



## MODERNITY-COLONIALITY IN THE CONSTRUCTION OF THE TECHNO-SCIENTIFIC HEGEMONY OF REINFORCED CONCRETE IN THE DEPENDENT COUNTRIES

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### ABSTRACT

In this text, we will follow the construction of the techno-scientific hegemony of reinforced concrete, in the context of dependent Latin American capitalism. Our intention is to demonstrate some fundamental historical moments in the construction of this hegemony, which began with architectural modernism in early last century. After this, we follow its consolidation from the 1960s onwards with housing policies. Finally, with the deepening and the expansion of its horizon, verified with the development of the housing production policies of the conciliation governments, in the beginning of the 21st century. In this period, we only intend to identify some elements that marked the reorganization of the productive-industrial sector of civil construction and the production of built space, especially of popular housing. This hegemony represented a new stage of capitalist techno science, loaded with an epistemic racism, which subjugated other techno scientific options, other constructive practices of space production, especially popular housing, creating new contradictions to access to it and to the exploitation and alienation of work. To this end, we will be guided by the Marxist Theory of Dependence, and decolonial thought, to understand this hegemony, accompanied by the sharpening of the exploitation of the workforce on construction sites.

**Keywords:** Decoloniality, development ideology, marxist dependency theory, housing, racism, reinforced-concrete.

### RESUMO

Ao longo deste texto, acompanharemos a construção da hegemonia tecnocientífica do concreto armado no contexto histórico do capitalismo dependente latino-americano. Nossa intenção é demonstrar alguns momentos históricos fundamentais que identificamos na construção dessa hegemonia, iniciada com o modernismo arquitetônico no segundo quartel do século passado, seguida pela sua consolidação, a partir da década de 1960, com as políticas habitacionais e, finalmente, com o aprofundamento e a ampliação do seu horizonte, verificados também com as políticas de produção de moradia dos governos de conciliação, no início do século XXI. Nesse recorte temporal, pretendemos apenas identificar alguns elementos que marcaram a reorganização do setor produtivo-industrial da construção civil e da produção do espaço construído, especialmente da moradia popular. Essa hegemonia representou a construção de uma nova etapa da tecnociência capitalista, carregada de um racismo epistêmico, que subjugou outras opções tecnocientíficas, outras práticas construtivas de produção do espaço, especialmente da moradia popular, criando novas contradições ao acesso a ela e à exploração e alienação do trabalho, perpetuando a colonialidade. Nos guiaremos pela Teoria Marxista da Dependência, em diálogo com o pensamento decolonial, visando a compreensão dos processos históricos da construção dessa hegemonia, acompanhados pela agudização da exploração da força de trabalho nos canteiros de obra.

**Palavras chave:** Decolonialidade, teoria marxista da dependência, moradia, racismo, concreto armado.

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## INTRODUCTION

This text organizes and advances on some issues faced by us in recent years, based on what we call the geopolitics of knowledge, dependence and coloniality in Latin America. From a decolonial perspective, in dialogue with the Marxist Theory of Dependence – MTD, we have been exploring possibilities to fight coloniality in architecture and in the production of social housing, particularly at the techno-scientific level<sup>1</sup> of socio-technical construction practices<sup>2</sup>. In this way, we try to understand the subalternization and the epistemicides promoted by the adoption of the technoscience of reinforced-concrete, which imposed a constructive system, a scientific rationality and an organization of work and power that became hegemonic throughout the 20th century. We hypothesize that this hegemony was established through coloniality of knowledge<sup>3</sup>, which structures the modern-colonial capitalist world-system with significant support from modern architecture. Traditional constructive technosciences<sup>4</sup>, whether those from ancestral peoples prior to Europeans, whether those established during colonialism – which are currently not standardized, or even those considered “popular”. They often residually safeguard other social and economic practices (although often hybrids with modern-western technoscience) and have other power relations. Mostly, they are linked to knowledge attenuated and silenced by modernity<sup>5</sup>, dominated by so-called “traditional” communities – that is, non-white communities. It is a kind of knowledge

that has been neglected by the Western, hegemonic knowledge – this latter produces the non-existence under the yoke of hegemonic, exclusionary totalities: the ignorant, the underdeveloped, the unproductive. Grounded on prevalent criteria of knowledge, of development and productivity and on a perspective of social classification, an idea of inferiority is naturalized (SANTOS, 2006).

