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# Spolia Reuse in Contemporary Architectural Design: Applications and Significance

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## Abstract

The strategy of reusing materials and architectural elements in new buildings and locations after extracting them from previous structures and sites, known historically as "spolia," is now an important approach in contemporary architectural project design. This strategy showcases a balance between tradition and innovation, transforming heritage elements into new architectural pieces that carry contemporary artistic and cultural values. The purpose of this research is to uncover the forms of this practice and the meanings or purposes associated with it, within a theoretical framework that serves as a tool for designers when dealing with such projects. The research reviews studies on the subject and extracts the most important terms, then moves on to analyse several worldwide case studies of contemporary projects that have applied the concept of spolia reuse. The purpose is to enrich the framework by highlighting the reused architectural elements and their new functions, as well as the meanings and interpretations linked to these cases. The research identifies key indicators, including respect for heritage, creative artistic expression, sustainability, and recycling. The aim of the article is to shed light on the importance and effectiveness of using the concept of spolia reuse in the design of modern architectural projects and to promote a sustainable and innovative architectural culture.

**Keywords:** Spolia, Reuse of Heritage, Respect for Heritage, Open-Ended Meanings, Heritage Recycling, Sustainability, Community Participation.

## إعادة استخدام Spolia في التصميم المعماري المعاصر: التطبيقات والأهمية

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الخلاصة:

تعد استراتيجية إعادة استخدام المواد والعناصر المعمارية في مبان ومواضع جديدة بعد اقتلاعها من مباني ومواقع سابقة، والمعروفة تاريخيا بـ "spolia"، نهجًا مهمًا في تصميم المشاريع المعمارية المعاصرة. إذ تظهر هذه الاستراتيجية توازنًا بين التقليد والابتكار، حيث يتم تحويل العناصر التراثية إلى قطع معمارية جديدة تحمل قيمًا فنية وثقافية معاصرة. يهتم البحث الحالي بكشف أشكال ظهور هذه الممارسة وأهم الدلالات أو الأغراض التي صاحبتها، وفق إطار نظري يصلح أن يكون أداة بين أيدي المصممين عند التعامل مع هكذا مشاريع. يعمد البحث الى مراجعة الدراسات التي تناولت الموضوع ويستخلص منها أهم المفردات، ثم يتحول الى تحليل عدة حالات دراسية لمشاريع معاصرة طبقت مفهوم استخدام spolia، مما يبرز العناصر المعمارية المعاد استخدامها ووظائفها الجديدة، بالإضافة إلى الدلالات والتفسيرات التي ترتبط بهذه التجارب. توصل البحث إلى أهم الدلالات فشملت احترام التراث، التعبير الفني الإبداعي، الاستدامة وإعادة التدوير، تهدف هذه المقالة الى المساهمة في إلقاء الضوء على أهمية وفعالية استخدام مفهوم spolia في تصميم المشاريع المعمارية الحديثة وتعزيز الثقافة المعمارية المستدامة والمبتكرة.

## 1. Introduction

The concept of spolia dates back to ancient architectural practices. The term spolia is derived from Latin, meaning “spoils” or “plunder.” This practice involves the reuse of materials or architectural elements from previous structures in new buildings. It has been observed across different civilizations throughout history. Many studies shed light on these

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historical practices, such as studies on Egyptian architecture [1], [2], a study on the use of spolia in Mesopotamian architecture [3], and studies on the Romans and their use of spolia [4], [5]. In addition, studies have explored the symbolic meanings of this practice when a new doctrine competes with a previous one, such as studies [5], [6] on the use of pagan Roman spolia in Christian architecture, and the study [7] on the use of Roman and Christian spolia in Islamic architecture. The reasons and motivations for this reuse have been attributed to practical, economic, symbolic, or cultural considerations [3]. Today, this practice forms an important aspect of contemporary architectural design and heritage conservation, as well as being linked to ideas of resource utilization and longevity.

Gradually, some initiatives and companies are emerging to supply this growing market, including Rotor Deconstruction, a leading Belgian company in the field of reused (recovered) building materials [8]. Additionally, a stone archive has been established in a storage facility in West London, containing an organized office facade where each piece of stone is cataloged by the building it originated from, the layer it was part of, and its location on the building facade. The storage facility contains completely dismantled stone facades, awaiting reuse on-site [9]. In Rome, the project The Library of Spolia has been established, developing a Spolia library and catalog. It is a new public institution for the reuse of architectural parts in Rome and a set of instructions on how to reuse them [10].

In turn Various projects around the world apply the concept of "spolia" by reusing old architectural elements and materials in innovative and sustainable ways, adding new dimensions to the design process. This research aims to explore and analyse these applications and highlight the contemporary interpretations and drive of this concept. A Descriptive analytical method is followed in the theoretical part of the article, including a review of the definitions of the concept of spolia and its uses and the extraction of the indicators of motives and purposes of spolia reuse in contemporary design to formulate the framework of indicators. Using the extracted indicators, authors will then examine and a set of worldwide case studies that have applied the concept of "spolia" in architectural design, to help enrich the theoretical framework by analysing the reused elements and materials in each case, along with their original and new functions. The research will also explore the contemporary meanings and interpretations of each case and its relevance in the context of architectural design and heritage conservation.

