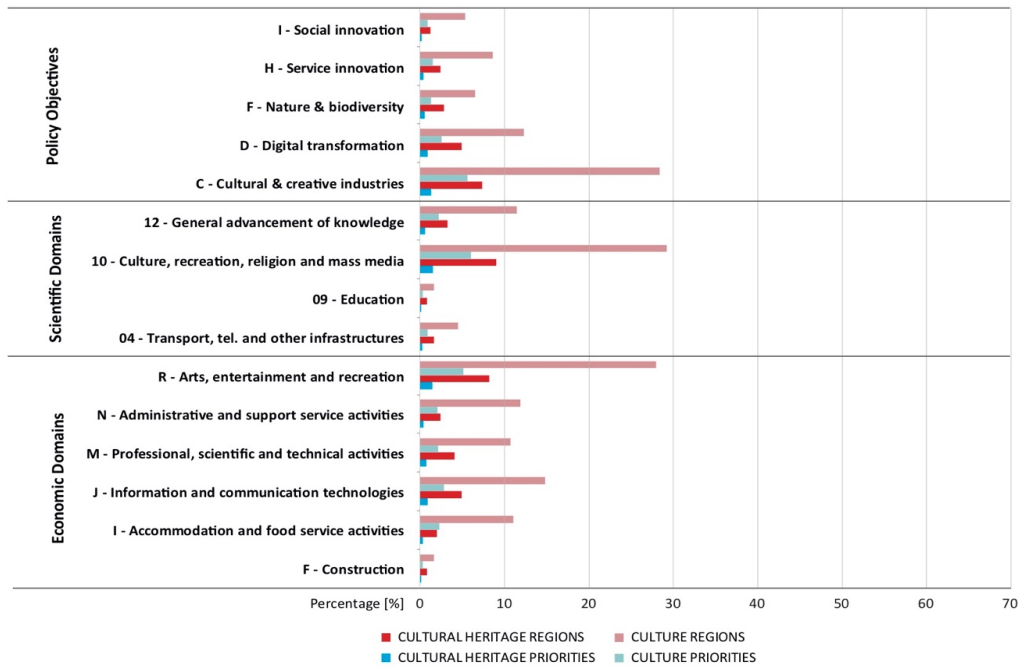


Fig. 84: Culture and cultural heritage presence in total number of regions and priorities under economic domains of smart specialisations

Three relevant circular economy related economic sub-domains, out of 82 in total, are presented in Fig. 85. It is worth mentioning that there is a lack of differentiation between F.43 Specialised construction activities and F.41 Construction of buildings, while some difference in favour of the first could have been expected.

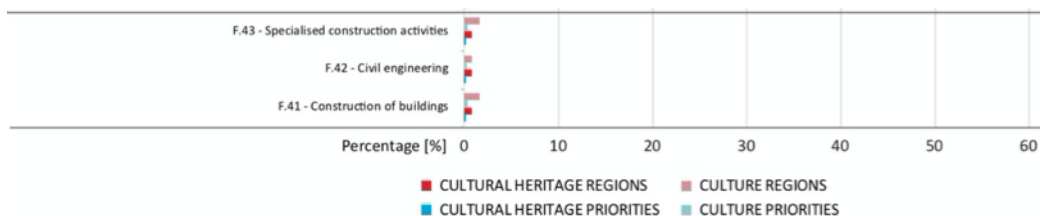


Fig. 85: Culture and cultural heritage presence in total number of regions and priorities under construction economic sub-domain of smart specialisations

The findings related to the economic domain E – Water supply; Sewerage, waste management and remediation activities have not been elaborated in more detail, as their percentages was equal to zero.

7 Conclusions and future work

Returning to the questions posed at the beginning of this research, it is now possible to state that only a very small number of regions include cultural heritage adaptive reuse through smart specialisation in their regional circular economy strategies. Findings from both the qualitative and the quantitative analysis, through first and second assessment, suggest the following: some NUTS entities have included circular economy in their regional innovation strategies for smart specialisation, thus defining circular economy as a priority sector for the region, but still not including cultural heritage adaptive reuse as a part of its implementation. The second major finding is that the economic sub-domain related to circular economy, Construction, has integrated cultural heritage under smart specialisation strategies in a very small number of regions. Another of the more significant findings to emerge from this study is that cultural heritage is not adequately recognised as a potential for economic development under the economic domain associated with adaptive reuse and circular economy. Adaptive reuse in relation to cultural heritage, as a term, has not been mainstreamed in circular economy strategies, neither in smart specialisation strategies.

