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Original Research Article

Adaptive Reuse of Historical Churches: An Analysis of Eight Case Studies

Shina Sad Berenji[1]
Sajad Moazen[2*]
1. Ph.D. in Landscape Architecture, Tarbiat Modares University, Tehran, Iran
2. Assistant Professor, Conservation Department ,School of Architecture and Environmental Design, Iran University of Science and Technology, Tehran ,Iran

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ABSTRACT

Shifting the museum-like perspective on historical buildings towards their adaptive reuse that plays a role in the urban fabric contributes to their preservation and longevity. The study and analysis of global experiences in redefining the use of historical structures and equipping them for new functions are rich with insights. This research aims to examine the approach to the physicality of old buildings and the new activities of structures repurposed as churches. It seeks to extract the strategies and actions taken by studying and analyzing case studies. Thus, by reviewing global experiences in intervening in religious historical buildings, it acquires modern procedures for dealing with valuable historical edifices and presents new horizons in addressing these structures. This paper employs a descriptive-analytical method and gathers data related to eight case studies through library research and credible scientific documents, then analyzes and compares them with logical reasoning. The case studies located in various countries have been examined based on their physical and functional characteristics, new additions, and materials used. In selecting the cases, it seeks to provide a diverse range in size and the extent of intervention. The research findings indicate that considering the multiple religious, cultural, social, and economic values of churches, adopting a collaborative approach involving investors, stakeholders, local people, and experts is influential in the success of these projects. In the discussion of new additions, while maintaining the principle of distinguishing between old and new materials, the creative use of new materials and elements can aid in preserving the authenticity and integrity of the work. Paying attention to today's needs and updating the building's physical and functional aspects while considering their capabilities and hidden and apparent values ensures their continued existence.

* Corresponding author: **Phone:** +989166911404, **E-mail:** Sajad_moazen_166@yahoo.com

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Introduction

Over time, the conservation of architectural heritage has been recognized as a cultural necessity, supported by international conventions and profound research. Adapting such heritage for contemporary uses has become a significant topic in the sustainable development of the built environment. The continued appropriate use of historical buildings is one of the best ways to ensure their survival, and adaptive reuse compatible with heritage buildings plays a significant role in the sustainable preservation of various types of historical structures (Hanachi & Shah-Teimouri, 2022). In this context, "adaptive reuse" has become common and is generally defined as finding a new use for a building, usually requiring changes to the existing structure to fit a specific function. This transformation begins with the building's function and may involve other alterations such as circulation paths, orientation, and the relationship between spaces; it may be necessary to construct additions and demolish parts. Thus, during the adaptive reuse process, different parts of the building, from internal and external aspects to the structural system and current function, may change to adapt to new functions. In this regard, in addition to preserving the material values of buildings or sites, a significant aspect of reuse is maintaining the immaterial or spiritual significance and intangible values of the ensemble. It is especially crucial for symbolic buildings or places with a significant sense of place, such as those with social, political, commemorative, or religious meanings. Adaptive reuse entered the mainstream architectural discourse and became popular in the post-industrial era, especially in the 1960s and 1970s (Cantell, 2005). However, adaptive reuse is not a new phenomenon in itself. The concept of reusing old buildings for various purposes technically dates back centuries. For centuries, old buildings have been preserved and adapted to be used in their communities, and this continuous use of old buildings has helped recognize their unique values and qualities as heritage. There are two main approaches among heritage conservation specialists regarding adaptive reuse that are somewhat contradictory (Ahn, 2007, 3).

-Some specialists and researchers consider adaptive reuse a historical conservation strategy. They believe that adaptive reuse, by changing the function of the building to new functions or uses to meet contemporary needs, helps to extend the life of historical buildings (Pimonsathean, 2002). For example, Viollet-le-Duc states, "The best way to preserve a building is to find a use for it" (Viollet-Le-Duc, 1990).

-The second group of specialists promotes a minimal intervention approach in historical buildings. They argue that every time a historical building undergoes any intervention (restoration), part of its authenticity is lost and sacrificed for preservation. The result is expressed as follows: "Preservation is better than repair, repair is better than recovery, recovery is better than reconstruction." This approach reflects their opposing stance and orientation regarding adapting historic buildings to new uses (Zargaran, 2017). Therefore, adaptive reuse as a conservation strategy is often more controversial than any other preservation strategy, mainly because adaptive reuse creates functional changes in the original buildings (Ahn, 2007, 3).

• Change of use in churches

The change of use is a part of the life cycle of buildings, and religious and sacred architecture is no exception. These structures must evolve to adapt to the necessities of their urban context and time. In recent years, several sacred buildings, primarily churches, have changed use. This trend, perhaps more evident in Northern Europe, is steadily increasing. It is crucial in conservation projects to maintain a proper balance between authenticity and integrity, heritage and real life, and social evolution. Sacred and religious architecture encompasses a complex set of values, and if not adequately considered, the impacts of adaptive reuse strategies can be detrimental and destroy the values associated with the work. Ideally, any intervention in such structures should have the least impact on the heritage values of the building and its environment, and if the intervention cannot protect the heritage values, it may be destructive in itself (Fiorani et al., 2017).

For an adaptive reuse plan, the designer must initially confront a series of challenges and make decisions about how to proceed and successfully adapt churches to preserve their integrity and historical values. The feasibility of such an approach can be assessed by providing answers to these questions:

- What values exist in sacred and religious architecture and structures, and how are they evaluated?
- How can new functions be introduced into their existing fabric without altering the identified values?
- What values does adaptive reuse create for the building?

