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Architecture in the age of digital representation: Space as a photogenic and homogenized object of consumption

Dijital temsil çağında mimarlık: Fotojenik ve homojenleştirilmiş bir tüketim nesnesi olarak mekân

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ABSTRACT

Digital representation tools increasingly influence not only how architectural projects are presented but also how architectural form is conceived and evaluated. This study critically examines the tension between visually driven design decisions and functional, environmental, and contextual criteria.

The research adopts a qualitative, theoretically grounded, critical, and case-based comparative approach, drawing on the literature on digital representation, architectural form, and form–energy relationships, and evaluating three selected architectural cases through four analytical criteria. Rather than measuring building performance empirically, the study interprets the selected cases through established form–energy and environmental design principles.

The analysis suggests that transparent, fluid, and iconic forms idealized in digital representations may generate tensions related to energy demand, maintenance requirements, and spatial comfort. Across the selected examples, these tensions are interpreted as part of a broader production logic shaped by digital representation aesthetics rather than as isolated design decisions.

The study contributes to the architectural literature by conceptualizing digital representation not merely as an aesthetic preference but as a potential design driver shaping the relationship among architectural form, environmental performance, and sustainability.

Keywords: *Digital representation, Architectural form, Render Aesthetics, Energy and raw material use.*

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ÖZET

Dijital temsil araçları, mimari projelerin yalnızca sunuluş biçimini değil, mimari formun nasıl tasarlandığını ve nasıl değerlendirildiğini de giderek daha fazla etkilemektedir. Bu çalışma, görsel olarak yönlendirilen tasarım kararları ile işlevsel, çevresel ve bağlamsal ölçütler arasındaki gerilimi eleştirel bir çerçevede incelemektedir.

Araştırma, dijital temsil, mimari form ve form-enerji ilişkilerine yönelik literatüre ve seçilmiş üç mimari vakaya dayanan, kuramsal temelli, eleştirel ve vaka temelli karşılaştırmalı nitel bir yaklaşım benimsemektedir. Çalışma, yapı performansını ampirik olarak ölçmek yerine, seçilen vakaları form-enerji ilişkisi, kabuk/malzeme, çevresel ve kullanıcı konforu ile temsil estetiği ve mekânsal performans olmak üzere dört analitik ölçüt üzerinden yorumlamaktadır.

Analiz, dijital temsillerde idealize edilen şeffaf, akışkan ve ikonik formların enerji talebi, bakım gereksinimleri ve mekânsal konforla ilgili gerilimlere yol açabileceğine işaret etmektedir. Seçilen vakalarda görülen bu gerilimler, tekil tasarım kararlarından ziyade dijital temsil estetiği tarafından şekillendirilen daha geniş bir üretim mantığının bir parçası olarak yorumlanmaktadır.

Çalışma, dijital temsili yalnızca estetik bir tercih olarak değil, mimari form, çevresel performans ve sürdürülebilirlik arasındaki ilişkiyi şekillendirebilecek potansiyel bir tasarım yönlendiricisi olarak kavramsallaştırarak mimarlık literatürüne katkı sunmaktadır.

Anahtar Kelimeler: *Dijital Temsil, Mimari Form, Render Estetiği, Enerji ve Hammadde Kullanımı*

1. INTRODUCTION

Digital Representation tools are transforming how images are produced, circulated, and evaluated in contemporary production and communication processes. This transformation has led visual production to move beyond its role as a mere means of presentation and become an element that can influence decision-making processes and modes of production. In architecture, rendering engines, parametric design tools, and AI-assisted visualization techniques can likewise affect not only how projects are presented but also how design decisions are formed.

This study focuses on digital representation as a design driver that generates tension between visual form and environmental and spatial performance. Render aesthetics, social media visibility, AI-based image production, and market pressure are treated as supporting factors that shape this central problem.

In the existing literature, the effects of digital representation and visual culture on architectural design have been discussed through studies such as Carpo (2017), Picon (2014), Klingmann (2007), Zukin (1995), and Harvey (2006), while the relationship between architectural form and energy performance has been examined by Steadman (2006), Ratti et al. (2003), Steemers (2003), and Tuhus-Dubrow and Krarti (2010).

However, these two strands of literature have largely developed separately, and studies that jointly examine how digital representation aesthetics relate to environmental performance and spatial experience through architectural form remain limited. This study addresses this theoretical gap.

Accordingly, the three selected architectural cases are examined through four analytical criteria: form–energy relationship, envelope/material, environmental and user comfort, and representational aesthetics and spatial performance. The aim is not to produce empirical performance results but to critically and conceptually interpret the environmental and spatial consequences of digitally driven architectural form. In this respect, the study contributes to the architectural literature by establishing an analytical link between digital representation studies and the literature on form–energy and environmental performance, thereby offering a more integrated framework for discussing how digital aesthetics influences design decisions.

