Journal of Architectural Sciences and Applications
JASA 2025, 10 (1), 654-670
Research article
e-ISSN: 2548-0170
https://dergipark.org.tr/en/pub/mbud

Re-functioning with BIM and Identifying Suitable Function for the Dar-ul-Aman Palace, Afghanistan

Abdul Salam NASIMI[1], Hasan Ş. HAŞTEMOĞLU [2*]

ORCID 1:0000-0001-9625-2939
ORCID 2:0000-0002-8818-6174
[1] *Kandahar University, Faculty of Engineering and Architecture, 3801, Kandahar, Afghanistan.*
[2] *Suleyman Demirel University, Faculty of Architecture, 32260, Isparta, Türkiye.*
** **e-mail**: hasanhastemoglu@sdu.edu.tr*

Abstract

Historic structures such as Dar-ul-Aman Palace in Afghanistan have significant cultural values in terms of connecting the past, present and future generations. In order to determine the appropriate function for the historical palace, 32 palaces converted into hotels around the world were examined and the main challenges and issues were identified. The aim of the study was to determine the most appropriate function for the palace by considering architectural, structural, economic, social, cultural and environmental factors. For this purpose, the Pourebrahimi model and BIM technology were used to determine the most appropriate function for the palace, and the appropriate function was selected from five functions (museum, library, hotel, school and hospital). As a result of the analysis, it was concluded that Dar-ul-Aman Palace is more suitable as a hotel or tourist accommodation rather than a museum. This re-functioning strategy will both ensure the preservation of the palace and contribute to the development of sustainable tourism. The findings obtained will provide important policy implications for conservation efforts in Afghanistan and will provide a sample framework for other heritage buildings.

Keywords: *BIM (building information modeling) revit, re-functioning, Dar-ul-Aman Palace, Afghanistan.*

Afganistan'daki Dar-ul-Aman Sarayı'nın BIM ile Yeniden İşlevlendirilmesi ve Uygun İşlevin Belirlenmesi

Öz

Afganistan'daki Dar-ul-Aman Sarayı gibi tarihi yapılar, geçmişi, bugünü ve gelecek nesilleri birbirine bağlaması açısından önemli kültürel değerlere sahiptir. Çalışmada tarihi saraya uygun işlevi belirlemek için, dünya çapında otele dönüştürülen 32 saray incelenmiş, temel zorluklar ve hususlar belirlenmiştir. Çalışmanın amacı, mimari, yapısal, ekonomik, sosyal, kültürel ve çevresel faktörleri göz önünde bulundurarak saray için en uygun işlevi belirlemektir. Bunun için, saray için en uygun işlevi belirlemek üzere Pourebrahimi modeli ve BIM teknolojisi kullanılarak, beş işlev (müze, kütüphane, otel, okul ve hastane) arasından uygun işlev seçimi yapılmıştır. Analizler sonucunda, Dar-ul-Aman Sarayı'nın müze işlevinden ziyade otel veya turistik konaklama yeri olarak daha uygun olduğu sonucuna varılmıştır. Bu yeniden işlevlendirme stratejisi, sarayın hem korunmasını sağlayacak hem de sürdürülebilir turizmin gelişimine katkı sağlaycaktır. Elde edilen bulgular Afganistan'da koruma çalışmaları açısından önemli politika çıkarımları ve diğer miras yapılar için örnek çerçeve sağlayacaktır.

Anahtar kelimeler: *BIM revit, yeniden işlevlendirme, Dar-ul-Aman Sarayı, Afganistan.*

Citation: Nasimi, A. S. & Haştemoğlu, H. Ş. (2025). Re-functioning with BIM and identifying suitable function for the Dar-ul-Aman Palace, Afghanistan. *Journal of Architectural Sciences and Applications*, 10 (1), 654-670.

DOI: https://doi.org/10.30785/mbud.1586520

Received: *November 16, 2024 –* ***Accepted:*** *July 7, 2025*

1. Introduction

Afghanistan boasts a rich multicultural heritage influenced by diverse civilizations, reflected in Kabul's architectural diversity pre and post-Islam (Ayoobi & Demirkol, 2021). Many historic buildings, indicative of various eras, exist but have suffered neglect, leading to their decay. Refunctioning emerges as the most viable solution to preserve these structures from further deterioration (Koç, 2019). With its historic, social, and political significance, Kabul is home to many architectural landmarks (Issa & Kohistani, 2007). Noteworthy monuments include the Timur Shah Mausoleum, Eid Gah Mosque, Dar-ul-Aman Palace, and more. However, insufficient research on Kabul's architectural styles has led to misconceptions. While many architects believe a blend of Islamic and Western styles exists, the significance of distinguishing between these influences is underscored (Ayoobi & Demirkol, 2021). Historic structures act as conduits between the past, present, and future, embodying sociological, economic, political, and religious facets. They symbolize a nation's material and spiritual heritage (Mazı, 2009). However, rapid urbanization, population growth, and environmental factors often jeopardize these treasures. Restoration or repurposing, guided by comprehensive plans, becomes necessary. Due to evolving social, cultural, and economic conditions, historic buildings may require new functions to stay relevant. Spatial arrangement post-repurpose crucially upholds the building's essence. Capital cities boast architectural gems reflecting profound historic narratives, necessitating robust preservation strategies for posterity. Sadly, neglect, misguided strategies, intentional harm, and disasters plague many historic sites, prompting restoration or adaptive reuse (Mahrebel, 2006). These efforts safeguard cultural legacies and enrich communal spaces, merging history with contemporary life (Kurak and Konakoğlu, 2019). Amanullah Khan, regarded as the pioneer of modernization in Afghanistan from 1919 to 1929, was appalled by Kabul's chaotic streets and envisioned a modern capital. His idea of modernity involved importing Western architectural designs, excluding those from England, Afghanistan's adversary. The "Darul Aman" area, six kilometers from Kabul, was created to realize this vision, designed by French architect Godard and international craftsmen using plaster and stone (Issa, 2006). The Dar ul-Aman Palace, built between 1925 and 1927 during Shah Amanullah Khan's reign, is Afghanistan's first concrete building and a debated cultural asset. Although not representing traditional Afghan architecture, its neoclassical German style reflects its era's architectural trends, lending it significance in terms of structure and local identity. Initially used by the Amani government; however, during times of change, the rules of repurposing were not considered. It was used for different purposes in different periods, but it could not meet the requirements and rules of repurposing. Despite facing war and insecurity, the palace has endured, symbolizing resilience and tranquility amidst turmoil (Hussaini, 2017). The Restoration of Dar ul-Aman Palace was completed in 2019 with a high cost of approximately 11 million dollars and was proposed as a museum and Cultural Center. Unfortunately, however, it has not been positively and effectively utilized since then. In this study, a detailed study including reuse recommendations for Dar ul-Aman Palace has been conducted. Our aim is to find a suitable function for this palace based on norms and standards that consider its location, history, and architectural features. Research on Dar ul-Aman Palace's form, typology, location, and room count led to the evaluation of five functions (museum, library, hotel, school, and hospital) using the Pourebrahimi model. Among these, the hotel and tourist accommodation function emerged as the most fitting. The reactivated palace could house 66 rooms, comprising single rooms, suite rooms for one to three guests, luxury rooms, and VIP accommodations for two people each.

By examining the current plans of Dar al-Aman Palace, the aim was to determine a suitable function for this palace and to use BIM technology and Revit software in this process. The use of BIM tools for scenario simulation enables the exploration of various reactivation options, considering cultural, historic, and functional aspects. BIM technology and Revit software assisted us in Clash Detection and Review, Planning and 3D Modeling, Visualization of Design Intent, and Enhanced Collaboration Coordination.

