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CRITICAL SPATIAL REASONING IN DESIGNING: A VISITOR'S CENTRE RELATING TO BEYLIKDÜZÜ ARCHAEOLOGICAL SITE, ISTANBUL

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Abstract. Architectural Design Studio helps students develop the skills to abstract, conceptualise and analyse space. This paper addresses the process of developing critical thinking and design, focusing on the central project, relating to Beylikdüzü Archaeological Excavation Site in Istanbul, Turkiye. This project provides the opportunity for students to explore the context, restrictions of the site and metaphors in design while operating more as an incubator for collaboration than a formal studio course. More specifically, the project aims to improve links between the welcome centre and the archaeological site and hence fills a research gap by exploring the value of producing three-dimensional thinking able to deliver architectural solutions that are new to the context. The purpose of the study is to investigate students' abilities in site analysis, topography and environment for appropriate designs that are functional and sustainable. Methods such as SWOT analysis and topographical studies are incorporated within the framework to propose a unified design solution that is sensitive to both the archaeological site and cultural attachment. The results show integrated and innovative solutions that combined the welcome centre with the archaeological area, helping to enrich the visitor experience. Cultural preservation and taking into consideration the value of archaeological sites to integrate them with minimum damage in new architectural interventions is another aspect seen through this project.

Keywords: *Visitor centre, archaeological site, topographical study, SWOT analysis, Turkiye.*

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1. Introduction

To improve the visiting experience and give travellers information, instruction and services, visitor centres are crucial (Tlabela & Douglas, 2022; Palumbo & Teutonico, 2002). These centres, however, frequently encounter several operational and design difficulties. Ensuring functionality is one of the main issues in tourist centre design. Inadequate amenities, a misalignment between the centre's design and the demands of its patrons or poor spatial organisation can all cause centres to fall short of their intended purpose. The centre's capacity to manage visitor flow, give information and provide essential amenities may be hampered by functional deficiencies (Palumbo & Teutonico, 2002). The gradual erosion of architectural features is another important problem. This loss may be the consequence of improperly treated wear and tear or renovations that disregard the original plan. In light of these difficulties, resilience theory offers a helpful framework for dealing with them, guaranteeing that tourist centres can adjust and prosper

despite shifting circumstances and pressures. Maintaining a visitor centre's visual appeal and cultural importance requires resilience through the preservation of its architectural integrity (Gursoy *et al*., 2022). Furthermore, a lot of visitor centres find it difficult to adjust to changes in tourism trends, special events or seasonal variations in visitor numbers. The visitor experience and the centre's operational effectiveness may suffer as a result of crowding during busy times and underuse during slower times.

The close association of archaeological sites is with various practices, viz, historical, cultural, creative, mystical, symbolic, eco-friendly & natural aspects, as well as serving economic purposes, which makes them living examples of human, social and technical advancement. These sites (Palumbo & Teutonico, 2002) and (Vecco, 2010) embody two aspects of heritage: intangible (symbols, customs, beliefs, visualisations and traditions) and tangible (history, buildings, physical state and constraints). These places face many preservation threats, including natural expansion, pollution, tourism pressure, criminal activity, inappropriate exploration or measures and lack of funding and legal protection and maintenance (Tejedor *et al*., 2022).

Urban growth and infrastructure expansion pose challenges to these historical sites by causing disruptions to their physical environment (Palumbo & Teutonico, 2002). Furthermore, they indirectly contribute to problems like pollution, over-tourism and social conflicts, all of which can have effects on both the historical assets and the area's biodiversity (Palumbo & Teutonico, 2002). Therefore, preserving sites effectively is closely tied to societal welfare, accountability, community involvement and fostering sustainable economic progress. Numerous archaeological sites face obstacles like changes in weather patterns and land development, while trying to restore them involves dealing with heritage-related matters encompassing social aspects (like boosting tourism appeal and community involvement), environmental concerns (such as sustainable growth and preserving biodiversity) and economic factors (including benefits and innovation). The connection between the environment is closely linked to society and the economy (Scoones *et al*., 2020).

Visitor centres prioritise user experience and engagement as elements in providing a welcoming and enriching environment (Lucchi, 2023). A good user experience entails navigation and access to clear information and facilities that cater to visitors' needs for a pleasant visit experience. Engagement pertains to the interactions between visitors and the centre displays that aim to build a bond and leave a memorable impact. Today's design methods often overlook the need for a holistic strategy that incorporates analytical thinking and imaginative concepts in the design phase. Moreover, there's a shortfall in using versatile spaces such as visitor centres to encourage connections, learning and involvement, with the environment surrounding archaeological sites (Lucchi, 2023). This research endeavours to bridge these gaps by creating a model that highlights the site's dynamics, artistic ingenuity and cooperative education. The main goal of the research is to enhance students' abilities in recognising and uncovering relations, focusing on solutions using participatory design approaches. The goals can be categorised into two areas;

i. Help students enhance their abilities in understanding site relationships by examining the site context and surroundings and considering the topography.

ii. Proposing a welcome centre aimed at boosting visitor interaction within sustainable design approaches.

The research findings show that the use of 3D design software greatly enhances students' skills in visualising and crafting spatial connections effectively. Furthermore,

consideration of analysis, site constraints and metaphorical design has resulted in more unified and inventive outcomes. The design for the visitor centre seamlessly blends with the site, enhancing visitor engagement and guaranteeing functionality. The study suggests that employing 3D design approaches is crucial in creating solutions that align with the context, especially when working with historically significant locations. In design education, the collaborative atmosphere nurtures imagination and analytical thinking, emphasising the importance of working as a team.

The methodology of the study was put into practice as follows; Initially analyzing the provided plot extensively by considering its context and surroundings like terrain features and nearby structures along with vegetation density; next came the identification and recording of elements affecting the design process which involved conceptualising and visually illustrating the study concepts; finally utilizing design techniques like concepts formation, within a given context while acknowledging constraints and using metaphorical expressions to enhance and polish design concepts.

2. Strategies for Integrating Visitor Centres into Natural and Built Environments

Achieving a harmonious integration of visitor centres into their natural and built environments requires careful planning and design. One key strategy is to conduct a comprehensive site analysis to understand the unique characteristics of the location. This includes evaluating the topography, climate, vegetation and surrounding structures. By understanding these factors, designers can create visitor centres that blend seamlessly with their surroundings, minimising visual and ecological disruption (Palumbo & Teutonico, 2002). Another effective strategy is to utilise contextual design principles, which involve designing buildings that reflect the local architectural style and cultural heritage. This approach ensures that the visitor centre complements the existing built environment and respects the local identity. For example, using locally sourced materials and traditional construction techniques can create a sense of continuity and connection with the surrounding area (Agboola & Zango, 2014).

Landscape integration is also crucial for harmonising visitor centres with their environment. This involves designing outdoor spaces that enhance the natural landscape and provide a smooth transition between the built and natural environments. Techniques such as using native plants, creating natural pathways and preserving existing trees and water features can help achieve this integration. These elements not only enhance the aesthetic appeal of the visitor centre but also support local biodiversity and create inviting spaces for visitors to explore and enjoy (Apelt *et al*., 2007). Incorporating features that respond to local climate conditions is another important strategy. This can include designing for natural ventilation, incorporating shading devices to reduce heat gain and using materials with high thermal mass to regulate indoor temperatures (Tejedor *et al*., 2022; Agboola *et al*., 2023). By responding to the local climate, visitor centres can reduce their reliance on mechanical heating and cooling systems, thereby lowering energy consumption and enhancing comfort for visitors (Gunderson, 2000).

Integrating sustainable practices and materials into the design of visitor centres and ensuring their harmonious integration with the natural and built environments are essential for creating functional, environmentally responsible and aesthetically pleasing spaces. These strategies not only minimise the environmental impact of visitor centres but also enhance their role as educational and inspirational hubs for visitors, promoting

a deeper appreciation for sustainability and environmental conservation (Loureiro, 2021). Visitor centres can significantly enhance user experience and engagement by incorporating innovative design solutions and interactive elements (Baldwin & Ching, 2017). Key strategies are presented in Table 1. By leveraging these innovative design solutions and interactive elements, visitor centres can create dynamic and engaging environments that enhance the overall visitor experience and foster meaningful connections with the content and the site (Mirkovski *et al*., 2019).