2. METHOD AND MATERIAL

This study adopts a qualitative, theoretically grounded, critical, and case-based comparative approach to examine the relationship between digital representation aesthetics, architectural form, environmental performance, and spatial experience. Rather than producing quantitative simulations or measured building-performance data, the study evaluates the selected buildings within a theoretical framework informed by digital representation, architectural form, form–energy relationships, and environmental design. Evaluations that are not supported by measured data are therefore treated as interpretive hypotheses rather than empirical findings.

The research material consists of academic literature on digital representation, visual culture, architectural form, and environmental performance; published project documents; technical information; visual materials, such as renderings and architectural photographs; published criticism; and, where available, documented performance-related information. In each case analysis, it is explicitly indicated whether the information used is based on technical documentation, published criticism, documented data, or theoretical inference.

The three selected cases-Heydar Aliyev Center, Museum of the Future, and VIA 57 West-were chosen according to four criteria: (1) their iconic and visually distinctive architectural character, (2) the clear presence of digital representation aesthetics in their architectural image, (3) the availability of published technical, project-based, or performance-related information, and (4) their representation of different climatic and contextual conditions. Limiting the analysis to three built projects at the building scale provides a more comparable basis for examining visually driven architectural strategies under different environmental conditions.

The analytical criteria were developed by drawing on theoretical frameworks that discuss the role of digital tools in architectural form-making, such as Carpo (2017), the relationship between iconic architecture and visual/consumer culture, such as Sklair (2010), and the relationship between building form and environmental performance, such as Ratti et al. (2003).

Accordingly, the analytical framework is structured around four criteria: (1) form–energy relationship, (2) envelope/material, (3) environmental responsiveness and spatial comfort, and (4) representational aesthetics and spatial performance. The form–energy relationship addresses form complexity, surface-to-volume relationships, and climatic responsiveness. The envelope/material criterion examines façade systems, material characteristics, and maintenance requirements. Environmental responsiveness and spatial comfort consider daylight and shading strategies, climatic adaptation, airflow-related design decisions, and their potential implications for spatial comfort. Representational aesthetics and spatial performance focus on iconic and photogenic qualities, visual priorities emphasized in architectural representation, and the relationship between visual representation and documented or theoretically interpreted physical performance.

These four criteria enable a systematic evaluation of the environmental and spatial consequences of buildings that have become iconic through digital representation, as well as a critical examination of the relationship between visual representation and physical performance. The methodological process is summarized in Table 1.

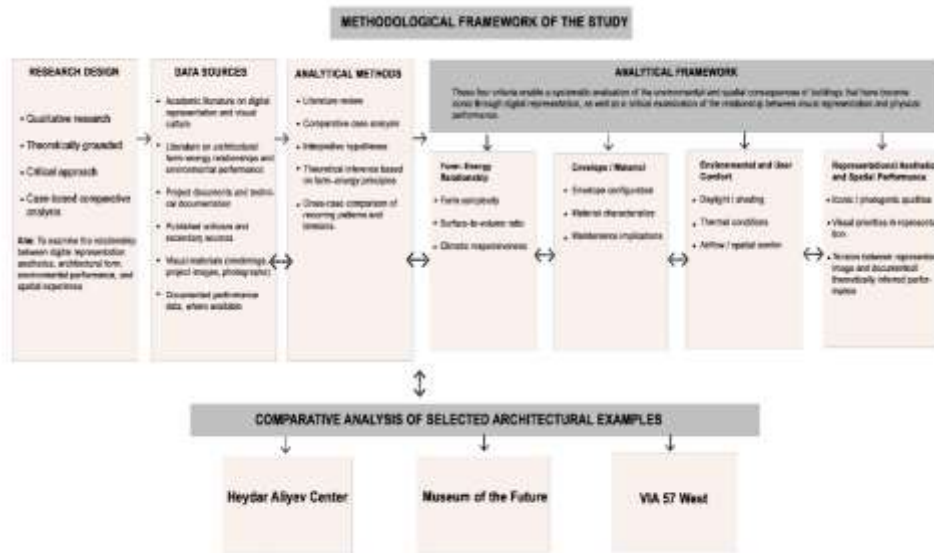


Table 1. Methodological Framework for the Comparative Analysis of Selected Architectural Cases

3. DIGITAL REPRESENTATION, DESIGN PROCESS AND ARCHITECTURAL FORM

The influence of digital representation on architectural design is shaped not only by developments in visualization techniques, but also by form production, iconization, the circulation of architectural images, and market pressures. As visual impact and digital visibility become increasingly important, aesthetic priorities and investor–market expectations may play a more influential role in shaping architectural form.

3.1. Digital Aesthetics and Form Generation

Digital tools have enabled architects to produce complex geometries, fluid surfaces, and forms that would be more difficult to develop through conventional design processes. Carpo (2017) argues that digital technologies have transformed not only techniques of representation but also modes of design thinking and form generation, while Picon (2014) highlights the formal freedom this transformation has created in contemporary architecture.

