The challenges in the restoration of the Capanema Palace, Rio de Janeiro

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Abstract

The Gustavo Capanema Palace, conceived during Getúlio Vargas's administration as the Ministry of Education and Health, is a landmark of Brazilian modernism designed by Lúcio Costa, Oscar Niemeyer, and collaborators, with Le Corbusier's guidance. Its pioneering features, as *pilotis*, brise-soleils, free plans, passive ventilation, and integration of art, furniture, and landscape, anticipated environmental concerns and symbolised national modernisation. Protected since 1948, the building has faced recurrent conservation challenges. Restoration campaigns since the 1980s culminated in the most extensive intervention, which began in 2019 and concluded in 2025. Guided by principles of minimal intervention, reversibility, and authenticity, the project addressed dilemmas such as replacing obsolete industrial materials and introducing discreet climate systems without compromising integrity. The case demonstrates how modernist heritage can be adapted to contemporary needs while preserving historical values.

Keywords

Modernist architecture, Brazilian architecture, Heritage restoration, 20th-century architecture, Minimal intervention.

Landmark of Brazilian Modernist Architecture

The Gustavo Capanema Palace was conceived during Getúlio Vargas's first administration (1930-1945) as a headquarters for the Ministry of Education and Health, and it stands as an iconic example of modernist architecture in Brazil. Named in honour of the incumbent minister, its design was intended to symbolise the aspirations of a modern nation. The project was developed by a team of prominent Brazilian architects, including Lúcio Costa, Affonso Eduardo Reidy, Carlos Leão, Jorge Machado Moreira, Ernani Mendes de Vasconcelos, and Oscar Niemeyer Soares Filho, with technical guidance from Le Corbusier, whose influence deeply permeated the development of Brazilian modernism.

This collaboration resulted in a design that embodies the modernist principles: a composition of two perpendicular rectangular blocks with approximately 27,500 m², 10-meter-high *pilotis* in the 16-story tower, free-plan interior, modular structural systems, a rooftop garden, cross-ventilation strategies, and the pioneering use of *brise-soleils* on the highest building north façade alongside a vast glass curtain wall on the south (Figure 1). These sun-shading elements, originally developed by Le Corbusier, were employed at an unprecedented scale. Beyond architectural advancements, the design anticipated modern concerns with environmental sustainability. Long before such considerations became standard, the Capanema Palace incorporated passive design strategies that enhanced natural lighting and ventilation, contributing to a more rational and efficient use of electricity. The structural innovation, engineered by Emílio Baumgart, featured an inverted mushroom-slab technique that eliminated beams, creating flexible interior spaces. Additionally, a counterweight mechanism installed on the façades allowed for the effortless

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Fig. 1 Rio de Janeiro, Gustavo Capanema Palace (photo by O. Liberal, 2012).

operation of large glass panels[1]. The building also integrated art and landscape design, featuring tile panels by Candido Portinari, gardens by Roberto Burle Max, and original furniture designed by Lúcio Costa's team of architects, resulting in a total artwork[2].

Now housing the National Institute of Historic and Artistic Heritage (IPHAN) and other governmental institutions, its significance was recognised early. In 1948, with the advocacy of Lúcio Costa, then head of IPHAN's Division of Protection Studies, it became the first modernist structure to be protected in Brazil and was added to UNESCO's tentative list in 1996.

A History of interventions and the 2019 restoration

Celebrating its 80th anniversary on 3 October, this modernist landmark has faced significant conservation challenges over time. The first noteworthy restoration (1981-1992) focused on safety and comfort, including upgrades to building systems, fire protection, improvements in lifts, as well as the restoration of external elements such as façades and gardens. Nevertheless, due to budgetary constraints, economic instability, and high inflation, the scope of work was significantly curtailed[3].

In 1993, a condition report identified critical issues: structural corrosion, deteriorating window frames, detachment of façade cladding, insufficient fastening of the *brise-soleils*, and the degradation of sanitary installations. Between 1994 and 2001, with funds raised by the Society of Friends of the Gustavo Capanema Palace, another comprehensive restoration programme was drawn up, proposing the restoration of the tiles, façades, interior finishes, installations and lifts, all following the 'original intention' of the architects who designed the building. It also included the incorporation of new furniture in the offices, keeping only on the 8th floor, which has traditionally always housed the

Fig. 2 Rio de Janeiro, Gustavo Capanema Palace. Details of the cabinets where the air conditioning was supposed to be installed previously, and of the 15 cm false ceiling being made for its installation (photo by O. Liberal, 2023).