Table 1. Enhancing user experience and engagement through innovative design solutions and interactive elements

Design Criteria	Detailed informatıon	References
Interactive Exhibits:	Implementing hands-on displays, digital touchscreens and virtual reality (VR) experiences can make learning more engaging and memorable.	(Makransky & Lilleholt 2018)
Immersive Environments:	Designing spaces that reflect the theme or purpose of the visitor centre, such as recreating historical settings or natural habitats, can provide immersive experiences that captivate visitors.	(Privitera *et al*., 2024)
Technology Integration:	Utilising mobile apps, augmented reality (AR) guides and real-time information updates can enhance visitor interaction and provide personalised experiences.	(Loureiro, 2021)
Engaging Storytelling:	Using multimedia presentations, interactive timelines and personal stories to convey information in a compelling and relatable manner.	(Baldwin & Ching, 2017; Mirkovski *et al*., 2019)
Flexible Spaces:	Creating adaptable areas that can host a variety of activities, from workshops and lectures to temporary exhibits and community events, can cater to diverse visitor interests and needs.	(Baldwin & Ching, 2017)
Wayfinding and Accessibility:	Ensuring clear signage, intuitive layouts and accessibility features to make the centre navigable and welcoming for all visitors.	(Lukito & Arvanda, 2017)

Ontology is a branch of philosophy that explores the nature of being, existence and reality, addressing assumptions about what exists in the world (Creswell & Creswell, 2017). In research, ontological positions shape how reality is perceived. For instance, a realist ontology posits that reality exists independently of human perception, while a constructivist stance views reality as socially constructed through culture, language and shared experiences (Guba & Lincoln, 1994). In applied fields like knowledge management and artificial intelligence, ontology refers to a structured framework for organising and interpreting knowledge (Gruber, 1993). The main functions of ontology include: conceptualization, which defines and organizes domain-specific concepts; standardization, which promotes shared understanding across systems; knowledge representation, which maps relationships between concepts; reasoning and inference, enabling systems to derive new information from existing data and interoperability,

which supports data integration across platforms using consistent terminologies (Studer *et al*., 1998).

The Visitor's Centre for the Beylikdüzü Archaeological Site is meaningfully related to ontology in philosophy through the understanding of space, place and existence. The study of being and reality provides a foundational lens through which architects and designers conceptualise what exists within a site, how space is perceived and what meanings are constructed through design. A realist ontological stance emphasises the site's physical and historical realities, its tangible archaeological features and spatial constraints, as existing independently of interpretation. In contrast, a constructivist ontology interprets the site and its design potential as socially constructed, shaped by cultural narratives, visitor experiences and interpretive layers added through design. Thus, the act of designing the Visitor's Centre becomes an ontological exercise negotiating between what is (the material remains) and what is constructed (the meanings and experiences through architectural intervention), enabling critical spatial reasoning to bridge the gap between past heritage and contemporary use.

3. Theoretical Framework

The study's theoretical framework articulates the overarching vision and guiding principles for the design concept. Two concepts were adopted and serve as a roadmap for translating abstract ideas into tangible design elements and inform the decision-making process. They include key themes, metaphorical references, spatial qualities and experiential goals that shape the conceptual narrative of the project. The foundation of adaptive architecture is the belief that structures should be dynamic spaces that adapt to the psychological, sensory and cultural needs of their occupants rather than being static objects (Jencks, 2003; Kronenburg, 2007). By emphasising user-centred design, it ensures that places accommodate a range of user experiences by giving comfort, accessibility and emotional well-being top priority (Kellert *et al*., 2011). By taking into account a site's historical, ecological and physical features, contextual responsiveness enables design to blend in with its surroundings rather than overpower them (Pallasmaa, 2012). The process of creating spatial characteristics that elicit favourable psychological reactions, such as tangible warmth, natural light and significant symbolism, is known as emotional resonance (Day, 2017). By combining these aspects, the tourist centre can serve as a narrative setting that fosters identification, memory and a feeling of place in addition to being a physical building.

The second framework is the resilience theory initiatives, which have emerged as an increasingly significant perspective for examining connected systems of society and the environment, in particular, human-dependent ecological landscape systems such as the tourist sector (Gunderson, 2000). According to Gunderson (2000), resilience refers to the capacity of a system to withstand disturbances while maintaining its core functions and controls. This concept is appealing because it incorporates the principles of sustainability while adding a dynamic dimension to it (van Apeldoorn, 2011). To address these issues, resilience theory can be applied through a framework based (Figure 1) on four key dimensions.

The first dimension is resilience in the composition of the ontology function, which focuses on the core functions of the visitor centre, ensuring they remain robust and adaptable. Key strategies include flexible design, modular components and multi-functional areas. These strategies help create adaptable spaces that can be reconfigured

to meet changing needs, use modular design elements that can be easily added or removed and design spaces that serve multiple purposes, reducing the risk of obsolescence (Palumbo & Teutonico, 2002; Jiménez-Barreto *et al*., 2023).

The second dimension is extended function, which involves enhancing the roles of visitor centres beyond basic visitor services. This can include community engagement through educational workshops and cultural events, implementing sustainability initiatives such as renewable energy sources and waste reduction programs and leveraging technology to provide interactive exhibits, virtual tours and real-time information updates (Agboola & Zango, 2014).

The third dimension is the integration of buildings into the surrounding environment. Ensuring that visitor centres are harmoniously integrated into their natural and built environments enhances their resilience. Strategies include contextual design that reflects the local architectural style and cultural heritage, landscape integration that blends the visitor centre with its surroundings and incorporating features that respond to local climate conditions, such as natural ventilation, shading and rainwater harvesting (Palumbo & Teutonico, 2002; Jiménez-Barreto *et al*., 2023).

The fourth dimension involves using alternative construction technologies and materials to improve the resilience of visitor centres. This includes using sustainable materials that are durable, renewable and have a low environmental impact, employing advanced construction techniques such as prefabrication and 3D printing to enhance construction efficiency and quality and integrating systems that enhance the building's resilience to environmental stresses, such as energy-efficient HVAC systems and robust structural designs (Scoones *et al*., 2020). In conclusion, applying resilience theory to the design and operation of visitor centres can help address common issues and enhance their ability to adapt to changing conditions. By focusing on the core functions, extending their roles, integrating them into the environment and utilising innovative technologies and materials, visitor centres can become more resilient, ensuring they continue to provide valuable services and experiences to visitors over time (Tejedor *et al*., 2022).

The anticipated building, its functions, space and shape, changes in different aspects and the controlled behaviour responding to the surrounding environment and people's growing requirements are the main topics of study in landscape architecture's resilient space design research. Resilience in this context of Archaeological Site emphasises the ability of spaces to adapt and respond dynamically to changing conditions and demands (Lucchi, 2023). Incorporating the concept of resilience into visitor centre architectural design theory aims to create spaces that can accommodate the diverse and evolving needs of visitors. This means that buildings should be flexible and capable of dynamically adapting to changing tourist demands. A resilient visitor centre can adjust its space, functions and form in response to varying visitor needs and environmental conditions, ensuring that it remains functional and relevant over time.

The resilience and alignment in the composition of the ontology function pertain to the adaptable setting of the function according to the number of visitors and their varying demands during different travel periods (Jiménez-Barreto *et al*., 2023). The ontological function space of the tourist centre is divided into "service" and "servant" spaces based on the unique functional space attributes and usage frequency. This classification allows for effective integration and resilient matching, ensuring that the centre can dynamically adjust to meet diverse visitor needs.

