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Challenges of cultural heritage adaptive reuse: A stakeholders-based comparative study in three European cities

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ABSTRACT

The adaptive reuse of cultural heritage can contribute to sustainable development and circular economy, preventing waste production and resource depletion by extending the heritage lifespan. This reuse is limited by challenges mostly identified at the case study level. However, further theorising these challenges could enrich the related body of knowledge and contribute to their mitigation. By defining a theoretical framework, this research builds on the cross-sectional analysis of adaptive reuse undertaken in three European cities: Amsterdam, Rijeka, and Salerno. The challenges were identified by representatives of the public, private, knowledge, and non-profit sectors through stakeholder engagement workshops. Examples of challenges common to the three cities are shortcomings in existing approaches; lack of awareness and capacity; cultural heritage interpretation and management; data management; costs; conflicting interests; lack of knowledge; lack of participatory processes; and compliance with regulations and policies. Being identified in diverse European cities, these challenges can be representative within the European region. Arguably, some of these challenges also apply to other regions since they were reported in case studies from Asia, North America, and Oceania. Addressing these challenges could contribute to sustainable development by potentially contributing towards efforts to achieve ten of the Sustainable Development Goals, as some challenges align with some of these goals.

1. Introduction

Cultural heritage has been acknowledged as a potential contributor to sustainable development (Giliberto, 2021; ICOMOS, 2014; UNESCO, 2011, 2013). It is increasingly recognized as playing a role in urban identity and liveability (CHCfE Consortium, 2015; Davos Declaration 2018, 2018; Guzmán et al., 2017; Landorf, 2009; UNESCO, 2013; United Nations General Assembly, 2015). Heritage contribution to sustainable development is acknowledged by including its conservation as a target for Goal 11 of the 2030 Agenda for sustainable development of the United Nations, which aims to "make cities and human settlements safe, resilient and sustainable" (United Nations General Assembly, 2015). Yet, the lack of a definition of 'heritage' in the target challenges determining what/how/for whom/by whom to conserve (Giliberto, 2021). Despite these challenges and although it is not always clear how heritage contributes to sustainable development, there are examples of these contributions, such as "enhance[ing] long term tourism benefits" (ICOMOS General Assembly, 2011; Labadi et al., 2021, p. 12) and enabling social cohesion by "offer[ing] platforms for shared identities, experiences, and exchange" when inclusive heritage practices are applied (Labadi et al., 2021, p. 71) (ICOMOS General Assembly, 2011; Labadi et al., 2021, p. 12). Nonetheless, heritage conservation can entail tensions and conflicts, as the ones that sometimes arise between social cohesion and tourism (Kinseng et al., 2018).

Likewise, the role of heritage within circular economy and circular cities is receiving attention (Foster, 2020; Fusco Girard, 2019; Ikiz Kaya et al., 2021). Prolonging the life cycle of cultural heritage through conservation,[1] e.g. by reuse, aligns with the circular economy purposes of closing or slowing resource loops, reducing the consumption of resources, and preventing waste production (Foster, 2020; Fusco Girard, 2019). Yet, non-renewable heritage resources need to be conserved (Labadi et al., 2021) to contribute to sustainable development and

Abbreviations: ARCH, Adaptive Reuse of Cultural Heritage; EGD, European Green Deal; EU, European Union; SDG(s), UN Sustainable Development Goal(s).

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[1] Conservation entails all actions retaining the heritage significance by caring for the heritage (Australia ICOMOS, 2013; Labadi et al., 2021; Lin, n.d.).

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circular economy (CHCfE Consortium, 2015; Council of Europe, 2014). To conserve cultural heritage,[2] adaptive reuse is an acknowledged strategy. Numerous challenges hamper the Adaptive Reuse of Cultural Heritage (ARCH), however, they lack a theoretical framework and their identification is mostly case study-based. To address this gap, the article aims at determining the common challenges to the ARCH from the stakeholders' perspective with a comparative study.

This article is organized into six additional sections. Section 2 provides the background of this research and details its aim. Section 3 introduces the challenges for the ARCH reported in the literature. Section 4 describes the methodology used in the present research. Section 5 reports the results of the cross-sectional comparative study identifying the challenges common to the three cases analysed. This section also presents an overview of the SGDs relating to the challenges and the geographical coverage of these challenges. In Section 6, the results are discussed, the findings are related to results from other cases worldwide, and the main conclusions are drawn. Moreover, Appendix A introduces and defines 'heritage' and 'cultural heritage'.

2. Adaptive reuse and detailed research aim

To conserve cultural heritage, adaptive reuse is an acknowledged strategy (ICOMOS, 1964). "Adaptive reuse" here refers to the process that extends the heritage useful life by providing it with a (new) use, hence conserving it (Conejos et al., 2016; Douglas, 2006). The ARCH is an interdisciplinary and multi-stakeholder process (Plevoets & van Cleempoel, 2019; UNESCO, 2005) that can contribute to sustainable development and circular cities (Bullen & Love, 2011a; Conejos et al., 2016; Department of Environment and Heritage, 2004; Fusco Girard, 2019; Mohamed et al., 2017; Vardopoulos, 2019; Yung & Chan, 2012). The first contribution to sustainable development is deciding to implement adaptive reuse (Bullen & Love, 2011a; Glumac & Islam, 2020). Furthermore, ARCH benefits the environmental, social, cultural, and economic dimensions of sustainable development (Vardopoulos, 2019). For example, it can prevents/reduces the production of demolition waste (Yung & Chan, 2012) conserve the embodied energy (Conejos et al., 2016), retain the heritage attributes and values (Bullen & Love, 2011a; Remøy, 2014), reduce costs at times (Alba-Rodríguez et al., 2021; Bullen & Love, 2011a; Shipley et al., 2006; Yung & Chan, 2012), generate employment (Dyson et al., 2016), prompt transit-oriented growth (Riggs & Chamberlain, 2018), and contribute to placemaking (Architects'Council of Europe, 2018; Hill, 2016; Zang et al., 2020). Some of these environmental benefits can contribute to fighting climate change by mitigating its impact while possibly integrating climate adaptation strategies within the built environment (Architects' Council of Europe, 2018; Conejos et al., 2016; Fatorić & Egberts, 2020; Yung & Chan, 2012). For example, the ARCH can integrate strategies to further climate change mitigation, such as rainwater reuse (Fusco Girard, 2020), and climate change adaptation, such as maintenance (Sesana et al., 2018). Furthermore, climate change-related threats to heritage, e.g. accelerating degradation processes, can be addressed within the ARCH, reducing the vulnerability of heritage to climate change and climate change impacts (Sesana et al., 2018). Yet, at times, the ARCH fails to contribute to fighting climate change. For example, when heritage poor energy efficiency performance is not addressed because of reasons such as the principle of "minimal change to significant fabric" (Article 21, Australia ICOMOS, 2013; 2019) or heritage listing limitations to intervention (Bullen & Love, 2011a; Sesana et al., 2018). In sum, conserving cultural heritage by adaptive reuse has the potential to contribute to sustainable development (CHCfE Consortium, 2015; Guzmán et al., 2017).

Striving for sustainability and overcoming the threats posed by climate change, the European Union (EU) aims at being climate neutral by 2050. The EU set this aim forward with the policy initiative known as European Green Deal (EGD) (European Commission, 2019). The EGD pays also attention to the building stock which accounts for about 40% of the EU energy consumption and more than 35% of greenhouse gas emissions from energy (Ellen MacArthur Foundation, 2019; European Commission, 2019; UN Environment and International Energy Agency, 2017). To fulfil the aim of the EGD, the Renovation Wave Strategy (European Commission, 2020) was launched. This strategy pursues higher resource and energy efficiency by renovating the existing buildings. Within this strategy, the New European Bauhaus poses culture and the built environment at its core. This initiative is set to promote co-creation and "design future ways of living, situated at the crossroads between art, culture, social inclusion, science and technology" (European Commission, n.d.). Hence, it is also acknowledged that interventions on the existing built environment embed a cultural dimension besides a technical one. Within this effort to improve the sustainability of the built environment, "adapting instead of demolishing when possible (Bullen & Love, 2010), is an essential ingredient to change the building industry towards more sustainable future and conserve valuable resources for the time ahead" (Glumac & Islam, 2020, p. 1). Therefore, to achieve the aim set by the EGD and the aspiration of the New European Bauhaus, the conservation of cultural heritage plays a key role as it does its adaptive reuse.

Adaptive reuse entails a complex decision-making process (Aigwi et al., 2019; Giuliani et al., 2018; Glumac & Islam, 2020). To facilitate these processes, several decision support tools have been developed over time (Aigwi et al., 2020; Conejos et al., 2017; Glumac & Islam, 2020; Langston & Shen, 2007; Mısırlısoy & Günce, 2016; Oppio et al., 2017; Tan et al., 2014) (Glumac & Islam, 2020; Oppio et al., 2017). In addition, the ARCH could also be enabled by identifying, understanding, and possibly addressing its challenges. In other words, since challenges hinder the ARCH, identifying them can contribute to determining solutions to address them and potential levers to enable the ARCH. Enabling the ARCH can likely contribute to sustainable development in general and implementing the EGD vision within the EU. However, the challenges that hamper the adoption and implementation of adaptive reuse are limitedly theorised.

The challenges of the ARCH are limitedly theorised since the literature identifying them is mostly based on case studies (e.g. Bullen & Love, 2011a; Conejos et al., 2016; Yung & Chan, 2012). Even when comparing examples of adaptive reuse, the examples are mostly within a city or a broader territory (e.g. Aigwi et al., 2018; Bullen & Love, 2011a; Conejos et al., 2016) or within one country (e.g. Australia in Clark, 2013). Cross-territorial comparisons across nations are limited, and often their main aim is not to identify challenges. For example, these comparisons identify design approaches (Hettema & Egberts, 2020) or propose models for adaptive reuse strategies (Mısırlısoy & Günce, 2016). However, comparing challenges to the ARCH across nations contributes to identifying differences and similarities within these challenges. The generalisation enabled by a new cross-territorial overview can help define a theoretical framework for the challenges of the ARCH (Eisenack et al., 2014). It can also help determine the impact of contextual factors and ways to overcome such challenges, both beyond the scope of the

[2] "Cultural heritage" is defined as follows: it consists of non-renewable resources inherited from past generations that express people's values, knowledge, and traditions, including all aspects of the environment (Council of Europe, 2005). The use of "cultural heritage" in this research is justified by the overlooking of biological diversity and processes of which natural heritage consists among others. Specifically, in the remainder of the text "cultural heritage" is used instead of "built heritage" to avoid limiting the investigation to narrower possible definitions of built heritage that disregard its intangible dimension *inter alia* (Tweed & Sutherland, 2007). This terminology choice aligns with the concept of *Baukultur* that "*encompasses existing buildings, including monuments and other elements of cultural heritage, as well as the design and construction of contemporary buildings, infrastructure, public spaces and landscapes. [And it is] (…) also expressed in the planning processes for building projects, infrastructures, cities, villages, and open* landscapes" (Davos Declaration 2018, 2018, point 4).

present research (Eisenack et al., 2014; Esser & Vliegenthart, 2017).

To contribute to theorising such challenges, this article presents a cross-sectional analysis within Europe, i.e. a cross-territorial comparative study (Esser & Vliegenthart, 2017). With this comparative study, the article aims at determining the common challenges to the ARCH from the stakeholders' perspective. Challenges were identified by using stakeholder engagement workshops and considering a multi-scale perspective. Hence, the present research attempts to answer how challenges to the ARCH compare in the cities of Amsterdam, Rijeka, and Salerno. Not only the general insight derived might likely be valid within the European region, but also within world regions with contexts similar to the diverse case studies here investigated.