Within this process, visual impact, originality, distinctiveness, and iconic appearance have become more prominent in the evaluation of architectural form. Jencks's (2006) concept of the iconic building demonstrates that architectural form can be assessed not only through its functional and technical qualities, but also through its capacity to generate a strong symbolic and visual identity. Digital representation environments, in turn, support the visibility and circulation of this iconic character.

Fluid geometries, flawless surfaces, and dramatic compositions, when emphasized in renderings, can shape the perception of a project before it is built. For this reason, digital representation can be understood not merely as a tool for conveying an existing design, but also as a mechanism that influences which formal qualities are brought to the forefront.

However, it cannot be assumed that a visually compelling architectural image corresponds directly to the physical and spatial performance of a building. Visual representation may reflect elements such as material behavior, maintenance requirements, environmental conditions, and user experience only in a limited or idealized manner. For this reason, this study addresses representational aesthetics through the relationship between visual priorities and physical and spatial performance.

3.2. The Intervention of Investor and Market Dynamics in Design

The influence of digital representation on architectural design is closely related to the economic and cultural conditions of architectural production. In the global architectural context, project images circulating on digital platforms play an important role in shaping the recognition, brand value, and public visibility of buildings.

Klingmann's (2007) discussion of architecture within the context of the "experience economy" indicates that buildings are evaluated not only as functional and spatial entities, but also as instruments for producing institutional and urban identity.

The relationship between iconic architecture, markets, and consumer culture is addressed more directly in Sklair's work. Sklair (2006) discusses the role of architectural icons in relation to urban visibility and the growing demand for distinctive architectural landmarks, while Sklair (2010) relates iconic architecture to the culture-ideology of consumerism and emphasizes the symbolic and economic value generated by such buildings. This framework suggests that architectural form may be shaped not only by designers' preferences, but also by investor expectations, branding strategies, and demands for visibility.

Similarly, Zukin (1995) draws attention to the role of architectural imagery in producing economic and symbolic value through the relationship among the city, visual culture, and consumption. Accordingly, distinctive forms that generate a strong visual identity and circulate effectively in digital media can be understood not merely as aesthetic choices, but also as design tendencies associated with market and visibility mechanisms.

Within this framework, the formal possibilities offered by digital tools and investor–market pressures may jointly influence the production and evaluation of architectural form. The environmental and spatial implications of this relationship are discussed below.

4. ENVIRONMENTAL AND SPATIAL CONSEQUENCES OF ARCHITECTURAL FORM

Architectural form influences environmental performance not only through its aesthetic qualities but also through its geometry, surface-to-volume ratio, envelope system, and interaction with climatic conditions. Therefore, evaluating formal decisions emphasized through digital representation requires consideration not only of visual qualities, but also of the form–energy relationship, envelope and material characteristics, environmental responsiveness, and spatial comfort.

4.1. The Form-Energy Relationship

The relationship between building form and energy performance is commonly explained through factors such as surface-to-volume ratio, geometric complexity, and climatic conditions. Ratti et al. (2003) and Steadman (2006) highlight the influence of building geometry on environmental performance. Examining this theoretical relationship quantitatively in the Turkish context, Kahraman and Köymen (2023) also demonstrate a clear association between form compactness and energy consumption in winter-tourism accommodation buildings.

In general, an increase in the surface-to-volume ratio may enlarge the building envelope exposed to external conditions, thereby increasing the potential for heat gains or losses. For this reason, the environmental performance of fragmented, highly articulated, or complex geometries should be evaluated not only in terms of their visual qualities, but also in relation to climate, orientation, and envelope characteristics. A recent systematic review of the factors influencing building energy performance similarly shows that performance cannot be attributed to building form alone; multiple variables, including envelope characteristics, orientation, climatic conditions, and occupancy-related conditions, need to be considered together (Olu-Ajayi et al., 2024).

Within this framework, the form–energy relationship is used in this study not to classify particular geometries directly as “efficient” or “inefficient,” but to theoretically evaluate the potential effects of formal design decisions on energy performance.

4.2. Envelope and Material

The building envelope forms the primary interface between indoor and outdoor environments and influences environmental performance through façade geometry, opening ratios, material properties, and shading decisions (Hegger et al, 2008). Envelope characteristics, along with orientation and climatic conditions, are also identified as key variables affecting building energy performance (Olu-Ajayi et al., 2024).

In particular, high glazing ratios are directly associated with solar heat gain, heat loss, daylight use, and shading requirements; these effects may vary depending on façade orientation and climatic conditions (Tuhus-Dubrow & Krarti, 2010). Complex façade systems may also introduce additional design and implementation requirements regarding material use, connection details, and maintenance needs.

Accordingly, the envelope and material criterion is used in this study to evaluate the relationship between the transparency, continuity, and surface effects emphasized in digital representation and the building's physical and environmental characteristics.