In turn, the MTD, since the 1960s and 1970s, has offered generous contributions to comprehend the subordination relations within capitalism, revealing the inconsistency of the ECLAC’s steps vision or the ECLAC’s evolutionary-linear logic. These ECLAC’s perspectives were largely responsible for the ideology of development that guided the post-World War II period (PRADO, 2020). Similarly, ECLAC is also responsible for the developmentalism defended by the left governments of Latin America in the last two decades (SANTOS, 2016). In a convergent and complementary direction, matured from the mid-2000s onwards by theorists, mostly Latin Americans, the decolonial thought (DUSSEL, 2005; LANDER, 2005; QUIJANO, 2005; MIGNOLO, 2007; LUGONES, 2008; WALSH, 2007; SEGATO, 2012; GROSFUGUEL, 2016) perceive the world through its multiple identities, geographies and dissident bodies. Thus, it strongly denounces Western modernity, underlying capitalism, and its intrinsic colonial violence and coloniality of being, of power and of

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<sup>1</sup> We prefer “technoscience” to “technology”, because we are here following the debate of some of the theorists of Social Studies in Science and Technology, who point out that the boundaries between science and technology are increasingly dissolving (cf. JOVER, 2015). Moreover, “technology” is a limited concept to understand technical production and its relationship with the science of capitalist society (cf. DAGNINO, 2008). With regard to “coloniality”, we refer to the three dimensions of coloniality (CASTRO-GÓMEZ, 2007): of being, of power and of knowledge.

<sup>2</sup> That is, technological and techno-scientific production as social practices, in contrast to the ideological vision that fetishizes the object in a supposed autonomy and independence of both in relation to the societies that produce them.

<sup>3</sup> Here, we want to deal specifically with the coloniality of knowledge, separately from the coloniality of power and being.

<sup>4</sup> May that be those of ancestral peoples prior to Europeans, or those established during colonialism which are currently not standardized, or even those considered “popular”.

<sup>5</sup> We understand as modernity the period that began with the invasion of the Americas, as shown by the decolonial writings of Aníbal Quijano (2005), Walter Dignolo (2005), and Enrique Dussel (2005), for example. Unlike the usual Eurocentric perspective, which understands it from the Enlightenment onwards. These authors have also demonstrated that the Enlightenment is a tributary of the wealth produced by the invasion of the “new continent”. From the structuring elements of modernity, we focus here on universalism and philosophical and scientific rationalism, consolidated from the 15th century Eurocentric humanism, all based on patriarchy and racism (GROSFUGUEL, 2016).

knowledge, which results in a profound raciality of the modern-colonial capitalist world-system (QUIJANO, 2005), whose materiality also affects technoscientific production.

Indicating the racialization of the modern-colonial capitalist world-system, Aníbal Quijano points out that the invasion of the Americas has engendered one of the most structuring pillars of society in the last five hundred years. This episode placed Europe – or the white man – at the center of the world. At the same time, the author demonstrates that the end of colonialism did not mean the end of coloniality. He also pointed out that the idea of race produced new social identities based on a racial hierarchy, which is coincident with a class hierarchy. This rising idea of race forged and even legitimized a powerful pattern of social domination that is currently in force today. Marxist thinkers such as Franz Fanon and Angela Davis already demonstrated, long before the decolonial writings, that racism, together with patriarchy, constitute the basis for the development and consolidation of capitalism itself. (DAVIS, 2016 [1981]; FANON, 2013 [1961]).

By shifting the turning point of modernity to the invasion of the Americas, the decolonial turn exposes some problems of the critical thinking, specially the European, that refuses to understand that racism and patriarchy<sup>6</sup> are part of the economic system, of the production and accumulation of wealth that enabled the “blossoming of European splendor” from the 17th century onwards. Therefore, the self-imposed centrality of Europe over the rest of the world is based on racial hierarchization, which justifies the barbarism of the “civilization process” and constitutes a *sine qua non* tool for the advance of colonialism and imperialism since the 19th century. Capitalist technoscientific production has invariably been instrumentalized in this direction, grounded on the superexploitation of the labor force in dependent countries, especially in civil construction, as we will see later.

In Latin America, racial violence together with colonial rape, issue razed by black feminists (CARNEIRO, 1995; GONZALEZ and HASENBALG, 1982), are therefore constitutive of a society rooted in the interwoven stratification of classes, of race, of gender, of sexuality and of geography. This combined stratification is intrinsic to the modern-colonial capitalist world-system which results in a very complex rationalization used to justify the genocide of the black and of the indigenous population, the devastation of nature, and femicide. In the opposite way, the decolonial turn together with MTD’s dialectical historical materialism and with feminism, are able to unveil this arrangement in a more assertive analysis of technology production. Together these theories contribute to the understanding of racist-capitalist patriarchy in the context of dependent capitalism. The text presented here is part of a work in progress and points out the foundation of our hypothesis, with a greater focus on the relationship between racism and capitalism and, less, at this moment, on its relationship with feminism.

One of the components of coloniality in American lands is the centrality of Western-European epistemology and its conception of space-time. That is, various elements that constitute modernity as we know and which affect diverse aspects of social life. The determinations of social reality, already well described by Marxism and Dialectical and Historical Materialism (DHM), find a complement in the decolonial contribution. It incorporates epistemic racism to the analysis of the commodity society. In turn, the decolonial, disattached from the MHD, loses its criticality and its epistemological ballast. It may become, thus, the victim of liberal perspective, albeit anti-racist and feminist. Therefore, we will express the criticism of coloniality through the implementation of the construction system of reinforced concrete in the country and its technoscientific logic, which is organized in the bases of an epistemic racism in relation to other pre-existent materials, systems and

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<sup>6</sup> Although it is of extreme importance, we will not deal with the problems of patriarchy in this text.

construction processes and in relation to other forms of construction and of production of the inhabited space. The dilemma is not in the material, or even in the constructive technique. Otherwise, the problem is in the dialectical relationship that was established among the material, its technoscientific logic and the development of dependent capitalism throughout the 20th century. This dialectical relationship does not find correlation with any other technique, constructive system or pre-existing productive organization.