Adaptive reuse of sacred buildings cannot be merely considered the process of transforming an unused or ineffective building into a new one that can be used for different purposes. Unlike the success of converting obsolete industrial complexes into new complexes with modern and attractive designs, adaptive reuse in sacred buildings is highly challenging and complex. Since there are multiple values associated with sacred

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architecture, various opinions arise about the proper use of such structures when it comes to their reuse. For conservation experts, the most significant challenge of adaptive reuse in sacred architecture is preserving the features and values of these buildings while also meeting the demands of stakeholders, whereas developers and investors are more interested in the economic value of churches and the potential income they may generate. With the rising costs of maintaining churches, questions arise whether they should be preserved at a higher expense or considered as new resources to be included in urban development plans. Especially since churches and other sacred architectures are usually in city centers, historic parts of the city are significant, notable, and accessible from all parts of the city; places where the economic value of land is often high and therefore have social and economic impacts. However, given the characteristics of sacred architecture, many heritage preservation experts believe that adaptive reuse makes many irreversible changes in the primary features of these buildings, severely affecting their authenticity and integrity; placing a new use in an old church, replacing its original use renders some architectural elements of churches unused and thus reduces their integrity (Mine, 2013, Zargaran, 2017). Therefore, this issue is a matter of contemplation and complexity.

Research Background

Various studies have been conducted on the change of use in churches. The topic of the fifth workshop of the European Association for Architectural Education, held in 2017, was conservation-adaptation, one of the most vital questions in addressing heritage buildings and culturally significant places. This workshop addressed challenging questions:

-How can the redevelopment of such a building or site be combined with the transfer of its tangible and intangible values?

-What are the limitations and opportunities in the adaptive reuse of "sensitive" heritage?

-How can the spirit of place be preserved in these buildings?

The papers from this workshop have been published in a book that approaches the issue from various perspectives (Fiorani et al., 2017). Several theses at the master's and doctoral levels have also addressed this topic. For example, a doctoral project at the University of Texas examines the adaptive reuse of abandoned historic churches. After studying 16 churches and surveying a demographic, this research concludes that according to respondents, reuse as a cultural function is acceptable, but commercial and residential uses are not. They find uses that have a conceptual similarity to a church, especially in relation to the church's educational functions, more acceptable. Conversely, they believed churches should not be converted into commercial buildings for economic gain (such as restaurants). However, when individuals were exposed to modified church images, their perceptions changed. In this case, social-cultural buildings scored lower, and commercial and residential buildings scored higher than the initial acceptance results (Ahn, 2007). Another dissertation examines the adaptive reuse of churches in Germany and the United States. This research, which studied religion and conservation laws for both countries, concludes that sensitive adaptive reuse that respects the building and old and new uses is best achieved when all values are considered, and stakeholders are involved in the planning process. This paper studies a value-centered approach as a recommended strategy for the adaptive reuse of churches (Lueg, 2011).

Other research often addresses diverse issues related to church reuse or other uses by examining case studies. For instance, a study examining two cases of adaptive reuse of historic buildings (one church and one historic market) investigates the factors influencing the success or failure of the project. The research shows that a uniform design approach in one place can have different results in the socio-economic system. The quality of intervention depends on the quality of the architectural project and the fit of the new use in relation to the building itself and the urban fabric in which it is located (De Medici et al., 2020). Another study attempts to identify factors that contribute to the successful adaptation of former churches and the advantages and disadvantages of adopting cutting-edge design solutions. This research also surveys the public to examine more desirable uses for churches. After analyzing five churches, this paper concludes that the least popular are those that are single-function and lack a distinguished new entrance. The study states that significant changes can be key to greater use of a particular structure. After analyzing selected churches, the research identifies two main methods for adapting historic sacred buildings:

-External innovation: contrasting elements and highlighting the entrance.

-The least possible intervention on the exterior of the building.

The study believes that changing the function of a former church and distinguishing this change by adding

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a new external element attracts public attention and encourages their entry. Thus, this phenomenon creates a kind of tourist attraction that can bring long-term benefits to the building. The analysis of this research indicates that factors increasing interest in historic churches are their multifunctionality and the innovation of a new and distinctive form outside the building. Bold yet appropriately chosen architecture and construction can lead to the creation of new aesthetic value and complexity. However, adding new elements should not destroy or negate the identity of the structure or place. New entities must be harmonious with the surrounding environment and match the area's original character. The article suggests finding a middle ground, as overly bold projects may lead to the loss of authenticity and destruction of the building's and the surrounding environment's identity. Moreover, an overly restrictive approach may hard the implementation of any change (Szuta & Szczepański, 2020).

Due to the lack of discussion on this topic in domestic publications and articles, the present article has selected examples from various churches that have undergone a change of use, which will be introduced, analyzed, and reviewed in the forthcoming sections.

Research Methodology

This article aims to determine the existing approaches to dealing with the change of use in historic churches across eight European countries. The churches under study in this research are located in Germany, Spain, Ecuador, Bulgaria, the Netherlands, and Georgia, representing Northern and Eastern Europe. These examples were selected for their diversity in scale to facilitate a comparison of the approaches adopted. The investigation commenced with data collection from esteemed scientific publications for each case study. In cases where pertinent articles or books were not available, trustworthy online resources were utilized to procure initial data. The contemporary condition of these edifices was scrutinized through the lens of extant scholarly works. Subsequently, the amassed data was meticulously categorized, and a multifaceted analysis was conducted. It encompassed the exploration of the nature of the new functions, the determinants influencing the selection of these functions, and the critical examination of the newly incorporated elements—specifically in terms of volume, roofing, and entrances—as well as the materials employed. The analytical process also entailed a detailed evaluation of the chosen materials. The findings were systematically organized and presented in tabular and graphical formats, offering a comprehensive and comparative analysis of the adaptive reuse approaches in historic churches.

Findings

This section introduces the selected churches for this article.