4.3. Environmental Responsiveness and Spatial Comfort

Environmental performance is not limited to energy consumption; daylight, shading, natural ventilation, orientation, and indoor environmental conditions are also key components of a building's relationship with the climate (Olgyay, 2015; Hegger et al., 2008). Therefore, the environmental responsiveness of architectural form and envelope decisions should be evaluated in terms of how they respond to the climatic conditions of their context.

Daylighting and shading strategies, façade openings, orientation, and airflow-related design decisions can influence the quality of the indoor environment and conditions of spatial comfort (Olgyay, 2015; Hegger et al., 2008).

However, since this study does not include measured indoor environmental data or user evaluations, interpretations concerning comfort are treated not as empirical findings, but as interpretive hypotheses based on documented design decisions and established environmental design principles.

5. ANALYSIS OF ICONIC ARCHITECTURAL BUILDINGS

This section examines the Heydar Aliyev Center, the Museum of the Future, and VIA 57 West through the four analytical criteria defined in the methodology: form–energy relationship, envelope and material, environmental responsiveness and spatial comfort, and representational aesthetics and spatial performance.

5.1. Heydar Aliyev Center - Zaha Hadid (Baku)

Designed by Zaha Hadid Architects in Baku, the Heydar Aliyev Center is characterized by its fluid geometry and a continuous surface that connects the plaza and the building. In the project, the plaza surface rises and transforms into the building envelope, while folds, bifurcations, and undulations blur conventional boundaries between ground, envelope, interior, and exterior. Zaha Hadid Architects describes this approach as a contemporary architectural language that departs from the rigid and monumental traditions of Soviet architecture in Baku (Zaha Hadid Architects, 2013; ArchDaily, 2013), (Figure 1).



Figure 1: Heydar Aliyev Center: fluid and continuous exterior form.
(ArchDaily, Architect: Zaha Hadid Architects; Photograph: Hufton + Crow)

The building's free-form geometry produces an extensive and highly articulated envelope system. According to Werner Sobek's technical project description, the solid exterior envelope covers approximately 39,100 m², while the plaza surface extends over approximately 9,000 m². The exterior envelope was developed as a multilayered, three-dimensional free-form system connected to the primary structure through a secondary steel substructure (Werner Sobek). In terms of the form–energy relationship, these documented geometric characteristics are relevant to parameters such as surface-to-volume ratio, heat transfer, and envelope exposure.

However, building-specific measured energy-consumption data or comparative energy simulations were not identified in the available project documentation; therefore, the energy implications of the geometry are considered only in relation to established form–energy principles discussed by Ratti et al. (2003) and Steadman (2006).

The physical realization of the free-form geometry required a high degree of integration between architectural form and structural systems. The building employs a hybrid structural system consisting of reinforced-concrete elements and a steel space frame. To achieve large, column-free interior spaces, some vertical load-bearing elements were integrated into the envelope and wall systems. Special structural solutions include curved “boot columns” in the western section and “dovetail”-shaped cantilever elements in the eastern part of the building, both developed to support the complex geometry of the envelope (Arch Daily, 2013).

The exterior envelope is composed of GFRC and GFRP panels selected for their capacity to accommodate varying curvatures and maintain the continuity of the building surface. ArchDaily reports that the panel system was rationalized with respect to fabrication, transportation, installation, temperature variations, seismic movement, and wind loads (ArchDaily, 2013). Werner Sobek further states that the development of the envelope involved three-dimensional parametric modeling, engineering coordination, production-data generation, and installation planning (Werner Sobek). These project data indicate that the continuous exterior surface was achieved through the coordination of multiple structural, material, and fabrication components.

The building’s large spans and column-free interior organization extend the continuity of the architectural form into the interior. ArchDaily notes that uninterrupted interior spaces were made possible by integrating vertical structural elements into the envelope and wall systems (ArchDaily, 2013). These large, geometrically complex spaces also serve as the basis for evaluating environmental parameters such as daylight distribution, airflow, and thermal control. Since measured indoor environmental performance data were not identified in the available technical documentation, no direct conclusions are drawn regarding thermal or comfort performance.

The representational identity of the Heydar Aliyev Center is strongly associated with its white surfaces, fluid geometry, continuous envelope, and changing relationship with light. ArchDaily states that the building's surface changes in appearance with daylight conditions. At the same time, semi-reflective glazing provides controlled visual connections to the interior, and nighttime lighting reinforces visual continuity between the interior and exterior (ArchDaily, 2013). The building received the Design of the Year award from the London Design Museum in 2014, further increasing its international visibility.

The award was also accompanied by public debate over the project's political and social context, including allegations of forced evictions and human rights concerns in Azerbaijan (Wainwright, 2014).