Nevertheless, the study offers the answer to the questions addressed showing that the significance and representation of cultural heritage and/or culture through the occurrence of their respective terms in description of circular economy strategies and in smart specialisations strategies is very low. This data, with accurate percentages shall offer a starting point for further improvements at both, academic research and policy improvements.

Overall, these results indicate that, although creative and cultural sector forms are an important growth factor in many cities and regions, integration of these aspects in circular economy domains remains a challenge that national and supranational governments will have to address in the future. Regions need to recognize and take into account the complexity of interconnections between the traditional cultural assets, such as cultural heritage adaptive reuse, on the one hand, and the improvement of circular economy, on the other.

This study could be characterized as an addition to discussions on forming a proposal of the areas and pillars to be subjects of analysis in tracking the implementation of circular economy. Previous studies (Ranta et al., 2017) highlighted that norms and cultural aspects play an important role in shaping the transition towards more sustainable choices and the adoption of circular economy principles.

The current research also poses a question on the social and cultural aspects of technical issues and of the technology aspects of circular economy. Although many “R frameworks” in academia as well as in regional strategic documents could have incorporated terms such as “cultural heritage buildings”, “historical buildings”, they simply fail to do that (even in cases when they indirectly refer to them). Therefore, in addition to the fundamental challenges concerning these matters, the technical issues and the technological aspects of the circular economy, efforts need to be made in awareness raising regarding the social and cultural aspects, which is considered as yet another little explored area.

References

- Avdiushchenko, A., 2018. Toward a Circular Economy Regional Monitoring Framework for European Regions: Conceptual Approach. *Sustainability*, 10(12), p.4398.
- Blomsma, F., Brennan, G., 2017. The emergence of circular economy: a new framing around prolonging resource productivity. *J. Ind. Ecol.* 21 (3), 603–614.
- Boschma, R., 2014. Constructing regional advantage and smart specialisation: Comparison of two European policy concepts. *Scienze Regionali*.
- Capello, R. and Kroll, H., 2016. From theory to practice in smart specialization strategy: emerging limits and possible future trajectories. *European Planning Studies*, 24(8), pp.1393-1406.
- Capello, R., 2014. Smart Specialisation Strategy and the EU Policy Reform. *SR SCIENZE REGIONALI*, 13(1), pp.4-14.
- Coffano, M. and Foray, D., 2014. The centrality of entrepreneurial discovery in building and implementing a smart specialisation strategy. *Scienze Regionali*.
- Cooke, P. and De Propris, L., 2011. A policy agenda for EU smart growth: the role of creative and cultural industries. *Policy Studies*, 32(4), pp.365-375.
- Cooke, P.N. and Lazzeretti, L. eds., 2008. *Creative cities, cultural clusters and local economic development*. Edward Elgar Publishing.
- Council of the European Union, 2017. Council conclusions on Synergies and Simplification for Cohesion Policy post-2020, doc. 14263/17, p. 6.

Council of the European Union, 2017. Delivery and implementation of cohesion policy after 2020: Council adopts conclusions Doc. 11426/17 + ADD 1

De Vries, B.J. and Petersen, A.C., 2009. Conceptualizing sustainable development: An assessment methodology connecting values, knowledge, worldviews and scenarios. *Ecological Economics*, 68(4), pp.1006-1019.

Ellen MacArthur Foundation, 2017. Priority Research Agenda. Available at. https://www.ellenmacarthurfoundation.org/assets/downloads/higher-education/EMF_Priority-Research-Agenda-copy.pdf.

European Commission, 2012. Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3)

European Commission, 2015. Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions Closing the Loop - an EU Action Plan for The Circular Economy

European Commission, 2017. Strengthening Innovation in Europe's Regions: Strategies for resilient, inclusive and sustainable growth (Doc. 11426/17 + ADD 1)

European Commission, 2018. Multiannual Financial Framework (MFF) 2021-2027

Foray, D., 2014. *Smart specialisation: Opportunities and challenges for regional innovation policy*. Routledge.