• Dominican Church

The Dominican Church is a 13th-century Gothic church built in 1294 in the center of Maastricht from stone and served the local Dutch community for 500 years. In 1796, its ecclesiastical function ceased with Napoleon's invasion, and subsequent uses included bicycle storage, exhibition space, and a banquet hall. In 2006, the church found a new destiny when a bookstore was created inside it (Ciranna, 2017, Zargaran, 2017). This bookstore is one of the most beautiful in the world, housed in a perfectly preserved old church brimming with wall and ceiling paintings. Many believe that the "true power of reading" is revealed in the old church. External elements such as stained glass, wall paintings, arches, and the quality of light in the space have been preserved (Fig. 1). A "book tower" made of steel with two floors (400 square meters) was constructed to create an overhead view inside the church. In addition, a

Fig. 1. Dominican Church. Source: www.arcstreet.com.

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very modern entrance made of weathering steel (Corten steel) was attached to the building, which appears old due to the material used (Mirabella Roberti, 2017). The project's success is thanks to the successful collaboration of public and private organizations (municipality, historical building care, project developer, and new user). This project won the Lensvelt Architectural Prize in 2007 in the Netherlands (Vellecco & Martone, 2021). There are differing opinions about the extent and manner of interventions in this work. Some believe that during this change of use, the original architectural structure has been preserved but now includes a contemporary addition that respects its religious and symbolic value and is also reversible. Others believe that the new metal mezzanines, structurally separate from the original structure, are visually discordant and severely weaken the spatial identity of the building. This structure occupies half of the main nave and one of the two side aisles, creating a denial of symmetry in the original structure. This process follows a postmodern trend and induces a kind of semantic detachment that aims to neutralize symbolic focus (Harney, 2017; Mirabella Roberti, 2017). Among the criticisms of this project is the change of use of the altar area into a bar, which some consider a mocking perspective (Fiorani et al., 2017, 355).

• Kolumba Church

The Episcopal Museum of Cologne, built in 1853, was a testament to the dominance of the St. Kolumba tradition over Cologne, aiming to showcase its power by establishing a museum for religious art from early Christianity onwards. During World War II, the museum and its surroundings were destroyed by Allied air raids. The outer walls, part of a tower, and a Gothic statue of the Virgin Mary remained intact. Immediately after the war, in 1949, a small church named Madonna was built amidst the ruins as a memorial to the bombings. The museum reopened in another location in Cologne in 1954 and returned to its historic site in 1972, but it soon became apparent that there was not enough space for large exhibitions. In 1996, a competition for the museum's reconstruction was held, won by Peter Zumthor. The reconstruction's main goal was not only to improve its scenography and functionality but also to create a place for tranquility and reflection. The historical character of this site was to be preserved by integrating old and modern art. This collection had been under the bishop's care for over 150 years. The independence of the small church from the museum was one of the conditions of the new project, as it was still used for religious purposes. The new building is mostly constructed on the ruins of a late Gothic church and frames the archaeological remains, known as the 'ruin hall.' A new side wing and upper floor levels accommodate exhibition spaces. The ruined hall, the museum's largest room, resembles a vast archaeological square with slender metal columns. A winding pathway of dark brown wood guides visitors through the war artifacts. This memorable space is strikingly illuminated as light filters through pores created by removing bricks. Alongside the shadows, the infiltration of street sounds impacts the ambiance. The original church is enclosed by the large ruined hall but remains fully functional and accessible from the outside. The new building includes 16 exhibition rooms organized across three levels. Zumthor used 'woven' gray bricks to unify the site's lost pieces. These gray bricks, 60 centimeters thick, were designed by Petersen Tegl of Denmark specifically for this project. The new bricks, combined with the church's remnants, narrate the story of a contemporary museum. The new reflects the old, the past changes in the present, and is understood in a new way. Numerous dense small holes in the wall allow beams of light to penetrate the room, and with the changing seasons and shifting light play among the remaining artifacts, the environment is always in flux (Fig. 2). The new cream-colored shallow walls contrast

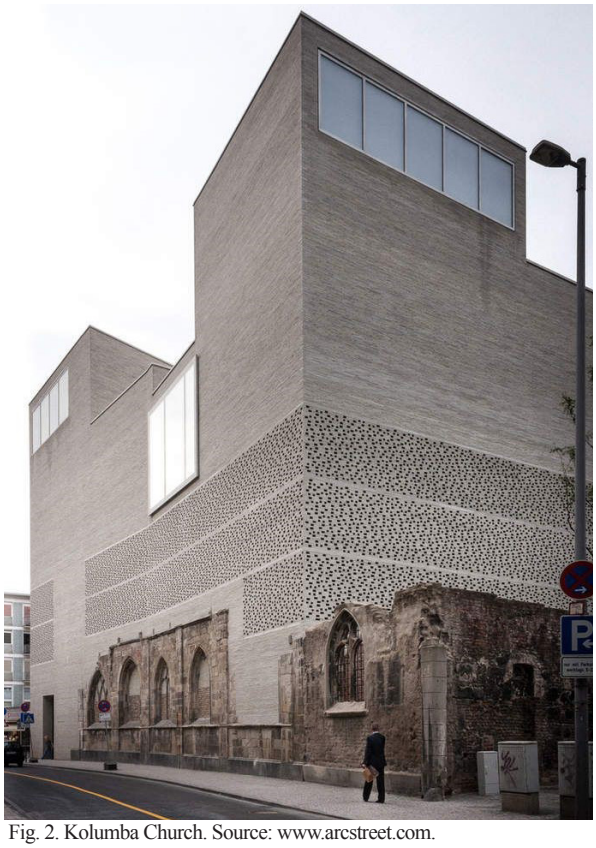

Fig. 2. Kolumba Church. Source: www.arcstreet.com.

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with the ancient walls, prompting and stimulating emotions in the Kolumba Art Museum. Handcrafted materials unite the site's demolished parts, placing old and new side by side. Peter Zumthor, while maintaining a vision of a new organization, managed to revalue the historic city with a sense of calm and contemplation (Jia et al., 2013; Plevoets & Cleempoel, 2019). This project has received multiple awards.