Below, we show how the contribution of decolonial theory allows us to complement and reveal other layers of interpretation about the production system of the cement and concrete industry (and, consequently, on the building sector, in an extended meaning) and the building site. Thus, complementing the interpretation of some of the authors who have already made important contributions on these themes, such as Benjamin Coriat and his analysis of the construction site-type work (CORIAT, 1983)<sup>7</sup> and Sérgio Ferro's drawing-building site dialectic (FERRO, 2006). Both authors are dedicated to explaining how labor is organized on the building site and its economic function for capitalism. They have in common, in their analyses, to deconstruct the myth that this productive *locus* and its productive structure were obsolete in relation to other industrial productive structures, especially in comparison to the automobile manufacturing sector, always regarded as a reference for the industry. Ferro shows that the work process at the construction site, or "construction site-type work", in Coriat's terms, maintained manufacturing as its work organization system because it favored and continues to favor the extraction of absolute surplus value and the super exploitation of labor. In turn, Coriat highlights the mistake in interpreting the obsolescent, stating that this specific manufacturing condition with limited productive rationalization was a result of the dynamics of the real estate product. Because it is linked to land (a fixed support of the use value), he understands

that the productive structure and the work process should circulate around fixed goods, and not the other way around, as in other industrial sectors. Thus, regarding the principles of scientific administration of Taylorism, the construction site-type work had limited industrialization and standardization. For this reason, construction site-type work was "*insufficiently Taylorized because it was different*" (HALFEN, 2019, p. 32, our italics) and not because it was obsolete. Although Ferro does not exactly use the concept of "construction site-type work" as Coriat did, in this text we will use it, considering the content of both analysis, Coriat's and Ferro's.

From this perspective, we believe that a historical rearrangement or a modernization of the construction site-type work was established, since the establishment of the Portland cement and reinforced concrete industry in the beginning of the 20th century in Brazil and other Latin American countries. In this context, modern architecture was its fundamental impulse together with the consolidation and establishment of the absolute hegemony of a unique constructive system – the reinforced concrete – which, in turn, is based on a set of specific technoscientific knowledge, permanently and progressively determined by decisions centralized by those who command the means of production and the production chain, (re)producing the coloniality of power. The start of reinforced concrete hegemony gained strength with housing policies particularly after the 1960s, which contributed to naturalize and universalize a production chain in the building sector that mostly exploits black or non-white bodies and whose access largely disregards out women, especially black women<sup>8</sup>. These policies also generated numerous debates and initiatives of important counterpoint and resistance in the social housing field between the late 1970s and early 1990s. Finally, the most recent impulse in the expansion of the reinforced concrete hegemony occurred under the aegis of progressive governments of the first two decades of the 21st century in Latin

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<sup>7</sup> In his text, the French sociologist Benjamin Coriat (1983) contrasts the construction-site type work with the factory type work.

<sup>8</sup> Although extremely relevant, the issue of access to housing is not the object of this text.

America, although there have also been counterpoint and dispute policies for this hegemony.

**The beginnings of industrialization, modernism and the technoscience of reinforced concrete: notes from Latin American developmentalism**

The Peruvian José Carlos Mariátegui (2008 [1928]) argued in his work that local elites, since their inception, do not have a project of national autonomy. Furthermore, he states that the Latin American bourgeoisie is subordinate to imperialism – initially responding to the colonial project and, after independence, linked to the growing and current imperialist geopolitics. The subordination pointed out by Mariátegui, more than being something to be “overcome”, is a structuring part of capitalism, according to the entire theoretical-political framework derived from the MTD (BAMBIRRA, 1978; 2014; MARINI, 2012; SANTOS, 1978). In other words, capitalism, since its origins – which includes the invasion of the Americas, the expansion of mercantilism and the enrichment of Europe before the Industrial Revolution –, is an expansive system of unequal incorporation and subordination of countries.

Simultaneously, technological advances and choices made at the heart of imperialism have guided the diffusion of constructive technologies since the 19th century. During the Second Industrial Revolution (1850-1950), when iron and steel played an important role, the so-called “cast-iron architecture” was disseminated. It would spread throughout much of the world, often linked to a symbol of status and modernity, translated into “clean” lines and appropriate to the

new material and the industrial world, developed by neoclassicism, eclecticism and art nouveau, dominant architectural styles and movements of the period (BENEVOLO, 1989). It should be noted that cast-iron architecture arrived in the Americas ready-made, coming from England and other European countries, only to be assembled here, as it was the case of the Palácio Aguas Corrientes (Argentina, 1894), the Estación Central de Ferrocarriles (Uruguai, 1897), and, in Brazil, the Mercado de Manaus (1883), the Theatro José de Alencar (Fortaleza, 1910), the Estação da Luz (São Paulo, 1910) and many other institutional buildings and luxurious residences of the local elites<sup>9</sup>.