## 2. The Term Spolia and Its Uses

The roots of the term "spolia" are found in the Greek and Roman Antiquities Dictionary, as documented in "Greek and Roman Antiquities" (1890). In this dictionary, there were four terms commonly used to refer to spoils captured in war: praeda, manubiae, exuviae, and spolia. While the term "praeda" has a broader meaning, encompassing all types of spoils, "spolia" specifically refers to armor and weapons that could be preserved and displayed. The Romans had a tradition of displaying military spoils, works of art, and even building components taken from conquered territories in plain view of the city of Rome and its public buildings—to demonstrate the dominance of the Roman Empire. Spoils acquired through individual prowess were considered the rightful property of the victorious warrior and were often prominently displayed in their residences. [11] The term "spolia" was coined as a term for reused artifacts by archaeologists active in Rome around 1500. This use of "spolia" goes back to medieval Latin, where the term retained its classical military meaning of "things taken by force." In medieval texts, reused items or materials are referred to by their proper names, such as "columns," "marbles," "sarcophagi," etc. [12]. In other fields, the term "spolia" has not only been used for physical objects but also appeared in literature. For example, in Sumi's study "Poetry and Architecture: A Dual Tradition in the Siniya of Ahmad Shawqi," published in [13], the author uses the term "spolia" to express the reuse of vocabulary from poetic and literary texts across different periods. For example, vocabulary from Abbasid texts appears in modern classical Arabic poetry. The study specifically addresses how the poet Ahmed Shawqi reused rhymes from Al-Buhturi's Siniyat, which he opposed, as it was shown that Shawqi reused 45 words from Al-Buhturi's rhymes in 56 verses, which is equivalent to 80% of the verses of his poem [13].

In the realm of music, Brett David Potter has discussed the recycling of images, sounds, and aesthetics, stating: "Being an artist is not about creating from nothing, but about reinterpreting and reshaping pre-existing art forms, nature, and culture, including the stories and images that shape and guide our lives, into new and often radically different forms and shapes". The process of drawing on pre-existing sources, even when one puts one's individual vision to creative use, is often referred to as spolia. 'Artists have always creatively engaged with their historical, social, and aesthetic contexts to transform pre-existing stories into new and unexpected forms, from John Milton's rewriting of Genesis in Paradise Lost to Shakespeare's notorious plot thefts to popular music, which exists as a culture of constant recycling and interpretation' [14].

Thus, the meaning of spolia reuse shifted from military and violent connotations related to Romans, to connotations more related to purpose-oriented use and benefit. And from the limit of the physical to the encompassing of the non-physical.

## 3. Contemporary Architectural Practice of Reusing Spolia

This section addresses literature on the contemporary implications of the concept of Spolia to build a theoretical framework around this practice.

### 3.1 Theoretical Framework on the Practice of Spolia and Its Implications

In the fields of archaeology, art history, and history, Spolia has traditionally been studied as a phenomenon of the past. Today, the reuse of salvaged building components and materials has become

fundamental [15]. Theorists have presented perspectives that this research will extract as follows:

Dale Kinney discusses the "dual historical perspective on the concept of Spolia," which Kinney himself previously formulated. He defends a "triple perspective," noting that for the Arch of Constantine: alongside the viewer who observed the reliefs in their original Trajanic context, and the Constantine viewer who saw them on the arch, there is also a reading of the contemporary viewer today. Based on Richard Brilliant's concepts of spolia in se and spolia in re — where the former refers to the physical reuse of elements and the latter to the use of images, decorations, or patterns without reusing materials — Paolo Liverani adds a third type, that is spolia in me. This type is described as "subjective, dictated by an agreement accepted by the observer or reader" [16]. The main distinction made is between two concepts related to the reuse of historical elements in 19th-century design:

Spolia in re: This refers to the stylistic reuse of elements from the past in new buildings. The document states that from the 1867 World's Fairs onwards, "national pavilions took the form of replicas and creative interpretations of the historical architecture of the countries they represented. The furnishings displayed inside their buildings or for sale at the corresponding trade fairs followed similar patterns." This is described as a form of "spolia in re" the reuse of the past in contemporary architecture and decoration [17].

Spolia in se: refers to the direct material reuse of historical parts and objects. The study notes that "a lesser-known fact is that spolia in se, i.e., the reuse of materials, was also a key element in many pavilions at the 19th-century World's Fairs." It gives the example of the Egyptian pavilions, which featured authentic furnishings, as well as decorations and samples that reused historical parts in modern frames. When the pavilions were later dismantled, these physical parts were often reused elsewhere, such as in the reception hall of the Vienna Exhibition of 1873 [17].

Thus, three types of spolia are clarified: material spolia involving elements and materials, immaterial spolia involving the use of previous ideas and patterns, and interpretive spolia depending on the reader's perspective.

The study [18] shows that the concept of spolia challenges traditional notions of authenticity and emphasizes the openness and flexibility of architectural design. The use of heritage remnants in contemporary architecture goes beyond merely preserving or restoring historical structures. It involves the deliberate integration of elements from different time periods, styles, or cultural contexts into new architectural compositions. This process of reuse and appropriation creates a dialogue between past and present, allowing for the reinterpretation and recontextualization of historical elements within a contemporary framework. This usage provides diverse opportunities for meaning and significance, enabling exploration of historical, cultural, and aesthetic layers within the design, adding depth and complexity to the architectural composition. Through the incorporation of spolia, architects can create links between different time periods, challenge established symbols and classificatory structures, and evoke a sense of continuity and heritage [18]. Additionally, the concept of Spolia in contemporary architecture highlights the importance of sustainability and ingenuity. By reusing existing architectural elements, materials, or artworks, it reduces waste and promotes a more environmentally conscious approach to building [18].

The study [19] discusses two contemporary purposes of the practice of spolia: the search for new forms of decoration and the renewed interest in place. In relation to the search for new forms of decoration, the study notes a growing interest in incorporating spolia to provide stylistic touches without the need to develop a new decorative vocabulary, allowing architects to use existing architectural elements to enhance the aesthetic appeal of their designs. In addition, the study highlights the growing interest in place as a motivation for the use of spolia in architecture, as the incorporation of old elements into new projects can create a connection to the history and context of the place. The study also indicated that the use of spolia in contemporary architecture goes beyond aesthetic reasons and includes economic and creative considerations, where different materials are assembled in an innovative manner, "Bricolage" to create unique and unconventional designs. The study emphasizes that incorporating spolia in contemporary architecture represents a creative process involving the blending and innovation in reusing existing architectural elements [19].