1.1. Re-functioning historic Buildings: A Study on Converting Palaces into Hotels

The concept of re-functioning emerged initially from conservation efforts and gained prominence during the environmental concerns of the 1960s and 1970s. It addresses the necessity of updating buildings to align with evolving technological and socio-cultural needs, rescuing historic structures from decay through repurposing (Burden, 2004). Factors influencing appropriate function selection are crucial in spatial organization during reuse, especially for buildings with industrial heritage. These include location, spatial arrangement, and functional compatibility, all interrelated and vital for interior design decisions (Altınoluk,1998; Kaşlı,2009). Determining a structure's suitability for conversion into a hotel entails evaluating its location, room adaptability, space requirements, and structural adequacy for hotel functions (Tapkı, 2016). This study examines 32 palaces globally converted into hotels, analyzing challenges and transformation factors. The palace's historic context, conversion hurdles, and factors influencing the hotel transformation process are key aspects. A structured form was created detailing palace names, conversion years, and locations for comprehensive analysis (Table 1).

Table 1. Palaces converted into hotels in different countries

NO	Project Name	Country	City	Year of Re-function
1	Taj Mahal Palace	India	Mumbai	1903
2	Umaid Bhawan Palace Hotel	India	Jodhpur	1971
3	Rambagh Palace Hotel	India	Jaipur	1957
4	Taj Falaknuma Palace Hotel	India	Hyderabad	2010
5	Taj Lake Palace Hotel	India	Rajasthan	1963
6	Adile Sultan Palace Hotel	Turkey	Istanbul	2002
7	Tarabya Palace Hotel	Turkey	Istanbul	1995
8	Ibrahim Pasha Hotel	Turkey	Istanbul	1980
9	Four Seasons Hotel	Turkey	Istanbul	1996
10	Ciragan Palace Kempinski	Turkey	Istanbul	1990
11	Sumahan on the Water	Turkey	Istanbul	2005
12	Hotel de la Cite	France	Carcassonne	1910
13	Hotel of Ambassador Wien	Austria	Vienna	1963
14	Ashford Castle Hotel	Netherlands	Amsterdam	1930
15	Belmond Hotel Caruso	Italy	Ravello	1980
16	GORING HOTEL	London	Belgravia	1930
17	Hotel of Hamburger Hof	Germany	Frankfurt	1990
18	Hotel d'Angleterre	Denmark	Copenhagen	1750
19	The Four Seasons Hotel George	France	Paris	1997
20	Palacio del Retiro Hotel	Spain	Madrid	1990
21	The Krasnapolsky Palace	Netherlands	Amsterdam	1866
22	Palacio de los Capitanes Generales	Cuba	Havana	2019
23	Palais Hansen Kempinski	Austria	Vienna	2013
24	Sofitel Legend Santa Clara	Colombia	Cartagena	1995
25	Hotel Danieli	Italy	Venice	19th century
26	Ritz-Carlton, Vienna	Austria	Vienna	2012
27	Waldorf Astoria Amsterdam	Netherlands	Amsterdam	2014
28	Kasan Sıraevleri Hotel	Iran	Kasan	2013
29	Four Seasons Lion Palace	Russia	St. Petersburg	2009
30	Castell Son Claret	Spain	Mallorca	19th century
31	Boston Hotel	America	Massachusetts	2019
32	Heritage Hotel	India	Pudukkottai	2011

The conversion of historic structures into hotels presents unique challenges worldwide. The Boston Hotel, transformed in 2019, faced hurdles like historic preservation, coordination complexities, and modeling challenges mitigated by BIM usage and clash tests (Mancık, 2023). India's Umaid Bhawan Palace, converted in 1971, grappled with age-related preservation issues and market competition, striving to maintain its allure (Sinha, 2012). Similarly, Turkey's Çırağan Palace Kempinski, converted in 1990, navigated preserving historic texture amidst a competitive market, focusing on luxury and guest experiences (Yabancı, 2022), France's Four Seasons Hotel George, converted in 1977, balanced modernizing infrastructure with historic character preservation, aiming for luxury and sustainability

(Jackson and Naipaul, 2008). Colombia's Sofitel Legend Santa Clara, transformed in 1995, harmonized modernization with historic integrity, emphasizing luxury and local culture (Santoya Mendoza, 2019). Spain's Palacio del Retiro, converted in 1990, prioritized historic conservation, luxury, and sustainability amid Madrid's urban challenges (Fort González, et al 2004). India's Chidambara Vilas, renovated in 2011, highlights the need to balance modern needs with cultural preservation (Doshi & Devi, 2023). Adaptive reuse is pivotal in preserving threatened buildings by offering viable alternatives for new uses. This process acknowledges that buildings age and require continuous maintenance or may become obsolete. When specific uses become irrelevant, adaptive reuse enables transformation for new purposes, promoting sustainability (Langston, et al 2008). Dar-ul-Aman Palace underwent significant re-functioning over the years, serving various purposes, from governmental offices to medical facilities and refugee shelters. Initially recommended for repairs by the Supreme Court in 1972, it saw extensive renovations, including the modernization of heating, electrical, and water systems, the addition of mezzanine floors, and the installation of a telephone system. Despite damages from fires and bombings, ongoing restoration efforts have maintained its historic significance, adapting it to contemporary standards and needs (Ibrahimi, 2014). BIM, or Building Information Modeling, revolutionizes information management in the Architecture, Engineering & Construction (AEC) industries, offering efficiency and cost savings. Initially conceived at Georgia Tech in the late 1970s, BIM gained traction post-2000. The Revit platform, acquired by Autodesk in 2002, emerged as a market leader due to its extensive user base and comprehensive support, encompassing Revit Architecture, Structure, and MEP product families. Architects, engineers, and construction professionals widely adopt BIM, recognizing its effectiveness in project management and design (Azhar, et al 2008; Charlesraj, 2014; Rokooei, 2015). This review explores innovative BIM methodologies applied to heritage sites globally, showcasing their potential for comprehensive building representation. Proposed is a Scan to BIM method for cultural heritage, utilizing 3D GIS models linked to databases. Applied to a rock church in Italy, this method integrates laser scanning and photogrammetry to create detailed BIM models (Pepe, et al 2021). Acknowledging BIM's challenges for historic buildings, a solution using point clouds and historic data integration is proposed. Tested on a Romanesque church in Spain, this approach proves adaptable to similar structures (Godinho, et al 2020). Further examples include a BIM model development for a palace in Portugal, emphasizing historic data inclusion and multifunctional utility (López, et al 2018). Similarly, BIM's role in archaeological heritage management is highlighted, showcasing its potential for detailed 3D modeling and information layering (Moyano et al., 2020). Lastly, a trend emerges in integrating BIM with other techniques, emphasizing the potential of Historic BIM (HBIM) to capture geometry and historic context (Yang et al., 2020). This review underscores the versatility and potential of BIM in preserving and enhancing historic building functionalities, with applications ranging from structural analysis to cultural heritage management. In integrating BIM and CFD for building environment simulations, recent studies show enhanced building performance and comfort through numerical simulations despite current limitations in dynamic data transfer (Zheng et al., 2023). Additionally, ontology-based frameworks facilitate environmental monitoring and compliance checking by integrating BIM data with sensor and regulatory information, proving effective in real-world applications (Zhong et al., 2018). These insights support re-functioning historic buildings using advanced BIM techniques.

2. Material and Method

In this paper, the Dar-ul-Aman Palace, located in the 14th district southwest of Kabul, Afghanistan, and constructed between 1925 and 1927 during the reign of Shah Amanullah Khan, is selected as the study subject. Designed by French architect Andre Godard and built by German architect Walter Harten, this architectural marvel is a cornerstone of modern architecture, contributing significantly to the New Kabul City project (Hussaini, 2017). Throughout its history, the palace underwent various transformations, serving as the Shah's offices and parliament, the Ministry of Public Works, the Supreme Court, and the Ministry of National Defense. It has undergone restoration following fire and bombings, with the most recent restoration between 2016 and 2019 in honor of Afghanistan's 100th Independence Day. Architecturally, the palace follows a neoclassical style, featuring a U-shaped

corridor scheme with 154 rooms and three stories. Its structural elements include reinforced concrete, marble, and traditional materials, such as clay, cement, brick, and iron. Initially proposed to operate as a Museum and Cultural Center, the palace holds immense heritage value, embodying historical, aesthetic, and social-cultural significance. Surrounded by notable landmarks like the Afghanistan National Museum, Tajbeg Palace, and Chehel Sotoun Palace, it offers spectacular mountain views (Ibrahimi, 2014) (Figure 1).