However, the raw material was extracted in Latin America, being exported and industrialized in central countries, being later (re)purchased, at a higher price, by the same countries that exported it. As can be seen, an unequal cycle of capitalist reproduction between countries was established, in which relations of subordination and dependence to Latin American countries were fixed (MARINI, 2000 [1973]). In this subordinate integration of dependent economies to the world market, there is a transfer of value from the periphery to the center, maintaining historically unequal relations between colony and metropolis, which is consolidated in capitalism in its imperialist era. Associated with this integration into the world market, Marini also elucidates the dynamics of super-exploitation of labor force, that is, a tendency towards greater exploitation of the worker’s physical strength – a characteristic of the colonial enterprise, which has had the enslavement of black and indigenous people on the new continent as its productive base. Recent studies demonstrate that there is a racialization

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<sup>9</sup> In the specific case of São Paulo, iron was more limited to public buildings, while houses, at first, were no longer built in rammed earth to be replaced by brick and, in the 20th century, replaced by concrete (LEMOS, 1989). In all these exchanges, there is a transformation of social and labor relations in the predominant forms of construction techniques, by extension, we could also add of the corresponding construction site-type work. That is, the rammed earth architecture of the colonial period was supported by the work of the enslaved. The brick replaces this work by the immigrant labor, above all, Italian. Finally, in the process of industrial proletarianization, with the rise of reinforced concrete, there is the importation of labor from the Brazilian northeast as part of the country's development project. Although rammed earth and bricks result in lesser alienation of work, allowing its reproduction with greater autonomy of knowledge and material, they were also productive processes of city construction, based on labor exploitation. However, such materials and techniques constitute a contrast to the imported iron architecture, as they do not characterize a subordinate insertion of the country in world capitalism. In our central argument, we seek to elucidate the social insertion of historical processes related to the specific construction site-type work that is consolidated from the use of reinforced concrete. Firstly, in formal architecture and, nowadays, already mirrored in informal architecture.



of poverty in Latin America (ANDREWS and LA FUENTE, 2018)<sup>10</sup>, a result of colonial violence and capitalism that profoundly affected the territory, society and labor relations in the subcontinent. It is the non-white population, with the lowest level of education, which make up the majority of manual construction workers – from the colonial city to the concrete city.

At the end of the 19th century, iron, as one of the preferred materials of the elites for civil construction, mainly in buildings related to infrastructure or symbols of power and status, was gradually substituted by the newly discovered reinforced concrete<sup>11</sup>. The new technology brings together the qualities of metal (to support traction) and concrete (to support compression). By the time of Europe's devastation after World War I, there was an urgent need to meet the demand for housing, when the development of reinforced concrete was already sufficient for an industrial scale-up of production. In the 1920s, notably state commissions in Germany and the emerging debate from the Bauhaus on the indiscernible relationship of projective production with industry (KOPP, 1990) were significant milestones in the consolidation of this technology among those preferred by new self-nominated "modernist" architects. It is not by chance that housing was at the heart of the Weissenhofsiedlung building exhibition, in 1925, and the CIAM, in 1928 and 1929 (BENÉVOLO, 1989). Under the direction of Mies van der Rohe, the German exhibition, moreover, encouraged the use of reinforced concrete, both as technological experimentation and as an architectural language and education of taste.

In Latin America, although isolated examples of modern architecture have been registered<sup>12</sup>, in this

period, it emerged as a hegemonic language and technology only after World War II. Before that, the most emblematic experience is certainly the building for the Ministry of Education and Health (current MEC building), in Rio de Janeiro, in 1936. It is worth remembering that the minister responsible for this, Gustavo Capanema, rejected the winning proposal of the competition – more linked to the aesthetic values of the Old Republic (SEGRE, 2013) –, in favor of the team coordinated by Lúcio Costa. His proposal could effectively consolidate "the imaginary of the Brazilian New Man" (ibidem) forged by the Vargas Era. During this period, a series of modernization policies was introduced, which emphasis on the MEC building professed an emblematic role. From the Vargas Era onwards, the urban-industrial world acquired centrality in the country, demanding a state configuration that could overcome the values of a slave society towards an industrial society, albeit subordinate to the central countries (IANNI, 1968).

In the same period, the first large national engineering companies were consolidated, many of which came from foreign companies such as the German Wayss & Freytag or the Danish Christiani & Nielsen. It should be emphasized that one of the main areas of activity of these companies, since their early days, has been popular housing, together with urban speculation and infrastructure, already under the scope of reinforced concrete in its construction site-type work (CAMPOS, 2012). Moreover, they were quickly organized in employer unions (ibidem). These new engineering companies converged with the national developmentalism characteristic of the Vargas Era, which aimed to initiate and progressively and increasingly stimulate the development process in a very distinct way from the previous period: the

<sup>10</sup> The study of racial inequality is still considerably more in-depth in Brazil than in other countries in *Nuestra America*, for this reason, our text will reflect this difference to some extent.