Rabaça's study [18] entitled "Spolia and Open Work" discusses the post-structuralist concept of "open work" as a conceptual framework for understanding spolia. It presents the term Open-endedness which refers to the idea that a work of art or piece of architecture can be open to multiple interpretations and meanings, including the disruption of existing symbols and structures. [18] proposes the use of structural linguistics as a methodological tool to analyze spolia reuse by drawing parallels between language and the reuse of architectural elements. The study explores the semantic openness of spolia and the syntactic structure through which signs and meanings are created, where a referent consists of a signifier and a signified, indicating an intended communicative purpose and thus the intention of meaning. Study [18] discusses the communicative potential of spolia, as illustrated by architect Carlo Scarpa's use of a marble portal in his design for the entrance to the Tolentini Monastery in Venice, shown in Figure (1). The portal was found in the monastery's refectory during renovations in the 1960s. When Scarpa was commissioned to design the entrance, he decided to place the portal on the ground, next to the entrance, and transform it into a basin. By disrupting the verticality and function of the portal, Scarpa transformed the watercourse from a real portal into a metaphorical one. The inverted pyramid shape of the stepped concrete layers containing the water conveys a sense of depth, while the reflection of the water emphasizes the idea of a threshold. The rectangle containing the grass, which defines a dark level, may

convey a darker interior space through a small, partially open portal. He transformed it into a symbol, the "gate," exploring concepts such as threshold and depth

**Figure (1):** Carlo Scarpa, Istrian Marble Gate in the Courtyard of the Entrance to the Institute of Architecture in Venice (IUAV), Venice, 1984-1985," Source: [18] Rabaça, A. (2022).

[18] Also discusses the relationship between spolia and the system in which it is inserted. The study acknowledges that when ancient elements are inserted into a structural and symbolic system different from the original work, the meaning of spolia changes. This shift in the system poses challenges and possibilities for contemporary architectural design. Furthermore, the study examines the linguistic aspects of spolia, linking it to concepts such as intertextuality, significance, citation, and quotation. It highlights the dialectical relationship between structuralism and poststructuralism in understanding spolia.

The study argues that incorporating ancient elements into new buildings revives the iconic meaning and craftsmanship associated with these materials, thereby contributing to the preservation of cultural identity.

The study [20] argues that the reuse of architectural elements is an effective strategy for the preservation of cultural and architectural heritage. This integration illustrates how architectural remains and creative thinking are used in the redesign of cities and historic sites, promoting respect for heritage and contributing to the preservation of cultural identity in communities and cities.

Furthermore, the reuse of architectural remains is a step towards environmental sustainability, as it reduces the need for new natural resources and reduces construction and demolition waste. The study [21] indicates that the reuse of traditional building materials has proven to be highly valuable in the long term. This practice has consistently demonstrated the inherent value of traditional raw materials and their products in addressing sustainability issues, in the broader sense of preserving material and non-material resources for future generations. Throughout the history of construction, the symbolic value of spolia has been compatible with recycling practices, demonstrating an intrinsic awareness of reuse as a means of reducing material and energy waste. Today, sustainability is rarely viewed from a long-term perspective, and when it is, the approach tends to be theoretical. However, in the past, it was a common and necessary aspect of building management when material waste was a forbidden luxury. The study [15] proposes to expand the concept of waste in contemporary architecture and emphasize its role in conveying heritage values and promoting sustainability. It focuses on the use of sustainable and historical materials in modern designs, reflecting the interest in balancing heritage preservation with contemporary architectural needs.

### 3.2 Extracting the Theoretical Framework:

Based on previous studies, three main dimensions can be identified for the purposes and implications of the reuse of spolia at present, which will be identified in the following.

#### 3.2.1 Respect to Heritage

This dimension is represented by two purposes:
First purpose: Preserving heritage through reviving the iconic meaning and craftsmanship associated with the reused elements and materials and contributing to the preservation of cultural identity. Preserving heritage calls for attention to various types of heritage values, the followings are those which could be embodied in spolia reuse [22].

- Historical value: represents the importance of the site or element in terms of the historical events or periods it witnessed.
- Aesthetic/Architectural Value: Includes consideration of the shape, scale, colour, texture and materials of the fabric, as well as the smells and sounds associated with the place and its use.
- Contextual Value: heritage displays complementarity with the urban scene.
- Scientific/ Academic Value: this depends on the importance of relevant data in terms of its rarity, quality or representational quality.
- Social Value: the reflection of thought, belief, or social values of interest to society (perpetuating a sense of identity).
- Symbolic/ Memorial Value: reflects the memory of the place in relation to the people associated with it, provokes events of the past in the memory and collective identity.

Second purpose: Creating a connection with the past and evoking a sense of continuity by creating a connection with the history and context of the place. It includes exploring the historical, cultural and aesthetic layers within the design, as well as integration with the urban environment. Within this view, the new design should be in line with the architectural character of the site and blend with the urban surroundings. [23] using spolia of building material which matches the context is a way of achieving this connection.

The study [24] highlights the importance of preserving heritage in creating a connection with the past. Individuals directly perceive stimuli they have previously encountered, which are stored in their memory as part of their past experiences. This process is linked to the person rather than the perceived object, and is connected to personal experiences and expectations, meaning the stimuli stored in their memory within the circle of their previous experiences. In other words, it generates a sense of new stimuli, experiences, and triggers [25]. These memories

(historical or family stories related to a place where a person was born or lives) develop over time. This factor is characterized by a strong and persistent sense, which increases with relatively long stays, being stronger in communities where individuals spend more time in the same place, thus making the place an integral part of personal history. Consequently, autobiographical relationships require time to develop, making them realistic connections. In relation to heritage buildings, time emerges as an important factor, as the longer a building exists, the more opportunities there are for generations of people to accumulate memories with the building. Additionally, the building itself may be associated with historical events that have significance for the community, increasing the likelihood of a psychological connection between the building and its occupants. People also tend to connect themselves with heritage or historical places they visit and document their memories there, especially when the visit holds personal significance. [24].