Figure 1. The current state of the exterior design of Dar-ul-Aman Palace (Nasimi, 2023)

2.1. Pourebrahimi Model

The refunctioning of the Dar-ul-Aman Palace, located in the capital of Afghanistan, Kabul, has been stated as finding and examining a function suitable for norms and standards. Firstly, the current situation of the palace was examined to determine a suitable function for this palace. In 2019, during the restoration, the Aga Khan Architecture Office and the ministries involved in the project considered this place's five different functions (museum, library, hotel, school, and hospital). These five different functions were evaluated in terms of the Pourebrahimi model (Architectural features, structural and installation features, economic features, regulatory status, social and cultural features, and environmental and spatial features). The Dar-ul-Aman Palace was comprehensively evaluated according to the proposed Model. Considering the pros and cons, the most suitable function of the hotel was determined (Pourebrahimi et al., 2019). This is a new model. Because researchers (Goodwin, 2008; Murtagh & Keaveney, 2006; Tan et al., 2014; Wang & Zeng, 2010) evaluated their models in a comprehensive Figure and proposed this Model by considering their positive aspects. Therefore, the Pourebrahimi model was used, taking into account its parameters in the evaluation. This Model, after evaluating the existing models in the region, was proposed by Mohammad Pourebrahimi, Seyed Rahman Eghbali, Hasan Zolfagharzadeh, and Hassan Ghafori Fard, professors at Imam Khomeini International University and Amir Kabir University of Technology in Iran. As a result of this evaluation, the most suitable function was a hotel. In this context, palaces around the world that have been refunctioned as hotels were examined, problems encountered in the transformation and points to be considered were determined. The building's characteristics in terms of its location and architectural features (plan organization, spatial arrangement) were examined in detail in the context of field studies. In addition, BIM was used as a tool to draw palace plans. It was aimed to document each floor of the Dar-ul-Aman Palace as a hotel using BIM technology and Revit software in a three-dimensional, as shown in Figure 2.

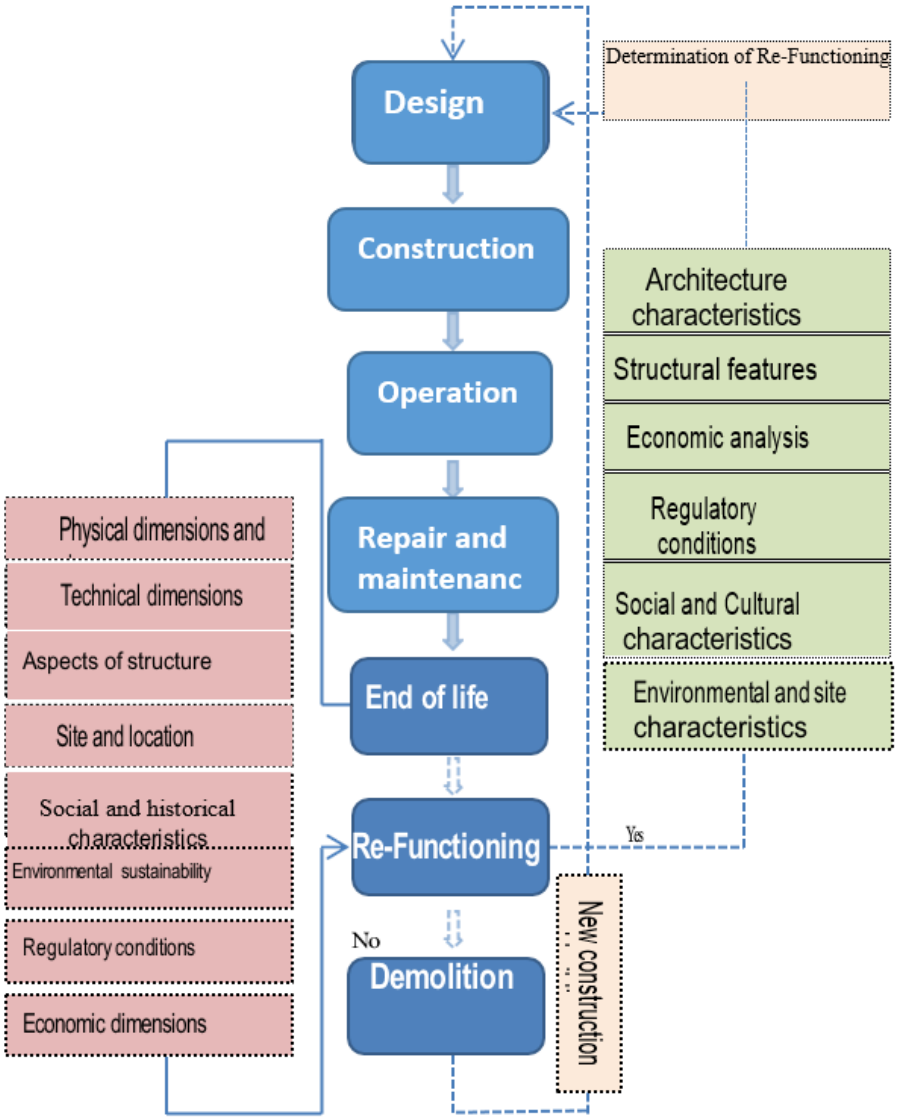


Figure 2. Re-functioning criteria for existing buildings (Pourebrahimi et al., 2019)

2.2. Use of (BIM) in the Re-functioning of Dar-ul-Aman Palace

To manage all interventions in the process of converting Dar-ul-Aman Palace into a hotel effectively, the Proposal for Repurposing Dar-ul-Aman Palace as a Hotel was designed in Revit 2021 with all details. The needs of today's world have made construction projects more complex, and on the other hand, technological advancements help experts work more efficiently and effectively. BIM is a global concept that can be applied throughout the life cycle of a project and prevents unnecessary claims (Pour Rahimian, 2020). BIM helps us eliminate extra elements that could cause problems before the design phase. Implementing BIM requires a higher level of information than three-dimensional modeling. BIM reduces repetitive work because we see everything on the correct scale beforehand, and it still assists in teamwork. Additionally, it helps with integrated project delivery and significantly reduces time and cost as you progress with everything planned in advance and notice all the project's shortcomings before rebuilding them. As seen in Figure 3 below, in the current state of Dar-ul-Aman Palace, disabled toilets and urinals were not considered. By placing partition walls with the help of BIM, space for disabled toilets has been arranged before the repurposing process. Additionally, the rooms have been arranged according to their requirements before the re-functioning (Figure 3).