IPHAN, the original furniture designed for the building. One specific detail is that these interventions were supervised by the project's authors. The last one was supervised just by Niemeyer, the only one still alive at the time[4]. Following a period of limited activity, some restoration works were conducted between 2012 and 2017, mostly related to the facades and external area, including the restoration of the openings, *brise-soleil*, terraces, and stone gables, among other services. However, the major federal-funded intervention began in 2019, under the Growth Acceleration Programme for Historic Cities, and finished at the end of 2024. The contract nº 16, celebrated at the end of 2018, focused on the restoration, conservation and modernisation of the facilities at the Gustavo Capanema Palace. This constituted the most extensive restoration project ever undertaken by the Ministry of Culture[5], encompassing all internal civil works, flooring, ceilings, window frames, partitions, furniture, artworks, gardens, paintings, and all installations, as well as their review and replacement when necessary. This article focuses on the distinct conservation challenges posed by this intervention, which took six years.

Minimal intervention as a guiding concept for architectural restoration

As Kühl observes, Brazilian legislation has no explicit guidelines for restoration. There exist, however, programmes, projects, and academic studies that elucidate the evolution of restoration principles in Brazil, examining how these have been applied in the day-to-day practice of IPHAN[6]. The prevailing theory treats heritage as a document, prioritising the respect for historical strata, so as not to erase architectural phases that have shaped it. This approach prioritises minimal intervention, reversibility, and the maintenance of authenticity, adhering to international charters, particularly the 1964 Venice Charter.

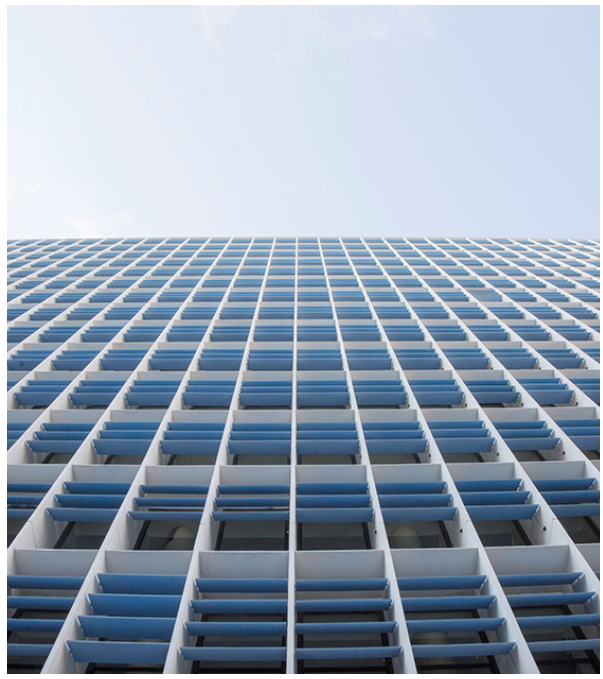

Fig. 3 Rio de Janeiro, Gustavo Capanema Palace. The south façade and its blue blinds. Details of the air conditioning already installed between the pillars and the linoleum flooring (photo by O. Liberal, 2025).

Fig. 4 Rio de Janeiro, Gustavo Capanema Palace. The north façade and its blue metal *brise-soleil* (photo by O. Liberal, 2018).

This marks a departure from earlier 20th-century practices at IPHAN, which often eliminated certain eclectic or Art Deco architectural features, justifying it by the need to restore «the 'original character' of these properties, removing the 'unworthy additions' they had suffered»[7]. For modern architecture, the challenges are different, but equally demanding, centring on material obsolescence and integrating new technologies without compromising design integrity. In the case study, the restoration guidelines can be identified in a technical report about the works, namely reversibility, minimal intervention, and the maintenance of authenticity, enabling the needed modernisation:

The analyses and discussions that took place during the technical meetings held during this period, with requests for changes and corrections to the proposals, always aimed to achieve the assumptions of minimal interference, reversibility, maintenance of the monument's authenticity, and enable the modernisation necessary for the survival and functionality of the listed property[8].