**3.3.2 Creating innovative contemporary design or (creative artwork), which also involves the ensuing two purposes**

First: Introducing formal touches without the need to develop new decorative vocabulary. This adds depth and complexity to the composition and architectural structure. Therefore, integrating waste into contemporary architecture represents a creative process that involves mixing and innovation according to the concept of bricolage.

Ornamentation has faced much criticism and review in architectural discourse. However, it is emphasized that ornamentation in all its forms brings architecture closer to the public. "Whether we are talking about the applied classicism of the postmodern era or the thin shell of decorative facades resulting from digital production, ornamentation today is seen from a distance. This alienation is the essence of the problem - a problem because ornamentation is the language through which architecture communicates with a wider audience, and every deviation adds another degree of separation between the profession and the public [26]. Therefore, resorting to decorative and artistic elements from heritage becomes a bridge to bring architectural work closer to its audience.

Second: Achieving an open-connotation artwork that carries meanings and connotations from creation throughout history, consisting of a signifier and a signified, using a structural and symbolic palette different from its origin, and the design is built on an intentional communicative basis, and thus the connotation means intent. In this context, [27] describes architecture that tells history as semiotic architecture, where architecture is a language of communication between the creative self of the architectural work and the recipient of this work, where architecture exists to copy texts and express them through the overlapping of blocks, deleting some elements, employing colors, and changing some basic colors to be able to take on a specific meaning for the recipient. This architecture is aesthetically evaluated through the quality of interpretation and its ability to convey meaning and link events that have emotional impact on the recipient. [27]

Semiotics has been introduced to architecture with postmodernism, being the science of signs [28], and Schultz sees it as the science of studying history and symbols [29]. The pioneers of semiotics have developed models for semiotic analysis, and the most important of these methods are:

The "binary model" by Ferdinand de Saussure: including the signifier and the signified, where the signifier is "the form that the sign takes," and the signified is "the concept to which it refers" [30]. In architecture, the signifier (sign) is the architectural form or shape, while the signified (meaning) is the meaning evoked by that form.

The "triadic model" by Charles Sanders Peirce's Model: consisting of three elements; the Representamen (the sign vehicle) meaning the form that the sign takes, the Interpretant (the interpretation of the sign) which is the meaning that the sign conveys, and the Object (the referent) being the thing to which the sign refers.[31]

Peirce's contribution in classifying signs into the following three types, is very pertinent [31]:

Symbolic: There is no resemblance between the signifier and the signified; the relationship is purely arbitrary, such as with letters and numbers.

Iconic: There is a resemblance between the signifier and the signified, where the signifier possesses attributes of the signified (color, appearance, texture, sensation, smell), such as drawings, sounds, maps, and gestures.

Indexical: There is a direct relationship between the signifier and the signified, either material or causal, and this connection can be perceived or inferred from natural signs such as smoke, thunder, and footprints.

Thus, through the concept of Spolia, creative expression in architectural design is enabled by relying on various types of signs. The use of architectural elements can be manipulated to offer open-ended meanings, according to the concept of interpretive spolia (Spolia in me).

**3.3.3. Sustainability:**

Two main purposes can be noted within the view of sustainability in spolia reuse:

Environmental Sustainability: Where the reuse and recycling of architectural materials in new locations reduces resource exploitation and minimizes demolition and its waste.

Social Sustainability: By preserving individual and community memory and stimulating interaction, sharing, and community development.

Regarding environmental sustainability, study [32] indicates that the restoration of built heritage can serve not only to preserve historical records of the past but also to provide models for new sustainable architecture. Historical architecture, by its nature, is generally sustainable and resilient. It demonstrates how local resources can be used thoughtfully and rationally in new construction. For this reason, it can inspire low-energy solutions necessary to address the current climate crisis. Restoration projects allow us to analyse the fabric of historical buildings, understand the materials used, how they were transformed and

assembled, and how they provided the best response to usage needs and natural elements. Vitti's study [32] explores how preserving and analysing historical buildings allows us to interpret the complex and detailed reality of regional architecture. By revisiting the analysis of historical construction as a fundamental element for understanding architecture and adopting manual graphic records as a tool for expressing the complexity of the building's fabric, it is possible to identify local building traditions and inspire new sustainable architecture.

Unblistered brick is part of architectural history and has undergone much technological development. If renewing a building is no longer feasible, recycling the brick as a material is possible. This affirms the continuity of development and contributes to cultural and environmental sustainability. [32]

In the field of social sustainability, the concept of collective memory of the community becomes prominent. Collective memory [34] is defined as: "The recall of images that have been organized either chronologically or according to the names we give them, and the meaning attributed to them within our group." Numerous studies have highlighted the relationship between collective memory and heritage, where memory plays an important role in shaping both historical and new heritage sites. Study [33] suggests that appropriating spolia material or elements in new buildings can relate to cultural values and intellectual motivations, including the deliberate connection of the proposed building to the historical building through, while [32] argues that contemporary architecture built from spolia material partially conveys the heritage of previous architecture or what it might represent.

Hence, spolia reuse can be seen as an effective tool for enhancing community engagement and preserving collective memory. By reusing old architectural materials, communities can rebuild their stories and heritage in a way that makes them an integral part of daily life and modern architectural culture.