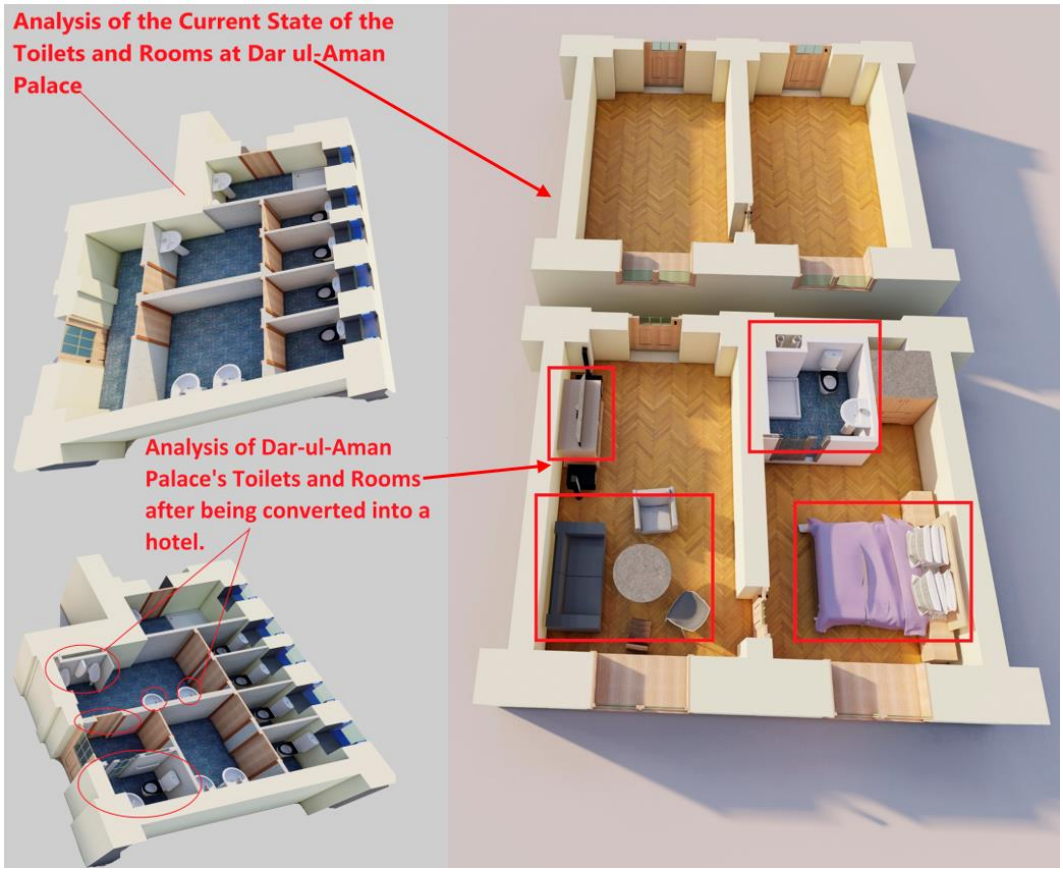


Figure 3. Re-functioning and comparing the toilets and rooms of the Dar-ul-Aman Palace with BIM (Nasimi, 2023)

After the conversion of Dar-ul-Aman Palace into a hotel, two solutions were considered based on past research on interventions in the historic buildings converted into hotel units.

- To minimize plumbing interventions in the palace, existing wet units should be kept fixed, and additional units should be added to the adjacent rooms (Ulusoy, 2022).

- Alternatively, ready-made bathroom cabins can be preferred. All details inside the cabins will be integrated into the building only, with plumbing connections outside the cabin. This way, the risk of wet volumes leaving water and moisture in the building will be reduced, and plumbing interventions will be minimized. Old bathroom cabins can be removed and replaced with a different cabin. Therefore, it is important to reduce the intervention in the existing building using ready-made bathroom cabins and to reduce the damage caused by water and steam to the building (Haştemoğlu, & Beyhan, 2017).

After the conversion of Dar-ul-Aman Palace into a hotel, shower-WC (ready-made bathroom cabins) were added to some rooms that previously did not have shower-WC. This is because today's comfort conditions and regulations require the use of shower-WC in hotel unit rooMSc. The second option was preferred. It should be noted that the palace does not have many stories so that we can pass the equipment pipes through the void space of the ribbed slab.

In the construction industry, BIM is favored for its ability to enhance coordination and reduce collision issues compared to 2D drawings. Collision control with BIM detects errors early, allowing for more accurate coordination and cost savings during production. This feature, illustrated in Figure 4, highlights the benefits of using BIM for collision detection in projects like the Dar-ul-Aman Palace (Figure 4).

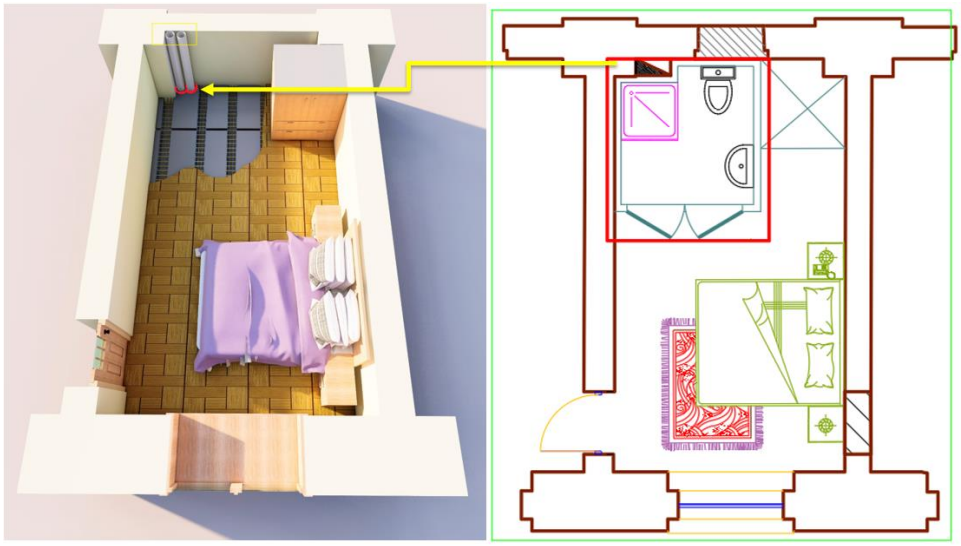


Figure 4. Shows clash detection and the routing of water supply pipes through the avoid ribbed slab on the room floor, facilitated by BIM (Nasimi, 2023)

The process of creating a new project page in Revit involves selecting the "New" option, choosing the "Metric-Architecture Template," and specifying measurement/display units. Structural element modeling in Revit requires assigning wall thickness and material properties before drawing walls. BIM technology in Revit allows precise measurement of wall layers, aiding in interdisciplinary communication and clash control, crucial in cultural heritage preservation (Odabaşı, 2022). Figure 5 illustrates the comprehensive control over wall dimensions and properties in Revit, including material attributes like physical structure, durability, color, and price, enhancing design accuracy and functionality (Figure 5).

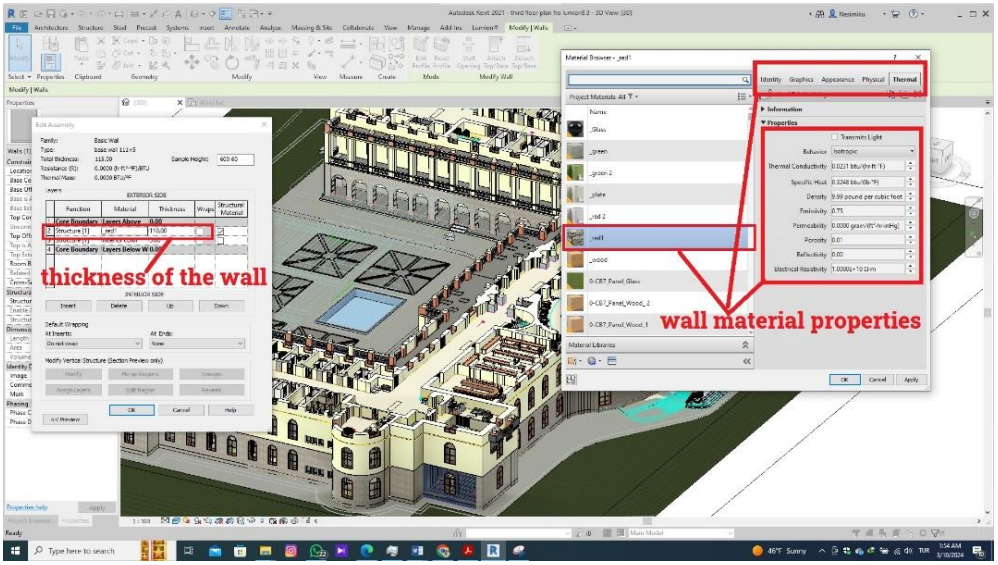


Figure 5. Assignment of material properties (Nasimi, 2023)

Object-oriented modeling, a key aspect of BIM, enables the creation of many building elements using a few objects. It integrates architectural details like dimensions and materials, allowing easy modifications across the entire model. This parametric approach offers flexibility for design revisions and experimentation with different parameters, ensuring accurate and efficient drawing adjustments (Kurucaoğlu, 2023) (Figure 6).