This report details the technical meetings held to address unforeseen restoration issues. These questions led to the formation of an advisory committee comprising various experts. Although IPHAN had officially appointed inspectors (an architect and an engineer) to follow the restoration works, the committee proved to be highly valuable, given the numerous modifications and adjustments in use that the project required over time[9].

Key Conservation Challenges and Solutions

Since the beginning of the works at the Palace, changes in use to accommodate the interests of several governmental institutions that want to occupy portions of the building were a problem, which impacted the project development and led to unpredictable changes in the structure and installations. Besides that, regarding the structural frame in reinforced concrete, the 16-floor building was designed without bracing, without expansion joints or joints between different materials, simply because such requirements did not exist at the time. The first Brazilian technical standard

regarding reinforced concrete was published in 1940 (NB-1 - Brazilian standard nº 1 for calculation and execution of reinforced concrete works)[10]. However, as pointed out by the construction supervising engineer: «the building is very functional and did not present any serious structural problems, even after so many years, as its design was very innovative for the time, very well projected by the avant-garde engineer Emílio Baumgart, made of reinforced concrete and being the first to use mushroom slabs in Brazil»[11].

A quintessential challenge of modern heritage is replacing obsolete industrial materials. The extensive linoleum flooring was severely deteriorated. While tests proved modern vinyl's superior resistance and durability[12], the maintenance of linoleum prevailed (Figure 3). Since the 1970s, during earlier intervention attempts, the architect Lúcio Costa emphatically opposed replacement, stating, «while I am here, no one will touch these floors. These signs of time are natural and make them very beautiful»[13]. Consequently, the decision was to maintain the same pavement and new linoleum was commissioned from the original Dutch supplier, accepting higher costs, longer lead times and inferior durability, to preserve authenticity, even though an exact colour match was unattainable.

This philosophy extended to other elements. The blinds were custom-made by the original manufacturer but updated with automated operation (Figure 3). As Vidal notes, «material obsolescence is a critical issue in modern heritage: industrial materials lacking continuous production are complex to reproduce, often requiring semi-artisanal, semi-industrial methods for small quantities, sometimes using obsolete machinery»[14]. This was exemplified by the hall's glass brick panel, which had missing and damaged pieces. Originally made from colourless French glass (unavailable in Brazil, where glass has a greenish tint), the decision was made to disassemble the panel, salvage sound original pieces, and have new pieces custom-cast using the clearest available domestic glass. These new pieces were intentionally installed in a distinct tonal range. As architect Paulo Vidal stated, «Will a specialist notice? Yes, and that is good. It is good because they are not the originals»[15].

This philosophy mirrored the approach taken with the restoration of Candido Portinari's integrated tile panels. The existing pieces were recovered, and the missing pieces were custom-made. Different historical interventions used distinct tiles, each identifiable by its specific base tile (e.g., thickness, straight or curved edges), creating a documented technical reserve that allows experts to differentiate between original and reproduced elements. The structural system of the immense steel window frames and the *brise-soleils* was another critical point (Figure 4). Despite their colossal dimensions, all movement was managed by an advanced counterweight system, which was restored to full function. Although aluminium substitution had been considered for decades, the decision to restore the steel-framed windows prevailed, justified by their durability and, crucially, their originality. But the most complex dilemma, unanimously highlighted by interviewees and extensively documented in the process, was integrating an active climate control system. An old requirement, driven by changing microclimates in Rio de Janeiro's centre and the impracticality of manually operating the building's heavy, counterweighted windows for cross-ventilation[16]. The initial 2012 project proposed a VRF (variable refrigerant flow) split system, which posed significant problems: irreversible alterations to historic timber cupboards to house units and pumps, impractical floor-embedded piping that would alter floor levels, and future maintenance issues (Figure 2)[17]. Consequently, the 2019 project scope included seeking a new solution. A consensus proved elusive until 2023, with most options involving visible equipment that would cause visual pollution. The adoption of a new technology, low-profile cassette evaporators embeddable in a minimal 15 cm false ceiling, was ultimately selected as the least impactful, most reversible, and

maintainable solution. These units were positioned between pillars near the windows, discharging air inward and remaining largely concealed. In addition, each floor operates independently, facilitating choice and emphasising a hybrid system. This prioritises the building's original passive climate control strategies (cross-ventilation, solar shading blinds) supplemented by active cooling primarily in summer months, aiming for energy efficiency, thermal comfort, and system longevity.