• Vilanova de la Barca Church

The Vilanova de la Barca Church, nestled in the heart of Catalonia, was primarily constructed in the Romanesque style in the 13th century, yet its pointed arches display Gothic influences. Severely damaged during the Spanish Civil War in 1936, the church's walls lay in ruins for over 80 years. In 2009, a decision was made to halt the decay and preserve the church in its current state. Architects proposed reproducing the original external lines of the structure and repurposing the former church as a multipurpose hall for exhibitions and concerts. Brick played a pivotal role in this complex reconstruction process. The intervention focused on the covering elements (façade and roof of the building). A mesh-textured brick façade was used to reconstruct the demolished wall sections. The entire addition of walls and roof, serving as a new architectural shell, gently leans against the ancient wall remains. From the outside, the old church appears as a restored historical building, while inside, due to the additions, the influx of natural light through new windows and a patio gives it a renewed appearance, preserving the space's tranquility and contemplation—the essence of the place's sacredness. This project establishes an architectural dialogue between the old and the new, the past and the present. In the eastern section, the restoration of two side buttresses, likely of Romanesque origin, and a late Gothic pointed dome over the altar has been carried out. The church's stone entrance, weathered by time and the elements, has been reconstructed with regionally sourced flat and hewn stones. The exterior façade increases ambiguity and complexity with the absence of windows and the reconstruction of demolished sections with a perforated texture. The dense and irregular texture of the added flat and hewn stones supports visual continuity and integration with the original fabric. However, the interior façade is designed with white perforated bricks, enhancing the contrast and disjunction between the old sections and new elements (Fig. 3). The former access to the altar, heavily damaged, is redefined as the new entrance, allowing this area to regain its authentic identity after years of neglect separated by a dividing wall. This church has been awarded the 2022 Brick Award and the 2018 RIBA Award.

• Corbera d'Ebre Church

The Corbera d'Ebre Church suffered significant damage during the Spanish Civil War (1936-1939), with its roof destroyed and most of its arches collapsed. The ruins remained as a memorial to the events that profoundly affected the village and its inhabitants. For 50 years, the building was abandoned, becoming a ruin within the city. The architect's redesign intended for the ruins to remain a symbol of the civil war, evoking the era of destruction. A transparent material was proposed for the roofing, allowing the new church roof to be a structural intervention that aids in providing abundant natural daylight throughout the building. This church is a prominent example of repurposing a structure while preserving its architectural features. A new transparent roof made of ETFE was considered for the ensemble. The idea of transparency was to preserve the character of the ruins as much as possible. It also maintains the feeling of being outdoors, keeping the church open to the sky and illuminated by sunlight. The lightness of the roof was intended to minimize the impact on the existing walls. In summary, a simple and transparent layer was added to return the old church to the people of the city, transforming it into a new, safe, multi-purpose

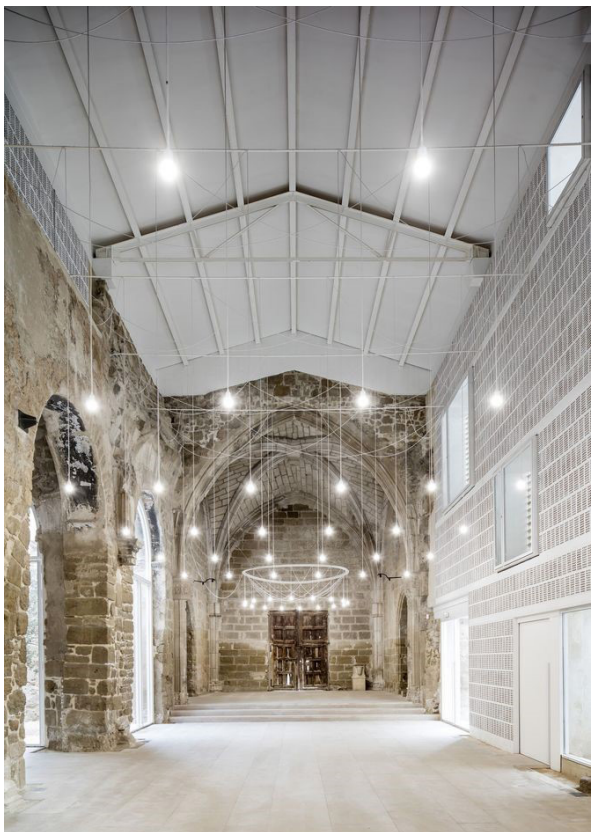

Fig. 3. Vilanova de la Barca Church. Source: www.arquitecturaviva.com.

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public space for exhibitions, conferences, and social programs (Fig. 4).

• Bagrati Cathedral

Constructed in the year 1003, Bagrati Cathedral stands as a significant cultural edifice within the political and architectural history of Georgia. Devastated by an explosion in 1691, the cathedral was registered in its ruined state on the UNESCO World Heritage List in 1994. The reconstruction of Bagrati Cathedral, completed in September 2012, has drawn the focused attention of Georgian politicians, authorities of the Georgian Orthodox Church, and architectural historians. Some contend that the reconstruction of Bagrati Cathedral was part of the political agenda of Mikheil Saakashvili, the then-president of Georgia, and acted contrary to the objectives of architectural historians and the academic principles of restoration and conservation. As a result, the reconstructed Bagrati now faces the risk of being removed from the World Heritage List. According to the World Heritage Committee's report, "Bagrati Cathedral has been altered to such an extent that its authenticity has been irreversibly compromised." Contrary to the recommendations of ICOMOS, the remaining original stone blocks were not reused, and new structural sections made of reinforced concrete were irreversibly embedded into the historical fabric (Brumann, 2017) (Fig. 5). The reconstruction of Bagrati has implications for the future of conservation and restoration practices in Georgia.