At the urban scale, the building is situated within a large open landscape and is visually distinguished from the surrounding built fabric by its scale, geometry, and material expression (Figure 2). The contrast between the building's continuous white surface and the denser surrounding urban fabric is clearly observable in project photographs and published visual documentation.



Figure 2: The location of the Heydar Aliyev Center within the urban fabric of Baku.
(ArchDaily Architect: Zaha Hadid Architects)

5.2 Museum of the Future - Dubai

Designed by Killa Design and engineered by Buro Happold, the Museum of the Future in Dubai is distinguished by its toroidal geometry, defined by a central elliptical void, and by its parametrically developed envelope system. The building is composed of three principal symbolic elements: the green hill represents the earth, the torus-shaped main volume represents humanity and its capacity for innovation, and the central void represents the unknown future. The museum's official description presents the building as an alternative architectural form that deliberately departs from the high-rise typology dominating Dubai's skyline. The building is 77 m high and has a total floor area of approximately 30,548 m² (Museum of the Future, 2022), (Figure 3).



Figure 3: Museum of the Future, Dubai.
(ArchDaily, Architect: Killa Design; Calligraphy: Mattar bin Lahej)

To integrate the building's complex geometry with environmental performance, three-dimensional energy modeling and parametric optimization tools were used during the design process. According to Montjoy (2022), low-energy and low-water engineering systems, energy and water recovery, passive solar design, air-quality filtration systems, and renewable energy sources were considered together. These strategies are reported to have achieved approximately 25% savings in total energy use and a 45% reduction in water consumption, while the building also received LEED Platinum certification (Montjoy, 2022). Current sustainability information published by the museum further states that approximately 30% of its energy demand is supplied by a nearby solar-energy facility and that up to 70% of wastewater is reused (Museum of the Future, 2022).

Digital modeling became a direct design instrument in developing the relationship between form and energy performance. According to Baully (2023), the energy model was integrated into the building's three-dimensional digital prototype, while the size and position of the calligraphic glazed openings were parametrically determined by considering heat gain, daylight availability, and HVAC requirements together. The use of high-performance glazing and parametric optimization is reported to have enabled the façade to reduce external heat transfer by 66% relative to Dubai regulatory requirements and to reduce the building's energy use by up to 50% relative to a conventional exhibition building of similar size (Baully, 2023).

The physical realization of the free-form toroidal geometry required the development of a steel diagrid shell as the primary structural system. After evaluating reinforced-concrete shell, steel plate, and alternative structural systems, the project team selected the steel diagrid based on performance, constructability, and transportation requirements. The system allows the exhibition floors to remain column-free.

Custom computational algorithms developed by Buro Happold were used to optimize the diagrid geometry in relation to member diameters, façade thickness, material use, fabrication, and transportation constraints. The algorithm evaluated thousands of possible geometric configurations to achieve the final structural form using the minimum amount of material for the main structure (Bauly, 2023).

Digital modeling was also used as a central coordination tool across the architecture, façade engineering, structural engineering, and building services disciplines. Killa Design and Buro Happold spent approximately two years developing a full digital prototype of the building, which was subsequently used to coordinate the structure, façade, mechanical and electrical systems, and construction processes. Tekla Structures and other BIM-based tools were employed to identify interdisciplinary clashes, control geometric tolerances, and organize fabrication and installation processes (Montjoy, 2022; Bauly, 2023).

The exterior envelope covers approximately 17,600 m² and consists of 1,024 stainless-steel-clad GFRP panels, each with a unique size and geometry. The panels were manufactured using specialized robotic production processes (Museum of the Future, 2022).

According to Bauly (2023), more than 10,000 individually shaped glass pieces were integrated into these panels, and the positions of the calligraphic openings were coordinated in the digital model to prevent conflicts with the diagrid nodes. The glass components were processed and cut locally into various geometries using water-jet technology.

The Arabic calligraphy incorporated into the façade functions not merely as a visual surface treatment but as a window system integrated directly into the building envelope. The calligraphic openings allow daylight to enter the interior, while the façade design and material selection were developed to reduce solar heat gain. The museum's official sustainability documentation also states that indoor air quality, lighting, and temperature are dynamically controlled through smart building systems (Museum of the Future, 2022).

The building's environmental strategies extend to the landscape design. The planted hill beneath the museum is described as a natural thermal buffer against desert heat and as a measure contributing to reduced cooling demand. The landscape incorporates 30 native plant species and is supported by an intelligent irrigation system that responds to real-time weather data (Museum of the Future, 2022).

The architectural identity of the Museum of the Future is formed by the integration of the toroidal volume, the central void, the stainless-steel surface, and the Arabic calligraphy that extends across the façade. The inscriptions consist of statements about the future attributed to Sheik Mohammed bin Rashid Al Maktoum and were rendered on the building's surface through the calligraphy of Mattar bin Lahej.

In the museum's official description, this formal approach is presented as a deliberate departure from Dubai's high-rise skyline and as an architectural representation oriented toward the future (Museum of the Future, 2022), (Figure 4).