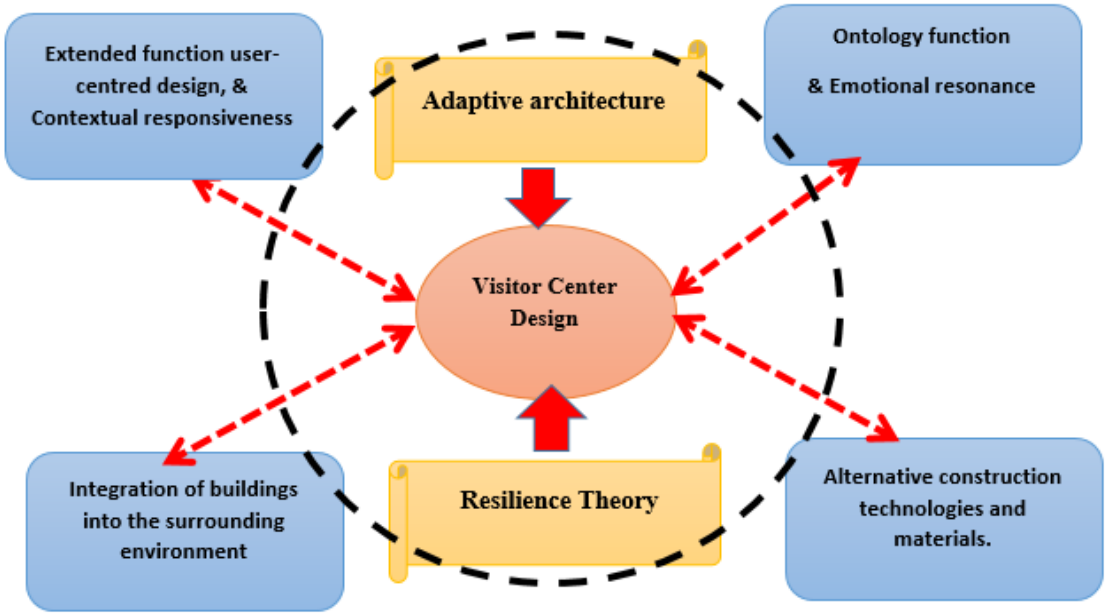


Figure 1. The study's theoretical framework

4. Methodology

4.1. Case Study Analysis

The study employs a case study approach as a research method in exploring the design concept of the visitor centre for the Beylikdüzü Archaeological Excavation Site. The programmatic requirements of the Visitor Centre, including the functions to accommodate visitor information, exhibition spaces, restrooms, etc., as well as any specific design considerations such as accessibility requirements and sustainability goals, were analysed in detail (Gilboy *et al*., 2013). Thus, the design project program is presented in Table 2. Achieving the design concept involves a series of analyses of similar case studies, conducting thorough site analysis through historical context and considering the potential users (Friedman *et al*., 2013). Conducting a thorough inventory and analysis of the site's existing conditions is critical for identifying opportunities and constraints that may influence the design process. This includes mapping existing vegetation, natural features, infrastructure, utilities and any site-specific challenges or limitations that need to be addressed. Analysing factors such as solar orientation, prevailing winds, views and access points helps inform site planning and design decisions (Agboola *et al*., 2023). Most importantly, the case studies focus on evaluating the effectiveness of three-dimensional design methodologies in achieving the overall project objectives and enhancing the spatial relationship between the new structure and the archaeological site. This will help identify their strengths and weaknesses. The case study approach was employed in conducting a thorough site analysis, focusing on the historical context of the site and the needs of potential users (Lucchi, 2023; Flyvbjerg, 2006). This method allowed for a detailed examination of similar existing projects and environments, providing valuable insights into how visitor centres can effectively enhance engagement with archaeological sites. The case study approach includes (i) historical context and (ii) user-centred considerations.

For the historical context**,** the case studies selected were situated in regions with rich archaeological histories, allowing for a deeper understanding of how past civilisations are presented and preserved in modern times. By analysing these examples, key factors such as architectural design, site integration, cultural significance and heritage conservation were evaluated (Feilden & Jokilehto, 1998). This analysis informed decisions regarding the most appropriate architectural expressions and materials for the visitor centre, ensuring the design resonated with the site's historical importance.

Relating the user-centred considerations incorporates the potential users of the archaeological site, including tourists, researchers and the local community, was a central focus of the case study approach. Each case was examined for how it accommodated different user groups, considering factors like accessibility, educational engagement, visitor flow and interaction with the historical environment (Galeazzi & Di Giuseppantonio Di Franco, 2017). This user-centred approach helped to identify design strategies that enhance the visitor experience while respecting the site's archaeological value. Overall, by bridging historical context and user considerations, the case study approach provided a robust framework for developing integrative spatial solutions that meet the needs of both the site and its visitors.

Table 2. The functional requirements for the Welcome Centre

Functional Requirements: Specific activities and services	Potential Users / Unit of Analysis	Methods
• Visitor information and orientation services • Exhibition and interpretation spaces • Gift shop and café facilities • Restrooms and other amenities • Administrative and staff areas • Welcome Hall; Exhibition Hall; Various Touristic Activity Areas; Sales, Promotion; Show Hall; Observation Terrace; Conveniences like WC; Service Venues; Outdoor landscaped areas, among others.	• This may include tourists, residents, school groups, researchers and other stakeholders. includes and is not limited to the following functions:	• Case study approach by conducting thorough site analysis through historical context and considering the potential users

4.2. Benefits of Adopting Existing Case Studies

Adopting existing case studies in architectural research and design provides a structured way to analyse and apply best practices from similar projects to new contexts. By examining completed projects that share characteristics with the current design challenge, this approach allows for the extraction of relevant insights that can guide decision-making and design development (Flyvbjerg, 2006). Adopting existing case studies in the design of visitor centres offers a wealth of advantages that ensure both functional effectiveness and contextual sensitivity. One of the primary benefits is the ability to make informed design choices. By analysing successful visitor centres, particularly those located at archaeological or heritage sites, architects and planners can

evaluate critical factors such as material selection, integration with the landscape and user engagement strategies. This allows for design decisions to be rooted in real-world precedents that have demonstrated success in similar environments (Feilden & Jokilehto, 1998).

Another key advantage lies in enhancing historical and cultural relevance. Case studies showcase how various architectural interventions have sensitively responded to the context of archaeological sites, balancing the need for preservation with the demands of modern visitor experiences (Lucchi, 2023). Drawing from these examples ensures that new designs convey a thoughtful respect for heritage while providing interactive, educational spaces for contemporary users. Moreover, case studies provide valuable insight into user experience and accessibility. By examining how existing centres manage visitor flow, accommodate diverse user needs - including those of tourists, scholars and local communities and implement inclusive engagement strategies, designers can develop more responsive and accessible environments (Feilden & Jokilehto, 1998). This ensures that new proposals not only attract visitors but also provide equitable access and meaningful experiences.

Sustainability and innovation also emerge as vital benefits of engaging with precedent studies. Many modern architectural projects demonstrate how eco-friendly materials, energy-efficient systems and sustainable design techniques can be harmoniously integrated into sensitive contexts (Friedman *et al*., 2013). Learning from such examples allows new projects to incorporate sustainable principles tailored to the environmental and cultural conditions of the site (Galeazzi & Di Giuseppantonio Di Franco, 2017). In conclusion, the application of existing case studies offers a robust foundation for the design of a visitor centre that aims to enhance engagement at an archaeological site. These precedents ensure that the proposed design is not only visually compelling but also functionally viable, contextually appropriate and environmentally responsible. They allow architects to address challenges with confidence while embracing opportunities for innovation and community enrichment (Rapoport, 1982).

5. SWOT Analytical Approach to the Existing Case Studies

5.1. The Apple Park Visitor Centre

The Apple Park Visitor Centre is located in Cupertino, United States and was constructed in 2017. Covering approximately 1,870.6 square meters, it was designed by the renowned architectural firm Foster and Partners. The Visitor Centre (Figure 2), situated along Tantau Avenue, serves as an exclusive public gateway to Apple Park. One of its standout features is an expansive roof terrace, offering stunning views of the main building and providing a unique glimpse into Apple Park's innovative design and architecture. The centre itself is a testament to Apple's commitment to excellence and attention to detail, showcasing the same sleek and modern aesthetic that the company is known for. Inside, visitors can explore a variety of exhibits and interactive displays that highlight Apple’s history, products and vision for the future. Additionally, the Visitor Centre includes a café, an Apple Store with exclusive merchandise and an augmented reality experience that allows visitors to learn more about the campus. Designed to be more than just a visitor centre, it embodies the spirit of Apple’s innovation and creativity, making it a must-visit destination for technology enthusiasts and Apple fans alike.