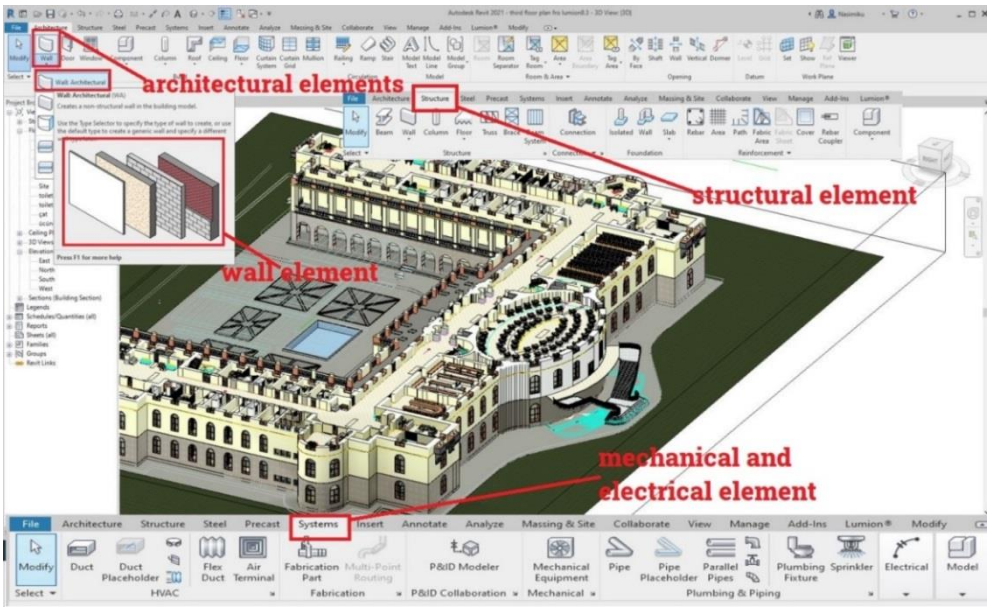


Figure 6. The main elements and objects of BIM (Nasimi, 2023)

Interoperability (IFC) in BIM technology facilitates accurate data exchange and communication among different teams in construction projects. This feature, also known as Industry Foundation Classes (IFC), enables seamless sharing of project data across architectural, engineering, and construction disciplines. BIM's collaborative approach allows real-time updates and simultaneous work by multiple teams, enhancing project efficiency and coordination (Mancık, 2023) (Figure 7).

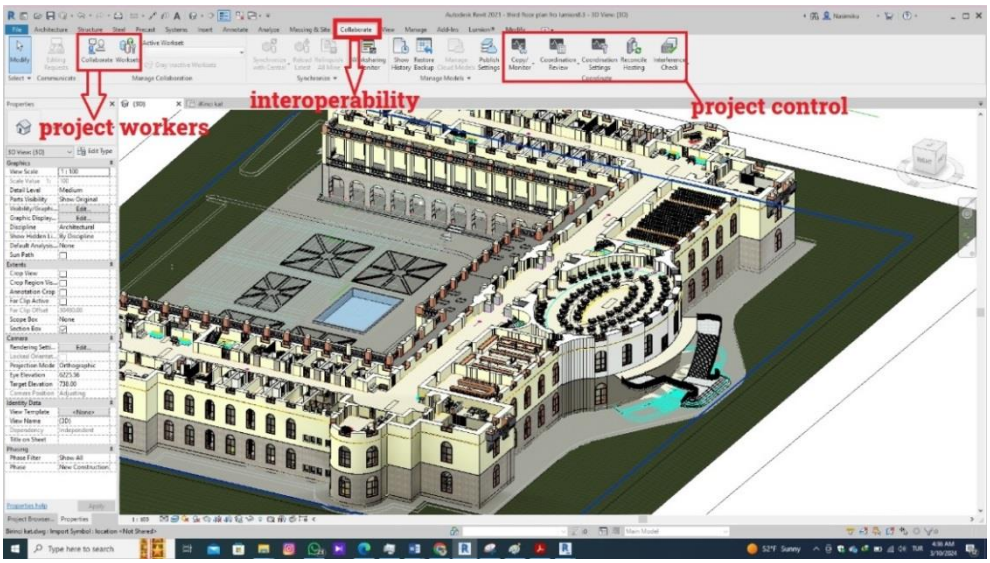


Figure 7. Shows a schematic of the collaboration option in Revit for achieving interoperability among different disciplines (Nasimi, 2023)

3. Findings and Discussion

The Dar-ul-Aman Palace, serving as a museum and cultural center in Afghanistan, the necessary information about Dar-ul-Aman Palace was first gathered (**Error! Reference source not found.**), and t hen this information was examined according to the Pourebrahimi model (**Error! Reference source not found.**) and five proposed functions (museum, library, hotel, school, and hospital) (**Error! Reference source not found.**). The re-functioning process focused on making minimal structural changes. After evaluating the five functions, it was found that the hotel function is the most suitable for this palace. This determination was made because it was the only option that could be accommodated with minimal intervention in the structural and architectural system of the palace. To support this conclusion, we reviewed 32 palaces worldwide that have been converted into hotels. The main elements, such as lifts and stairs remained in their original state. Challenges included

adjustments to the kitchen and restaurant layout, resolved based on their proximity to essential areas. Disabled toilet and urinals concerns were addressed using BIM technology (**Error! Reference s ource not found.**). Another concern was that some rooms did not have shower-WC facilities; ready-made bathroom cabins were added to some rooms using BIM (**Error! Reference source not found.**). T he concern of pipes passing through the ribbed slab was also resolved. The placement of a multipurpose hall posed logistical challenges, ultimately situated on the third floor for optimal use. Sports facilities were carefully distributed on the first floor to manage load distribution across the building (**Error! Reference source not found.**), which shows the current state of Dar-ul-Aman Palace's r ooms and the changes after its re-functioning as a hotel. (**Error! Reference source not found.**) shows the assignment of material properties through BIM technology for Dar-ul-Aman Palace. Furthermore (**Error! Reference source not found.**), showcases the main elements and objects utilized for the palace through BIM, emphasizing the interdisciplinary collaboration among experts managing the project's information exchange and applied changes, as illustrated in (**Error! Reference source not found.**). This interoperability highlights the coordination among different disciplines involved in the project. Finally illustrates the transformation of Dar-ul-Aman Palace from a museum into a 66-room hotel spanning three floors, showcasing the successful repurposing achieved through meticulous planning and execution (**Error! Reference source not found.**).

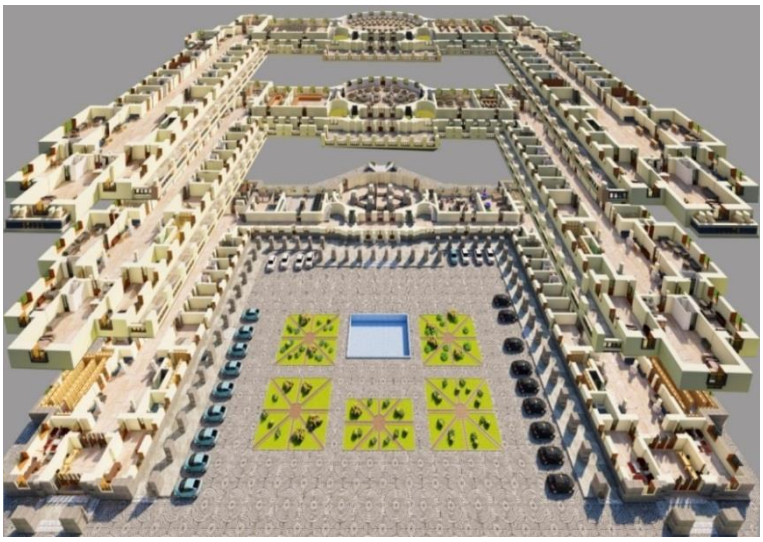


Figure 8. 1, 2 and 3-floor plans of Darul Aman Palace as a hotel using BIM and revit (Nasimi, 2023)

3.1. Proposal for Re-functioning Dar-ul-Aman Palace as a Hotel

The Dar-ul-Aman Palace stands as a potential hotel due to its historic significance, strategic location near other tourist attractions, and recent restoration in 2019 (Table 2). The palace's appeal to tourists is evident with neighboring historic sites like the Afghanistan National Museum and Tajbeg Palace (Ayoobi & Demirkol, 2021). Hotels serve as accommodations and play a crucial role in preserving local culture and heritage. They attract high-income tourists seeking elegance, comfort, and personalized services (Üksel, 2009). Afghanistan's tourism sector has seen growth, making it a safe destination post-Taliban rule. The palace's refunctioning aligns with this growth, catering to local and foreign tourists amidst an increase in annual visitors (Ab Saleem & Weerakit, 2011). Refunctioning involves adapting existing structures for new purposes, and the U-shaped layout of Dar-ul-Aman Palace makes it conducive for a hotel conversion. The palace's suitability was evaluated using the Pourebrahimi model, considering factors like spatial arrangement and architectural features (Apaydın, 2007) . Ultimately, the proposal for repurposing Dar-ul-Aman Palace as a hotel aligns with tourism development efforts in Afghanistan and presents a viable opportunity for sustainable cultural preservation and economic growth.