Conclusion

The restoration of the Capanema Palace underscores the unique challenges of conserving modernist architecture. The empirical structural design of the palace proved remarkably sound and resilient over eight decades, difficulties lay instead in material authenticity and the integrating of new technologies. The project balanced preservation with modernisation, addressing the obsolescence of original industrial materials by equalising historical accuracy with practical longevity, often at significant expense. The integration of essential new systems, particularly climate control, emerged as a critical bottleneck, demanding solutions aligned with the minimal intervention and reversibility. The restoration's success lies in a clear theoretical framework. Despite pressures from changing uses and the complexities of modern standards, the technical committee upheld the principles of authenticity, minimal impact, and the legibility of new interventions. The Capanema Palace thus stands not only as a monument to Brazilian modernism but also as a key case study in careful conservation, demonstrating how such landmarks can be adapted for contemporary use without compromising their foundational values and historical integrity.

[1] Cf, ROBERTO SEGRE, NAYLOR et alii, *O Ministério da Educação e Saúde Pública (1935-1945): As inovações climáticas e tecnológicas*, Rio de Janeiro, «Revista Docomomo Brasil», vol. II, 2010. pp. 5-8.
[2] Cf. SPHAN, *Boletim 18*, Rio de Janeiro, SPHAN 1982. p.4.
[3] Cf. FRANCESCA DALMAGRO MARTINELLI, *Entre o concreto e o papel: a memória arquitetônica do Palácio Gustavo Capanema*. Master's in Cultural Heritage Preservation, Rio de Janeiro, IPHAN 2017. pp. 88-119.
[4] *Ivi*, pp.138-139.
[5] Cf. DANIELLI CINTRA, construction supervisor from 2021 to 2024, excerpt from the interview with this researcher on 15 August 2025.
[6] BEATRIZ MUGAYAR KÜHL, *História e Ética na Conservação e na Restauração de Monumentos Históricos*. «Revista CPC», vol. I, 2006. p. 15.
[7] Cf. MÁRCIA REGINA CHUVA, *Investigando as restaurações fundadoras do patrimônio: das práticas rotineiras às normas técnicas*. «Nos Arquivos do IPHAN» 2010. p.2. Free translation.
[8] JOÃO LEGAL LEAL, *Technical report nº 122/2021/COTEC IPHAN-RJ/IPHAN-RJ*. (Process IPHAN nº 01500.004711/2018-12), 2021. p. 1. Free translation.
[9] Cf. DANIELLI CINTRA, op, cit.
[10] ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS. *NB-1 - Cálculo e execução de obras de concreto armado*. Rio de Janeiro, ABNT 1946.
[11] Cf. DANIELLI CINTRA, Op. cit. For more information about this topic, see Danielli Cintra et alii. *Palácio Gustavo Capanema: estrutura e construção*. «Concreto & Construções», C, 2020.
[12] Cf. ROBSON ANTÔNIO DE ALMEIDA, architect, former Director of the Special Projects Department of IPHAN, who managed the Capanema restoration works. Excerpt from the interview with this researcher on 31 July 2025, in which Almeida described the test made *in loco*.
[13] FRANCESCA DALMAGRO MARTINELLI, Op. cit. p.107. Free translation.
[14] PAULO EDUARDO VIDAL, architect, former technical coordinator and Superintendent of IPHAN-RJ, excerpt from the interview with this researcher on 30 July 2025. Free translation.
[15] PAULO EDUARDO VIDAL, Op. cit. Free translation.
[16] Cf. ROMMEL CURZIO VALENTE, former engineer of Records and CEO of Concrejato, the company that executed the restoration at Capanema Palace between 2019 and 2024. Excerpt from an interview with this researcher on 01 September 2025.
[17] DANIELLI CINTRA, *Technical report nº 72/2022/COTEC IPHAN-RJ/IPHAN-RJ*, (Process IPHAN nº 01500.004711/2018-12), 2023. p. 5. Free translation.