• Saint Paraskeva Church

The ancient city of Nesebar, listed as a UNESCO World Heritage Site, is a testament to the harmonious coexistence of multiple civilizations with nature, preserved to this day in a vibrant urban fabric. Constructed in the 13th century, the St. Paraskeva Church is a living representation of the aesthetic principles of sacred single-naved structures in medieval Bulgaria. These churches were typically covered with gable roofs and adorned with small bricks and glazed ceramics as the main decorative elements of the façade. Despite nearly a third of the original volume and height being destroyed over seven centuries, along with various other restorations and interventions, the church's essence has been relatively preserved. St. Paraskeva Church is part of the "Faith in Nesebar" project by the Municipality of Nesebar, situated on the cultural-touristic route "The Spiritual Road." The protection, restoration, and church revival are the outcomes of an architectural competition organized by the Bulgarian National Committee of ICOMOS in collaboration with the Municipality of Nesebar and the local museum. The most significant issues were the considerable demolition of the building's height and the unstable, jagged walls. Nevertheless, the church retains the characteristics of a vital urban structural element. The intervention and reclamation of its functional significance restore the building's bold role in the city's composition and character. All original elements were carefully protected, and harmonious interventions were carried out. Contemporary tools and techniques were employed to recreate the spatial features of the church. Only elements with undeniable evidence were restored, avoiding any hypothetical restorations. Perforated corten steel sheets were used to articulate the building's original structure, both internally and externally. These materials harmonize well with the church's color and are recognized as contemporary. The sequence of brick and stone layers of varying sizes in the original building's façade has been replicated by creating holes in the steel sheets. The contact of new materials with the original structure is minimal, and all interventions are reversible (Moazen & Sad Berenji, 2024) (Fig. 6).

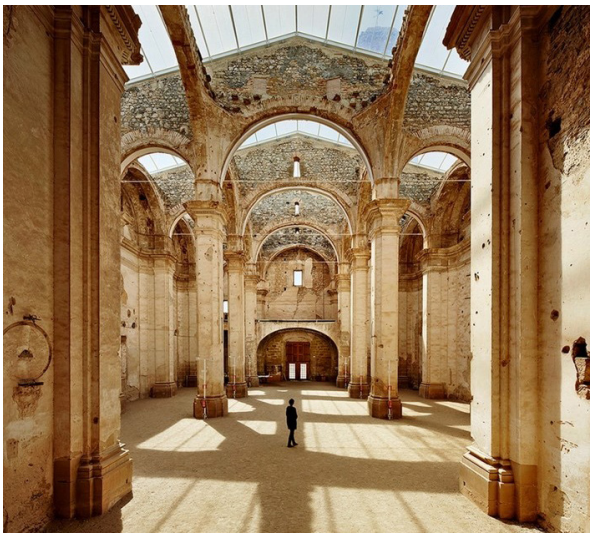

Fig. 4. Corbera d'Ebre Church. Source: www.archello.com.

Fig. 5. Bagrati Cathedral. Source: www.flickr.com..

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The church has always been the city's heart, mediating and translating culture and information. This function, which has played a significant role in the city's history, continues in this project. The main idea of this project is to enable the church to become a cultural information center with diverse functions—exhibition hall, concert venue, 3D show hall, animation, documentary, and films related to the city's historical development and its cultural-historical artifacts, as well as general cultural heritage education. Thus, the church has been transformed into a significant museum used for the preservation of artifacts from other churches that are now in ruins. For instance, for the first time, wall paintings from the St. George Church, demolished in 1958, are made publicly accessible (Karagianni & Tanou, 2021).

• Baños Church

The Banos Church, after being repaired in 1831 following the earthquake of 1797, ultimately became a ruin after the earthquake of 1949. The ministry responsible for maintaining cultural heritage sites, which are agents of local, regional, and national development through its emergency management unit, employed professional services to design a roof over the walls of the city's oldest church in Banos (dating back to 1788 AD). The project's objectives were defined to honor the architectural heritage as follows:

-Redefining the function of an unused and forgotten space as an urban infrastructure that should meet the spatial needs of the community center in the city of Banos.

-Constructing a safe roof for the church with a design that emerged from the abstracting process of the original roof.

-Protecting and reinforcing the existing structure (internal walls and remaining roof materials), ensuring ventilation and natural light (Moazen & Sad Berenji, 2024).

The old church's walls were confined by a series of adjacent buildings, which diminished the significance of the existing structure. The dynamism of the new roof, in contrast to the church's static environment, revalues the hidden virtues of the old church. The proposed materials possess the necessary characteristics to demonstrate the design's difference from the original structure: a metal framework and transparent polycarbonate (Fig. 7).

• Saint Francis Church

Between 1721 and 1729, the Franciscan Monastery complex underwent a period of extensive reconstruction at the hands of Franciscan clerics. It functioned as a monastic retreat until the year 1835, after which it stood until its eventual demolition by state authorities in the year 2000. Post-demolition, only fragments of the ecclesiastical structure and its boundary walls were left standing, their integrity compromised by the substandard quality of the initial construction. The conservation process aimed to safeguard these vestiges; nevertheless, the task of harmonizing the historical remnants with modern additions presented a considerable challenge. The restoration strategy for this ecclesiastical site, situated in Sant Pedro, Catalonia, was designed to repurpose the edifice into a versatile cultural hub and exhibition venue, to be executed in a bifurcated phase. Furthermore, it is projected that a tertiary phase will facilitate the conversion of the upper strata of the church's southern section into an archival space, preserving the historical narrative of the region.

The condition before the intervention was such that the church's nave remained untouched and entirely legible. The vaults of the nave and the chapel had partially collapsed. The external view of the church was historically interesting, but despite severe damage, the interior revealed its remarkable spatial qualities. With a collapsed roof, the building had remarkably improved its interior space through the flow of natural light from its ruined roof. The church interior, which typically does not receive natural light, was bathed in a magnificent

Fig. 6. Saint Paraskeva Church. Source: www.archdaily.com.