Figure 4: Museum of the Future, Dubai.
(ArchDaily, Architect: Killa Design; Calligraphy: Mattar bin Lahej)

5.3. BIG - VIA 57 WEST (New York)

Designed by Bjarke Ingels Group (BIG) in New York, VIA 57 West was developed through the “courtscraper” concept, which combines the European perimeter-block typology with the American skyscraper. The approximately 830,000 ft² building contains 709 residential units and a landscaped courtyard of approximately 22,000 ft² at its center. The building rises to approximately 450 ft at its northeastern corner while remaining lower at the other corners, producing a tetrahedral and sloping massing configuration (ArchDaily, 2016) (Figure 5).



Figure 5: VIA 57 West (Courtscraper), New York.
(ArchDaily, BIG – Bjarke Ingels Group; Photograph: Nic Lehoux)

The relationship between density and open space shapes the building's formal organization. According to BIG's project description, the design combines the density of Manhattan high-rise development with the shared courtyard model of the European perimeter block. By keeping the three lower corners and raising the northeastern portion, the massing opens the courtyard toward the Hudson River. It allows western sunlight to penetrate more deeply into the interior (Figure 6). This configuration also helps preserve river views from the neighboring Helena Tower (ArchDaily, 2016).



Figure 6: VIA 57 West (Courtscraper), New York.
(ArchDaily, BIG – Bjarke Ingels Group; Photograph: Nic Lehoux)

In terms of the form–energy relationship, VIA 57 West incorporates orientation, the distribution of openings, and courtyard geometry as responses to environmental conditions. The sloping massing was designed to enhance views of the Hudson River and improve daylight access to the residential units. On the upper levels, apartments are organized in a “fishbone” arrangement and oriented toward the waterfront, while large terraces inserted into the sloping façade were designed to enhance both views and daylight access (Arch Daily, 2016).

The central courtyard is a key component of the building's environmental and spatial organization. Designed by Starr Whitehouse, the landscape transitions from a shaded woodland character on the eastern side to a sunnier meadow condition toward the west. The courtyard includes 80 new trees and 47 native plant species. According to BIG, its geometry allows low western sunlight to penetrate the block while also creating a sheltered communal outdoor space for residents. Although privately accessible, the courtyard remains visually connected to the surrounding city and to the green landscape of Hudson River Park (ArchDaily, 2016).

The façade design is directly related to the building's changing geometry. From the west, the building is perceived as a hyperbolic paraboloid or a warped pyramid, whereas from the east it appears as a more slender and vertical high-rise. Terraces cut into the upper façade were integrated into the sloping surface and coordinated with residential requirements for daylight, views, and privacy (ArchDaily, 2016). Published construction documentation also shows how curtain-wall systems, narrow vertical windows, and angled balconies were adapted to the building's irregular massing (Mac Leod, 2014).

In the spatial organization, many of the shared amenities are concentrated around the courtyard. The main entrance lobby connects directly to the courtyard via a broad staircase. At the same time, lounges, event spaces, fitness facilities, a swimming pool, and other communal functions are arranged to establish visual and physical continuity between the interior and exterior shared spaces. Cultural and retail uses at the lower levels further extend the program beyond residential use, contributing to the project's mixed-use character (ArchDaily, 2016).

The representational identity of VIA 57 West is strongly associated with the changing perception of its mass from different viewpoints. From the west, the building appears as a broad, sloping pyramidal form, while from the east it produces a much thinner tower silhouette. This variable geometric character has given the building a distinct visual presence within the Manhattan skyline. In 2016, VIA 57 West received the Best Tall Building Americas award from the Council on Tall Buildings and Urban Habitat. It was also recognized by the International Highrise Award for its innovative combination of the perimeter block and skyscraper typologies (ArchDaily, 2016).

At the urban scale, the building is located at the intersection of West 57th Street and the West Side Highway, with direct visual connections to Hudson River Park and the waterfront. During the early planning process, concerns were raised about the potential for a long stretch of inactive frontage along 58th Street. As part of the New York City Planning Commission review process, modifications including additional retail uses and storefront elements were introduced to strengthen the building's relationship with the street (Rosenfield, 2012). These documented changes indicate that the project's unusual massing was considered not only in terms of skyline impact and residential organization, but also in relation to street-level urban conditions.

6. DISCUSSION

When the three cases are considered together, the relationship between digital representation and architectural performance appears neither linear nor uniform. Although the Heydar Aliyev Center, the Museum of the Future, and VIA 57 West all employ strong and highly recognizable geometries, the environmental, spatial, and urban consequences of these geometries differ considerably. The discussion therefore focuses not on treating iconic or digitally generated forms as a problem in themselves, but on how visual priorities are balanced against technical, environmental, and contextual requirements.