3. Challenges to the adaptive reuse of cultural heritage

Although presenting benefits and entailing opportunities, the ARCH also encompasses many challenges. Challenges can broadly be defined as factors hampering the adoption and implementation of heritage reuse. Therefore, they entail barriers, hurdles, constraints, and obstacles. A list of the challenges to the ARCH, derived by literature review,[3] is reported in Table 1. The literature identifying such challenges presents cases conducted in the regions of Africa (Steinberg, 1996), Asia (Tan et al., 2018; Yung & Chan, 2012), Europe (Fernandes et al., 2020; Remøy & Van Der Voordt, 2014), North America (Bourne, 1996; Elrod & Fortenberry, 2017; Shipley et al., 2006), and Oceania (Aigwi et al., 2018; Bullen & Love, 2011a; Conejos et al., 2016; Dyson et al., 2016; Mehr et al., 2017). Particularly, economic concerns and contamination issues are the challenges reported in cases spread among most regions, i.e. Asia, Europe, North America, and Oceania. Overall, in the identification of challenges, these studies mainly engaged architects, developers, and project managers (Aigwi et al., 2018; Bullen & Love, 2011a; Conejos et al., 2016; Dyson et al., 2016; Shipley et al., 2006) and seldom representatives from the public sector and NGOs were interviewed (Yung & Chan, 2012).

4. Methods

4.1. Multiple-case study

This research performed a multiple-case study (Eisenhardt & Graebner, 2007) comparing at multiple scales the cities of Amsterdam in The Netherlands, Rijeka in Croatia, and Salerno in Italy. These three cities were the pilot cases of the CLIC project framing the present research; thus, selected for the study. The case studies are geographically distributed within Europe: in Western Europe, Central and Eastern Europe, and Southern Europe (Publications Office of the European Union. n.d..). They also present diverse socio-economic-political contexts and scales (Méral et al., 2020; Veldpaus et al., 2020). Table 2 illustrates some aspects of this diversity to provide context. Amsterdam is the capital of the Netherlands. It is an example of a smart city which positions heritage within its smartness strategy (Amsterdam Smart City. n.d..).; Angelidou, 2017; Angelidou et al., 2017; Mora & Bolici, 2017). Furthermore, it is one of the pioneer cities in the transition towards circular economy (Circle Economy, Fabric, & TNO, 2016; Circle Economy, Copper8, & Amsterdam, 2018). Its Municipality acknowledges the role of heritage and its conservation in maintaining a sustainable and diverse city beyond the historic value (City of Amsterdam. n.d..). Furthermore, the 17th-century Canal Ring Area of Amsterdam is a World Heritage site (UNESCO World Heritage Convention. n.d..) and the City features as one of the case studies presented in a guidebook on the Historic Urban Landscape (WHITRAP; City of Ballarat, 2016). Rijeka is the third Croatian city and a post-industrial port city with a shrinking population. It has an urban regeneration strategy focusing on heritage conservation to develop into a cultural city and urban tourist destination; thus, attempting to address the closure of several industrial activities and the downsizing of the port activity initiated with the Croatian War of Independence in the 1990s (Ažman Momirski, 2020; Lovra, 2016; Lozzi-Barkoviae, 2006; Marjanić, 2011; Mrak, 2013; Stipanović et al., 2019; Urošević, 2015). The City was the European Capital of Culture 2020 (Rijeka 2020. (n.d).). Salerno is the capital of the province of Salerno, in southwestern Italy. In Salerno, the Scuola Medica Salernitana was founded. It is one of the first medical schools and a forerunner of modern universities (Britannica, n.d.; Capone, 2010). It hosts a diverse range of architectural styles including medieval, 19th-century, and post-war architecture along with modern buildings designed by so-called archistars (Comune di Salerno, n.d.-b, n.d.-a). There are only a few heritage-designated areas and buildings that remain vacant since the city has undergone significant restoration and adaptive reuse projects since the 1990s (Lupacchini, 2020).

In each city, a similar data collection and analysis methodology were employed to enable data comparability. Particularly, the data collection adopted a multi-scale perspective to highlight the influence of scales on each other, considering how measures and processes at site and urban levels impact adaptive reuse and vice versa (Galdini, 2019; Wilkinson, 2018). In other words, in each case, both site and urban scales were considered. Particularly, the examples of site scale were i) Pakhuis de Zwijger in Amsterdam, a warehouse reused as a cultural and communal hub (see Pintossi et al., 2021b), ii) Rihub in Rijeka, a former nursery and store hosting a multi-functional space including a co-working (see Pintossi et al., 2021a), and iii) Giardino della Minerva in Salerno, a 13th-century physic garden reused as a botanical garden with a herbal tearoom and a plant nursery (see Pintossi et al., 2023). The references provided per each example contain descriptions, images are provided in Appendix B.

These sites were selected based on two criteria. First, they are in the operation and maintenance phase of the ARCH. Therefore, at least one cycle of the ARCH process can be scrutinized since the site is in the last phase and already went through the initiation, planning and design, and construction phases. Second, the examples of site scale represent good practices of the ARCH within their local contexts in Rijeka and Salerno, whereas in Amsterdam the foundation managing the site partnered with the CLIC project, being an example of grassroots ARCH with a business model functioning without any structural public subsidies (Garzillo et al., 2020; Wildman et al., 2021). The site examples in Rijeka and Salerno represent good practices according to the local partners[4] of the research project framing this research (Pintossi, 2022). Thus, they reflect the local partners' perspective of a good ARCH among the portfolio of ARCH in these cities. As a result of this selection process, the examples of site scale are different from each other.

4.2. Data collection

To identify the challenges to the ARCH, a series of three stakeholder engagement workshops was organized, one in each city (Pintossi, 2022; Pintossi et al., 2021a, 2021b, 2023). Participants were divided into multi-disciplinary and multi-background teams. They participated in a series of roundtable discussions to identify the challenges to the ARCH. For this identification, the participants adopted a multi-scale perspective, respectively "site", "urban", and "elsewhere". This third scale was intended to offer the participants the possibility to refer to specific scales

[3] A semi-systematic literature review was performed. The search string run in Scopus in April 2020 was *TITLE-ABS-KEY ("adaptive reuse" AND "cultural heritage"*. Results were complemented by snowballing and peer reviewer suggestions ('Boland, Cherry, & Dickson, 2017; Snyder, 2019). Sources in English, accessible to the authors and not authored by them, and explicitly mention challenges were included in the review.

[4] The local partners were the Municipality of Rijeka for the Rijeka case study, and the Municipality of Salerno for the Salerno case study.

Table 1
Challenges for the adaptive reuse of cultural heritage, the geographical distribution, and underpinning literature.

Challenge	Region[a]						References[b]
	Africa	Asia	Europe	North America	Oceania	South America	
Availability of reliable information				x	x		(Bourne, 1996; Conejos et al., 2016)
Availability of skilled craftmanship and materials compatible with the original ones				x	x		(Aigwi et al., 2018; Bullen & Love, 2011a; Conejos et al., 2016; Douglas, 2006; Shipley et al., 2006)
Compliance with safety requirements				x	x		(Aigwi et al., 2018; Bullen & Love, 2011a; Clark, 2013; Conejos et al., 2016; Douglas, 2006; Shipley et al., 2006)
Disagreement among stakeholders over new uses				x			(Elrod and Fortenberry, 2017)
"Continuity of local community life"		x					(Yung and Chan, 2012)
Economic viability and costs		x	x	x	x		(Conejos et al., 2016; Douglas, 2006; Elrod & Fortenberry, 2017; Fernandes et al., 2020; Shipley et al., 2006; Tan et al., 2018; Yung & Chan, 2012)
Handling of contaminations and hazardous materials		x	x	x	x		(Clark, 2013; Douglas, 2006; Hettema & Egberts, 2020; Remøy & Van Der Voordt, 2014; Shipley et al., 2006; Tan et al., 2018; Vrusho & Pashako, 2018)
Identification of the new function							(Mısırlısoy & Günce, 2016; Plevoets & van Cleempoel, 2019)
Minimization of change		x		x	x		(Douglas, 2006; Mehr et al., 2017; Shipley et al., 2006; Yung & Chan, 2012)
Obtainment of the approval of the change of use		x		x	x		(Conejos et al., 2016; Douglas, 2006; Elrod & Fortenberry, 2017; Langston & Shen, 2007; Wilkinson et al., 2014)
"Physical restrictions" (e.g. the structural grid)					x		(Conejos et al., 2016; Douglas, 2006; Mehr et al., 2017; Plevoets & van Cleempoel, 2019)
Political circumstances	x	x		x			(Bourne, 1996; Steinberg, 1996)
Prevention of values loss		x		x	x		(Mehr et al., 2017; Shipley et al., 2006; Yung & Chan, 2012)
Public awareness					x		(Bullen and Love, 2011a)
Status of physical decay			x		x		(Douglas, 2006; Dyson et al., 2016; Remøy & Van Der Voordt, 2014; Vrusho & Pashako, 2018)

[a] The challenges were identified in cases that are located in these regions.
[b] Some references identify challenges for adaptive reuse in general and not specifically for the reuse of heritage. Some references report challenges without referring to specific cases, e.g. Mısırlısoy & Günce, 2016. Furthermore, Douglas, 2006, Plevoets & van Cleempoel, 2019, and Wilkinson et al., 2014 are handbooks with no specific geographic focus.

Table 2
Profiles of the cities scrutinized by the comparative study.

Dimension	Amsterdam	Rijeka	Salerno	References
Population and demographic trends [no. inhabitants]	↗ about 780 000 in 2011, almost 875 000 in 2021	↘ around 128 000 in 2011, about 108 000	↘ about 134 000 in 2011, almost 128 000 in 2021	(CBS, 2021; DZS, 2011, 2023; ISTAT, 2011, 2022)
Area [km^2]	219.32	44	58.96	(Amsterdam, n.d.; Rijeka, n.d.;)
National Gross Domestic Product (GDP) per capita in 2020 [€]	45 900	12 200	27 800	(CBS, 2021)
Administrative role	National capital	County capital	Province capital	(Amsterdam, n.d.; Salerno, n.d.; Rijeka, n.d.)
Inscription in the UNESCO World Heritage List	Yes. The Seventeenth-Century Canal Ring Area of Amsterdam inside the Singelgracht was inscribed in 2010	No	No	(UNESCO World Heritage Convention. n.d..)
Adaptive reuse	Strategy for regeneration, identity development, and solving vacancy. The Netherlands has a policy system that very much supports adaptive reuse.	Gradually becoming more common	More connected with solving vacancy, gradually being supported by heritage policies too.	(Garzillo et al., 2020; Méral et al., 2020)
Heritage and Planning	Frameworks for Heritage and Planning are well integrated on a national level	Frameworks for Heritage and Planning with decision-making at different levels and separate authorities	Frameworks for Heritage and Planning are complex and contradicting	(Garzillo et al., 2020; Méral et al., 2020)
Bottom up adaptive reuse	Likely and possible: system clear to navigate, available support at times	Structurally not encouraged	Rare: difficult system to navigate without expertise and capacity	(Garzillo et al., 2020; Méral et al., 2020)

or other contexts deemed relevant for the discussion. Data was deduced from the participants' contributions to the discussions, validated by reaching a consensus among these stakeholders.