Based on the preceding discussion, the research establishes the preliminary theoretical framework for the indicators of interpretations & purposes of reusing architectural heritage spolia as a contemporary practice as illustrated in Table (1), which is the first research objective.

**Table (1):** "Research Vocabulary for Interpretations & Purposes of Reusing Architectural Heritage Materials," Source: Authors

| ***Indicators*** | ***Vocabulary*** | ***Secondary Vocabulary*** | ***Description*** |
|---|---|---|---|
| *Respect for Heritage* | *Preservation of Heritage* | *Preservation of Aesthetic Values* | *illustrating the decorative and artistic details of reused architectural elements, enhancing their visual beauty and adding historical authenticity to modern buildings.* |
| | | *Preservation of Scientific Values* | *Accurate documentation of the rarity & craftsmanship and knowledge that produced the architectural element used.* |
| | | *Preservation of Historic & Symbolic Values* | *Religious, national, or historical values symbolizing specific figures or events.* |
| | *Connecting with heritage* | *Integration with the heritage context* | *Effective and harmonious integration between historical architectural elements and modern designs within a heritage context, to create an urban environment that enhances the place's aesthetics and preserves its heritage in a cohesive and renewed manner.* |
| | | *Reminding of another area for different reasons* | *Using elements or materials recovered from another area to enhance cultural and historical connections and preserve local identity.* |
| *Creative Artistic Work* | *Adding formal and decorative complexity* | | *Using the element without changing its usual condition, i.e., placing it in a traditional relationship in the new location. giving that the elements have rich decorative and aesthetic qualities.* |
| | *Openness of meanings and connotations* | | *By displacing the element from its traditional or usual condition, when employed in the new location.* |
| *Sustainability* | *Environmental Sustainability* | *Resource Utilization* | *Utilizing elements and materials with intrinsic value that enhance their material worth.* |
| | | *Reduction of Demolition Waste* | *Using elements and materials suitable for recycling, even if they do not have intrinsic value.* |
| | *Social Sustainability* | *Preserving individual and communal memory* | *Using elements and materials that evoke and remind the local community (or individuals) of a previous place or event of significance in their lives.* |
| | | *Encouraging interaction and sharing* | *Strengthening interaction and a shared sense of connection among those engaging with the place where Spolia practices have been applied.* |
| | | *Enhancing local community awareness of heritage* | *Presenting architectural elements prominently in the new design to capture the attention of the observer.* |

## 4. Case studies of contemporary spolia reuse

The research moves on below to present a group of global case studies that adopted the reuse of architectural heritage spolia, including elements and materials to investigate the forms of emergence of the vocabulary of the theoretical framework, and to enrich it with the details produced by these experiences. A table will be organized for each project summarizing the reuse experience and extracting the purposes for which it was used.

### 4.1. The General Bank in Brussels

It is the former head office of Banque Generale (currently BNP Paribas), which is a large Belgian bank. The building was designed by architect Hugo Van Kuyck (1902-1975) in collaboration with Pierre Gillissen. Pierre Guilissen (1920-1989) and was built between 1968-1971.

The interiors of the public areas (reception hall, entrance, elevator halls), directors' offices, and strong room were designed by Jules Wabs (1919-1974). The staff restaurant was designed by Jules Wabbes (1928-2007). The interiors designed by Wabbes and Gevers

were characterized by "extraordinary richness in materiality and craftsmanship", where sensitive lighting of the spaces enhances the appearance of materials and textures. After more than 30 years, the building no longer met modern office requirements, so demolition was announced in 2013 despite the building and interiors being valuable examples of post-war design. This sparked debate about heritage value and environmental impact, however, although not protected as a monument, parts of the interiors were preserved and reused in new projects, as decomposition and reuse of the interior was seen as a potential conservation strategy. The building's interiors were carefully analyzed by Rotor, a company that analyzed the interior of the General Bank and then reused its fragments in new projects. Uprooted elements included furniture, granite tiles from the floors and walls (some very large), suspended ceiling elements, and lighting fixtures. Doors, doorknobs, handrails, coat hangers, and signs. 230 tons of materials were reused - about 0.2% of the building's total mass. Because the dismantling and fragmentary reuse of General Bank's interiors was explicitly framed as a means of heritage preservation. [35]

**Figure (4a):** The building before demolition, with the adjacent Palace of Fine Arts and across from Ravenstein Gallery. (Right) The Bank Restaurant by Christopher reused wooden ceiling elements in new designs. (Left) Photos published in Décor Magazine, November.

**Figure (4b):** Wood elements of the cafeteria before dismantling. Photography by J. van Hevel. Brussels. Urban©. (Right) Parts of the Wabbes cafeteria in the collection at the Design Museum in Ghent. ©Design Museum Ghent.

**Table (2):** Summary and description of the experience of the General Bank in Brussels," Source: Author.

| Semantics/interpretation | Its function after reuse | Its original function | Materials | Its function after reuse | Its original function | Elements |
|---|---|---|---|---|---|---|
| *Respect for heritage, environmental sustainability.* | *The wooden roof material was reused in new designs* | *It was used as a finishing material for the restaurant ceiling, and as teak wall panels in the restaurant space* | *The wood* | *Several uses have been proposed, including preservation in museums and employment in new interior designs* | *It was an essential part of the bank's original interiors.* | *The doors* |
| *Respect for heritage, environmental sustainability.* | *Reuse it in new designs* | *Window glass* | *The glass* | *It has been used in new interior designs* | *It was an essential part of the bank's original interiors.* | *Cabinets Lighting installations* |
| *Respect for heritage, environmental sustainability.* | *Floor finishing material in another new design* | *Finishing material for floors* | *Travertine stone* | *Several uses have been proposed, including preservation in museums and employment in new interior designs* | *Natural lighting sources for the bank* | *Windows* |

### 4.2: Cubo House / terrace

Existing heritage-listed Victorian terrace house Designed by Phooey Architects Location: Melbourne, Australia Year: 2013 Area: 410sqm PHOOEY Architects converted an existing heritage-listed Victorian terrace house from a two-storey building in Melbourne to a bespoke, sustainable home for a young family, pieces of material salvaged from demolition are stored on-site for recycling. [36]

**Figure (5):** The image shows the stairs and railings reused as a hanging chandelier in the space and highlights the windows installed as a light wall. (Right), the recycled metal doors used on the facade as a privacy and sun-shading device (Center), the reused bricks on the rear facade reassembled in a surreal manner. (Left), source: Peter Bennetts Photographer, 2013.