Figure 2. Views of the Apple Park Visitor Centre, United States
Source: Rogers and Foster + Partners (2017)

5.1.1. Understanding the Design Context of Apple Park Visitor Centre and Its Psychological Impacts on Users

The Apple Park Visitor Centre in Cupertino, California, is a prime illustration of how architecture's aesthetic, spatial and experiential elements can discreetly appeal to people's psyches. The centre is an immersive brand experience that strongly appeals to customers' psychological needs for ease, clarity and creativity. Table 3 presents a summary of the centre's design context and its psychological impacts on users.

Table 3. Summary of the Relevance of the Design Context of Apple Park Visitor Centre and Users' Psychological Impacts

Design Feature	Psychological Impact on Users
a. Minimalism and Clarity	The architecture embodies Apple's elegant and simple design ethos. The smooth integration of stone, carbon fibre and glass creates a feeling of clarity and serenity. By keeping things simple, visitors may concentrate on their experience without being distracted by clutter or excessive stimulation.
b. Transparency and Connection	A psychological sense of openness and trust is fostered by the extensive usage of glass walls. As part of Apple's brand ideals, transparency is reinforced both literally and figuratively by allowing visitors to look through the area and visibly connect with the park surroundings. Additionally, by improving spatial orientation and lowering anxiety, this openness fosters psychological ease.
c. Sensory Balance	The layout of Apple Park properly balances acoustic control, tactile materials and natural light. Feelings of balance, accuracy and tranquillity are evoked by these sensory harmonies. The warmth of wood components, the tactile coolness of stone and the constant greenery all appeal to people's biophilic tendencies,

	promoting mental health and a feeling of connectedness to the natural world.
d. Brand Identity and Emotional Resonance	Clean lines, futuristic details and flawless technical integration are just a few of the subtle, emotive clues that the design uses to underscore Apple's brand. These qualities inspire wonder and awe, emotions that are consistent with Apple's reputation for innovation. Users are engrossed in a story of quality and innovative design rather than only watching buildings.

5.2. Cradle Mountain Visitor Centre

Cradle Mountain Visitor Centre is located in Tasmania, Australia and was constructed in 2020 (Figure 3). Covering a total area of about 1,100 square meters, it was designed by Cumulus Studio. The centre offers a warm alpine welcome, reflecting both the rugged anticipation on arrival and the distinctive Cradle Mountain geology. A variety of business facilities as well as an orientation building are part of this sculptural, wilderness-inspired construction, providing visitors with essential information and amenities. The design of the centre emphasises harmony with the natural surroundings, featuring materials and architectural elements that blend seamlessly with the landscape. Visitors are greeted by an inviting atmosphere that sets the tone for their exploration of the stunning Cradle Mountain region. The centre serves as a gateway to the wilderness, offering insights into the area's unique geological features, flora and fauna. In addition to providing orientation and information, the Cradle Mountain Visitor Centre houses a café, a gift shop and spaces for exhibitions and events. These facilities enhance the visitor experience by offering a place to rest, shop for souvenirs and learn more about the natural and cultural heritage of Cradle Mountain. The centre stands as a testament to sustainable and thoughtful design, ensuring that it complements the pristine environment it serves to showcase.



Figure 3. Views of the Cradle Mountain Visitor Centre, Australia
Source: Cradle Mountain Visitor Center (2024)

5.2.1. Context Design of the Cradle Mountain Visitor Centre and the user's psychology

A striking example of design that works in harmony with the environment and the human mind is the Cradle Mountain Visitor Centre. Its architecture fosters emotional, sensory and cognitive reactions that improve the visitor experience in addition to serving as a gateway to a national landmark. Table 4 presents a summary of the centre's design context and its psychological impacts on users.

Table 4. Summary of the Psychological Accommodation in the Design Context of Cradle Mountain Visitor Centre

Design Feature	Psychological Impact on Users
a. Sense of Arrival and Transition	As a threshold space, the facility provides guests with a mental and physical escape from the everyday world to the splendour of Cradle Mountain's natural setting. Through meandering routes, framed views and delicate spatial sequencing, the building crafts a journey-based narrative that lulls visitors into a state of contemplation and builds their anticipation and preparedness to interact with the natural world.
b. Materiality and Emotional Warmth	A lot of locally produced materials are employed, such as stone, worn steel and wood. These components strengthen a feeling of place by offering emotional stability and tactile familiarity. Users' biophilic instincts are triggered by the textural authenticity, which evokes feelings of cosiness, warmth and a sense of connection to the land, all of which are critical for psychological relaxation and overall wellbeing.
c. Integration with Nature and Biophilia	Instead of being imposed on the landscape, the centre is a part of it. Its dark timber panelling, green roofs and low-slung shape enable it to fit in well with the wooded surrounds, fostering a sense of environmental respect and psychological belonging. The thoughtful integration of natural light and views of the surrounding bushland lowers stress and improves mental clarity.
d. Wayfinding and Spatial Intuition	The interior's sensible and readable spatial design lessens cognitive overload and creates a psychologically comfortable navigation experience. Visitors can concentrate on immersion rather than orientation because they are led through a series of exhibition rooms, ticketing, shopping and interpretative zones without any confusion. This promotes emotional comfort and self-assurance in new situations.

5.3. The Summary of the SWOT Analysis of the Two Case Studies

The Apple Park Visitor Centre and the Cradle Mountain Visitor Centre both have unique strengths, weaknesses, opportunities and threats as presented in Table 5. The Apple Park Visitor Centre presents several strengths. Designed by Foster and Partners, its innovative architecture aligns with Apple's modern and sleek aesthetic (Rogers & Foster + Partners, 2017). Unique features such as the extensive roof terrace provide breathtaking panoramic views of the main Apple Park building. The centre showcases Apple's commitment to excellence and attention to detail through interactive exhibits highlighting Apple's history, products and vision for the future. Visitors can enjoy exclusive merchandise and a distinctive augmented reality experience that offers deeper insights into the campus. Located strategically in Cupertino, the heart of Silicon Valley, it attracts tech enthusiasts and tourists. However, the facility also has weaknesses, including high maintenance and operational costs, limited accessibility for those outside the United States or without transportation and potential overcrowding that can impact the visitor experience (Lagiewski & Kesgin, 2017).

There are several opportunities for the Apple Park Visitor Centre. It can develop educational programs and tours for schools and universities, expand the range of

exclusive merchandise, use virtual tours and online exhibits to reach a global audience and host tech-related events, product launches and workshops (Rogers & Foster + Partners, 2017). Additionally, enhancing sustainability features and promoting eco-friendly practices could attract environmentally conscious visitors. However, the centre faces threats such as technological obsolescence due to rapid advancements in technology, economic downturns affecting visitor numbers and spending, security risks as a high-profile location, competitive attractions that may draw visitors away and susceptibility to natural disasters like earthquakes in California (Fyall *et al*., 2022).