The participants invited to attend these research activities represented a broad variety of stakeholders involved in the ARCH, reflecting the multi-disciplinary (Plevoets & van Cleempoel, 2019) and multi-actor (Conejos et al., 2016; Mısırlısoy & Günce, 2016) nature of reuse practices. The participants were experienced in the adaptive reuse, heritage conservation and management, circular cities, and sustainable urban development fields within the three cities analysed and/or Europe (Pintossi, 2022; Pintossi et al., 2021a, 2021b, 2023). They were purposefully sampled among stakeholders from the public, private,

knowledge, and NGO sector (Aigwi et al., 2018). The profile of the workshop participants is provided in Fig. 1. Respectively, 40 participants attended the workshop in Amsterdam, 35 in Rijeka, and 41 in Salerno.

4.3. Data analysis

4.3.1. Content analysis

The collected data was analysed by content analysis (Krippendorff, 1980). Prior to the analysis, the corpus of contributions reporting challenges was prepared and cleaned by digitally transcribing the contributions, excluding ambiguous wording, removing abbreviations, and translating to English some of them (Wickham, 2014). Afterwards, the corpus was inductively and deductively coded by manifest analysis and synthesised by frequency synthesis and thematic synthesis (Bengtsson, 2016; Thomas & Harden, 2008), validated by peer debriefing (Janesick, 2015). Regarding the multi-scale perspective, participants used the third scale to provide general contributions. Within each theme, contributions were categorized into "sub-challenges" that were subsequently clustered in "challenges": challenges further abstract a group of identified sub-challenges. In other words, challenges offer higher-level findings by synthesising the participants' contributions into more general insights.

4.3.2. Comparative study

The comparative study of the three case studies contributes to advancing the understanding of challenges to the ARCH. A descriptive comparison of the cases is performed to identify the common challenges, i.e. those challenges that are reported in three different contexts independently from their scale, enabling a first generalisation. This comparative study is performed as a small-N, cross-sectional comparison, using as a unit of comparison the challenges and sub-challenges identified. These units are compared using the themes identified by the content analysis as comparison dimensions. Construct biases are avoided by adopting a similar methodology for the data collection and involving participants representing similar stakeholder groups in each case study. The chances of bias sampling are reduced by engaging similar participants. Finally, the measurement bias is avoided by having the same researcher perform the content analysis, validated by peer debrief (Janesick, 2015).

Since the purpose of this comparative study is to gather a general insight on challenges to the ARCH, themes were included in the comparison based on criteria set to select the prominent, common themes. In other words, the cross-sectional analysis considered themes reported in all three cases that also i) had at least five contributions and ii) were among the 10 most frequently mentioned within a case. These were the selection criteria adopted. Afterwards, challenges and sub-challenges were compared to identify the common ones.

Then, the common challenges were further analysed. Firstly, they were related to the 2015 UN Sustainable Development Goals (SDGs) (United Nations General Assembly, 2015) by deductive coding (Krippendorff, 1980), using the 17 SDGs as codes. These codes were defined using the Targets that specify each of the SDGs (United Nations, 2017). For example, the challenge "absent or limited participatory processes" was coded as "Goal 16" which reads as "Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels" (United Nations General Assembly, 2015). The code was applied to the challenge analysed because introducing and developing the adoption of participatory processes in the ARCH can contribute towards "ensure responsive, inclusive, participatory and representative decision-making at all levels" (Target 16.7 of SDG 16). Identifying the link between the common challenges and the SDGs allows highlighting which aspect of sustainability would benefit from addressing these challenges to the ARCH. Secondly, the common challenges were compared with the challenges identified by the literature review (Table 1) to determine whether they can apply to other geographical regions besides Europe.

5. Results

5.1. Corpus and themes

Overall, the data collected during the three stakeholder engagement workshops includes 647 contributions reporting challenges to the

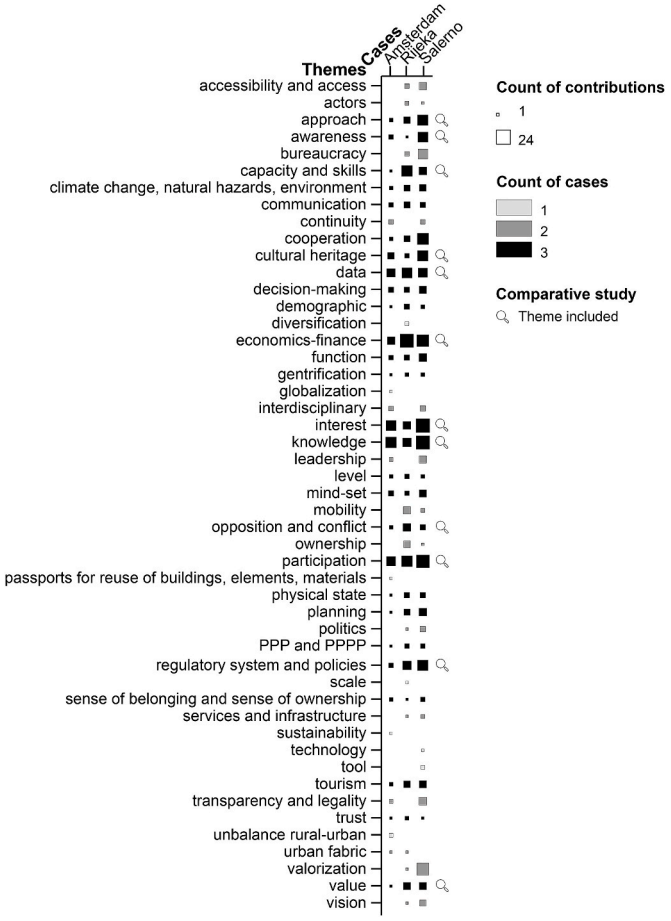

Fig. 2. Distribution of the themes per case study.

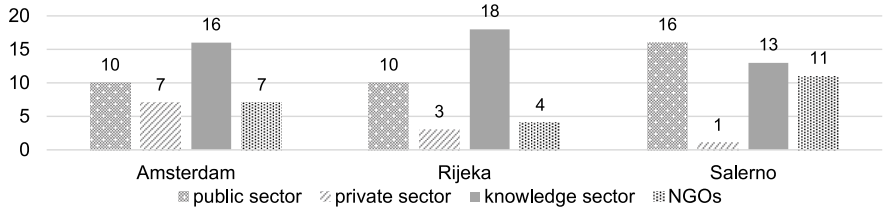

Fig. 1. Participants to the workshops per case study and per stakeholder group.

ARCH. By thematic synthesis, 49 themes were identified, as illustrated in Fig. 2. These themes can be organized into three groups based on the number of cases where they have been identified. The first group is constituted by the eight themes that concern only one case study. In this regard, Amsterdam counts the most themes referring to one case, i.e. four themes. The second group encompasses the themes shared between two cases. These themes are distributed as follow: nine are common to Rijeka and Salerno, four to Amsterdam and Salerno, and one to Amsterdam and Rijeka. In general, the 14 themes common to two cases encompass a modest number of contributions: 10 themes count less than 10 contributions each. In addition, the themes common to two cases are mainly characterized by a distribution of contributions skewed towards one case, since more than half of the contributions is identified in a case. This suggests that a theme was more mentioned in one case. This trend presents few exceptions, such as the themes referring to continuity and interdisciplinary. The third group gathers the themes that emerged from the analysis of all three case studies. Specifically, this group counts 27 themes. As it can be seen in Fig. 2, overall, these themes include most of the data collected. They account for around 80% of the contributions analysed. More than half of the themes present an even relative distribution of contributions between three or two cases.

Among the themes common to the three case studies, a subset satisfied the criteria to be included in the comparative study. Specifically, 12 themes—corresponding to 274 contributions—were included in the comparative study. Hence, the comparative study considered the challenges and sub-challenges referring to the following themes: approach, awareness, capacity and skills, cultural heritage, data, economics-finance, interest, knowledge, participation, opposition and conflict, regulatory system and policies, and value (see the description of the themes in Table C.1).

5.2. Challenges and sub-challenges

The comparative study identified 14 challenges common to the three cases. Challenges represent higher-level findings, in other words, they synthesised the results of the cases studied. The cluster identified sub-challenges; thus, further abstracting them to gather a general insight. The common challenges are listed and detailed in Table 3. Within the 12 themes eligible for the comparative analysis, 10 themes include challenges that are common to the three cases. These common challenges refer to approach, awareness, capacity and skills, cultural heritage, data, economics-finance, interest, knowledge, participation, and regulatory system and policies. These 10 clusters derived mostly from general contributions, apart from awareness-related challenges presenting a comparable number of contributions referring to the urban scale and general ones.

Overall, the 14 challenges refer either to the lack and limitation of processes of the adaptive reuse of cultural heritage or to the implementation of these processes. Sometimes, the general insight offered by these challenges includes sub-challenges in the cluster that are also shared among the three cases analysed. Yet, local nuances such as differences in scale might apply.

The 11 common sub-challenges are mostly related to the urban scale or general level in the three cities compared (Table 4). The site scale is only present for the city of Salerno. Particularly, four sub-challenges are represented in all three scales. The first of these sub-challenges is the lack of local expertise and skilled tradespeople.

The other three sub-challenges concerns participation: namely, the lack of participatory decision-making and co-planning or conditions for them; the lack of or limited participation, low willingness to participate; and the lack of or limited representation of certain groups such as citizens. The general trend for sub-challenges also identified at the site scale in a case is to be also identified at the urban scale and/or general level in the same city. An exception to this trend is represented by the low willingness to participate. This sub-challenge is solely identified at the site scale in Salerno.

Table 3
Common challenges on the adaptive reuse of cultural heritage.

Theme	Challenge	Brief description[a]
Approach	Shortcomings of current approaches	Limitations are perceived in the ways currently adopted in the adaptive reuse of cultural heritage and related processes, e.g. public-private partnerships
Awareness	Lack of or limited awareness	Absence or limitations are identified in the concern about the adaptive reuse of cultural heritage and realization of its value and related aspects, e.g. energy efficiency
Capacity and skills	Lack of capacity	Shortage or absence of capacity for the adaptive reuse of cultural heritage
Cultural heritage	Interpretation of cultural heritage and heritage sector	Challenges posed by the conceptualization of and opinions about heritage, its significance, and the heritage sector, such as heritage been seen as passive, static, or not a priority and the heritage sector as an isolated one within the urban dynamics
Cultural heritage	Management of cultural heritage	Challenges associated with aspects of heritage management, such as dealing with "informal heritage" or the integration heritage-sustainable development
Data	Data management issues	Challenges derived from the need to ensure findability, accessibility, interoperability, and reusability of (available) data
Economics-finance	Size of costs (estimated/perceived)	Magnitude of the costs perceived, estimated, or factual associated with the adaptive reuse of cultural heritage or specific phases, e.g. maintenance
Interest	Conflicting/different/diverging interests	Mismatch in the concerns for and advantages/benefits foreseen or derived from the adaptive reuse of cultural heritage
Interest	Lack of or limited interest	Missing or low concerns for the adaptive reuse of cultural heritage
Knowledge	Knowledge production	Production and creation of an understanding of and information about heritage, adaptive reuse, and their context
Knowledge	Lack of knowledge	Missing understanding and information related to heritage, adaptive reuse, and their context
Participation	Absent or limited participatory processes	Missing or scarce participation in the adaptive reuse of cultural heritage and related processes
Participation	Implementation of participatory practices	Difficulties encountered in the implementation of participatory processes
Regulatory system and policies	Compliance with regulatory, policy, and legislative documents	Compliance with specific requests of the regulatory system and policy or their implementation

[a] Description are partially adapted from Pintossi and coworkers (2021b, 2023). Further elaboration and additional details are available in related publications and the dataset analysed (see Pintossi et al., 2021a; 2021b, 2023).