Table 2. Evaluating the current and past status of Dar ul-Aman Palace

Examination of the current status of Dar ul-Aman Palace	
Historical Factors	
Construction date	1923-1927
Dar-ul-Aman Palace Transformation and Repurposing	The Dar-ul-Aman Palace underwent various transformations over the years, serving as the Shah's offices and parliament from 1928-1956, then housing the Ministry of Public Works until 1969. Subsequently, it became the Supreme Court before transitioning to the Ministry of National Defense. Restoration followed fire and bombing damage, with recent use as an isolation center during the 2020 pandemic (Hussaini, 2017)
Last restoration date	Restored again between 2016-2019 on the occasion of Afghanistan's 100th Independence Day
Architectural Features	
Location	Kabul, Afghanistan
Site and building size	Site size 405x310=125550m2 Building size =6080m2
Architectural style	Neoclassical
Number of floors	3
Floor plan, Arasta	Corridor layout, U-shaped
Number of rooms	154
Height	33m
Room size	(18.8m2)
Main Entrance	3
Entrance	3
Stairs	6
Elevator	5
Original function	Palace
Proposed	Museum and Cultural Center
Building orientation	The palace has many rooms in the east and west.
Structural features	
Building materials	Reinforced concrete, marble, brick (spiral stairs), walls and foundations made of clay, cement, brick, and iron in the old-fashioned way (Ibrahimi, 2014)
Heating and cooling	Heating system, Cooling and ventilation system (Hussaini, 2017)
Social and cultural features	
Heritage values	Architectural - Aesthetic - Historical - Contextual - Social - Cultural - Symbolic - (Hussaini, 2017)
Environmental Factors	
Historical buildings and places in the neighborhood	Afghanistan National Museum, Tajbeg Palace,Chehel Sotoun Palace, Parliament Assembly building (Ayoobi and Demirkol, 2021).
City distance	Distance to Kabul's main city is 6 km, but if Dar ul-Aman city is built, it will be located within the city
View	Magnificent mountain views from the north and west
Dar-ul-Aman City and	The Darul Aman Administrative Complex, initiated in 2018, aimed to finish within three years. Spanning 100 hectares, it incorporates 31 administrative buildings, 18 ministries, and blends traditional and contemporary Islamic architectural styles (Ayoobi and Demirkol, 2021).

According to the results as shown in Table 3 above, five different functions (museum, library, hotel, school, and hospital) were compared in terms of the Pourebrahimi model (Table 3). As a result of this comparison, considering the strengths and weaknesses of each function, it was determined which one was the most suitable. As a result of this evaluation, it was found that the most suitable function for Dar-ul-Aman Palace is hotel and tourist accommodation.

Table 3. Checking the suitability of the Palace for function according to the Pourebrahimi model

Checking the suitability of the Palace for (museum, library, hotel, school, and hospital) function (Pourebrahimi et al., 2019)

Buildings requirements	Suitability for School	Suitability for Museum	Suitability for Library	Suitability for Hospital	Suitability for Hotel
Architectural Characteristics					
Lobby and reception	X	X	X	X	X
Corridors and passage ways	X	X	X	X	X
Room sizes	O	O	O	O	X
Natural lighting	O	O	O	O	X
Restaurant and bars	X	X	X	X	X
Plan schame	X	O	O	X	X
Meeting and conference rooms	X	X	X	X	X
Administrative offices	X	X	X	X	X
Circulation system	X	O	O		X
Multipurpose hall	X	X	X	X	X
Gym	X	X	X	X	X
Large gallery exhibition	X	O	O	X	X
Auditorium	X	O	O	X	X
Marketing and sales department	X	X	X	X	X
Structural Features					
Equipment systems	O	O	O	O	O
Load	O	O	O	O	O
Possibility of adapting to the proposed use	O	O	O	O	X
Regulatory Conditions					
Security and emergency preparedness	O	O	O	O	O
Building Partitioning according to building requirement	X	O	O	O	X
Economic Analysis					
Planned budget	X	X	X	X	X
Impact on the local economy	O	X	X	O	X
Market condition	O	O	O	O	X
Initial investment and budget required for future maintenance	O	X	X	O	X
Social and Cultural Characteristics					
Social and Cultural	O	X	X	O	X
Cultural and historic context	O	X	X	O	X
Security and environmental factors	X	X	X	X	X
Community needs	O	O	O	O	X
Environmental and Site Characteristics					
Green Areas and Garden	X	X	X	X	X
Public transportation access	X	X	X	X	X
Environmental factors	X	X	X	X	X
Tourist areas and other points of interest	O	X	X	O	X
Distance to city center	O	X	O	O	X
Parking and transportation services	X	X	X	X	X

After the proposal to convert the Dar-ul-Aman Palace from a museum and cultural center to a hotel unit, all interventions made to the palace were evaluated in detail. At this stage, all elements and objects added, arranged, and removed were examined according to the best use and suitability of the hotel. All rooms were transformed into hotel rooms without interfering with the structural system of the building in accordance with the standards of the hotel. In some rooms, doors were closed as per needs and new functions, while partition walls were added in some rooms when necessary. The conversion of the Dar-ul-Aman Palace into a hotel presents an opportunity to directly welcome and host domestic or foreign guests visiting our country, introducing our country and cultural values. It aims to provide various experiences for participants in the tourism phenomenon. However, architectural, historic, and cultural values must be carefully preserved in this process. The conversion of the Dar-ul-Aman Palace, which holds historic and architectural importance in Kabul City and its surroundings, into a hotel will be a suitable solution to maintain these values. Repurposing historic buildings into hotels significantly contributes to tourism and the economy. Adapting abandoned structures is vital for sustainability and economic growth. The new function of a building must align with its existing plan. Architecture creates new spaces and preserves historic memory. While preserving history is crucial, repurposing buildings mitigates the risk of disuse.

4. Conclusion and Suggestions

The Dar-ul-Aman Palace, constructed between 1925 and 1927 during Shah Amanullah Khan's reign, this Palace is Afghanistan's first concrete building, symbolizing significant architectural advancement. Its unique architecture and intricate decorations make it a vital cultural and historic landmark, embodying social memories and local culture. Over time, the palace was repurposed for various uses but failed to meet re-functioning standards, lacking fulfillment of its intended requirements and guidelines. In 2019, it was restored and suggested as a museum and cultural center at an estimated cost of $11 million, yet it has not been effectively utilized. During the restoration of Dar-ul-Aman Palace, crucial aspects like the circulation system, building typology, and spatial arrangement were overlooked. The sequential museum scheme clashed with the unsuitable corridor layout. Rooms and window sizes and natural lighting systems didn't meet museum standards. Interventions should adhere to specific rules to avoid endangering historic buildings. The palace's former use as the Ministry of Defense contributed to its demolition, highlighting the importance of considering the structure's intended function. Ignoring social and cultural needs is also a significant concern. Afghanistan's lack of expertise in restoration and re-functioning was evident. Ashraf Ghani prioritized completing the project for Afghanistan's 100th Independence Day without considering essential re-functioning factors. This led to challenges and compromises in the effective utilization of Dar-ul-Aman Palace. Firstly, national and international research should have been conducted to find a suitable function according to norms and standards and to analyze this function. After evaluating the proposed five functions (museum, library, hotel, school, and hospital) according to the Pourebrahimi model and examining the parameters (architectural features, structural and installation features, economic features, regulatory status, social and cultural features, environmental and spatial features), it was concluded that the hotel function is the most suitable for this palace. Because it was the only option that could be suitable for the hotel function, with minimal intervention in the palace’s structural and architectural system. Afterward, the Dar-ul-Aman Palace was transformed into a hotel with 66 rooMSc. BIM was used as a tool in the process of transforming the Dar-ul-Aman Palace into a hotel. BIM technology and Revit software helped in issues, such as placing toilets in rooms, routing water pipes through installations, collision detection and examination, planning and 3D modeling, visualizing design intent, and improved collaboration coordination. All interventions made for the conversion of Dar-ul-Aman Palace into a hotel have been studied. The comparison of the current state of the palace with the proposed state after repurposing and the examination of which elements were rearranged, added, or removed during the repurposing process have been studied.