One of the clearest differences between the cases lies in how formal complexity is managed. At the Heydar Aliyev Center, the fluid, continuous surface creates a powerful architectural identity, while its physical realization depends on advanced structural and envelope solutions. At the same time, the limited availability of data on actual energy use and indoor environmental performance means that the building's visual qualities are documented far more extensively than its long-term environmental performance. The issue is therefore not that the building can be defined as environmentally unsuccessful, but that the architectural image remains substantially more visible than the conditions of use, maintenance, and performance that emerge over time.

The Museum of the Future introduces a more complex situation. Its energy modeling, high-performance façade systems, use of renewable energy, water recovery, and smart building technologies indicate that environmental performance was treated as a significant design concern. However, these indicators primarily concern operational energy and water use and are not sufficient on their own to establish comprehensive sustainability. The building's complex toroidal geometry also depends on intensive structural systems, custom-made façade components, robotic fabrication, and highly specialized construction processes whose embodied energy, carbon impacts, maintenance requirements, and end-of-life consequences are not documented with the same level of clarity. The case therefore raises a critical question: do advanced technological systems reduce environmental burdens at their source, or do they only partially offset the additional demands generated by formal complexity? In this sense, sustainability may risk shifting from a principle that constrains design decisions into a technological mechanism that enables increasingly complex forms to remain operationally efficient.

VIA 57 West presents a different relationship between iconic form and context. Its geometry is linked to specific spatial and environmental objectives, including daylight, views, density, and shared open space. However, these same decisions also intersect with economically valuable features such as river views, privileged residential orientation, and market differentiation.

Contextual optimization and market optimization are therefore difficult to separate. Digital design tools can respond to environmental and spatial conditions while simultaneously enhancing attributes that carry economic value. This suggests that optimization is not neutral; the parameters selected for optimization are shaped by broader investment, use, and representational priorities.

A further issue concerns the relationship between digital representation and material reality. In both the Heydar Aliyev Center and the Museum of the Future, surfaces that appear continuous, smooth, and unified in images depend, in physical construction, on numerous distinct components, joints, structural elements, and highly precise assembly processes. Digital representation tends to suppress this technical complexity, allowing the architectural surface to appear lighter, more homogeneous, and more seamless than its construction actually is. Rather than describing this condition as complete dematerialization, it may therefore be more accurate to understand it as the visual concealment of material complexity. The building does not become less material; its material system often becomes more complex while appearing visually simpler.

This visual simplification is also connected to the production of symbolic and economic value. The three buildings function not only as spaces to be occupied but also as highly recognizable images that can circulate widely. Iconicity therefore extends beyond formal originality and contributes to urban identity, institutional visibility, and investment value. In the Heydar Aliyev Center, this representational power intersects with political and urban context. Its strong distinction from the surrounding fabric and its status as an internationally legible prestige project make it difficult to separate architectural image from the broader modernization and visibility strategies associated with its production. The public debate surrounding forced evictions and human rights concerns further demonstrates that architectural representation cannot be considered independently of the political conditions in which it is produced.

A similar representational logic operates in the Museum of the Future through the language of technology, innovation, and futurity. The building does not merely contain exhibitions about the future; it constructs a highly specific visual image of what the future is expected to look like. It therefore operates simultaneously as a museum, an urban landmark, and a physical symbol of Dubai's future-oriented identity. Architectural form in this case carries not only functional and environmental responsibilities, but also the task of producing an institutional and urban narrative.

Taken together, the cases suggest that digital representation-oriented architectural production should be understood through a broader production logic rather than through the success or failure of individual buildings.

Visual recognizability, technical optimization, environmental performance, market value, and political or institutional representation increasingly intersect within the same design process. The central tension lies in the fact that digital tools can support more precise, environmentally responsive, and high-performing buildings while also enabling more complex and resource-intensive forms driven by visual and symbolic value. What becomes critical, therefore, is not the technology itself but the hierarchy of design priorities by which it is employed and the extent to which visual value is balanced against material, environmental, spatial, and contextual performance.

7. CONCLUSION

This study argues that the central issue in digitally mediated architectural production is not the use of complex or iconic forms themselves, but the hierarchy of priorities that governs their development. The comparative analysis indicates that visual distinctiveness, environmental performance, material requirements, spatial experience, and contextual conditions do not necessarily operate in opposition; rather, their relationship depends on how they are negotiated within the design and production process. The conceptual contribution of the study, therefore, lies in reframing the discussion from a simple opposition between digital representation and physical performance to an examination of how representational value is situated alongside technical, environmental, and spatial criteria.

The study is limited by its qualitative and case-based structure. It does not include original energy simulations, measured building-performance data, post-occupancy evaluations, life-cycle assessments, or interviews with users and design teams. Accordingly, performance-related interpretations are based on published technical documentation, documented project information, and theoretically informed comparison rather than direct empirical measurement.