5.3. Challenges and SDGs

Addressing the challenges of the ARCH has a twofold contribution to sustainable development. On the one hand, it facilitates the adoption and implementation of adaptive reuse which has proven to benefit the four dimensions of sustainable development, i.e. cultural, economic, environmental, and social dimensions (Bullen & Love, 2011a, 2011b; Langston et al., 2008; Yung & Chan, 2012). On the other hand, these challenges, if addressed, can impact sustainable development by

Table 4
Common sub-challenges.

Theme	Challenge	Sub-challenge	Case	Amsterdam			Rijeka			Salerno		
			Scale[a] N[b]	S	U	G	S	U	G	S	U	G
Approach	Shortcomings of current approaches	Need of change	10			x		x	x		x	x
Awareness	Lack of or limited awareness	Lack of or limited awareness about specific processes or aspects	7			x		x			x	x
Capacity and skills	Lack of capacity	Lack of local expertise and skilled tradespeople	8			x		x	x	x		x
Data	Data management issues	Lack or limited findability, accessibility, interoperability, and/or reusability	17			x		x	x		x	x
Economics-finance	Estimated or perceived size of costs	Size of costs of intervention	4			x		x			x	x
Interest	Conflicting/different/diverging interests	Conflicting interests among stakeholders	11			x			x		x	x
Interest	Conflicting/different/diverging interests	Generic conflict	5			x			x			x
Knowledge	Lack of knowledge	Lack of knowledge about the heritage resources	8		x	x			x		x	x
Participation	Absent or limited participatory processes	Lack of participatory decision-making/co-planning or conditions for them	10			x		x		x	x	x
Participation	Implementation of participatory practices	Lack of or limited participation, low willingness to participate	9			x		x	x	x		
Participation	Implementation of participatory practices	Lack of or limited representation of certain groups, e.g. community, citizens	7		x	x		x	x	x		x

[a] S stands for site scale, U for urban scale, and G for general.
[b] N stands for the number of contributions reporting such sub-challenge.

contributing to achieving some SDGs (Table 5).

Overall, addressing the identified challenges chiefly contributes to "make cities and human settlements safe, resilient and sustainable" (Goal 11) and "ensure sustainable consumption and production patterns" (Goal 12) by facilitating the ARCH. This facilitation "strengthen[s] efforts to protect and safeguard the world's cultural and natural heritage" (Target 11.4) and "… reduce[s] waste generation through prevention, reduction, recycling and reuse" (Target 12.5). In fact, these two goals are related in general to the ARCH, a strategy that conserves heritage, hence adverts demolition waste production and reuses the heritage resource by giving them a new purpose.

Furthermore, addressing the participation-related challenges could likely impact three additional SDGs, besides Goal 11 and Goal 12. As it can be seen in Table 5, firstly, addressing these challenges might positively impact the achievement of gender equality (Goal 5). Secondly, it can benefit the reduction of inequalities (Goal 10). Thirdly, it can

Table 5
SDGs that are impacted by addressing the common challenges.

Challenge	SDGs[a]											N
	3 GOOD HEALTH AND WELL-BEING	4 QUALITY EDUCATION	5 GENDER EQUALITY	7 AFFORDABLE AND CLEAN ENERGY	8 DECENT WORK AND ECONOMIC GROWTH	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	10 REDUCED INEQUALITIES	11 SUSTAINABLE CITIES AND COMMUNITIES	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	13 CLIMATE ACTION	16 PEACE, JUSTICE AND STRONG INSTITUTIONS	
Shortcomings of current approaches				x				x	x			3
Lack of or limited awareness								x	x	x		3
Lack of capacity		x				x		x	x			4
Interpretation of cultural heritage and heritage sector								x	x			2
Management of cultural heritage								x	x			2
Data management issues								x	x			2
Amount of costs (estimated/perceived)					x			x	x			3
Conflicting/different/diverging interests								x	x			2
Lack of or limited interest								x	x			2
Knowledge production								x	x			2
Lack of knowledge								x	x			2
Absent or limited participatory processes			X				x	x	x		x	5
Implementation of participatory practices			X				x	x	x		x	5
Compliance with regulatory, policy, and legislative documents	x						x	x	x			4
N	1	1	2	1	1	1	3	14	14	1	2	–

[a] In general, addressing the identified challenges do not directly benefit six of the SDGs; namely, "no poverty", "no hunger", "clear water and sanitation", "life below water", "life on land", and "partnership for the Goals". Therefore, these SDGs are excluded from the table.

promote inclusive societies for sustainable development (Goal 16). For example, while overcoming the participatory-related challenges of the ARCH, e.g. by introducing such practices or addressing the sub-challenge pointing out the lacking or limited representation of groups such as citizens, the solution could embed the participation of women and girls (Target 5.5 of SDG 5) as well as the empowerment and promotion of inclusion irrespective of any status (Target 10.2 of SDG 10). Additionally, raising awareness about the ARCH also aligns with raising awareness on climate change mitigation and adaptation (Target 13.3 of SDG 13) since the ARCH is recognized as one strategy to mitigate climate change and introduce adaptation solutions within the built environment (Fatorić & Egberts, 2020; Yung & Chan, 2012).

5.4. Challenges worldwide

Arguably, some of the common challenges can apply to other regions. Four of the challenges identified by the present research as European are also reported by or very similar to those revealed by the literature based on studies conducted in other regions. Therefore, some of the common challenges are likely to apply also within Asia, Oceania, and North America.

Among the 14 European challenges, four are also identified in cases from other regions (Table 6). The first of such challenges is the lack of awareness. In Australia, public awareness about adaptive reuse is a barrier according to architects, developers and building managers (Bullen & Love, 2011a). The second challenge likely to apply to other regions is the lack of capacity. It is also found in studies investigating New South Wales, Australia; the metropolitan area of Perth, Australia; the city of Whanganui, New Zealand; and Ontario, Canada (Aigwi et al., 2018; Bullen & Love, 2011a; Conejos et al., 2016; Shipley et al., 2006). These studies considered the experiences of architects, developers, engineers, building managers, heritage professionals, and representatives of the local government council. The third challenge also identified in other regions relates to the costs of adaptive reuse. This barrier is reported in studies conducted in Asia, Europe, North America, and Oceania. Specifically, these studies investigated cases in Australia, Canada, Hong Kong, the United States of America, and Portugal; some of these studies interviewed architects, developers, project managers, but also heritage consultants, government officials and NGOs in the Hong Kong case. This challenge is also reported in Douglas' handbook about building adaptation (2006), a reference frequently cited in the literature on the ARCH. Finally, the fourth transregional challenge, the lack of knowledge, refers also to the availability of reliable information which is an issue identified in New South Wales, Australia, interviewing architects and project managers (Conejos et al., 2016) and in North America (Bourne, 1996).

Two additional European challenges present an affinity with challenges that were identified in the literature investigating cases from other regions, although the nuances between the results of the present research and literature findings suggest a more cautious relation (Table 6). The first of these challenges is compliance with regulatory, policy, and legislative documents. Although this challenge might comprise compliance with safety requirements, this is not specifically identified in the three European cases cities as it was in cases within Oceania and North America (Aigwi et al., 2018; Bullen & Love, 2011a; Conejos et al., 2016; Shipley et al., 2006) as well in Douglas' handbook (2006). The second European challenge with less affinity with findings from the literature is the interpretation of cultural heritage and the heritage sector. This European challenge also refers to heritage significance which relates to the values of heritage. In the literature, the prevention of values loss and the minimization of change, both intertwined with heritage significance, are mentioned as obstacles to the ARCH. These two obstacles are identified in cases within Asia, North America, and Oceania (Mehr et al., 2017; Shipley et al., 2006; Yung & Chan, 2012).

6. Discussion and conclusions

To contribute to theorising the challenges to the ARCH, the present research draws from a cross-territorial comparative study of challenges identified from the stakeholders' perspective within Europe. On the general level, a trend was identified focusing on the common challenges of adaptive reuse. It is likely that the common issues, identified by the comparative study, are i) shortcomings of current approaches, ii) lack of or limited awareness, iii) lack of capacity, iv) interpretation of cultural heritage and heritage sector, v) management of cultural heritage, vi) data management issues, vii) amount of costs (estimated/perceived), viii) conflicting/different/diverging interests among/of stakeholders, ix) lack of or limited interest, x) knowledge production, xi) lack of knowledge, xii) absent or limited participatory processes, xiii) implementation of participatory practices, and xiv) compliance with regulatory, policy, and legislative documents. These issues are identified in three diverse European cases, which suggests that they can be European challenges, since they cut across diverse socio-economic-political

Table 6
European challenges, i.e. common to the European case studies analysed in this study, that are likely to apply also in other world regions and underpinned literature. The challenges indicated with an asterisk are akin to challenges find in the literature.

"European" challenge	Region considered in the literature[a]						References[b]
	Africa	Asia	Europe	North America	Oceania	South America	
Lack of awareness					x		(Bullen and Love, 2011a)
Lack of capacity				x	x		(Aigwi et al., 2018; Bullen & Love, 2011a; Conejos et al., 2016; Douglas, 2006; Shipley et al., 2006)
Costs		x	x	x	x		(Conejos et al., 2016; Douglas, 2006; Elrod & Fortenberry, 2017; Fernandes et al., 2020; Shipley et al., 2006; Tan et al., 2018; Yung & Chan, 2012)
Lack of knowledge				x	x		(Bourne, 1996; Conejos et al., 2016)
*Compliance with regulatory, policy, and legislative documents (in literature as safety requirement)				x	x		(Aigwi et al., 2018; Bullen & Love, 2011a; Clark, 2013; Conejos et al., 2016; Douglas, 2006; Shipley et al., 2006)
*Interpretation of cultural heritage and the heritage sector (in literature as minimization of change)		x		x	x		(Douglas, 2006; Mehr et al., 2017; Shipley et al., 2006; Yung & Chan, 2012)
*Interpretation of cultural heritage and the heritage sector (in literature as prevention of values loss)		x		x	x		(Mehr et al., 2017; Shipley et al., 2006; Yung & Chan, 2012)

[a] The challenges were identified in cases that are located in these regions.
[b] Some references identify challenges for adaptive reuse in general and not specifically for the reuse of heritage. Furthermore, Douglas, 2006 is a handbook with no specific geographic focus.

contexts and scales (Méral et al., 2020; Veldpaus et al., 2020).

Arguably, some of these challenges can apply to other regions. The findings suggest that out of the 14 common challenges identified by the comparative study, 4 seem to be encountered in cases from multiple word regions, hence they are likely not regional issues. These challenges are namely, i) lack of awareness, ii) lack of capacity, iii) estimated/perceived costs, and iv) lack of knowledge. In general, these cross-regional challenges are identified in cases within Asia, North America, and Oceania. They might also be encountered in the ARCH in Africa and South America, but cases reporting such common challenges in these two regions were not encountered. Furthermore, two additional challenges—the interpretation of cultural heritage and compliance with regulatory, policy, and legislative documents—have affinities and similarities with obstacles that were also identified respectively in cases from Oceania and North America, and in Asia, North America, and Oceania. The remaining eight common challenges were currently only identified within the cases from the European region: namely, i) shortcomings of the current approaches, ii) management of cultural heritage, iii) data management issues, iv) conflicting, different, diverging interests, v) lack of or limited interest, vi) knowledge production, vii) absent or limited participatory processes, and viii) implementation of participatory practices.