Fig. 7. Baños Church. Source: www.archdaily.com.

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light-filled space. The project intervention aimed to preserve the amount and quality of the nave's space and the significant apertures for natural light. Efforts to maintain light apertures at various points led to different solutions: a large skylight on the northern front of the apse and a skylight with a view of the church's bell tower, possible from inside the nave.

The revival ideas for the building aimed to create a distinction between the new elements (employing contemporary construction systems) and the original elements of the historical church. To preserve all dimensions of the building's past, previous interventions, footprints, and damages were preserved in the new condition and remained visible, impactful, and even melancholic, like pits that were once decorations and signs of vanished elements.

Another challenge was maintaining the unity and originality of the dimensions of the nave after the construction of new annexes and volumes for the needs and needs of the church, including stairs to access the upper floor, toilets, and equipment room. Complementary structures were strategically placed to stand apart, some outside the edifice and others inside, all arranged to maintain the spatial coherence and architectural integrity of the church. This careful placement ensured that the broad view of the nave and the unique atmosphere of the main church remained unobstructed. In addition to providing access to the upper floors of the church, the building's stairway and ramp set defined a circular path throughout the building that resembled a museum. This circular path allows the whole church to be viewed from different fronts. By adding new values, the intervention to preserve the historical heritage of the building has enhanced it and given the old monastery a contemporary and unique look (Moazen & Sad Berenji, 2024). Clouses, the architect of the new parts, says: Instead of rebuilding, we have strengthened the existing condition of the old texture and added new elements that are different from the old textures. The reinforcements were done without removing the processes of decay and decay that have damaged the building. The materials used in the renovation are mainly glass and steel, which perfectly harmonize with the rough stone (Fig. 8).

A new entrance has been defined for this building. According to some, the issue of linking the new to the old has found an extreme solution here in the creation of new volumes. These volumes are placed on the collapsing spaces of the monastery, seemingly suspended, but in fact, resting on the remains of ancient masonry walls and supported by large concrete beams (Fiorani, 2017).

Discussion

Table 1 presents general information about eight case studies. These case studies's analysis is conducted from various perspectives including the type of new usage, new annexes, and materials employed.

In general, the types of interventions in these structures can be categorized into two main groups:

-Essential actions

-Adaptive additions

• Essential Actions

Essential actions are interventions necessary for the continued existence of a structure, whether it retains its original use or is repurposed. For instance, collapsed roofs or walls require restoration and protection, necessitating new coverings, which are considered new additions. According to the Venice Charter (ICOMOS, 1964), still a significant reference in contemporary scholarship and practice, new additions should be distinguishable from and reversible to the old parts. We observe some of these additions in the case studies examined in this research. Five out of the eight case studies had collapsed roofs, meaning over 60% of the cases required essential actions for new roofing.

• Adaptive additions

The second category of actions is not aimed at preserving and restoring the building's original lines but at equipping and preparing it for a new use. In reused buildings, most debates revolve around this second category of interventions.

Repurposing a building necessitates equipping and

Fig. 8. Saint Francis Church. Source: www.archdaily.com.

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Table 1. General information related to the eight churches examined. Source: authors.

	Name of the church	Country	Year of Restoration	New Use	Age of Building	Awards
1	Kolumba	Germany (Cologne)	2008	Religious Art Museum	14th century	Brick Award 2008 and other awards
2	Vilanova de la Barca	Spain (Lleida)	2016	Multipurpose Hall	13th century	RIBA Award 2018 Brick Award 2022
3	St. Paraskeva	Bulgaria (Nesebar)	2014	Cultural Center (Museum of Other Churches' Artifacts)	13th century	-
4	Corbera d'Ebre	Spain (Pobla de Vallbona)	1999-2014	Multipurpose Hall	-	-
5	Baños	Ecuador (Baños)	2010	City Community Center	1788	-
6	St. Francis	Spain (San Pedro)	2006-2020	Cultural Center	18th century	-
7	Bagrati Cathedral	Georgia (Kutaisi)	2012	Cultural Center	11th century	Georgia's Gold Medal and Fararadomos University International Award
8	Dominican	Netherlands	2007	Bookstore	13th century	Lensvelt Architectural Prize

preparing the structure for its new function. These additions may be visible from the outside of the overall building volume or only upon entering the structure. Thus, additions can be divided into two main categories:
-External Additions
-Internal Additions
Primary adaptive addition may include adding or highlighting an entrance, functional volumes required for the new operation, and furniture. For some structures, a new entrance has been defined with modern shapes and materials, such as the Saint Francis Church and the Dominican Church. Some studies believe that adding new volumes for the entrance enhances the building's appeal to users (Szuta & Szczepański, 2020). In this research, the most significant volume additions are related to the Bagrati Cathedral and the Kolumba Church.
The spectrum of additions to historical buildings varies and depends on factors such as the new use, the conditions of the specific building, the extent of the building, and the opinions of architectural and restoration experts. In other words, the healthier the components of the original building, the more the additions focus on equipping for the new use. If there are many ruined parts of the historical building, it is necessary first to take measures to adapt the conditions for the building's usability (essential actions).
Among the case studies discussed in this article, the Dominican Church had the least need for restoration actions and did not have many collapsed roofs or walls. However, it has the most internal additions for functional adaptation. The added volumes to the historical structure of the Bagrati Cathedral are so significant that it has become a candidate for endangered status and nomination for removal from the list of World Heritage Sites. Among the cases in this research, the Kolumba Church, although having a significant amount of additions, has a more acceptable result due to adherence to charter principles and appropriate use of materials (Fig. 9).