<sup>11</sup> As explained in Note 9, in this transition, brick was a relevant material, markedly in regions of the country with strong Italian migration, as was the case of São Paulo, well discussed in Carlos Lemos' book, *Alvenaria Burguesa* (Bourgeois masonry), from 1989. However, the resulting labor exploration process is distinct from the typical construction site-type work of reinforced concrete, which interests us here.

<sup>12</sup> In this text, we use the term "modern architecture" in the sense used by Anatole Kopp (1990) and as a synonym for "modernist architecture" and "modernism". That is, like the architectural production consolidated internationally from the 1920s onwards. Under the initial precepts of modern Central European architecture, based primarily on the industrial/factory universe and propagated by the various CIAM – International Congresses of Modern Architecture, in addition to specialized publications at that time. Despite being aware of the filigrees that the academic debate raises about the differentiation of terms, we will not enter this debate.

colonial agricultural exporter. In this context, modern architecture represented the construction of modern Brazil.

Furthermore, in the 1920s and 1930s, modernization became a central theme throughout the subcontinent, despite local specificities. The centrality of the debate on national identity materialized, in general, with the neocolonial and vernacular architecture experiences of the period. They both united the introduction of new technologies with the search to forge the identities of young nations, based on an updated reading of colonial architecture elements (SEGRE, 1991). Several architects, who later became modernists, had their neocolonial phases: Carlos Villanueva (Venezuela), Julio Vilamajó (Uruguay), Lúcio Costa (Brazil), Obregón Santacília (Mexico), Sergio Larrain (Chile), among others from the first generation of Latin American modernism (HITCHCOCK, 1955).

In parallel and for a relatively short period, from the mid-1920s to the mid-1940s, the Art Deco architecture and its imposing decorative motifs pleased rulers such as Prestes Maia, in São Paulo. It also featured in the new planned city of Goiânia and other spaces frequented by national elites, such as Teatro Carlos Gomes (1931), in Rio de Janeiro. Art Deco architecture served, as Roberto Segre (1991) points out, as a transition to the foundations of Latin American modernism and to endow its cities with “metropolitan” air, rather than to close a cycle, as happened on the European continent (KOPP, 1990). Simultaneously, Art Deco intermediated the proposals of the avant-garde with popular taste, being successful in aligning a figurative repertoire with industrial production (SEGRE, 1991). It functioned as a kind of “cultural logic” of previous industrial capitalism. Whether in Brazil or Venezuela, its fleeting presence functioned as a “bridge” from neocolonial to modernism. Both countries, with the intention of “modernizing” in those years, were headed by authoritarian governments. In the Caribbean, Art Deco is directly related to the increase in US influence in the region (SEGRE, 1991), with special emphasis on the landscape of the city of Havana.

It is under this modernizing and homogenizing idea, laden with coloniality, that the use of reinforced concrete throughout Latin America went through ephemeral experiments in architectural language, to iconically establish itself as “the” central technology of modernity: the material capable of creating a place where the modern Brazilian subject and “the imaginary of the Brazilian new man” could prosper (SEGRE, 2013). In the field of housing, from the Vargas era onwards, what we call here the hegemony of reinforced concrete and its corresponding construction site-type work, had one of its first moments in the housing production of the IAPs – Retirement and Pension Institutes and FCP – Popular House Foundation. The famous Pedregulho Complex, from 1947, designed by Carmem Portinho and Afonso Reidy, and constructed by the DHP – Department of Popular Housing of the Federal District, comprises a set of buildings that deliberately promoted the use of the construction technology of reinforced concrete. This technology was inserted in a set of modernism precepts, with a preference for articulated buildings, residential and collective equipment, with urban plans and rationalized construction processes (BONDUKI, 1998).

In this context of modernity, popular housing was also conceived in scale, especially from the 1960s onwards, with the establishment of the National Housing Bank (BNH), when popular housing started to be promoted and carried out by the State as a public policy. Differently from the housing production of the IAPs and the FCP, which maintained articulation with a social-democratic political-social project, attributing important qualities to the modernist solutions of buildings, both from an architectural and urban point of view, the production of the BNH revealed a gradual impoverishment of housing projects and the political content attached to them. Both experiences, although different, adopted the construction site-type work without further reflection on the problems of precarious labor inherent to it, neither on the environmental impacts of the reinforced concrete production chain nor on the undermining of other construction practices.

In Brazil, as in the rest of the subcontinent, large-scale housing promoted by governments was the priority solution for housing, in projects such as the Unidad Vecinal Matute (Lima, 1952), the Plan Cerro Piloto (Caracas, 1954), the Unidad Cerro Sur (Montevideo, 1955), among others. From that moment on, an inseparable relationship is established between the material, reinforced concrete, and the construction site-type work, as the preferential organization of the productive system of the “construction industry”. In the initial decades of use of reinforced concrete, there was a predilection for its use in infrastructure works. From the mass housing production, especially after the creation of the BNH, the construction site-type work reorganized by the technology of reinforced concrete, definitively and hegemonically entered civil construction and the popular imagination, as a synonym for “technology”, “advancement” and “development”.