Table 5. Summary of the SWOT Analysis Relating to the two case studies

Description	SWOT REPORTS			
	Strengths	**Weaknesses**	**Opportunities**	**Threats**
1. The Apple Park Visitor Centre	• Innovative Design • Unique Features: • Interactive Exhibits: • Exclusive Merchandise • Augmented Reality Experience • Strategic Location	• High Maintenance Costs • Limited Accessibility • Potential Overcrowding • High Operational Costs	• Educational Programs • Expanded Merchandise • Global Outreach • Event Hosting • Sustainability Initiatives • Tourism Growth	• Technological Obsolescence • Economic Downturns • Security Risks • Competitive Attractions • Natural Disasters
2. Cradle Mountain Visitor Centre	• Stunning Location • Thoughtful Design • Comprehensive Facilities • Sustainability • Visitor Experience • Educational Value • Technological Advancements	• Remote Location • Seasonal Limitations • Operational Costs • Limited Space	• Ecotourism Growth • Partnerships • Educational Programs • Event Hosting • Marketing Initiatives	• Environmental Impact • Economic Downturns • Competition • Wildlife Risks • Operational Challenges

The Cradle Mountain Visitor Centre in Tasmania, Australia, has its own set of strengths. Located near the iconic Cradle Mountain, it offers visitors breathtaking natural scenery (Cradle Mountain Visitor Center, 2024). The architecture, designed by Cumulus Studio, blends seamlessly with the natural environment, emphasising sustainability and harmony with the surroundings (Architecture Au, 2018). The centre includes comprehensive facilities such as an orientation building, commercial services, a café, a gift shop and exhibition spaces. It provides a warm alpine welcome and essential information for exploring Cradle Mountain, offering insights into the area's unique geology, flora and fauna (Branigan, 2008). Despite these strengths, the centre's remote location may make it less accessible to some visitors, potentially limiting foot traffic. Seasonal limitations and harsh weather conditions could also affect visitor numbers and the overall experience during certain times of the year. Maintaining the facility and its services in a remote area can be expensive and the centre has limited space for future expansion (Architecture Au, 2018).

The Cradle Mountain Visitor Centre has several opportunities. It can capitalise on the growing trend of ecotourism to attract more environmentally conscious travellers and develop partnerships with local businesses and conservation organisations to enhance visitor services and programs (Cradle Mountain Visitor Center, 2024; Branigan, 2008). Creating educational and interpretive programs for schools and tourists, hosting nature-related events, workshops and exhibitions and utilising digital marketing and social media to reach a broader audience and promote the centre are also viable opportunities. However, the centre faces threats such as potential environmental impacts from natural disasters or climate change, economic downturns that could affect tourism and visitor spending, competition from other attractions in Tasmania or other regions, wildlife risks that could pose dangers to visitors and staff and operational challenges related to maintaining the centre and providing consistent services in a remote location (Branigan, 2008).

6. Study's Site Analysis and Location

This study's site is located in Yakuplu, an area of Beylikdüzü on Istanbul's European side. It is known for its proximity to the Marmara Sea and the West Istanbul Marina, a modern hub for yacht enthusiasts, as shown in Figure 4b. Marmara Mahallesi, a Yakuplu neighbourhood, likely encompasses residential and commercial areas. It shows the urban arrangement of the site in terms of the spatial and building layout and organisation of various elements within the urban context. It highlights the relationships between buildings, public spaces and transportation networks, emphasising connectivity and accessibility. The site is rapidly developing, blending residential and commercial zones amidst urbanisation. Well-connected through various transportation modes, the area offers easy access to other parts of Istanbul. The district attracts residents due to its relatively modern infrastructure, proximity to transportation links and availability of amenities. The availability of the amenities in the areas has made the region a residential area and commercial hub (Kaboğlu *et al.*, 2005). Urbanisation projects aimed at improving the quality of life continue, with the development of parks, schools and cultural facilities, with some parts of the area hosting an archaeological site.





Figure 4. Site Analysis and Location
Source: Extract from student's Architectural Design studio project

7. Findings: New Conceptual Development of Architectural Drawings

This research is based on the idea of creating and building structures that not only represent a culture but also tell the story of the changing local history. It showcases how the environment responds to construction techniques and materials cited in Tuan (1977). The design of visitor centres can. Enrich the spatial experiences of many visitors, as mentioned in Falk and Dierking (2000). Such architectural designs carry significance and social relevance by subtly enhancing learning opportunities and reinforcing local cultural identities through their cultural impact, as highlighted in McIntosh (2004). Teaching students how to understand and visualise relationships using case studies and site analysis is in line with previous research by Bamberger & Schön (McIntosh, 2004; Salama, 2016). These studies highlight the significance of thinking in architectural education. Examining the topography of the site along with aspects like vegetation and access points was crucial in integrating the needs of the Welcome Centre with its surroundings, a practice that

echoes Lynch's belief that analysing a site can enrich design ideas by maximising its strengths and overcoming challenges. Craft a site layout proposal like the one depicted in Figure 5 showcases careful site planning and the optimal utilisation of the site's capabilities, a philosophy resonating with the research on design patterns.

In the stages of developing the concept idea for the project site design team conducted thorough research to take cues from the local culture's influence and historical background, as well as the natural surroundings of the area. This method is in line with Rapoport (1982), who highlights the significance of considering contextual nuances in design work. By delving into architectural styles and art movements while also keeping an eye on current design trends, we are following in the footsteps of Agboola et al. (2023) who recommended incorporating a range of design inspirations. The concepts of sustainability, like adaptability and air circulation, align with the ideas put forth by McDonough (2020) and the Agboola et al. (2023) approach, to design that promotes energy efficiency and environmental balance improvement. As the design evolved from concept to fine-tuning during the design development phase, the project followed a cyclical design approach emphasising additional exploration of architectural shapes, spatial arrangements, material choices and design specifics (Salama, 2020). This phase of the project's development process focused on meeting both the needs of users and their desires to create a design solution that is thorough and unified. Similar to the iterative improvement techniques described in design studies.

Functional layout designs (Figures 6 and 7), visually appealing building facades (Refer to Figure 8) and immersive 3-dimensional visualisations (Displayed in Figure 9) are elements in architectural planning as they influence both the practicality and the visual appeal of a structure. The advanced functional floor plans unveiled in this research act as the foundation of every endeavour, ensuring that spaces are well arranged to promote seamless user movement and engagement. The proposed plans take into account traffic flow patterns. The efficient use of space within different areas indoors while also focusing on creating a comfortable environment is emphasised by Ching and Shapiro (2020). This approach aims to address user requirements and boost operational productivity while potentially enhancing safety by reducing the risks of accidents or overcrowding situations on site. Moreover, the layout blueprint facilitates communication among architects, contractors and clients as it serves as a guide for construction activities, ensuring that the project aligns with its initial objectives.

The heights of a building add to its appearance by displaying its front view from various perspectives and showcasing its architectural style as proposed by Kostof et al. (1995). They blend with the environment. Play a significant role in leaving a strong impression that highlights the creativity of the designer and the unique identity of the building itself. Thoughtfully designed elevations also impact how light and shadows interact with the building and its surroundings while enhancing both its charm and energy efficiency. Elevations play a role in achieving a harmonious blend of aesthetics and functionality by ensuring that the building not only looks appealing but is also sturdy and suitable for the climate conditions. Moreover, 3 3-dimensional presentations breathe life into designs by offering a lifelike visual representation of the proposed structure. The 3D presentation in this research provides a viewpoint that enables stakeholders to envision the spatial layout of the building as well as its materials, textures and lighting in a more realistic manner, echoing the views shared by Guhathakurta and Chatterjee (2015). The use of 3 models improves communication among architects and clients as well as contractors, which helps in minimising misunderstandings and errors, in the construction

process (Meyer, 2015). This technology also enables the detection of possible design issues, leading to better decision-making and more successful project results overall. In essence, 3 visualisations support teamwork and guarantee that the design concept is comprehensively grasped and successfully executed throughout the project process. The combination of designed layouts for everyday use and visually appealing building facades developed in this research play a crucial role, in producing structures that are not only functional but also visually impressive and contribute to successful architectural results.