Furthering the understanding of challenges encountered in the ARCH provides evidence and knowledge with a fourfold implication. Firstly, by providing insights on the challenges common to diverse context can contribute towards the efforts to defining a framework for these challenges (Table). Secondly, it informs future implementations of adaptive reuse as well as policy and decision making. Particularly, the policy-making at multiple governmental levels can be informed by this more general insight. Thirdly, solutions might be drawn by examining the wider regional context of Europe or even considering other regions and cases within them where these challenges should be also seen to apply. Fourthly, informing practitioners, such as architects, and communities implementing the ARCH these findings can be a reference and guide them in anticipating some of their potential challenges and therefore mitigate or avoid them.

The research presents three main limitations; namely, it is limited to cross-sectional analysis, it might be affected by measurement bias, and its generalisability is subject to certain caution. Firstly, whilst this research lacks to perform a cross-longitudinal analysis, looking at the publication date of articles reporting some of the common challenges, it can be argued that some challenges have been already identified in the 2010s and a couple of them in the 90s and 2000s. Future research could integrate a cross-longitudinal analysis to further the understanding of challenges to the ARCH by including the temporal dimension. Such a cross-longitudinal analysis could also reveal the dynamic of challenges over time. Secondly, the measurement bias could be due to different understandings among participants within a country and among countries although the official working language was the same for the three data collections, i.e. English. The differences in understanding can also result from how terms speak to the participants based on their backgrounds and that “adaptive reuse” might cover different ranges of interventions among countries (Lin, n.d.). Future research could relate the local implementation of adaptive reuse to the international documents on the matter, such as the so-called ICOMOS Venice and Burra Charters (Australia ICOMOS; ICOMOS, 1964). Thirdly, this research presents a small-N study comparing European cities that represent a varied spectrum of contexts. This variety suggests that the cases represent various contexts (Méral et al., 2020) enabling a certain generalisability of the findings. However, the generalisability of the findings is subject to further research. Future research can boost the generalisation of the findings by repeating the cross-sectional analysis as a Large-N study considering as cases more cities both in the European region and other world regions as well as increasing the number of cases considered within each city, to robust the insight suggested by this research and further elaborate its first findings. It is suggested that a large-N study possibility adopts the same methodology used in this research to enhance the comparability while reducing possible construct biases. Nonetheless, some challenges are both identified in this research and in the literature, although some nuanced differences may apply. Therefore, some conclusions from previous studies confirm some of the findings of the present research and vice versa. Yet, previous studies and this research are characterized by different methods, stakeholders’ groups, and geographical contexts. This confirmation is therefore an argument of reliability and validity; thus, in favour of the development of a theoretical framework for challenges to the adaptive reuse of cultural heritage. Although, the cross-regional nature of the findings seems to suggest some generalisability of some challenges, further research is needed to confirm whether it is coincidental or not.

The synthesis produced by the comparative study attempted to provide a more general insight and demands further research. On the one hand, this can enhance the understanding of the adaptive reuse of cultural heritage and its adoption and implementation while revealing trends within its challenges. On the other hand, the process of synthesis towards a higher-level abstraction of the case-based findings removed some nuancing from the challenges. Therefore, the Large-N study already mentioned could contribute to advancing the breadth and depth of the present research, possibly further nuancing its results.

Preliminary findings from further analysing the results of the comparative study suggest the need to further investigate the ARCH and its challenges in relation to the SDGs. This research revealed the likely association of the common challenges with the SDGs. Additional research could evaluate how and to what extent the ARCH as well as addressing its challenges (can) contribute to the efforts to achieve the SDGs (Labadi et al., 2021). This gained insight could help further assess the ARCH contribution to sustainable development and possibly the one of heritage.

By comparing the cities of Amsterdam, Rijeka, and Salerno, a first general insight was gathered on common challenges for the ARCH which is a first step towards developing a framework for the challenges to the ARCH. Likely, some of these issues also apply in cases from other regions. “Responding to challenges in creative ways can result in opportunities that might not otherwise be identified or realised.” (Clark, 2013, p. 8). Particularly, overcoming such challenges can facilitate the adoption and implementation of adaptive reuse, therefore, potentially positively contributing to pursuing more sustainable and climate-friendly urban environments. For example, by contributing towards the effort aiming at achieving the SDGs such as making human settlements safe, resilient, and sustainable (SDG 11) and ensuring sustainable consumption and production patterns (SDG 12), but also could have a positive impact on less obvious goals as fostering gender equality (SGD 5), reducing inequality (SDG 10), and building an inclusive society for sustainable development (SDG 13). Addressing the ARCH challenges has the potential to also contributes toward attaining the objectives set forward by policies such as the European Green Deal.

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Data statement

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CRediT authorship contribution statement

Nadia Pintossi: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Data Curation, Writing - Original Draft, Writing - Review & Editing, Visualization, Project administration. Deniz Ikiz Kaya: Methodology, Validation, Writing - Review & Editing, Supervision. Pieter van Wesemael: Supervision. Ana Pereira Roders: Conceptualization, Methodology, Resources, Writing - Review & Editing, Supervision, Funding acquisition.

Declaration of competing interest

None.

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Appendices.

Appendix A

Heritage is a mobile term characterised by a non-unique definition. Scholars have been and are engaged in problematising the definition of 'heritage' (Muzaini & Minca, 2018). 'Heritage' can be defined as elements from the past deemed valuable and worth preserving within the present for the benefit of current and future generations (Muzaini & Minca, 2018, p. 2). The element of future in such definitions leads Harrison et al. (2020, p. 4) to argue that heritage is a series of activities focused on creating future worlds. Over time, the heritage concept broadened from 'monument'—object-based, top-down/institutionalised, static, and prescriptive—to 'cultural heritage'—process-based, also bottom-up/grassrooted, dynamic, and an expression of values and "social choice" (Akagawa, 2018; Bandarin, 2019; Smith, 2012; Tweed & Sutherland, 2007, van Oers, 2015; Vecco, 2010). Yet, this broadening entailed coexistence rather than substitution: contrasting and interplaying top-down and bottom-up definitions of heritage coexist and need to be seen as complementary rather than antithetical (Muzaini & Minca, 2018). This is exemplified by the so-called "Authorised Heritage Discourse" (AHD) (Smith, 2006) and the so-called "Heritage from Below" (HfB) (Robertson, 2016). AHD refers to a top-down *"comprehension of heritage [which] not only places (…) power in the hands of elite actors to shape our understandings of the past, but fails to deal adequately with the complexities and contradictions intrinsic to our fluid cultural identities, or with less tangible, personal forms of heritage (…)"* (Carter et al., 2019, p. 2). HfB refers to a bottom-up comprehension of "heritage as a process understood, practised and experienced on the ground by the people themselves" (Muzaini & Minca, 2018, p. 1). Regardless, if heritage is the imagining of the past from the present perspective, it is selective and reflects the perspectives and positions of those who promote and advocate for it, independently from where they position themselves in the top-down-bottom-up continuum (Muzaini & Minca, 2018, pp. 2–3).

Furthermore, in the broadening of the heritage concept, there was also a shift from isolation towards considering the relationships with and including the broader context and geographical setting such as cultural landscapes and living cities and their values (Australia ICOMOS; Pereira Roders, 2019; Turner, 2013). This untimely led to acknowledge the inseparable and intertwined character of cultural heritage and natural heritage (Labadi et al., 2021). The broadening of the concept of cultural heritage also witnessed the recognition of the intangible dimension of heritage. Consequently, the range of categories of heritage also expanded (Pereira Roders, 2019; Vecco, 2010). In sum, cultural heritage is a complex construct with an evolving, non-unique definition. It is about plurality, people, meanings, and values and it is dynamic. Therefore, it can entail conflicts, contestation, and contradiction as well as change (Pereira Roders, 2019; Smith, 2012).

Reflecting the expansion of the concept of cultural heritage, heritage management shifted toward being understood as a "management of change" (Bandarin, 2019; UNESCO, 2011) and opened up to a wider variety of stakeholders and disciplines (Landorf, 2019; Pereira Roders, 2019; Rosetti et al., 2022), and recognized a plurality of heritage practices and approaches (Australia ICOMOS; ICOMOS, 1994; Vecco, 2010). Yet, the degree of evolution and innovation differs from the international to the local level and around the world (Pereira Roders, 2019). The role of conservation has shifted from preservation toward "being part of a broader strategy for urban regeneration and sustainability," demanding broad participation and interdisciplinarity (Bullen & Love, 2011a, p. 411). Conserving both tangible and intangible heritage plays a role in sustainable development (CHCfE Consortium, 2015; Council of Europe, 2014; Labadi et al., 2021; Landorf, 2009; Yung & Chan, 2012). Specifically, the reflections on the role of heritage in sustainable development and the evolution of heritage conservation are comprised in the 2011 UNESCO Recommendation on the Historic Urban Landscape (HUL) (Bandarin, 2019; UNESCO, 2011). The Recommendation sets forward the HUL approach to integrating conservation within urban management. It proposes an additional approach to heritage conservation along with existing guidelines and policies (Bandarin, 2019; Ginzarly et al., 2019) acknowledging the results of the ongoing debate on conservation. It collates "complementary principles, concepts, approaches, and scopes that were already addressed separately and adopted in previous European and international recommendations and charters" (Ginzarly et al., 2019, p. 1000; Turner, 2013).

Appendix B

Fig. B1. Pakhuis de Zwijger, Amsterdam, The Netherlands. Façade on Piet Heinkade and a view of an interior. Credits: CC BY-SA 4.0 Jorinde (exterior view); Nadia Pintossi (interior view).

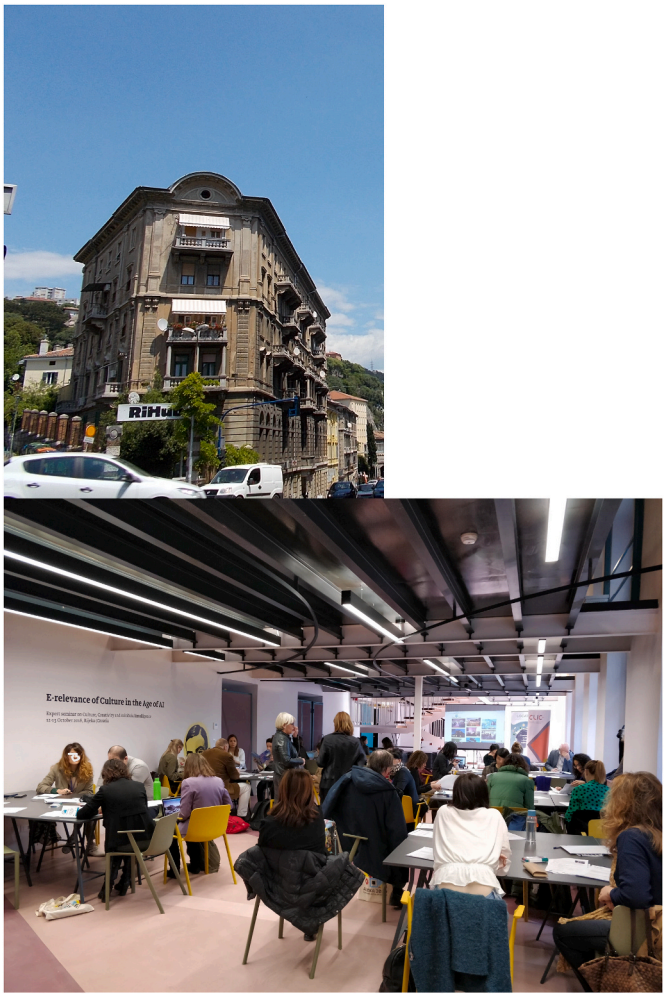

Fig. B2. RiHub, Rijeka, Croatia. Façade on Ivana Grohovca and a view of the interiors. Credits: CC BY-SA 4.0 Szeder László (exterior view - cropped); Nadia Pintossi (interior view).