• Functionality

Determining a new use for historical buildings, especially churches, is one of the most contentious aspects of their adaptive reuse. Various studies emphasize the importance of public participation and considering their opinions alongside those of experts, rather than solely relying on investors' perspectives. This is because investors often prioritize economic profitability, while experts prioritize the preservation of authenticity and integrity (Ahn, 2007). Among the uses considered for these eight churches, as observable in Fig. 10, cultural uses are most prevalent, followed by multipurpose halls.
Given that the Kolumba Museum displays religious art, its use can also be considered under the cultural category. Moreover, multipurpose halls are often places for public gatherings and hosting events with cultural-social content. If these types of uses are also included

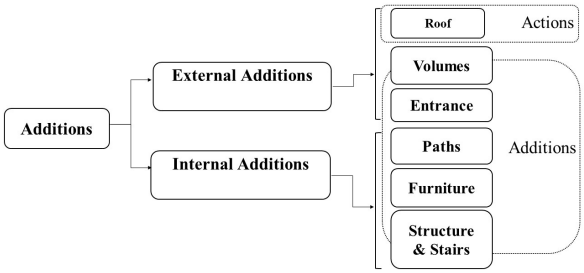

Fig. 9. Categorization of Annexes in Adaptive Reuse. Source: authors.

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under the cultural category, then more than 87% of the defined uses for these buildings in the case studies of this research are cultural. Even bookstores while falling under the commercial category, have a cultural essence. Thus, it appears that uses with cultural roots have been deemed more appropriate for the adaptive reuse of the religious architecture of churches.

• Materials

Article 12 of the Venice Charter's guidelines for the design of historic buildings states that "replacements of missing parts must integrate harmoniously with the whole, but at the same time must be distinguishable from the original so that restoration does not falsify the artistic or historical evidence" (ICOMOS, 1964). In interpreting and discussing the selection of materials and the design of new forms in light of the Venice Charter, it can be concluded that there should be noticeable differences between old and new architectures; thus, the intervention does not counterfeit the historical architecture (Khalaf, 2016). However, determining the compatibility of the original architecture and the adaptive work should not solely derive from a visual assessment of the relationship between the old and new architectures (Mine, 2013; Beste, 2019). For a better examination and analysis of the cases, four general categories can be considered for this section: roofing materials, entrance materials, materials used in external annex volumes, and materials used in internal annexes.

- Roofs

In terms of materials, we encounter two general categories:

-Translucent and transparent materials

-Materials without transparency properties

In the churches of Corbera d'Ebre and Baños, transparent materials have been used. The transparency in Corbera d'Ebre Church is significantly more pronounced. The collapsed roof in this church has been replaced with a transparent structure made of steel frames and ETFE foil to improve coverage and living conditions. The use of transparent materials maintains a delicate balance between nature and the building, as well as preserving the memory of war as an integral part of the place's history (Barou et al., 2018). One of the characteristics of glass or other translucent and transparent materials is that they are honest substances that act both complementarily and contrastingly. As suggested in the Venice Charter (ICOMOS, 1964), they "bear the mark of the modern" and do not falsify historical evidence (Barou et al., 2018). In Baños Church, a combination of metal structure and transparent polycarbonate has been used, while in the churches of Vilanova de la Barca, Saint Paraskeva, and Saint Francis, metal materials have been employed, and in the Church of Paraskeva, Corten steel has been used.

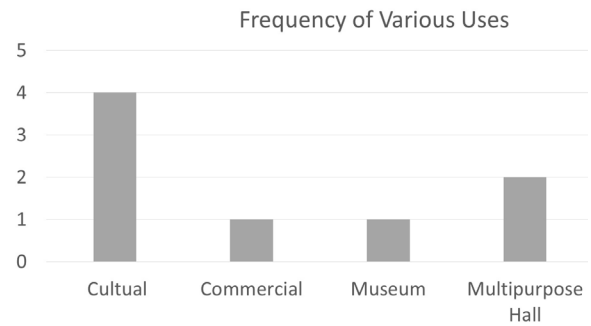

Fig. 10. Frequency of Uses in Adaptive Reuse of the 8 Churches Studied in This Research. Source: authors.

- Entrances

Two structures in this study feature appended entrance spaces. In Saint Francis Church, a combination of glass and metal forms an abstract volumetric facade. Studies suggest that restorations aimed at adaptive reuse and reconstruction of a historical building can employ glass elements as a means to enclose intermediary spaces (between columns, arcades, and vaults) or as part of an extension, usually abstract in form, to accommodate internal conditions and integrate new functions. The Saint Francis Monastery demonstrates the potential of glass in expansion structures, which can completely transform a historical building (ibid., 2018).

The Dominican Church has also defined a metallic entrance using Corten steel. Due to its inherent rust-like appearance, Corten steel conveys a sense of age and the passage of time, making it a suitable material for new additions to old buildings.

- Added volumes

The overall added volume to Kolumba Church is constructed of gray bricks except for the glass windows. In Bagrati Cathedral, the overall volume is made of metal and glass, which has been criticized for the irreversible nature of the construction method. Comparing these two structures clearly shows how the choice of materials significantly affects the outcome.

- Internal additions

Inside Kolumba Church, the additions are wooden pathways. In Saint Francis Church, wooden stairs and elements have been used, and in the Dominican Church, metal materials define floors, stairs, and bookshelves. The wood and metal used are monochromatic, distinct from the original building materials, and reversible.

A summary of the discussion on new additions inside and outside the building and the harmony or contrast of materials used in the case studies of this research is compiled in Table 2. Although in two cases

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homogeneous materials have been used, they differ from the old materials in terms of dimensions, structure, and color, and the principle of distinction has been well observed.

A general classification of the types of materials used in the examples of this research is mentioned in Table 3. It is noteworthy that the new materials used in a building often do not have much variety and are usually monochromatic materials used in adjacent sections.