Legend	
A	Green Landcaped Areas
B	Outdoor Recreation areas
C	Adjoining Buildings
D	Archeological Site
E	Outdoor Connection Areas Between the Visitors Center and the Archeological zone
F	Proposed Visitor Center

Figure 5. Site Plan Final Proposal
Source: Extract from Architectural Design studio Project

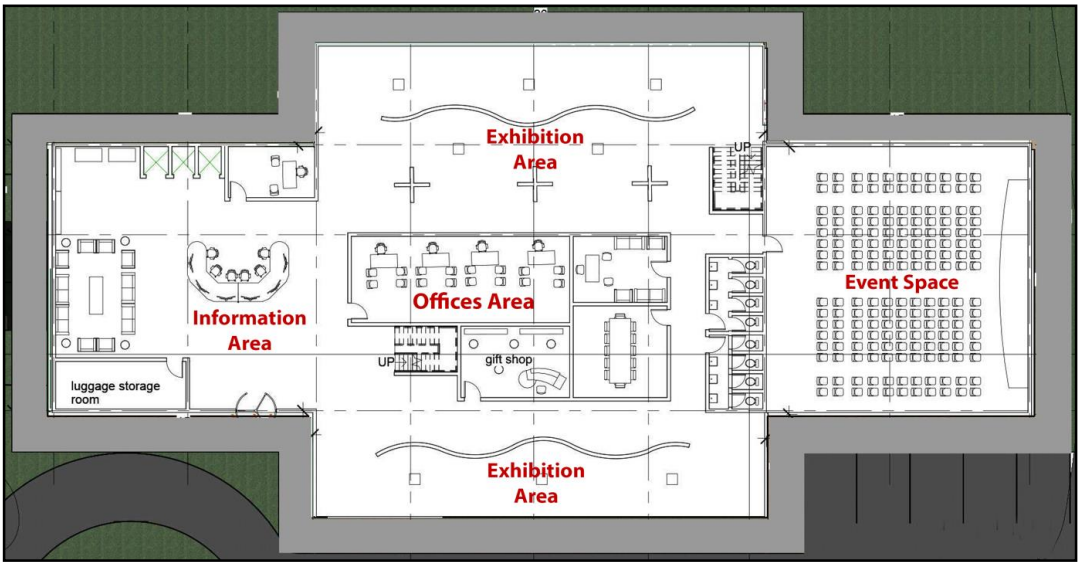


Figure 6. Ground Floor Plan of the Proposed Structure
Source: Extract from Architectural Design Studio Project

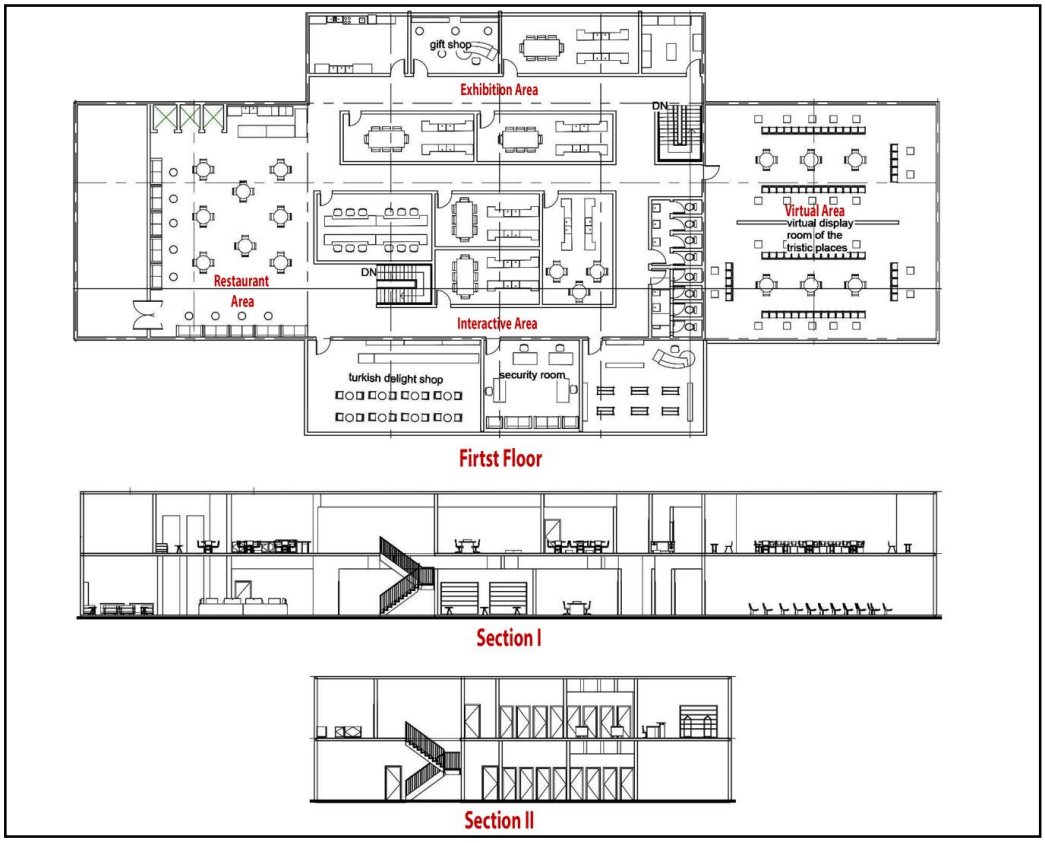


Figure 7. First Floor Plan and Sections of the Proposed Structure
Source: Extract from Architectural Design Studio Project

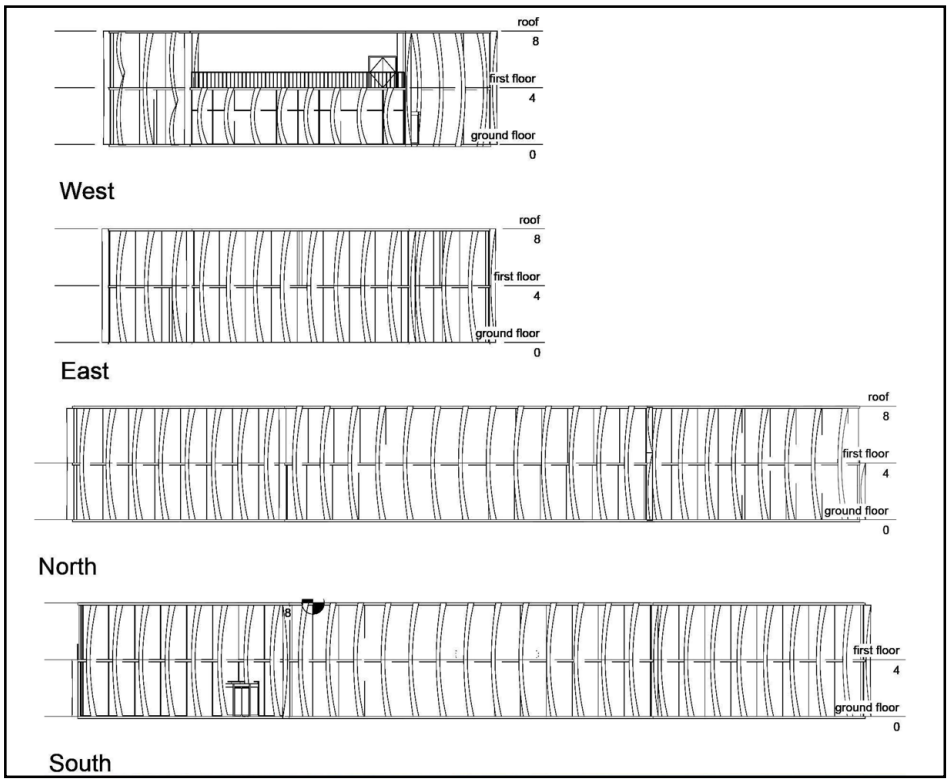


Figure 8. Views of the Proposed Structure
Source: Extract from Architectural Design Studio Project