Fig. B3. Views of Giardino della Minerva, Salerno, Italy. Credits: CC BY-SA 4.0 Miguel Hermoso Cuesta.

Appendix C

The themes included in the comparative study are described in Table C1.

Table C.1
Description of the themes included in the comparative study.

Theme	Description[a]
Approach	The theme addresses the ways currently adopted in the adaptive reuse of cultural heritage and related processes, e.g. public-private partnerships
Awareness	The theme reports on the concern about the adaptive reuse of cultural heritage and realization of its value and related aspects, e.g. energy efficiency
Capacity and skills	The theme refers to the capacity for the adaptive reuse of cultural heritage
Cultural heritage	The theme encompasses the conceptualization of and opinions about heritage, its significance, and the heritage sector
Data	The theme addresses aspects relating to data, e.g. collection and management
Economics-finance	The theme covers challenges relating to economic and financial aspects of the adaptive reuse of cultural heritage, e.g. costs
Interest	The theme addresses the concerns for and advantages/benefits foreseen or derived from the adaptive reuse of cultural heritage
Knowledge	The theme refers to the understanding of and information about heritage, adaptive reuse, and their context
Opposition and conflict	The theme gathers challenges referring to opposition and conflicts encountered in the adaptive reuse of cultural heritage or by these interventions.
Participation	The theme encompasses challenges relating to participatory processes to involve in varying degrees the stakeholders of the adaptive reuse of cultural heritage
Regulatory system and policies	The theme addresses issues referring to regulatory system and policies
Value	The theme reports on issues related to heritage values and the creation of values through adaptive reuse

[a] The descriptions are partially adapted from Pintossi and coworkers (2021b, 2023).

References

Aigwi, I. E., Egbelakin, T., & Ingham, J. (2018). Efficacy of adaptive reuse for the redevelopment of underutilised historical buildings: Towards the regeneration of New Zealand's provincial town centres. *International Journal of Building Pathology and Adaptation, 36*(4), 385–407. https://doi.org/10.1108/IJBPA-01-2018-0007

Aigwi, I. E., Egbelakin, T., Ingham, J., Phipps, R., Rotimi, J., & Filippova, O. (2019). A performance-based framework to prioritise underutilised historical buildings for adaptive reuse interventions in New Zealand. *Sustainable Cities and Society, 48*, Article 101547. https://doi.org/10.1016/j.scs.2019.101547

Aigwi, I. E., Ingham, J., Phipps, R., & Filippova, O. (2020). Identifying parameters for a performance-based framework: Towards prioritising underutilised historical buildings for adaptive reuse in New Zealand. *Cities, 102*, Article 102756. https://doi.org/10.1016/j.cities.2020.102756

Akagawa, N. (2018). Authorized heritage Discourse. In *The encyclopedia of archaeological sciences* (pp. 1–4). John Wiley & Sons, Inc. https://doi.org/10.1002/9781119188230.saseas0056.

Alba-Rodríguez, M. D., Machete, R., Glória Gomes, M., Paula Falcão, A., & Marrero, M. (2021). Holistic model for the assessment of restoration projects of heritage housing. Case studies in Lisbon. *Sustainable Cities and Society, 67*, Article 102742. https://doi.org/10.1016/j.scs.2021.102742

Amsterdam. (n.d.). Retrieved March 8, 2023, from: https://en.wikipedia.org/wiki/Amsterdam.

Amsterdam Smart City. (n.d.). Retrieved August 2, 2018, from: https://amsterdamsmartcity.com/network/amsterdam-smart-city.

Angelidou, M. (2017). The role of smart city characteristics in the plans of fifteen cities. *Journal of Urban Technology, 24*(4), 3–28. https://doi.org/10.1080/10630732.2017.1348880

Angelidou, M., Karachaliou, E., Angelidou, T., & Stylianidis, E. (2017). Cultural heritage in smart city environments. *ISPRS - International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, XLII–2*(W5), 27–32. https://doi.org/10.5194/isprs-archives-XLII-2-W5-27-2017

Architects' Council of Europe. (2018). Leeuwarden declaration: Adaptive re-use of the built heritage: Preserving and enhancing the values of our built heritage for future generations. https://www.ace-cae.eu/uploads/tx_jidocumentsview/LEEUWARDEN_STATEMENT_FINAL_EN-NEW.pdf.

Australia ICOMOS. (2013). The Burra charter: The Australia ICOMOS charter for places of cultural significance. https://australia.icomos.org/wp-content/uploads/The-Burra-Charter-2013-Adopted-31.10.2013.pdf.

Australia ICOMOS. (2019). Practice note. Heritage and sustainability 1: Built heritage. https://australia.icomos.org/wp-content/uploads/Practice-Note_Heritage-and-Sustainability-1-Built-Heritage.pdf.

Ažman Momirski, L. (2020). The resilience of the port cities of Trieste, Rijeka, and Koper. *Journal of Urban History, 1*. https://doi.org/10.1177/0096144220926600. –24.

Bandarin, F. (2019). Reshaping urban conservation. In A. Pereira Roders, & F. Bandarin (Eds.), *Reshaping urban conservation. The historic urban landscape approach in action* (pp. 3–20). Singapore: Springer. https://doi.org/10.1007/978-981-10-8887-2_1.

Bengtsson, M. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus Open, 2*, 8–14.

Boland, A., Cherry, M. G., & Dickson, R. (2017). *Doing a systematic review : A student's guide* (2nd ed.). SAGE.

Bourne, L. S. (1996). Reurbanization, uneven urban development, and the debate on new urban forms. *Urban Geography, 17*(8), 690–713. https://doi.org/10.2747/0272-3638.17.8.690

Britannica. (n.d.).University. Retrieved March 8, 2023, from: https://www.britannica.com/topic/university.

Bullen, P. A., & Love, P. E. D. (2010). The rhetoric of adaptive reuse or reality of demolition: Views from the field. *Cities, 27*(4), 215–224. https://doi.org/10.1016/j.cities.2009.12.005

Bullen, P. A., & Love, P. E. D. (2011a). Adaptive reuse of heritage buildings. *Structural Survey, 29*(5), 411–421. https://doi.org/10.1108/02630801111182439

Bullen, P. A., & Love, P. E. D. (2011b). Factors influencing the adaptive re-use of buildings. *Journal of Engineering, Design and Technology, 9*(1), 32–46. https://doi.org/10.1108/17260531111121459

Capone, P. (2010). From the Minerva garden in Salerno to circa instans illuminated herbaria: A virtual path without boundaries. *Acta Horticulturae, 881*(881), 985–992. https://doi.org/10.17660/ActaHortic.2010.881.164

Carter, T., Harvey, D. C., Jones, R., & Robertson, I. J. M. (2019). Introduction. In T. Carter, D. C. Harvey, R. Jones, & I. J. M. Robertson (Eds.), *Creating heritage. Unrecognised pasts and rejected futures*. Routledge. https://doi.org/10.4324/9781351168526.

CBS. (2021, July 14). Dutch GDP per capita still relatively high within the EU. Retrieved March 8, 2023, from: https://www.cbs.nl/en-gb/news/2021/28/dutch-gdp-per-capita-still-relatively-high-within-the-eu.

CHCfE Consortium. (2015). Cultural heritage counts for Europe. Retrieved September 5, 2018, from: www.encatc.org/culturalheritagecountsforeurope.

Clark, J. (2013). *Adaptive reuse of industrial heritage: Opportunities & challenges*. In Heritage Council Victoria.

Circle Economy, Copper8, & Amsterdam Gemeente. (2018). Amsterdam circular. Evaluation and action perspectives. Retrieved October 14, 2018, from: https://www.circle-economy.com/wp-content/uploads/2018/10/amsterdam-evaluation-EN-20180328.pdf.

Circle Economy, Fabric, & TNO. (2016). Circular Amsterdam: A vision and action agenda for the city and metropolitan area. Retrieved October 21, 2018, from: https://circle-economy.com/amsterdamcirclecityscan.

City of Amsterdam. (n.d.). Policy: Listed monuments. Retrieved December 10, 2019, from: https://www.amsterdam.nl/en/policy/policy-culture-arts/listed-monuments/.

Comune di Salerno. (n.d.-a). Cenni storici. Retrieved October 16, 2020, from: http://www.comune.salerno.it/client/scheda.aspx?scheda=4367&stile=7&parent=3912&ti=1.

Comune di Salerno. (n.d.-b). Presentazione della città. Retrieved October 16, 2020, from: http://www.comune.salerno.it/client/scheda.aspx?scheda=4566&stile=7&parent=3912&ti=42.

Conejos, S., Chew, M. Y. L., Yung, E. H. K., Conejos, S., & Chew, M. Y. L. (2017). The future adaptivity of nineteenth century heritage buildings. *International Journal of Building Pathology and Adaptation, 35*(4), 332–347. https://doi.org/10.1108/IJBPA-03-2017-0012

Conejos, S., Langston, C., Chan, E. H. W., & Chew, M. Y. L. L. (2016). Governance of heritage buildings: Australian regulatory barriers to adaptive reuse. *Building Research & Information, 3218*(5–6), 507–519. https://doi.org/10.1080/09613218.2016.1156951

Council of Europe. (2005). *Council of Europe framework convention on the value of cultural heritage for society*. Council of Europe Treaty Series; Council of Europe. https://rm.coe.int/1680083746.

Council of Europe. (2014). *Council conclusions of 21 May 2014 on cultural heritage as a strategic resource for a sustainable Europe*. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014XG0614(08)&from=EN.

Davos Declaration 2018. (2018). https://davosdeclaration2018.ch/media/Brochure_Declaration-de-Davos-2018_WEB_2.pdf.

Department of Environment and Heritage. (2004). *Adaptive reuse*.

Douglas, J. (2006). *Building adaptation* (Second). Butterworth-Heinemann.

Dyson, K., Matthews, J., & Love, P. E. D. (2016). Critical success factors of adapting heritage buildings: An exploratory study. *Built Environment Project and Asset Management, 6*(1), 44–57. https://doi.org/10.1108/BEPAM-01-2015-0002

DZS. (2011). Population in major towns and municipalities, 2011 census. Retrieved March 8, 2023, from: https://web.dzs.hr/Eng/censuses/census2011/results/htm/e01_06_01/E01_06_01.html.

2023 DZS. (2023). Population in major towns, municipalities and settlements, 2021 census. Retrieved March 8, 2023, from: https://podaci.dzs.hr/media/y00bavu1/popis_2021-stanovnistvo_najveci_gradovi_opcine_i_naselja.xlsx.

Eisenack, K., Moser, S. C., Hoffmann, E., Klein, R. J. T., Oberlack, C., Pechan, A., Rotter, M., & Termeer, C. J. A. M. (2014). Explaining and overcoming barriers to climate change adaptation. In *Nature climate change* (Vol. 4, pp. 867–872). Nature Publishing Group. https://doi.org/10.1038/nclimate2350, 10.

Eisenhardt, K. M., & Graebner, M. E. (2007). Theory building from cases: Opportunities and challenges. *Academy of Management Journal, 50*(1), 25–32. https://doi.org/10.5465/amj.2007.24160888

Ellen MacArthur Foundation. (2019). Completing the picture: How the circular economy tackles climate change. https://www.ellenmacarthurfoundation.org/assets/downloads/Completing_The_Picture_How_The_Circular_Economy-_Tackles_Climate_Change_V3_26_September.pdf.