### 4.3: Collage House, India, 2016

The project looks at the idea of recycling and collage in many ways, from the very physical aspects – such as materials, energy, etc. – to the intangible aspects – such as history, space and memories. The front façade sets the tone for what lies within, through a "window corner" that recycles old windows and doors from demolished houses in the city. [37]

**Figure (6):** The picture shows the doors and windows from the old houses of the city of Nephi, which were reused in the front facade of the house (right, left), Remnants of metal pipes are grouped together like a bamboo "wall of pipes" merging structural columns and rainwater drainage pipes together (center). Source: [37]

**Table (3):** Summary and description of the Cubo House terrace house experience," Source: Author.

| Semantics/interpretation | Its function after reuse | Its original function | Elements and materials |
|---|---|---|---|
| *Creative artistic expression - openness of connotations* | *The existing steps and balustrades became a chandelier hanging in the space. As in "Image (right)"* | *The axis of vertical movement in the house* | *The stairs* |
| *Environmental sustainability* | *A loft bed for the kids became carpentry handles in the kitchen.* | *Handrail for home stairs* | *Stair handrail* |
| *Creative-aesthetic artistic expression* | *A feature wall and a light well. As in "Image (Right)"* | *Natural lighting sources for the home* | *Windows* |
| *Creative artistic expression, environmental sustainability* | *Devices for outdoor privacy and sun shading. As in "Image (middle)"* | *Metal security doors for home* | *the doors* |
| *Creative artistic expression, environmental sustainability* | *Demolition drawings for the existing back of the house were cut into equal squares and rearranged in a surreal way - as in "Photo (Left)"* | *Finishing material for the back facade of the house* | *Bricks* |
| *Environmental sustainability* | *Windowsills and distinctive elements in the exterior facade as in "Photo (Center)"* | *Finishing material for the roof of the house* | *Ceiling tiles* |

**Table 4:** Summary and description of the Collage House, "Source: Author"

| Semantics/interpretation | Its function after reuse | Its original function | Elements |
|---|---|---|---|
| *Environmental sustainability. Connection to heritage and spatial context* | *Doors became part of the front facade of the new house.* | *Doors from old houses of the city* | *The doors* |
| *Creative artistic expression, environmental sustainability Environmental sustainability Connection to heritage and spatial context* | *It was installed and reused in an aesthetic way that defines the sleeping space and bed* | *Load-bearing and aesthetic wooden columns* | *Wooden columns* |
| | *Windows became part of the front facade of the new house.* | *Natural lighting sources for the home* | *Windows* |
| *Creative artistic expression, environmental sustainability* | *They are grouped together like a bamboo "wall of pipes" that integrates structural columns and rainwater drainage pipes together.* | *Metal tubes* | *Remnants of metal pipes* |
| *Environmental sustainability* | *Tiles for the floor of the new house* | *Finishing material for the roof of the house* | *Ceiling tiles* |

### 4.4: Ella Dining Room and Bar, USA, 2007

Designed by: UXUS Office, Location: United States, Year: 2007, In the "Ella Dining Room and Bar" project, 500 antique window shutters are used to give the place a unique and artistic look. The owners of the restaurant wanted it to become "the living room in Sacramento." ", an urban oasis where diners and other diners can go and relax after a long day's work ، complemented with modern elements such as LED gilded steel discs, creating an aesthetic balance between old and new. This interplay between traditional and contemporary elements adds an artistic and creative dimension to the design, it creates a unique and distinctive experience for users. [38]

**Figure (7):** Wooden window shutters in the wall and ceiling of the restaurant with modern elements such as gilded steel discs. (right, left), [38].

**Table (5):** Summary and description of the Ella Dining Room and Bar experience, United States, "Source: Author".

| | |
|---|---|
| **Semantics/interpretation** | *Respect for heritage: communication with heritage, artistic and creative expression* |
| **Its function after reuse** | *They were reused in the facade of the new house as basic aesthetic and functional elements. They were also used inside the house.* |
| **Its original function** | *It is commonly used in Vietnam largely due to its ventilation.* |
| **Elements** | *Wooden window shutters* |

### 4.5: Vegan House, Vietnam/2014

Designed by: Block Architects ، Location: Vietnam, Year: 2014, Area: 60m2 the house is in an old terrace next to an apartment built in 1965. The owner works in the travel and tourism industry, once rented the house and plans to renovate it and turn it into a cultural place. In this place people meet, share and cook traditional Vietnamese food. The owner stored all the old, abandoned things from his friends before starting the project. The items included all kinds of furniture such as table, chairs, wardrobe, window and lamp shade. With a limited budget, the architect wanted to exploit these old objects with existing objects and new objects to create a fresher place that preserves the traditional values of the previous house. Old windows were used as the main material to give a distinctive look. These windows have been used in Vietnam for a long time due to their ventilation. It has now been rearranged into a new facade with different

colors as in, covering the old facade, wrapping up to the roof and creating a special appeal, as well as harmony with the antiquity

of the entire area. Some windows opening onto the roof provide the trees below with space and natural light. [39]