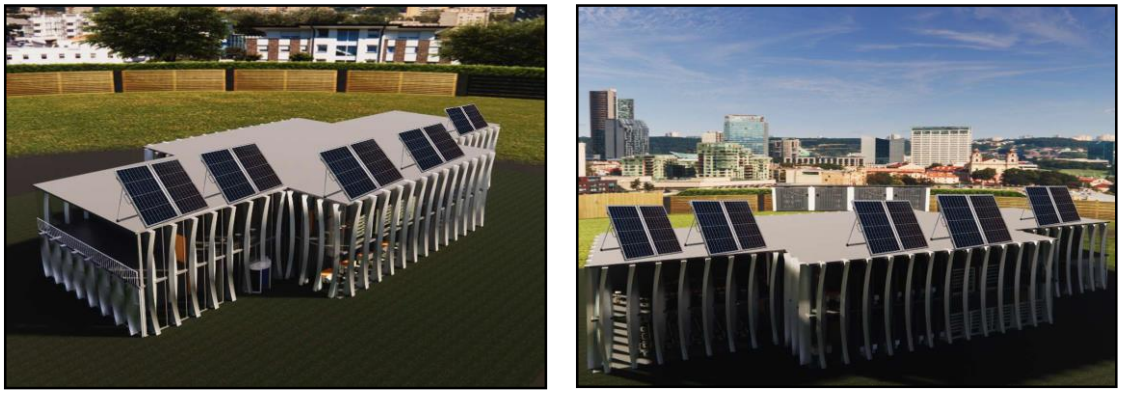


Figure 9. 3-D Views of the Proposed Structure showing the solar panel on the rooftop
Source: Extract from Architectural Design studio project

8. Discussion

The design development stage is a critical phase in the architectural design process that involves refining the conceptual vision into a detailed and executable design solution for the Visitor Centre. By focusing on spatial organisation, architectural expression, sustainability, technical documentation, material selection and collaboration, design development lays the foundation for the successful realisation of the project, ensuring that the final design meets the needs of its users, enhances the built environment and contributes positively to the community.

8.1. The planning and Design process for the Visitor Center

The primary goal of the research in this study is to perform a site analysis at the outset of the design process to understand the site's physical attributes and its cultural and regulatory setting in depth before making design choices based on this information. It is crucial to heed research like Salafsky et al. (2002), which underscores the importance of a detailed site analysis in ensuring that architectural designs are sensitive to their context and environmentally appropriate. In this scenario, the assessment entails collecting details about the site's position, dimensions, terrain, weather conditions and environmental characteristics, which are all essential for seamlessly blending the planned Visitor Centre with its environment.

The research mentioned in the study emphasizes the significance of delving into the cultural background of the location to pinpoint important landmarks and cultural assets that could impact design decisions significantly This resonates with the findings of Tweed and Sutherland (2007) who argue that recognizing importance is crucial for developing designs that connect with both residents and tourists, alike Designing with an understanding of culture allows architects to cultivate a feeling of belonging and identity within a place This can greatly influence how the community perceives the design Moreover the research highlights the significance of involving stakeholders such as holding discussions with residents, community organizations, government bodies and other related entities. This aligns with Kummitha (2019) who emphasises that including stakeholders in the design phase enables architects and designers to grasp the preferences, requirements and issues of users. Involving stakeholders at an early stage results in designs that are more apt to fulfil user needs and receive widespread approval from the community. Studying the structures and land usage plays a crucial role in shaping the

design process for architects because it helps them consider how their designs can improve the city's overall look and feel by blending well with existing buildings and transportation routes, as highlighted by Mouratidis (2021). Studying how people and vehicles move around can help designers improve the layout of an area and its connections to facilities-a point highlighted in Gehl's research on the significance of walkability and connectivity, in enhancing lively public areas.

Analyzing the environment is crucial for recognizing possibilities in design and eco-friendly construction approaches by considering factors like local climate conditions and natural resources availability such as sunlight exposure and water supply abundance to incorporate passive design methods and renewable energy solutions along with stormwater control measures early, in the project development process as supported by Zeng et al. (2021) emphasizing that integrating sustainability practices at the outset can greatly minimize a buildings ecological footprint. Additionally, these approaches improve the ability to adapt to climate variations, highlighting the growing emphasis on sustainability in work. The research also emphasises the importance of grasping the rules and regulations, like zoning laws, limits on building heights and parking prerequisites. Adhering to these guidelines can help architects steer clear of complications while navigating the design and approval phases. Studies conducted by Talen. According to the study noted in Talen (1996), it is emphasised that taking zoning laws and regulations into account early is crucial for the implementation of projects. Especially in urban areas, with strict regulations.

In summary and based on the data shown in Table 6 above, as detailed in this study report, reflect findings to previous research best practices. Past studies highlight the importance of considering context design elements that are culturally relevant and sustainable to create buildings that serve both purpose and significance within their surroundings. The emphasis placed on site analysis and cooperative program planning serves as the groundwork for developing a Visitor Centre that prioritises user experience while also being environmentally conscious and meeting all necessary guidelines and standards.

Table 6. Summary of the planning process for the Visitor Centre

Design Feature / Considerations	Psychological Impact on Users
1. Accessibility	Spatial programming translates functional needs into optimal layouts, ensuring efficient circulation, clear wayfinding and appropriate space allocation based on usage patterns, capacity and operational efficiency.
2. Sustainability and Resilience	Incorporating sustainability and resilience includes minimising environmental impact, conserving resources and using energy-efficient systems, passive solar design and eco-friendly materials for long-term durability.
3. Flexibility and Adaptability	Designing for flexibility ensures adaptability to future needs with multipurpose spaces, modular components and reconfigurable infrastructure, keeping the Welcome Centre functional and relevant long-term.
4. Selection of Preferred Concept	Select the preferred design concept that aligns with the project vision, client needs and user requirements, possibly synthesising or refining multiple concepts for clarity and feasibility.
5. Spatial Organisation and Layout	Refine spatial layout to optimise functionality, circulation and user experience, enhancing accessibility and wayfinding through iterative sketching, diagramming and 3D modelling of programmatic elements.

6. Integration with Nature and Biophilia	The Centre exemplifies biophilic design, harmonising with its natural surroundings through organic forms. Carefully placed openings invite natural light and frame scenic views, enhancing sensory comfort and connection to nature. This thoughtful integration reduces stress, fostering a sense of calm and rootedness.
7. Contemplation and Connection	The centre incorporates events/seating sections and interactive areas to promote introspection, relaxation and emotional healing. These areas facilitate emotional presence and mental relaxation, which is important for guests coming from hectic urban settings.

8.2. Developing the Architectural Expression, Form and Sustainable Design Strategies

With regards to the second research objective and also relating to the findings of Teutonico and Palumbo (2002), developing the architectural expression and form of the Visitor Centre in such a manner as to respond to the conceptual idea of the project and its context is also appropriate. Their research supports, as well, the need to address the building's massing, scale and proportions, as well as the articulation of all the other elements of a building to achieve a portraiture that is beautiful and distinct to the building type. It also focuses on the need to look for more interesting and sustainable ways of dealing with façades, materials, window patterns and more, to add aesthetic value, increase daylighting and maximise sustainability performance. Employing ecological design strategies combined with green building principles at all stages of the design process allows minimising the ecological footprint, increasing the comfort of users, as well as maximising the efficiency of resource use (Teutonico & Palumbo, 2002). Such strategies might include, among others, passive strategies like building orientation, natural ventilation, daylighting and thermal massing, as well as active strategies for energy generation, water management and waste management (Proenca *et al*., 2022). Moreover, the involvement of sustainability specialists and engineers is very important for the application of economically viable and creative strategies for the realisation of the objectives of sustainability of the project (Gunderson, 2000).

The construction of a Visitor Centre involves a lot of groundwork, including material selection, which dictates the appearance, usability and ecological features of the new building. This is possible if such conditions of research into the material are observed, such as analysis, cost-effectiveness, longevity, beauty and ecological inclusiveness. According to a study conducted by Proenca et al. (2022), ecological design regarding material selection and usage should be adopted as it cuts down on building environmental impact and improves the building lifecycle. Such trends in material selection are consistent with the earlier findings on sustainable design and therefore, as designed, the project meets wider environmental goals (Chen *et al*., 2022). The focus has shifted from colours and finishes alone to the structural contribution a material has to the architecture and the overall aesthetics of the building. Formulation of the design concepts is another key factor; here, design alternatives for the envisaged model are generated within the broader conceptual design. It involves finding different ways to partition the space meaningfully, present the architecture and convey the materials and the qualities of the experience to visualise the project idea in several ways. The design ideas are developed in stages of sketching, modelling and graphics-making concepts that explain the design.