Future research could test the framework developed here through comparative energy modeling, life-cycle and embodied-carbon assessments, post-occupancy evaluations, and interviews with designers and users. Further research could also examine the circulation of architectural images across digital and social media platforms to investigate more directly how representational visibility influences design priorities and how these priorities relate to the long-term physical performance of buildings.

REFERENCES

- ArchDaily. (2013, November 14). Heydar Aliyev Center / Zaha Hadid Architects. *ArchDaily*. <https://www.archdaily.com/448774/heydar-aliyev-center-zaha-hadid-architects>.
- Bauly, T. (2023, January 3). Museum of the Future sets standard for what's to come in digital design. Civil Engineering Source - ASCE. <https://www.asce.org/publications-and-news/civil-engineering-source/civil-engineering-magazine/issues/magazine-issue/article/2023/01/museum-of-the-future-sets-standard-for-whats-to-come-in-digital-design>
- Carpo, M. (2017). *The second digital turn: Design beyond intelligence*. MIT Press.
- Harvey, D. (2006). *Spaces of global capitalism*. Verso.
- Hegger, M., Fuchs, M., Stark, T., & Zeumer, M. (2008). *Energy manual: Sustainable architecture*. Birkhäuser.
- Jencks, C. (2006). The iconic building is here to stay. *City*, 10(1), 3–20.
- Kahraman, Ö., & Köymen, E. (2023). The influence of building form compactness on energy efficiency in accommodation structures: The case of Türkiye. *Sakarya University Journal of Science*, 27(5), 1055–1078.
- Klingmann, A. (2007). *Brandscapes: Architecture in the experience economy*. MIT Press.
- MacLeod, F. (2014, August 27). BIG's VIA 57 West Courtscaper and the integration of curtain wall systems in irregular massing. *ArchDaily*. https://www.archdaily.com/tag/bjarke-ingels-group/page/12?%3Bad_source=search&is_allowed_bot=true. <https://www.archdaily.com/tag/bjarke-ingels-group>
- Montjoy, V. (2022, June 23). *Overcoming design challenges with technology: Museum of the Future in Dubai*. ArchDaily. <https://www.archdaily.com/983458/overcoming-design-challenges-with-technology-museum-of-the-future-in-dubai>
- Museum of the Future. (2022). *Building the future: Environmental sustainability and Building Information Modelling (BIM)*. Museum of the Future Dubai Official Portal. <https://museumofthefuture.ae/en/sustainability>
- Olgyay, V. (2015). *Design with climate: Bioclimatic approach to architectural regionalism*. Princeton University Press.
- Olu-Ajayi, R., Alaka, H., Egwim, C., & Grishikashvili, K. (2024). Comprehensive analysis of influencing factors on building energy performance and strategic insights for sustainable development: A systematic literature review. *Sustainability*, 16(12), 5170.
- Picon, A. (2014). *Digital culture in architecture: An introduction for the design professions*. Birkhäuser.

- Rosenfield, K. (2012, February 14). New York City Planning Commission review: VIA 57 West frontage modifications. *ArchDaily*. <https://www.archdaily.com/111573/update-west-57th-big>.
- Ratti, C., Raydan, D., & Steemers, K. (2003). Building form and environmental performance. *Energy and Buildings*, 35(1), 49–59.
- Sklair, L. (2006). Do cities need architectural icons? *Urban Studies*, 43(10), 1899–1918.
- Sklair, L. (2010). Iconic architecture and the culture-ideology of consumerism. *Theory, Culture & Society*, 27(5), 135–159.
- Steadman, P. (2006). Why are most buildings rectangular? *Architectural Research Quarterly*, 10(2), 119–130. <https://doi.org/10.1017/s1359135506000200>
- Steemers, K. (2003). Energy and the city: Density, buildings and transport. *Energy and Buildings*, 35, 3–14. [https://doi.org/10.1016/S0378-7788\(02\)00075-0](https://doi.org/10.1016/S0378-7788(02)00075-0)
- Tuhus-Dubrow, D., & Krarti, M. (2010). Genetic-algorithm based approach to optimize building envelope design for residential buildings. *Building and Environment*, 45(7), 1574–1581. <https://doi.org/10.1016/j.buildenv.2010.01.005>
- Wainwright, O. (2014, June 30). Wave of controversy: Zaha Hadid's Baku cultural center wins Design of the Year. *The Guardian*. <https://www.theguardian.com/artanddesign/2014/jun/30/zaha-hadid-architecture>
- Werner Sobek AG. Heydar Aliyev Center Azerbaijan: Engineering complex geometries. *Werner Sobek Focus Projects*. <https://www.wernersobek.com/focus/hac/>
- Zukin, S. (1995). *The cultures of cities*. Blackwell.
- Zaha Hadid Architects. (2013). *Heydar Aliyev Center, Baku, Azerbaijan*. Zaha Hadid Architects Official Project Page. <https://www.archdaily.com/tag/zaha-hadid-architects>