In other words, until the second post-war period, many conditions were created for a favorable environment for the use of reinforced concrete, a process accompanied by the preparation and development of labor to deal with the innovative material and the construction site, as we know it today. It should be noted that, in the 1920s, reinforced concrete gained relevance in Brazil, as a patent system without professionals trained to calculate it (SANTOS, 2008; SOUZA, 2017; TELLES, 1993). Likewise, the gap was felt at the construction sites, forcing the first specialized companies to use labor brought from Germany, as happened with the Companhia Construtora Nacional, formerly Wayss & Freytag (SOUZA, 2008). Even at that time, structural calculus had no specific discipline in engineering schools –, which would have been unimaginable a century later<sup>13</sup>. The foundation, in 1936, of the ABCP - Associação Brasileira de Cimento Portland completes the boosting environment for reinforced concrete, in “technical” terms.

In addition to aesthetic and functional changes in buildings and in the city, the technoscience of reinforced concrete, in the predominant historical form it took in dependent countries, promoted a change in the organization of the construction site, starting to use a serial ordering based on industrial modes of production, under the yoke of greater productivity. The change is both technical and in the internal hierarchy and circulation of knowledge. The separation of design from labor meant the heteronomy of the construction site, which was henceforth subject to design rules. The main interest of this transformation is not in the technological development itself, but in the “profitability promoted by changes in the mode of production” (SANTOS, 2008, p. 119). In a second stage of professionalization in the area, technoscientific knowledge was used to disqualify the master builders, by disconnecting the construction site from the design and increasing the alienation, through a intensively hierarchical and heteronomous division of manufacturing work (FERRO, 1979).

It is also important to highlight that professionalization of architecture and engineering was also developed – when this technology was introduced in the country. It suited a collective project of social mobility, articulated around a certain type of knowledge, whose monopoly allows the control of a certain market. However, it is a double monopoly, which seeks both expertise at work and status in the social stratification system. Furthermore, the history of professional regulation of civil construction and professional education in the country is a result of the ideology of development. From the turn of the 19th to the 20th century, the ideology of development has been deeply related to the expansion of capitalism and imperialism, with the growing role of the US and its interests in South America (ATIQUE, 2009). It is such an expansion of capitalism that has been mistakenly called “development”.

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<sup>13</sup> It is worth emphasizing that the mathematical abstraction required by reinforced concrete has contributed to a hegemonization of professional teaching and practice in construction areas around the world (MOASSAB; CUNHA, 2020).



Furthermore, professionalization consolidates an abyssal separation between the construction site and design, marking an undisputed techno-scientific adherence to the capitalist mode of production, as pointed out by Sérgio Ferro (1979). In the following decades, under the perspective to “develop the country”, construction companies gained prominence (CAMPOS, 2012) and the construction site overcame design in the search for efficiency and effectiveness. Thus, the result is in the permanent disqualification of architects and architecture, replacing them with engineering professionals and with a serial designing production. Nowadays, after the intensification of worker’s alienation, occurred at the turn of the 20th to the 21st century, engineers themselves are sidelined by the marketing sectors of some companies, and architects are reduced to those who standardize the architectural typologies of the offered products (SHIMBO, 2010): both architecture and engineering are subject to contemporary forms of financialization of capital, as we will discuss further in the case of housing production.

We hypothesize that, from the 1950s/1960s, the consolidation of the construction site-type work linked to reinforced concrete as a basic technoscience and hegemonically used in Latin American construction sites, allowed greater exploitation and alienation of the workers, as well as has step up the dependent condition of the subcontinent’s countries in world capitalism. The industrialization of civil construction and the construction site has historically assumed a process of its own, distinct from factory industrialization in the Taylorist forms of other productive sectors. Benjamin Coriat called the specific process of industrialization in the building sector as “construction site-type work” (1983). Despite this, similarly to other production processes, the construction site-type work made more abstract, in its own way, the work in civil construction. It increased the oppression and precariousness of the working class, with its search for greater profitability and profit of the construction companies. In other words, construction site-type work, operated in the techno-scientific logic of reinforced concrete, imposes a profound alienation of the worker and establishes its

hegemony in relation to other construction techniques. In this way, it deepens alienation, as it becomes the main agent and the target of productive modernization in the sector, to the detriment of other constructive logics used in the continent. What we would like to add is that the construction site-type work dialectically produced a relationship with the production chain of reinforced concrete and with Portland cement and its technoscientific and production logic, more than any other material, technique or constructive system, especially than those considered traditional, such as brick or earth (rammed earth and wattle and daub). Here, we try to bring to light this fact, which in the analysis of Sérgio Ferro and Benjamin Coriat appears, in our opinion, indirectly. In addition, we believe that the production chain of reinforced concrete – Portland cement and iron – deepens the geopolitical and economic gap between countries. In decolonial terms, it amplifies the geopolitics of technoscientific knowledge in the production of commodities – with an emphasis on Brazil. That is to say, it escalates in third world countries an industry with very high labor exploitation and environmental impact. In this regard, it is worth remembering that the current kilns used by Brazilian cement companies to produce clinker are imported from the German industry ThyssenKrupp, as well as the cooling units from the German industry KHD Holboldt Wedag and, finally, the clinker crushers from the Danish FLSmidth.