According to Lawson (2005), integrative design is important to make a designed solution, as ideas can be exercised, evolved and developed before a decision is made.

This is similar to what architects do these days, as through an iterative process architects exploit their designs in such a way that at the end of the day, the designed solution meets its purpose, aesthetics, as well as practicality, all at the same time. Such processes, if compared with earlier conducted studies, correspond to normed architectural engagements. For example Chen et al. (2022) have pointed out factors like materials as one of the major tasks to achieve aesthetic and even functional ones, but emphasising sustainability. Moving forward, iterative development of design concepts, which was stressed by Lawson (2005) as used in this particular case, is one of the best architecture practices, as it facilitates a lot of rounds to get the best out of the required goals of the intended project. It is ensured that a combination of materials and design development is done to enable the Visitor Centre to be attractive, functional and appropriate to current architectural trends and environmental concerns.

8.3. Evolving a multi-functional Visitor centre that enhances consolidated collaborative learning

This objective involves performing timely design sessions, participating in necessary coordination conferences and encouraging other forms of communication as necessary to keep the development of the design as seamless and as integrated as possible. Focusing on teamwork and communication while considering everyone in the team to promote respectful working relationships enhances the project outcomes. Several important factors should be considered during the construction of a Visitor Centre to make sure that the design and functional expectations of the project are achieved. One of the basic tasks is that of preparing complete technical documents. These documents are important in directing the process of construction to enhance order and avoid misunderstandings. The technical documents provide all the detailed architectural aspects such as the multiple views cut of the real estate, including plans, sections, elevations and details. Additionally, it requires coordination with structural, mechanical, electrical and plumbing (MEP) systems to ensure all components are seamlessly integrated into the design. Previous studies have demonstrated the importance of thorough technical documentation in minimising construction delays and reducing the likelihood of costly changes during project execution. This aligns with research by Othman and Alamoudy (2021), which highlights that well-prepared documentation improves project delivery efficiency and mitigates risks associated with misinterpretations of the design intent.

A key element to consider is crafting a design storyline that effectively conveys the experiential aspects of the design itself. There's a tale woven around the design that highlights its weight and how it connects with its surroundings. This story can be shared through spoken words, pictures and interactive displays - all intended to captivate those involved and spark excitement for the endeavour. Salama (2017) highlights the significance of a design story in architecture by stressing how narratives can effectively link a project to its cultural and social surroundings to elevate its significance and impact.

Finally, a rigorous process of evaluation and feedback is necessary to ensure the design meets the project's goals. This process involves critically assessing proposed concepts against the project brief and programmatic requirements while considering contextual factors. Engaging with stakeholders, such as clients, end-users and design professionals, ensures that feedback is obtained to refine the design iteratively. Research has shown that stakeholder feedback is critical in aligning design concepts with real-world needs. Gifford (2007) underscores the significance of involving end-users in design evaluation processes, as it enhances the usability and satisfaction with the final

built environment. These considerations align with best practices in architectural project development, as identified in earlier studies and contribute to the successful realisation of a Visitor Centre that is both functional and meaningful within its context.

9. Conclusions and Suggestions

The proposed study introduces several innovative approaches to designing and operating visitor centres, distinguishing them from existing research and practices. This study reveals that using three-dimensional design tools significantly improves students' abilities to visualise and create complex spatial relationships. Moreover, the incorporation of contextual analysis, site limitations and metaphorical design led to more cohesive and innovative solutions. The welcome centre design in this research successfully integrates with the archaeological site, enhancing the visitor experience and ensuring functionality. The novelty lies in the comprehensive application of resilience theory, sustainability principles and advanced user engagement strategies within the context of visitor centres. Also, three-dimensional design methodologies are vital in developing contextually appropriate architectural solutions, particularly when dealing with sensitive historical sites. The collaborative learning environment also fosters creativity and critical thinking, underscoring the value of teamwork in design education. Incorporating sustainable practices and materials into the design and functionality of visitor centres is essential for minimising environmental impact and enhancing the overall visitor experience.

As revealed in this study, architectural sustainable practices can include energy-efficient systems, water conservation measures, waste reduction strategies and the use of renewable energy sources. For instance, integrating solar panels, rainwater harvesting systems and green roofs can significantly reduce the environmental footprint of a visitor centre. These practices not only contribute to environmental conservation but also offer educational opportunities for visitors to learn about sustainability. In addition, using sustainable materials, such as reclaimed wood, recycled metal and low-VOC (volatile organic compounds) paints, can further enhance the environmental performance of visitor centres. These materials reduce the demand for new resources and minimise the release of harmful substances into the environment. Also, sustainable materials often have a longer lifespan and require less maintenance, thereby improving the overall durability and functionality of the visitor centre. By adopting these sustainable practices and materials, visitor centres can serve as models of environmental stewardship, inspiring visitors to adopt similar practices in their own lives. This study bridges gaps in current architectural design practices by integrating multifaceted methodologies that enhance both functionality and user experience in the following ways:

- **Application of Resilience Theory:** This study is among the first to systematically apply resilience theory to the design of visitor centres. By addressing common design issues such as lack of functionality, loss of architectural characteristics and adaptability to fluctuating visitor numbers, the study provides a robust framework for creating resilient visitor centres that can thrive despite varying conditions and stresses.
- **Four-Dimensional Framework:** The introduction of a four-dimensional framework for resilience in ontology function, extended function, integration into the environment and alternative construction technologies and materials offers a novel approach to designing visitor centres. This framework ensures that visitor centres are not

only resilient but also multifunctional, environmentally integrated and sustainably constructed.

- **Sustainability and Environmental Integration**: This study revealed innovative strategies for harmoniously integrating visitor centres into their natural and built environments, ensuring minimal ecological disruption and enhancing aesthetic and environmental performance.
- **User Experience and Engagement**: The study emphasises the importance of user experience and engagement, proposing innovative design solutions and interactive elements to enhance visitor interaction. By integrating technology, immersive environments and flexible spaces, the study provides a comprehensive strategy for creating dynamic and engaging visitor centres.
- **Collaborative Learning Environment:** The study promotes the concept of a workshop as a collaborative learning environment. This approach encourages the production, discussion and sharing of information among participants, fostering a culture of continuous learning and innovation in architectural design.

By combining these innovative approaches, the study sets a new standard for the design and operation of visitor centres. It aims to create spaces that are not only functional and resilient but also engaging, sustainable and seamlessly integrated into their environments. This comprehensive approach addresses current gaps in architectural design practices and offers valuable insights for future research and development in the field. Further research on the long-term impact of three-dimensional design training on architectural practice is suggested, alongside the development of additional tools and resources to support three-dimensional design thinking in architectural education. This expanded focus will better prepare students for the complexities of real-world architectural challenges, particularly those involving sensitive historical contexts.

The study contributes to architectural education by highlighting the importance of three-dimensional design methodologies, especially in the context of real-world projects. It also emphasises the need for integrating historical and cultural sensitivity into design processes, offering a more holistic approach to architectural education. A key aspect of this study is its focus on applying three-dimensional design in real-world, historically sensitive contexts, which is often overlooked in traditional two-dimensional design education. The study introduces practical strategies for improving spatial relationships and site integration in architectural designs. The research is limited by its focus on a single archaeological site, which may restrict the generalizability of its findings. However, the methodologies developed in this study can be adapted for other historically and culturally significant sites. The study underscores the importance of integrating practical, real-world design challenges into architectural education. By emphasising three-dimensional thinking and collaboration, it equips students with the critical skills necessary for addressing complex design problems in their professional careers. The project contributes to cultural preservation by ensuring that new architectural interventions respect and enhance the value of archaeological and historical sites. The design of the welcome centre provides an inclusive and engaging space for visitors, thus promoting community engagement and cultural appreciation. Future research could explore the long-term impact of three-dimensional design training on architectural practice.

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