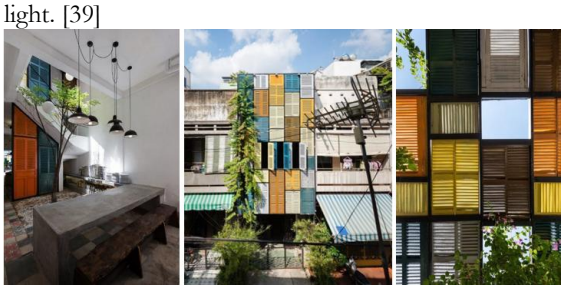

**Figure (8):** Reused wooden window shutters on the facade of the new house. (Right, left, center) [39]

**Table (6):** Summary and description of the Vegan House, "Source: Author".

| | |
|---|---|
| **Semantics/interpretation** | *Respect for heritage: communication with heritage, artistic and creative expression* |
| **Its function after reuse** | *They were reused in the facade of the new house as basic aesthetic and functional elements. They were also used inside the house.* |
| **Its original function** | *It is commonly used in Vietnam largely due to its ventilation.* |
| **Elements** | *Wooden window shutters* |

### 4.6: Reused Historic Ionic Columns, Athens/2014

In Athens, architects working within AREA consider the city to be a constant source of inspiration and a lively laboratory of ideas. This is evident in their use of materials recovered from previous structures and repurposing them in innovative and creative ways, giving them a new meaning and contributing to enriching the cultural and historical character of the place. For example, AREA cuts up historic columns, placing them horizontally to create benches and art walkways in the park, indicating their critical engagement with the architectural and cultural history of the city. This approach reflects innovative thinking and contribution to the development of the local community, where the interaction between old and new is to create creative and new solutions to contemporary architectural and urban challenges. The Ionic columns are considered classical remains, but they include a core of reinforced concrete. The Ionic columns were rescued from the original entrance to the garden of the Greek Foundation for Culture - Athens, and reused, as in the figure. (9). [40]

**Figure (9):** Ionic columns from the original entrance to the garden of the Greek Foundation for Culture and their reuse as benches and artistic paths in the garden (right, left, center) [40].

**Table 7:** Summary and description of reused historical Ionic columns in Athens, "Source: Author"

| | |
|---|---|
| **Semantics/interpretation** | *The interaction between old and new, creating artistic and creative expression* |
| **Its function after reuse** | *They were reused after being cut and placed horizontally to form artistic benches and paths in the garden.* |
| **Its original function** | *Use them as columns at the entrance to the garden of the Greek Cultural Foundation* |
| **Elements** | *Ionic columns* |

### 4.7: Trying out a new house from old bricks/Poland

It is a new old brick house in Poznań، Poland, made of recycled bricks by Design. Architekci W. Recycled old bricks are a growing source of inspiration for new buildings in the region, such as the family home in Poznań in Poland designed by Architekci Wrzeszcz. The architects drew on the local countryside in the context of dense forests and agricultural landscapes with the remains of brick-facaded German barns that were Previously typical of the area. Brick facades with precise architectural details and balanced proportions give these barns their distinctive character in the region. The architects incorporated it directly into their design. They dismantled a nearby barn and used its bricks to build a new family home. Incorporating recycled bricks from the old barn was the "core idea" behind the design approach, blending traditional materials with contemporary architecture. The architects believe that reusing historical materials like this not only preserves the continuity of local architecture, but also gives the new building a special atmosphere and character. They view the recycling of old bricks and architectural elements as an important way to sustainably incorporate traditional crafts and building techniques into modern design.

"This became the fundamental idea, which brought about a significant change in the approach to design in the field of architecture and sustainability." [33].

**Figure (10):** A new house made of old bricks in Poznań, Poland، recycled bricks designed by. Architecci W [33]

**Table (8):** Summary and description of the new house made of old bricks," Source: Author

| | |
|---|---|
| **Semantics/interpretation** | *Cultural and environmental sustainability* |
| **Its function after reuse** | *Reuse it as building material for a new house* |
| **Its original function** | *He was preparing building material for an old barn.* |
| **Elements** | *Bricks* |

### 4.8: Terra Cotta Nurse Sculptures in the Georgia Street Medical Building

Terra cotta nurses in the Georgia Street Medical Building, in this article "Spolia and use/reuse values" refers to the concept of spolia, which involves reusing parts or materials in new contexts. He mentions two books that explore spolia in the history of art and architecture. The article includes an image Distinctive of two replicated nurses as in Figure (11) placed as decorations on a building in Vancouver These nurses serve as an example of Spolia and its reuse The replicas represent displaced original elements of an earlier building, and their presence raises questions about the continued value attributed to the originals and the appropriation of their source of inspiration. Nurses now speak to different audiences, potentially conveying conflicting messages Overall, the image demonstrates how the spolia can be used as a reference for reuse and how it can elicit different responses and interpretations in its new context [41]. The first building in the Art style Deco in British Columbia. The building was a local landmark, and was the focus of extensive preservation efforts, which ultimately proved unsuccessful. However‹ elements of the building remain intact through the rescue and cloning of the original 11 -foot- tall clay nursery. Material spolia in-re, as the element itself was not transferred, but rather reproduced [17].