Despite having a Historic Preservation Department, the office lacks experts, regular plans, and scientific research, hampering its effectiveness. Government plans call for the restoration and repurposing of numerous buildings, and this research serves as the foundation for such endeavors.

One major challenge in restoring historic buildings in our country is the oversight of considering a new function during physical interventions, often leading to the attempt to add a suitable function later. Before repurposing and restoring, there was no regular research and plan to demonstrate the suitability of the palace's new function. Research should be conducted before reuse and restoration to anticipate and mitigate future problems; a comprehensive analysis of similar cases worldwide is necessary.

To bolster Afghanistan's tourism industry and optimize tourist sites, a standardized grading format should be established for hotels and accommodations, aligning with Afghanistan's conditions and standards.

The clientele of Dar-ul-Aman Hotel can comprise both local and foreign tourists. Each year, various conferences, symposiums, and seminars are held by ministries, institutions, and organizations, hosting university and school professors from other cities who visit Kabul for diverse purposes across different seasons. After the transformation of Dar-ul-Aman Palace into Dar-ul-Aman Hotel, these entities can achieve their objectives more effectively with enhanced facilities.

Acknowledgements and Information Note

The article complies with national and international research and publication ethics. Ethics Committee approval was not required for the study. This article is produced from the master's thesis titled "Use of building information modeling in re-functionalization projects: Darul Aman Palace" completed in the Department of Architecture, Süleyman Demirel University, Graduate School of Natural and Applied Sciences.

Author Contribution and Conflict of Interest Disclosure Information

The first author contributed %50 and the second author contributed %50 to the article. There is no conflict of interest.

References

Ab Saleem, S. A. & Weerakit, N. (2011). Strategies for the development of hospitality SMEs in Kabul, Afghanistan, *Journal of* Tourism, *Hospitality & Culinary Arts* (JTHCA), 3(1): 63-75. Access Address (10.10.2024): https://fhtm.uitm.edu.my/images/jthca/Vol3Issue1/chap-4.pdf

Ayoobi, A. W. & Demirkol, H. G. (2021). An evaluation of architectural monuments in Afghanistan as in the capital city, Kabul, *Journal of Design for Resilience in Architecture and Planning*, 2(1): 64-85. E-ISSN:2757-6329, Access Address (12.10.2024): https://drarch.org/index.php/drarch/article/view/38

Azhar, S., Nadeem, A., Mok, J. Y. & Leung, B. H. (2008). Building Information Modeling (BIM): A new paradigm for visual interactive modeling and simulation for construction projects, First International Conference on Construction in Developing Countries, Karachi, Pakistan, Access Address (20.10.2024): https://www.researchgate.net/publication/283118367

Apaydın B., B. (2007). *Conceptional and theoretical analysis of space transformation of buildings in the context of reusage as a hotel, MSc. Thesis, Mimar Sinan fine arts University Institute of Science and Technology, Istanbul, 31-138.* Access Address (13.10.2024): https://tez.yok.gov.tr/UlusalTezMerkezi/tezDetay.jsp?id=4U6gIlqlQWyVl4R_itlBuQ&no=KWkg5Z0hpgGSsHPlGK3enQ

Altınoluk, Ü. (1998). *Binaların yeniden kullanımı: program, tasarım, uygulama, kullanım*. Istanbul: Yapı-Endüstri Merkezi Yayınları.

Burden, E. E. (2004). *Illustrated dictionary of architectural preservation: restoration, renovation, rehabilitation, resuse.* New York: McGraw Hill Publising.

Charlesraj, V. P. C. (2014). Knowledge-based building information modeling (K-BIM) for facilities management, Proceedings of the International Symposium on Automation and Robotics in Construction, New Delhi, 936-941, 2014 Proceedings of the 31st ISARC, Sydney, Australia, ISSN

2413-5844, Access Address (4.9.2024): https://www.iaarc.org/publications/2014_proceedings_of_the_31st_isarc_sydney_australia/knowledge_based_building_information_modeling_k_bim_for_facilities_management.html

Doshi, S. & Devi, T. S. (2023). Adaptive reuse of historic buildings. *International Journal for Multidisciplinary Research*, 5(3): 1-19. E-ISSN: 2582-2160**,** Access Address (5.8.2024): https://www.ijfmr.com/research-paper.php?id=4002

Fort González, R., Alvarez de Buergo, M., Mingarro Martín, F. & López de Azcona, M. C. (2004). Stone decay in 18th century monuments due to iron corrosion. The Royal Palace, Madrid (Spain), *Building and Environment*, 39(3): 357-364. doi: https://doi.org/10.1016/j.buildenv.2003.09.012

Godinho, M., Machete, R., Ponte, M., Falcão, A. P., Gonçalves, A. B., & Bento, R. (2020). BIM as a resource in heritage management: An application for the National Palace of Sintra, Portugal, *Journal of Cultural Heritage*, 43:153. doi: https://doi.org/10.1016/j.culher.2019.11.010

Goodwin, E. J. (2008). The World Heritage Convention, the environment, and compliance, Colo. *J. Int'l Envtl. L.* & Pol'y,Vol 20:2, 157-198. Access Address (23.9.2024): https://core.ac.uk/download/pdf/162670713.pdf

Haştemoğlu, B. & Beyhan, Ş. G. (2017). Isparta Demirci Efe Mansion architectural prespective of analysis and re-functionalisation", *Journal of Architectural Sciences and Applications*, 2(1): 17-32. doi: https://doi.org/10.30785/mbud.312375

Hussaini, S. Z. (2017). Reconstruction and Consolidation of Historical Monuments (Dar-ul-Aman Palace, Ministry of Urban Development and Housing Historical Abode, Kabul, Afghanistan.

Ibrahimi, A. B. (2014.10.23). The Restoration and Adaptive Reuse of Darulaman Palace, Kabul, Afghanistan", International Conference, The Right to [World] Heritage, Germany 195-205. ISBN 978-3-00-047536-8, Access Address (9.10.2024): https://www.academia.edu/30605205/The_Right_to_World_Heritage

Issa, C. (2006). Architecture as symbol of national identity in Afghanistan, *Geographische Rundschau International Edition*, 2(4): 27-32. Access Address (23.9.2024): https://www.daug-online.org/downloads/references/magazine_articles/2006/GR_42006_Architecture_as_a_Symbol_for_national_Identity_Issa.pdf

Issa, C. & Kohistani, S. M. (2007). Kabul's urban ıdentity: An overview of the socio-political aspects of development, *ASIEN: The German Journal on Contemporary Asia*, (104), 51-64. doi: https://doi.org/10.11588/asien.2007.104.15156

Jackson, L.A. & Naipaul, S. (2008). Isadore sharp & four seasons hotels and resorts: Redefining luxury and building a sustained brand, *Journal of Hospitality & Tourism Education*, 20(2): 44-50. doi: https://doi.org/10.1080/10963758.2008.11736081

Kaşlı, B. (2009). *Reused industrial buildings in istanbul that are worth to conserve and their interior interventions: a case study / Santralistanbul", MSc. Thesis, Istanbul Technical University, Institute of Social Sciences, Istanbul, 22-31.* Access Address (14.10.2024): https://tez.yok.gov.tr/UlusalTezMerkezi/tezDetay.jsp?id=bNhgIqhQrdvu61_nQFzPNw&no=Yhh2LBuXIJA9KoTsxfZtBg