### **The Marxist Theory of Dependence and the Developmentalism Crisis: consolidation of the hegemony of the constructive system of reinforced concrete and its technoscientific and productive logic**

Architect Sérgio Ferro, although less recognized than he deserved in the early years of his writings, dedicated his work to demonstrating that “modern architecture [...] [is the child] of a huge crisis at the construction site, a response to unionism [...], concrete does not need masons nor carpenters” (2006, p. 288). If modern architecture is the child of crisis at the construction site, on the other hand, it is not true that the technoscientific logic of reinforced concrete does

not need masons or carpenters. We understand that Ferro was aware of issues other than those of Coriat's (1983) criticisms in relation to the construction site, even so, there are similarities: both devote part of their attention to the abstraction processes of labor, comparing it with other industrial sectors. Moreover, it is clear that this is not a limited modernization where the construction site that these authors were studying would be delayed in comparison to others, as awaiting a modernization to be completed. It is, instead, a structural characteristic of this productive sector in capitalism, mostly the dependent one, as proposed by Coriat's idea of a construction site-type work (*ibidem*).

We prefer to say that the construction site-type work, in its dialectic with the constructive system of reinforced concrete and Portland cement and its technoscientific logic, (re)produced a specific type of social alienation in the organization of civil construction work and construction sites in the world. To rephrase it, the construction site-type work promoted and accentuated a specific abstraction of labor to meet the demands of the production system. Returning to Sérgio Ferro's critique, the specificity of the modernist construction site-type work, which was established throughout the 20th century and based on this hegemony of reinforced concrete, was characterized by serial manufacturing. That is, it consists of an advanced division of labor that combines many partial workers under the coordination of a detailed hierarchy (FERRO, p. 112). Following Karl Marx when, in "The Capital" (MARX, 2013), he underlines the incompatibility between the manufacturing division and the division of labor, Ferro reveals pairs of oppositions that structure the construction site and its logic. Here, we would add the construction site-type work under the hegemony of reinforced concrete where there is a succession of tasks instead of simultaneity, "isolation of particular processes against continuity, specialization of stages against fluidity, syncretism against osmosis, summation against integral" (*Idem*, p. 116, italics in

the original). Ferro also highlights, on the construction site (or the construction site-type work, under the hegemony of reinforced concrete and Portland cement, in our terms), its heteronomy and the search for an increase in the income of the operations carried out by the workers as a possible way of expanding the relative surplus value. Perhaps, this is precisely what differentiates the technological pattern of the construction site-type work of dependent economies within capitalism in relation to the central ones. The super-exploitation of the working class, which means expansion of the extraction of absolute surplus value, incident on the increase in the exploitation of labor, which is greater in dependent economies, is an extra factor in relation to the extraction of relative surplus value, which falls on productivity and is responsible for the leaps in quality in the production system (also known as productive modernization processes). That is, in addition to the super-exploitation of labor, the increase of this relative surplus value occurs by means of the improvement of the efficacy and efficiency of each worker.

In Latin America, such super-exploitation of the working class, both in terms of relative and absolute surplus value, cannot be understood outside the racism that structures the modern-colonial capitalist world-system, a debate undertaken by decolonial thought and still with little resonance in architecture. The excessive Eurocentrism of the methodological references of research in the country and the subcontinent, colonized by a white, masculine, heteronormative and urban centric perspective, is in part the cause of the absence of racial debate in the area (MOASSAB, 2020). This scenario has only recently been reversed, especially with the arrival of black students in undergraduate and above all in postgraduate studies<sup>14</sup>. Fortunately, their massive arrival in the university implies an airing of scientific production, in which the racial issue cannot be ignored.

<sup>14</sup> Before racial quota policies, the presence of black people in higher education was negligible. Since the beginning of the 2000s, with the gradual implementation of quota policies in public universities, mainly from the enactment of the Law No. 12,711/2012, a massive entry of black men and women into the Federal Institutions of Superior Education was guaranteed. Several studies (BRITO, 2018; PAVÃO, 2019; SANTOS, 2013) have repeatedly demonstrated the positive impact of diversity promoted by racial quotas in the academic environment.

It is noteworthy that the ideology of development (PRADO, 2020) accompanies the separation between the so-called “developed” countries from those “underdeveloped”, under the ECLAC’s steps vision. By way of explanation, development is adopted as a horizon, which also ends up organizing a racial separation of the world-system: in the part of the globe considered developed there are mostly white populations and, in the so-called underdeveloped countries, there are predominantly non-white populations, mostly black, Afro-descendent or indigenous peoples<sup>15</sup>. The typological analysis of dependent capitalism presented by Vânia Bambirra (2013 [1972]) brings important inputs for the lines we propose, more attached to what we name as the “ideology of reinforced concrete”<sup>16</sup>. Regional asymmetries, in relation to modern architecture, more present, for example, in the Southern Cone than in the Andean countries, in a way corresponds to the insertion of countries in the context of the expansion and evolution of world capitalism such as Bambirra’s Type A, B or C countries.