Elrod, J. K., & Fortenberry, J. L. (2017). Adaptive reuse in the healthcare industry: Repurposing abandoned buildings to serve medical missions. *BMC Health Services Research, 17*(Suppl 1), 5–14. https://doi.org/10.1186/s12913-017-2339-4

Esser, F., & Vliegenthart, R. (2017). Comparative research methods. In *The international encyclopedia of communication research methods* (pp. 1–22). Wiley. https://doi.org/10.1002/9781118901731.iecrm0035.

European Commission. (2019). *Communication from the commission to the European parliament, the European council, the council, the European economic and social committee and the committee of the regions. The European Green Deal*. European Commission. *COM(2019) 640 final* https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52019DC0640.

European Commission. (2020). *Communication from the commission to the European parliament, the council, the European economic and social committee and the committee of the regions. A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives* (Vol. 2020, p. 662). COM. *fi* https://ec.europa.eu/energy/sites/ener/files/eu_renovation_wave_strategy.pdf.

European Commission. (n.d). Shaping more beautiful, sustainable and inclusive forms of living together Retrieved December 1, 2021, from: https://europa.eu/new-european-bauhaus/index_en.

Fatorić, S., & Egberts, L. (2020). Realising the potential of cultural heritage to achieve climate change actions in The Netherlands. *Journal of Environmental Management, 274*, Article 111107. https://doi.org/10.1016/j.jenvman.2020.111107

Fernandes, A., Figueira de Sousa, J., Costa, J. P., & Neves, B. (2020). Mapping stakeholder perception on the challenges of brownfield sites' redevelopment in waterfronts: The tagus estuary. *European Planning Studies*, 1–18. https://doi.org/10.1080/09654313.2020.1722985

Foster, G. (2020). Circular economy strategies for adaptive reuse of cultural heritage buildings to reduce environmental impacts. *Resources, Conservation and Recycling, 152*(October 2019), Article 104507. https://doi.org/10.1016/j.resconrec.2019.104507

Fusco Girard, L. (2019). Implementing the circular economy: The role of cultural heritage as the entry point.Which evaluation approaches? *BDC - Bollettion Del Centro Calza Bini, 9*(2), 245–277. https://doi.org/10.6092/2284-4732/7269

Fusco Girard, L. (2020). The circular economy in transforming a died heritage site into a living ecosystem, to be managed as a complex adaptive organism. *Aestimum, 77*, 145–180. https://doi.org/10.13128/aestim-9788

Galdini, R. (2019). Urban re-use practices in contemporary cities: Experiences in Europe. *Cities, 87*, 103–105. https://doi.org/10.1016/j.cities.2018.12.026

Garzillo, C., Balenciaga, I., Izulain, A., Rangil Escribano, T., & Wildman, A. (2020). *Synthesis report | adaptive Reuse of cultural heritage: An Examination of circular governance Models from 16 international case studies*. *ICLEI Europe*. https://iclei-europe.org/publications-tools/?c=search&uid=ewTajtJT.

Giliberto, F. (2021). Heritage for global challenges. A research report by PRAXIS: Arts and humanities for global development. https://changingthestory.leeds.ac.uk/wp-content/uploads/sites/110/2021/02/Heritage-for-Global-Challenges-Report-2021.pdf.

Ginzarly, M., Houbart, C., & Teller, J. (2019). The historic urban landscape approach to urban management: A systematic review. *International Journal of Heritage Studies, 25* (10), 999–1019. https://doi.org/10.1080/13527258.2018.1552615

Giuliani, F., Falco, A. De, Landi, S., Bevilacqua, M. G., Santini, L., Pecori, S., De Falco, A., Landi, S., Giorgio Bevilacqua, M., Santini, L., & Pecori, S. (2018). Reusing grain silos from the 1930s in Italy. A multi-criteria decision analysis for the case of Arezzo. *Journal of Cultural Heritage, 29*, 145–159. https://doi.org/10.1016/j.culher.2017.07.009

Glumac, B., & Islam, N. (2020). Housing preferences for adaptive re-use of office and industrial buildings: Demand side. *Sustainable Cities and Society, 62*, Article 102379. https://doi.org/10.1016/j.scs.2020.102379

Guzmán, P. C., Pereira Roders, A. R., & Colenbrander, B. J. F. (2017). Measuring links between cultural heritage management and sustainable urban development: An overview of global monitoring tools. *Cities, 60*, 192–201. https://doi.org/10.1016/j.cities.2016.09.005

Harrison, R., DeSilvey, C., Holtorf, C., Macdonald, S., Bartolini, N., Breithoff, E., Fredheim, H., Lyons, A., May, S., Morgan, J., & Penrose, S. (2020). *Heritage futures: Comparative approaches to natural and cultural heritage practices*. UCL Press. https://doi.org/10.14324/111.9781787356009

Hettema, J., & Egberts, L. (2020). Designing with maritime heritage: Adaptive re-use of small-scale shipyards in northwest Europe. *Journal of Cultural Heritage Management and Sustainable Development, 10*(2), 130–143. https://doi.org/10.1108/JCHMSD-04-2019-0032

Hill, S. (2016). Constructive conservation – a model for developing heritage assets. *Journal of Cultural Heritage Management and Sustainable Development, 6*(1), 34–46. https://doi.org/10.1108/JCHMSD-04-2015-0013

ICOMOS. (1964). International charter for the conservation and restoration of monuments and sites (the Venice charter 1964). In *IInd international congress of architects and technicians of historic monuments*. Venice: ICOMOS, 1964 https://www.icomos.org/charters/venice_e.pdf.

ICOMOS. (1994). The nara document on authenticity. https://www.icomos.org/charters/nara-e.pdf.

ICOMOS. (2014). Nara + 20: On heritage practices, cultural values, and the concept of authenticity. http://www.japan-icomos.org/pdf/nara20_final_eng.pdf.

ICOMOS General Assembly. (2011). The Paris declaration on heritage as a driver of development. https://www.icomos.org/Paris2011/GA2011_Declaration_de_Paris_EN_20120109.pdf.

Ikiz Kaya, D., Dane, G., Pintossi, N., & Koot, C. A. M. (2021). Subjective circularity performance analysis of adaptive heritage reuse practices in The Netherlands. *Sustainable Cities and Society, 70*, Article 102869. https://doi.org/10.1016/j.scs.2021.102869

ISTAT. (2011). Popolazione residente e popolazione presente MetaData : Popolazione presente per sesso. Censimento, 2011. Retrieved March 8, 2023, from: http://dati-censimentopopolazione.istat.it/Index.aspx?lang=it#.

ISTAT. (2022). Popolazione residente al 1° gennaio: Campania. Censimento 2021. Retrieved March 8, 2023, from: http://dati.istat.it/Index.aspx?QueryId=18563.

Janesick, V. J. (2015). Peer debriefing. In *The blackwell encyclopedia of sociology*. John Wiley & Sons, Ltd. https://doi.org/10.1002/9781405165518.wbeosp014.pub2.

Kinseng, R. A., Nasdian, F. T., Fatchiya, A., Mahmud, A., & Stanford, R. J. (2018). Marine-tourism development on a small island in Indonesia: Blessing or curse? *Asia Pacific Journal of Tourism Research, 23*(11), 1062–1072. https://doi.org/10.1080/10941665.2018.1515781

Krippendorff, K. (1980). Content analysis: An introduction to its methodology. In *Sage commtext series*. Sage.

Labadi, S., Giliberto, F., Rosetti, I., Shetabi, L., & Yildirim, E. (2021). Heritage and the sustainable development goals: Policy guidance for heritage and development actors. *ICOMOS; ICOMOS*. https://openarchive.icomos.org/id/eprint/2453/7/ICOMOS_SDGPG_2022.pdf.

Landorf, C. (2009). A framework for sustainable heritage management: A study of UK industrial heritage sites. *International Journal of Heritage Studies, 15*(6), 494–510. https://doi.org/10.1080/13527250903210795

Landorf, C. (2019). Urban social sustainability. In M. R. Shirazi, & R. Keivani (Eds.), *Urban social sustainability: Theory, policy and practice*. Routledge. https://doi.org/10.4324/9781315115740.

Langston, C., & Shen, L. Y. (2007). Application of the adaptive reuse potential model in Hong Kong: A case study of lui seng chun. *International Journal of Strategic Property Management, 11*(4), 193–207. https://doi.org/10.1080/1648715X.2007.9637569

Langston, C., Wong, F. K. W. W., Hui, E. C. M. M., & Shen, L. Y. L.-Y. (2008). Strategic assessment of building adaptive reuse opportunities in Hong Kong. *Building and Environment, 43*(10), 1709–1718. https://doi.org/10.1016/j.buildenv.2007.10.017

Lin, M. (n.d.). Redesign strategies. Framing how to redesign built heritage in Asia. TU Delft.

Lovra, E. (2016). Urban tissue typology and urban typology (1868-1918). *Prostor, 24*(2), 202–215. https://doi.org/10.31522/p.24.2(52).5, 52.

Lozzi-Barkoviae, J. (2006). *Industrial heritage in the culture tourism of the city of Rijeka*. TICCIH International Congress. https://works.bepress.com/the-internationalcommitteefortheconservationoftheindustrialheritage/12/.

Lupacchini, R. (2020). Consultazione pubblica finalizzata alla raccolta di proposte per il riuso degli "Edifici Mondo" nella prospettiva dell'economia circolare. http://www.comune.salerno.it/allegati/30257.pdf.

Marjanić, S. (2011). Art intervention in industrial cultural heritage or, how does socially useful art come about? *Narodna Umjetnost: Hrvatski Časopis Za Etnologiju i Folkloristiku, 48*(1), 29–52.

Mehr, S. Y., Skates, H., & Holden, G. (2017). Adding more by using Less: Adaptive reuse of woolstores. *Procedia Engineering, 180*, 697–703. https://doi.org/10.1016/J.PROENG.2017.04.229

Méral, D., Veldpaus, L., Kip, M., Kulikov, V., & Pedlebury, J. (2020). Typology of current adaptive heritage re-use policies. https://openheritage.eu/wp-content/uploads/2020/06/Typology-of-current-adaptive-resue-policies.pdf.

Mısırlısoy, D., & Günce, K. (2016). Adaptive reuse strategies for heritage buildings: A holistic approach. *Sustainable Cities and Society, 26*, 91–98. https://doi.org/10.1016/j.scs.2016.05.017

Mohamed, R., Boyle, R., Yang, A. Y., & Tangari, J. (2017). Adaptive reuse: A review and analysis of its relationship to the 3 Es of sustainability. *Facilities, 35*(3/4), 138–154. https://doi.org/10.1108/F-12-2014-0108 1

Mora, L., & Bolici, R. (2017). How to become a smart city: Learning from Amsterdam. In A. Bisello, D. Vettorato, R. Stephens, & P. Elisei (Eds.), *Smart and sustainable planning for cities and regions. SSPCR 2015* (pp. 251–266). Cham: Springer. https://doi.org/10.1007/978-3-319-44899-2. Bolzano, Italy, November 19-20, *2015*.

Mrak, I. (2013). Locally based development-tools for identifying opportunities and evaluating port area strategies of Rijeka. *Sustainability, 5*(9), 4024–4056. https://doi.org/10.3390/su5094024

Muzaini, H., & Minca, C. (2018). Rethinking heritage, but 'from below. In H. Muzaini, & C. Minca (Eds.), *After heritage. Critical perspectives on heritage from below* (pp. 1–21). Edward Elgar Publishing. https://doi.org/10.4337/9781788110747.00007.

van Oers, R. (2015). Cultural heritage management and sustainability. In M.-T. Albert (Ed.), *Perceptions of sustainability in heritage studies* (pp. 189–202). De Gruyter. https://doi.org/10.1515/9783110415278-016.