Koç, M. (2019). *Restoration and re-use proposal for Mardin Firdevs Kasrı, MSc. Thesis, Yıldız Technical University, Graduate School of Natural And Applied Sciences, Istanbul, 1-3.* Access Address (15.9.2024):https://tez.yok.gov.tr/UlusalTezMerkezi/tezDetay.jsp?id=PpTFGqRlNPzc1FDRtSUERg&no=49vEa3wgQ7iWcpxVMB6TAQ

Kurak, A. F. & Konakoğlu, Z. N. (2019). Reconstruction of historical buildings: case of trabzon chamber of architects, *Journal of the Cukurova University Institute of Social Sciences*, 28:2-7. Access doi: https://doi.org/10.35379/cusosbil.587899

Kurucaoğlu, S. (2023). *Using building information modeling in the interior design process, MSc. Thesis, Balıkesir Üniversity, Graduate School of Natural and Applied Sciences, Balıkesir, 41-48*. Access Address (20.10.2024): https://dspace.balikesir.edu.tr/xmlui/handle/20.500.12462/13115

Langston, C., Wong, F. K. W., Hui, E. C. M. & Shen, L.-Y. (2008). Strategic assessment of building adaptive reuse opportunities in Hong Kong, *Building and Environment*, 43(10): 1709-1718. DOI: 10.1016/j.buildenv.2007.10.017, Access Address (21.10.2024): https://www.sciencedirect.com/science/article/abs/pii/S036013230700203X?via%3Dihub

López, F. J., Lerones, P. M., Llamas, J., Gómez-García-Bermejo, J. & Zalama, E. (2018). Semi-automatic generation of BIM models for cultural heritage, *International Journal of Heritage Architecture*, 2(2): 293-302. DOI: 10.2495/HA-V2-N2-293-302, Access Address (17.9.2024): https://www.witpress.com/elibrary/ha-volumes/2/2/1833

Mahrebel, H. A. (2006). *Properties, damages, structures, repairing and strengthening techniques in historical buildings, MSc. Thesis, Istanbul Technical university Graduate School of Natural and Applied Sciences, Istanbul, Turkey, 128.* Access Address (17.9.2024): https://tez.yok.gov.tr/UlusalTezMerkezi/tezDetay.jsp?id=9ey3VAdJldJF9kZMRZuBkA&no=HChKO1vYRQUiK4empwGYOA

Mancık, E. (2023). *Investigation of the use of BIM technologies in building renovation process, MSc. Thesis, Gebze technical university, Graduate School of Natural and Applied Sciences, Gebze,186.* Access Address (8.9.2024): https://tez.yok.gov.tr/UlusalTezMerkezi/830555

Mazı, F. (2009). Tarihi çevrenin korunmasında sosyo–ekonomik faktörlerin etkisi, *Mevzuat Dergisi.* Vol 12, p138. ISSN 1306-0767. Access Address (9.9.2024): https://www.mevzuatdergisi.com/2009/06a/01.htm

Moyano, J., Odriozola, C. P., Nieto-Julián, J. E., Vargas, J. M., Barrera, J. A. & León, J. (2020). Bringing BIM to archaeological heritage: Interdisciplinary method/strategy and accuracy applied to a megalithic monument of the Copper Age, *Journal of Cultural Heritage*, 45: 303-314. doi: https://doi.org/10.1016/j.culher.2020.03.010

Murtagh, B. & Keaveney, K. (2006). Policy and conflict transformation in the ethnocratic city, *Space and Polity*, 10(2):187-202. doi: https://doi.org/10.1080/13562570600921683

Nasimi, A. S. (2023). *Use of building information modeling in re-functionalization projects: Darul Aman Palace, MSc. Thesis, Department of Architecture, Süleyman Demirel University, Graduate School of Natural and Applied Sciences. Isparta. 168.* Access Address (13.10.2024): https://tez.yok.gov.tr/UlusalTezMerkezi/ 882133

Odabaşı, H. (2022). *The heritage building information modelling (heritage BIM) and refunctioning through 3-D documentation of the Mehmet Aga House, MSc. Thesis, Başkent Üniversity, Institute of Science, Ankara. 165.* Access Address (14.10.2024): https://tez.yok.gov.tr/UlusalTezMerkezi/ 752818

Pepe, M., Costantino, D., Alfio, V. S., Restuccia, A. G. & Papalino, N. M. (2021). Scan to BIM for the digital management and representation in 3D GIS environment of cultural heritage site. *Journal of Cultural Heritage*, 50:115-125. doi: https://doi.org/10.1016/j.culher.2021.05.006

Pourebrahimi, M., Eghbali, S. R., Zolfagharzadeh, H. & Ghafori Fard, H. (2019). Modifying Buildings Life Cycle through Identifying Adaptive Reuse Criteria, *Journal of Architectural Thought*, 3(6): 126-143. doi: 10.30479/at.2019.11683.1325

Pour Rahimian, F., Seyedzadeh, S., Oliver, S., Rodriguez, S. & Dawood, N. (2020). On-demand monitoring of construction projects through a game-like hybrid application of BIM and machine learning, *Automation in Construction*, 110:103012. doi: https://doi.org/10.1016/j.autcon.2019.103012

Rokooei, S. (2015). Building ınformation modeling in project management: Necessities, challenges and outcomes. *Procedia - Social and Behavioral Sciences*, 210: 87-95. doi: 10.1016/j.sbspro.2015.11.332

Santoya Mendoza, O. S. (2019). *Reflection paper about Sofitel Legend Santa Clara hotel after my internships, MSc. Thesis, University of Cartagena, CARTAGENA, 9-19.* Access Address (16.9.2024): https://repositorio.unicartagena.edu.co/entities/publication/fadd8349-ec81-4520-a712-f7a600fb36f7

Sinha, D. (2012). *Renewing India's Relationship with Luxury in The Luxury Market in India*. London: Palgrave Macmillan UK, 7-13.

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

Tapkı, S. (2016). *The example of tourism building in the reuse building questioning of the concept of the identity, MSc. Thesis, Yıldız Technical Üniversity, Graduate School of Natural and Applied Sciences, Istanbul, 148.* Access Address (24.10.2024): https://tez.yok.gov.tr/UlusalTezMerkezi/ 442592

Ulusoy, A. Y. (2022). *Conservation and re-functioning in the context of historic buildings: Bursa Eski İpek Han, MSc. Thesis, Konya Technical Üniversity, Institute of Graduate Studies, Konya,220.* Access Address (22.10.2024): https://tez.yok.gov.tr/UlusalTezMerkezi/ 754599

Üksel, İ. (2009). *Traditional Turkish House's transformation of boutique hotel is confronted problems (Safranbolu houses and Sogukcesme Street comparative), MSc. Thesis, Mimar Sinan fine arts University Institute of Science and Technology, Istanbul, 312.* Access Address (23.10.2024): https://tez.yok.gov.tr/UlusalTezMerkezi/ 256592

Wang, H.-J. & Zeng, Z. T. (2010). A multi-objective decision-making process for reuse selection of historic buildings. *Expert Systems with Applications*, 37(2): 1241-1249. doi: https://doi.org/10.1016/j.eswa.2009.06.034

Yabanci, O. (2022). Historic hotel buildings in Istanbul City. *Tourism and Heritage Journal*, 4 (1):1-17. doi: https://doi.org/10.1344/THJ.2022.4.1

Yang, X., Grussenmeyer, P., Koehl, M., Macher, H., Murtiyoso, A. & Landes, T. (2020). Review of built heritage modelling: Integration of HBIM and other information techniques. *Journal of Cultural Heritage*, 46:350-360. doi: https://doi.org/10.1016/j.culher.2020.05.008

Zheng, L., Lu, W., Wu, L. & Zhou, Q. (2023). A review of integration between BIM and CFD for building outdoor environment simulation. *Building and Environment*, 228: 109862. doi: https://doi.org/10.1016/j.buildenv.2022.109862

Zhong, B., Gan, C., Luo, H. & Xing, X. (2018). Ontology-based framework for building environmental monitoring and compliance checking under BIM environment. *Building and Environment*, 141: 127-142. doi: 10.1016/j.buildenv.2018.05.046