**Table (9):** Summary and description of the terra cotta nurses statues in the Georgia Street building," Source: Author.

| | |
|---|---|
| **Semantics/interpretation** | *A comprehensive experience that combines respect for heritage and artistic and cultural expression, along with a commitment to sustainability and resource conservation.* |
| **Its function after reuse** | *As decorations on a building on the University of British Columbia campus.* |
| **Its original function** | *Originally, these statues were part of the former Vancouver Dental Building* |
| **Elements** | *Terracotta Nurse Statue* |

### 4.9: De Ceuvel project, reused boats / Netherlands

It is a former industrial plot of land located in the north of Amsterdam, which was transformed into a sustainable area using innovative technological solutions. The main feature of the "De Ceuvel" project is the use of house boats, which are linked to Dutch culture and the city of Amsterdam in particular, as these boats are usually used as floating homes. In the " De Ceuvel " project, boats were placed on land and used as spaces with different functions, as the land was secured with a ten-year lease. Among these different uses for which the boats were put is the popular café. In addition to another space known as "Crossboat" to organize creative events, workshops, training courses and master classes for practical learning about the technologies applied in the region, to enhance awareness. Also, the boats may be reused as hotel rooms, and these measures have increased the participation of the local community because they are all the main actors in transforming the space [42]. The "De Ceuvel" project shows how heritage architectural elements can be reused in a sustainable and innovative manner, contributing to improving the environment and encouraging community participation.

**Figure (12):** Reused items "boats" (left). Among these different uses in which boats were put to use is the popular café in the De Ceuvel project (right). [42]

**Table (10):** Summary and description of the De Ceuvel project, reused boats," Source: Author.

| | |
|---|---|
| **Semantics/interpretation** | *Environmental and economic sustainability, artistic and creative expression, societal transformation and inclusive participation.* |
| **Its function after reuse** | *In the " De Ceuvel " project, it was transformed into multi-use spaces such as a café‹ a " Crossboat " for organizing creative events and workshops, and hotel rooms.* |
| **Its original function** | *Originally, they were used as floating homes* |
| **Elements** | *House boats* |

Based on the above, Table (11) summarizes the objectives of using architectural heritage spolia in contemporary design works.

**Table (11):** Analysis of Spolia reuse in contemporary architecture, "Source: Author".

| Impact and results | New meanings | The connotations and interpretations achieved by the experience | | | The type of material or item reused | case study title |
|---|---|---|---|---|---|---|
| | | Environmental and social sustainability | Creative artistic expression | Respect heritage | | |
| *Promoting awareness of the importance of recycling, respecting heritage and supporting the local economy* | *Preserving aesthetic values, preserving symbolic values,* | • | | • | *The doors* | *General Bank in Brussels* |
| | | • | | • | *Windows* | |
| | | • | • | • | *Lighting fixtures cabinets* | |
| | | • | | • | *Wood* | |
| | | • | | • | *Glass* | |
| | | • | | • | *Stone* | |
| *Promoting local culture and stimulating innovation in architectural design, benefiting economically and environmentally* | *Openness of meanings and connotations* | • | • | | *The stairs* | *a house Terrace Cubo House* |
| | | • | | | *Stair handrail* | |
| | | • | • | | *Windows* | |
| | | • | • | | *The doors* | |
| | | • | • | | *Bricks* | |
| | | • | | | *Ceiling tiles* | |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Promoting awareness of the importance of recycling and stimulating innovation in the creative use of materials* | *Connection to heritage and spatial context* | • | • | • | *the doors* | *Collage House, India, 2016* |
| | | • | • | | *Wooden columns* | |
| | | • | • | • | *Windows* | |
| | | • | • | | *Remnants of metal pipes* | |
| | | • | | | *Ceiling tiles* | |
| *Enriching consumers' environmental choices and stimulating creativity in interior design* | *Creating a connection with the past and evoking a sense of continuity* | • | • | • | *Window shutters Wooden* | *Ella Dining Room and Bar* |
| *Respect for heritage and creative stimulation in design* | *Communication with heritage* | • | | • | *Wooden window shutters* | *Vegan House* |
| *Enriching cultural life and stimulating creativity in designing urban spaces* | *Interaction between old and new* | • | • | • | *Ionic columns* | *Reusing historical Ionic columns* |
| *Economic, environmental and cultural benefit* | *spolia in se Openness of meanings and connotations* | • | • | | *the doors* | *Casa obsoleta experience "old house"* |
| *Stimulate respect and appreciation for the medical field* | *Reusing the value attributed to the element through spolia in re* | • | • | • | *Terracotta Nurse Statue* | *Experience the Terra Cotta Nurse Statues* |
| *Making a positive change in the local environment* | *Social Sustainability "Enhancing Social Interaction"* | • | • | • | *Houseboats* | *De Ceuvel project experience* |

## 5. Conclusions

- The research indicates that the concept of reusing Spolia represents an important framework in creating architectural experiences with distinct artistic, cultural, and social value. This historically deep practice has gained new dimensions in the present time to enhance the dialogue between the past and the present in the field of architectural design, and to promote a balance between tradition and innovation.
- The research identified three patterns of Spolia use: Spolia in se refers to the direct physical reuse of historical parts and objects. Spolia in re refers to the stylistic reuse of elements from the past in contemporary design, which is an immaterial use. The research concludes that the use of Spolia in literature, poetry, music, and even visual works belongs to this type. The third type, Spolia in me, refers to allowing the recipient to interpret the meanings of Spolia, making these interpretations subjective and multiple.
- Regarding the implications and purposes of using Spolia, the research concludes the importance of the Spolia concept in contemporary architectural design through:

o Achieving balance between heritage and innovation: Using Spolia helps achieve a fruitful balance between cultural heritage and innovation in architectural design, contributing to the preservation of cultural identity and the promotion of innovation.

o Economic and environmental role of Spolia reuse: By collecting and reusing existing architectural materials, the Spolia concept contributes to reducing construction waste and promoting environmental sustainability, as well as providing cost-effective solutions.

o Stimulating creativity and multiple interpretations: The research shows that using Spolia encourages creativity in architectural design and evokes multiple interpretations of place and identity, enriching architectural and cultural dialogue.

o Sustainability of built heritage resources and their preservation, maintaining their relationship with society, and fostering a sense of identity and continuity.

The research recommends further studies on the applications of the Spolia concept in various architectural and cultural contexts, in addition to raising awareness of its importance in achieving sustainable architectural design.

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