• Building extent

It appears that one of the factors predisposing a structure to be equipped or unequipped with internal or external annexes is the extent of the building. A precise commentary on the relationship between the building's extent and the level of interventions requires a comprehensive and separate study from this research. However, this investigation addresses this relationship among the examined cases. In this study, five churches (the churches of Kolumba, Bagrati, Saint Francis, Corbera d'Ebre, and Dominican) have an area greater than 400 square meters, and three churches (the churches of Banos, Saint Paraskeva, Vilanova de la Barca) have an area less than 400 square meters (considering the area before annexes). In the Church of Saint Francis in Spain, due to the large size of the church, it is possible to define different spaces and uses within it. Consequently, the building contains additions such as internal stairs for connecting different levels. Similarly, in the Kolumba Museum, wooden pathways have been defined to create an exhibition route for viewing archaeological remains, and floors have been added to increase the exhibition space. In the Dominican Museum, a metal structure has been added for the display and sale of books. Whereas in smaller extent buildings, most changes are limited to optimizing the conditions of collapsed roofs and walls, as seen in the churches of Vilanova or Banos.

The following procedure was adopted to analyze the extent of interventions and compare it with the building's area. In cases where, apart from the restoration of existing elements or completion of collapsed roofs and walls (necessary actions), significant parts have been annexed to the building, a degree of two was assigned, and in cases where only necessary actions and the addition of minimal furniture for space adaptation were undertaken, a score of one was given, as shown in Table 4.

To find the relationship between the area of the

Table 2. Summary of materials and new additions inside and outside the building in the examined churches. Source: authors.

	Name of church	Materials		New External Additions				New Internal Additions	
		Homogeneous	Contrasting	Roof	Entrance	Volume	Path	New Structure, Stairs	Furniture
1	Kolumba	■				■	■	■	■
2	Vilanova de la Barca	■		■					
3	St. Paraskeva		■	■					■
4	Corbera d'Ebre		■	■					■
5	Baños		■	■					■
6	St. Francis		■	■	■			■	■
7	Bagrati Cathedral		■			■		■	■
8	Dominican		■		■			■	■

Table 3. Materials used in the churches studied in the research. Source: authors.

		Kolumba	Vilanova de la Barca	St. Paraskeva	Corbera d'Ebre	Baños	St. Francis	Bagrati Cathedral	Dominican
Transparent Materials	Glass						■	■	
	Polycarbonate					■			
	ETFE				■				
Metal	Corten Steel			■					■
	Black							■	■
	White		■						
Brick	Gray	■							
	White		■						
Wood		■					■		

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historical building and the second type of intervention, a range of less than 400 square meters was categorized as buildings with a small meterage, and buildings with an area greater than 400 square meters were categorized as buildings with a large meterage. The two scales were represented with the numbers 1 and 2 to illustrate that (Table 5).

Fig. 11 demonstrates a direct and significant correlation between the area and the annexes of the buildings. It suggests that the larger the extent of the structure, the greater the possibility of adding new annexes for new uses. Certainly, other factors are also significant; for instance, in the Kolumba Church, the location (adjacency to the street on two sides), the previous space of the church (major demolition of roofs and walls), and the need for new uses were influential in the extent of the annexes. In the Corbera d'Ebre Church, aside from the added roof, the building lacks new furniture and seems not to have reached full utilization. Therefore, the level of interventions has been assessed as minimal, although it has an area of over 400 square meters.

Conclusion

The range of defined functions in historical churches is quite extensive. The aim of this article is not to examine the various functions defined in churches but rather to open the discussion on redefining new uses for churches as religious buildings worldwide. This topic poses many challenges in theoretical foundations. However, it is essential to note that if a time comes when the dilemma of demolishing a building or changing its use arises, preserving the structure, even if only in form and not function, is preferable to demolition. Considering the religious values of these historical buildings, this article has examined the views and opinions of those in favor of changing the use of churches and how new uses can be adapted in these buildings, including necessary actions and adaptive annexes. However, for such projects to succeed, redefining the use must be done sensitively and precisely, with the participation of residents, stakeholders, and experts. Thus, uses that create fewer changes in the fabric and spirit of the building will be preferred over other options. After selecting a new use, the way to create the required changes in the structure and furniture needs to adhere to the principles set out in various conservation charters. Case studies show that using different materials, whether homogeneous or contrasting, depending on the project's conditions and the architect's choice, can both yield acceptable results. The principle of minimal intervention in meeting new needs must always be considered to preserve the building's authenticity and integrity more effectively. Given the breadth of religious functions among historical buildings in Iran and the existence of related and appropriate functions, addressing this issue can lead to the activation and return to life of a high percentage of semi-ruined or intact buildings in this land.

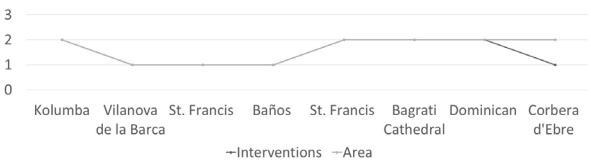

Fig. 11. Comparison of the extent of interventions and the area of the churches studied Source: authors.

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Table 4. The extent of interventions (necessary actions and annexes) in the churches studied in this research Source: authors.

	Kolumba	Vilanova de la Barca	St. Paraskeva	Corbera d'Ebre	Baños	St. Francis	Bagrati Cathedral	Dominican
Actions								
Additions								
Interventions	Extensive	Few	Few	Few	Few	Extensive	Extensive	Considerable

Table 5. The area of the churches studied in this research. Source: authors.

	Kolumba	Vilanova de la Barca	St. Paraskeva	Corbera d'Ebre	Baños	St. Francis	Bagrati Cathedral	Dominican
Area	450	217	95	1050	330	750	<1000	950
	2 (Large)	1 (small)	1(small)	2(Large)	1(small)	2(Large)	2 (Large)	2 (Large)

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