Foray, D., 2016. On the policy space of smart specialization strategies. *European Planning Studies*, 24(8), pp.1428-1437.

Gladek, E., 2017. The Seven Pillars of the Circular Economy. Available at. <http://www.metabolic.nl/the-seven-pillars-of-the-circular-economy/>.

Kipping, M. and Clark, T. eds., 2012. *The Oxford handbook of management consulting*. Oxford University Press.

Kirchherr, J., Reike, D. and Hekkert, M., 2017. Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*, 127, pp.221-232.

Kroll, H., 2015. Efforts to implement smart specialization in practice—leading unlike horses to the water. *European Planning Studies*, 23(10), pp.2079-2098.

Lieder, M. and Rashid, A., 2016. Towards circular economy implementation: a comprehensive review in context of manufacturing industry. *Journal of cleaner production*, 115, pp.36-51.

McCann, P. and Ortega-Argilés, R., 2015. Smart specialization, regional growth and applications to European Union cohesion policy. *Regional Studies*, 49(8), pp.1291-1302

McCann, P., 2015. *The regional and urban policy of the European Union: Cohesion, results-orientation and smart specialisation*. Edward Elgar Publishing

Murray, A., Skene, K. and Haynes, K., 2017. The circular economy: An interdisciplinary exploration of the concept and application in a global context. *Journal of Business Ethics*, 140(3), pp.369-380.

OECD, 2016. Farm Management Practices to Foster Green Growth. Available at. <http://www.oecd.org/publications/farm-management-practices-to-foster-green-growth-9789264238657-en.htm>.

Sauvé, S., Bernard, S. and Sloan, P., 2016. Environmental sciences, sustainable development and circular economy: Alternative concepts for trans-disciplinary research. *Environmental Development*, 17, pp.48-56.

Smol, M., Kulczycka, J. and Avdiushchenko, A., 2017. Circular economy indicators in relation to eco-innovation in European regions. *Clean Technologies and Environmental Policy*, 19(3), pp.669-678

Sörvik, J. and Kleibrink, A., 2015. Mapping innovation priorities and specialisation patterns in Europe. *European Commission: Brussels, Belgium*.

UNEP, U., 2011. Towards a green economy: Pathways to sustainable development and poverty eradication. *Nairobi, Kenya: UNEP*. Available at. http://web.unep.org/greeneconomy/sites/unep.org/greeneconomy/files/field/image/green_economyreport_final_dec2011.pdf

Abbreviations

RIS3 – Research and Innovation Strategies for Smart Specialisations (is a process, at the end of which regional/national strategies should identify activities, in which an investment of resources is likely to stimulate knowledge-driven growth);

Eye@RIS3 – an online database, intended as a tool to help strategy development. The purpose of the database is to give an overview of regions' priorities in order to enable others to position themselves, to find their unique niches and to seek out potential partners for collaboration. By updating the online database with regional/national priorities regions/countries gain visibility and have an opportunity to be recognised by potential counterparts looking for collaboration on a certain topic. The online tool also allows making comparisons of RIS3 and R&I specialisations across Europe for a better understanding of how other regions and countries are developing their strategies and innovation priorities and possibly identify competitive niches. Regions are requested to introduce/update input in the database, which will produce a realistic map of the process of RIS3 development.

NUTS – for the French “Nomenclature d'Unités Territoriales Statistiques”

ERDF – European Regional and Development Funds

The S3/R&I priorities in Europe are defined in the tool through the following three categories:

- 1) "Economic Domains" categories are based on the Eurostat's NACE2 sectoral codes and OECD categories;
- 2) "Scientific Domains" categories are based on the Nomenclature for the Analysis and Comparison of Scientific Programmes and Budgets (NABS 2007);
- 3) "EU Policy Objectives" category is composed of ten EU-wide policy areas - each with a set of various sub-categories – corresponding to the so called 'Societal Grand Challenges' identified in Horizon2020 and the headline policies in the Innovation Union Flagship Initiative, including Creative and Cultural Industries, KETs, Social Innovation and the Digital Agenda.

The three categories aim to provide an overview of the R&I activities, in which combined investments of the

EU, national, regional public and private resources are likely to stimulate knowledge-driven growth. The tool also combines and aligns the identified regional/national economic and R&I capabilities with the EU wide policy objectives.

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