Oppio, A., Bottero, M., & Ferretti, V. (2017). Designing adaptive reuse strategies for cultural heritage with choice experiments. In S. Stanghellini, P. Morano, M. Bottero, & A. Oppio (Eds.), *Appraisal: From theory to practice. Results of SIEV 2015* (pp. 303–315). Springer Verlag. https://doi.org/10.1007/978-3-319-49676-4_23.

Pereira Roders, A. (2019). The Historic Urban Landscape approach in action: Eight years later. In A. Pereira Roders, & F. Bandarin (Eds.), *Reshaping urban conservation. The historic urban landscape approach in action*. Springer Singapore. https://doi.org/10.1007/978-981-10-8887-2.

Pintossi, N. (2022). *Challenges and potential solutions for cultural heritage adaptive reuse: A comparative study employing the historic urban Landscape approach (bouwstenen)*. Eindhoven University of Technology. https://research.tue.nl/files/205757720/20220706_Pintossi_hf.pdf.

Pintossi, N., Ikiz Kaya, D., & Pereira Roders, A. (2021a). Assessing cultural heritage adaptive reuse practices: Multi-scale challenges and solutions in Rijeka. *Sustainability, 13*(7), 3603. https://doi.org/10.3390/su13073603

Pintossi, N., Ikiz Kaya, D., & Pereira Roders, A. (2021b). Identifying challenges and solutions in cultural heritage adaptive reuse through the historic urban landscape approach in Amsterdam. *Sustainability, 13*(10). https://doi.org/10.3390/su13105547. Art. 4250495.

Pintossi, N., Ikiz Kaya, D., & Pereira Roders, A. (2023). Cultural heritage adaptive reuse in Salerno: Challenges and solutions. *City, Culture and Society, 33*, Article 100505. https://doi.org/10.1016/j.ccs.2023.100505

Plevoets, B., & van Cleempoel, K. (2019). Adaptive reuse of the built heritage. In *Adaptive reuse of the built heritage*. Routledge. https://doi.org/10.4324/9781315161440.

Publications Office of the European Union. (n.d.). 7206 Europe. Retrieved March 8, 2023, from: http://eurovoc.europa.eu/100277.

Remøy, H. (2014). Preserving cultural and heritage value. In S. J. Wilkinson, H. Remøy, & C. Langston (Eds.), *Sustainable building adaptation: Innovations in decision-making* (Vol. 9781118477, pp. 159–182). Wiley Blackwell. https://doi.org/10.1002/9781118477151.ch8.

Remøy, H., & Van Der Voordt, T. (2014). Adaptive reuse of office buildings into housing: Opportunities and risks. *Building Research & Information, 42*(3), 381–390. https://doi.org/10.1080/09613218.2014.865922

Riggs, W., & Chamberlain, F. (2018). The TOD and smart growth implications of the LA adaptive reuse ordinance. *Sustainable Cities and Society, 38*, 594–606. https://doi.org/10.1016/j.scs.2018.01.007

Rijeka. (n.d.). Retrieved March 8, 2023, from: https://en.wikipedia.org/wiki/Rijeka.

Rijeka 2020. (n.d). About us: Meeting place. Retrieved January 21, 2021, from: https://dyxvzweoxwd33kn2xityw2ohfa–rijeka2020-eu.translate.goog/projekti/rihub/o-nama/.

Robertson, I. J. M. (Ed.). (2016). *Heritage from below*. Routledge. https://doi.org/10.4324/9781315586632.

Rosetti, I., Bertrand Cabral, C., Pereira Roders, A., Jacobs, M., & Albuquerque, R. (2022). Heritage and sustainability: Regulating participation. *Sustainability, 14*(3), 1674. https://doi.org/10.3390/su14031674

Salerno. (n.d.). Retrieved March 8, 2023, from: https://en.wikipedia.org/wiki/Salerno.

Sesana, E., Gagnon, A., Bertolin, C., & Hughes, J. (2018). Adapting cultural heritage to climate change risks: Perspectives of cultural heritage experts in Europe. *Geosciences, 8*(8), 305. https://doi.org/10.3390/geosciences8080305

Shipley, R., Utz, S., & Parsons, M. (2006). Does adaptive reuse pay? A study of the business of building renovation in Ontario, Canada. *International Journal of Heritage Studies, 12*(6), 505–520. https://doi.org/10.1080/13527250600940181

Smith, L. (2006). *Uses of heritage*. Routledge. https://doi.org/10.4324/9780203602263

Smith, L. (2012). Discourses of heritage: Implications for archaeological community practice. *Nuevo Mundo Mundos Nuevos*. https://doi.org/10.4000/NUEVOMUNDO.64148

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research, 104*, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

Steinberg, F. (1996). Conservation and rehabilitation of urban heritage in developing countries. *Habitat International, 20*(3), 463–475. https://doi.org/10.1016/0197-3975(96)00012-4

Stipanović, C., Rudan, E., & Zubović, V. (2019). Cultural and creative industries in urban tourism innovation: The example of the city of Rijeka. *ToSEE – Tourism in Southern and Eastern Europe, 5*, 655–666. https://doi.org/10.20867/tosee.05.47

Tan, Y., Shen, L.-Y., & Langston, C. (2014). A fuzzy approach for adaptive reuse selection of industrial buildings in Hong Kong. *International Journal of Strategic Property Management, 18*(1), 66–76. https://doi.org/10.3846/1648715X.2013.864718

Tan, Y., Shuai, C., & Wang, T. (2018). Critical success factors (CSFs) for the adaptive reuse of industrial buildings in Hong Kong. *International Journal of Environmental Research and Public Health, 15*(7). https://doi.org/10.3390/ijerph15071546

Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology, 8*(1), 45. https://doi.org/10.1186/1471-2288-8-45

Turner, M. (2013). UNESCO recommendation on the historic urban landscape. In *Understanding heritage* (pp. 77–88). DE GRUYTER. https://doi.org/10.1515/9783110308389.77.

Tweed, C., & Sutherland, M. (2007). Built cultural heritage and sustainable urban development. *Landscape and Urban Planning, 83*(1), 62–69. https://doi.org/10.1016/j.landurbplan.2007.05.008

Un Environment and International Energy Agency. (2017). Towards a zero-emission, efficient, and resilient buildings and construction sector. *Global Status Report*, 2017. https://www.worldgbc.org/sites/default/files/UNEP 188_GABC_en %28web%29.pdf.

UNESCO. (2005). Vienna memorandum on world heritage and contemporary architecture - managing the historic urban landscape. *World Heritage Centre*. http://whc.unesco.org/uploads/activities/documents/activity-47-2.pdf.

UNESCO. (2011). Recommendation on the historic urban landscape. https://whc.unesco.org/document/172639.

UNESCO. (2013). The hangzhou declaration: Placing culture at the heart of sustainable development policies. http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/CLT/images/FinalHangzhouDeclaration20130517.pdf.

United Nations. (2017). Resolution adopted by the general assembly on 6 july 2017. Work of the statistical commission pertaining to the 2030 agenda for sustainable development (A/RES/71/313). https://documents-dds-ny.un.org/doc/UNDOC/GEN/N17/207/63/PDF/N1720763.pdf?OpenElement.

United Nations General Assembly. (2015). Transforming our world: The 2030 Agenda for sustainable development. https://sustainabledevelopment.un.org/content/documents/21252030 Agenda for Sustainable Development web.pdf.

UNESCO World Heritage Convention. (n.d.). Seventeenth-century canal ring area of Amsterdam inside the singelgracht Retrieved March 8, 2023, from: https://whc.unesco.org/en/list/1349/.

Urošević, N. (2015). Culture and sustainable urban development: Valuing a common European heritage in Croatian candidates for the ECOC. In B. Lundgren, & O. Matiu (Eds.), *Culture and growth: Magical companions or mutually exclusive counterparts, 8th UNEECC conference proceedings* (Vol. 7, pp. 127–138). Umea, Sweden: Lucian Blaga University of Sibiu Press, 23–24 October 2015.

Vardopoulos, I. (2019). Critical sustainable development factors in the adaptive reuse of urban industrial buildings. A fuzzy DEMATEL approach. *Sustainable Cities and Society, 50*, Article 101684. https://doi.org/10.1016/j.scs.2019.101684

Vecco, M. (2010). A definition of cultural heritage: From the tangible to the intangible. *Journal of Cultural Heritage, 11*(3), 321–324. https://doi.org/10.1016/j.culher.2010.01.006

Veldpaus, L., Fava, F., & Brodowicz, D. (2020). Mapping of current heritage re-use policies and regulations in Europe. https://openheritage.eu/wp-content/uploads/2020/09/Brief-WP1-overview.pdf.

Vrusho, B., & Pashako, F. (2018). Adaptive reuse of underused industrial sites, case study: The superphosphate of lac. In G. Amoruso (Ed.), *Putting tradition into practice: Heritage, place and design* (Vol. 3, pp. 1097–1112). Springer International Publishing AG. https://doi.org/10.1007/978-3-319-57937-5_113.

WHITRAP; City of Ballarat. (2016). *The HUL guidebook: Managing heritage in dynamic and constantly changing urban environments. A practical guide to UNESCO's recommendtion on the historic urban landscape*. WHITRAP. http://historicurbanlandscape.com/themes/196/userfiles/download/2016/6/7/wirey5prpznidqx.pdf.

Wickham, H. (2014). Tidy data. *Journal of Statistical Software, 59*(10), 1–23. https://doi.org/10.18637/jss.v059.i10

Wildman, A., Izulain, A., Garzillo, C., Ikiz Kaya, D., van de Sandt, T., Telemo, V., Ohlén, B., Stanojev, J., Gustafsson, C., Bosone, M., Micheletti, S., Gravagnuolo, A., Lupacchini, R., Debevec, M., Acri, M., Dobričić, S., & Belošević Romac, S. (2021). Deliverable 5.5 CLIC pilot local action plans: One approach. *Diverse Outcomes*. https://www.clicproject.eu/wp-content/uploads/2021/05/CLIC-D5.5-CLIC-Pilot-Local-Action-Plans-One-Approach-Diverse-Outcomes.pdf.

Wilkinson, S. J. (2018). The context for building resilience through sustainable change of use adaptation. In S. J. Wilkinson, & H. Remøy (Eds.), *Building urban resilience through change of use* (pp. 1–20). Wiley Blackwell. https://doi.org/10.1002/9781119231455.ch1.

Wilkinson, S. J., Remøy, H., & Langston, C. (2014). Designing for future adaptive reuse. In S. J. Wilkinson, H. Remøy, & C. Langston (Eds.), *Sustainable building adaptation* (pp. 250–272). Wiley. https://doi.org/10.1002/9781118477151.ch12.

Yung, E. H. K., & Chan, E. H. W. (2012). Implementation challenges to the adaptive reuse of heritage buildings: Towards the goals of sustainable, low carbon cities. *Habitat International, 36*(3), 352–361. https://doi.org/10.1016/j.habitatint.2011.11.001

Zang, X., van Gorp, B., & Renes, H. (2020). Beer as cultural lubricant: Brewing tsingtao, regenerating qingdao. In *Tourism, cultural heritage and urban regeneration* (pp. 39–55). https://doi.org/10.1007/978-3-030-41905-9_3