Bambirra’s typologies are organized according to large types of dependent structures essentially related to the emergence of the first industries in the countries: at the end of the 19th century, Type A (Brazil, Argentina, Mexico, Uruguay, Chile and Colombia); after World War II, Type B (Peru, Venezuela, Ecuador, Costa Rica, Guatemala, Bolivia, El Salvador, Panama, Nicaragua, Honduras, Dominican Republic and Cuba); and basically agrarian-exporters, Type C (Paraguay, Haiti and Panama)<sup>17</sup>.

It is worth mentioning that the Marxist author showed strong insufficiencies to the typologies of countries previously proposed by Cardoso and Favero. According to Bambirra, their analysis takes the economic relations between countries as general landmarks and it is guided much more by a sociological analysis of geopolitical relations (2013). Bambirra’s typologies, on the contrary, are particularly interesting for our reflection insofar as they are based on the development of the industrial park of the countries. Thus, her typologies establish a direct relationship with the local material conditions (or lack of) in order to consolidate the entire complex production chain necessary for the manufacture of the main components of reinforced concrete: Portland cement and iron.

Precisely the countries with the oldest and most consolidated industrialization process are those with the greatest conditions for the implementation of the reinforced concrete production chain: Argentina, Chile, Mexico, Brazil, Uruguay and Colombia, those which began to industrialize before the World War I and those whose sector is driven by it (BAMBIRRA, 2013, p. 58). Therefore, it is not by chance that these countries assume a leading role and evidence in terms of modern architecture, becoming regional prominences in modernism, with international insertion in architectural circuit, even though this insertion is often subordinated<sup>18</sup>. Oscar Niemeyer, Clorindo Testa, Pedro Ramirez and Emilio Duhart are great names in reinforced concrete architecture in Latin America, known worldwide, all coming from Type A countries. Venezuela is an exception,

<sup>15</sup> Evidently, the existence of non-white populations in the global north and vice versa is not being denied. We are also dealing with hegemonic patterns that contribute to a geopolitical analysis based on also racial predominance, interwoven with economic power.

<sup>16</sup> Every valuation system in architecture and urbanism, including education, tends to an almost nationalist perspective of the virtues of modern Brazilian architecture, as the apex of the technical development of reinforced concrete, despite the “underdevelopment” of Brazil.

<sup>17</sup> Bambirra’s typologies collaborate to organize the understanding of Latin America’s subordinate insertion in world capitalism, recognizing the singularities of the groups of countries organized by her in terms of industrialization processes. The thinker will not stick to regional differences within countries. Neither will we deal with these particularities, as we focus on analyzing the hegemonic productive processes of civil construction. Furthermore, the typologies proposed by Bambirra in no way converge with ECLAC’s steps vision, on the contrary. MTD, since its genesis, advocates that underdevelopment is not a previous stage of capitalist development, but a necessary product of the worldwide expansion of European mercantile capitalism in the 16th century. The proposal of typologies aims to describe the forms of dependence historically possible in Latin America, without ranking the countries, much less inserting them in the evolutionary-linear logic that marks the steps vision perspective.

<sup>18</sup> The debate about identity or a more suited classification to modernist production outside the hegemonic axes of architecture was present in the 1980s, notably in SAL - Latin American Architecture Seminars. One of the most fruitful contributions, among several from those meetings, was the concept of “appropriate modernity”, proposed by Cristián Fernandez Cox. The Chilean architect defended the use of the term “appropriate” to differentiate it from an “Illustrated modernity” imposed on America Latin. The term would not deny modernity, but indicates possibilities of adjustment to other realities (cf. ZEIN and BASTOS, 2010).

although inserted by Bambirra in Type B, it emerges with a significant role in Latin American modern architecture. From the Petrolero State onwards, in the 1950s, Venezuela emerged with outstanding examples in modern architecture as in Villanueva's works, such as the Ciudad Universitaria de Caracas and the 23 de Enero housing complex.

It should be noted that at the turn of the 19th to the 20th century, these same countries were under imperialist dispute, namely evidenced by the Pan American Congresses. More than a simple word, Pan-Americanism is a term that encompasses the ideology of US foreign policy, revolving around the dispute for hegemony in the subcontinent, especially around the Southern Cone (SPYER, 2013). In contrast, Argentina was one of the countries to claim the use of "Latin America", seeking to curb Washington's advance in the region. The related Pan American Congresses of Architecture, in the interwar period, were held in Uruguay, in 1920, in Chile in 1923, in Argentina in 1927 and in Brazil in 1930, around the debate on the regulation of the profession and education (ATIQUE, 2009). The centrality of the debate in professional regulation was aligned with a market reserve for graduates – architects and engineers – as opposed to the former master builders' market (TELLES, 2008). A separation marked, since then, by the mastery of the new technology. Additionally, the Pan American congresses were extremely linked to the Monroe Doctrine and to the interests of bringing the United States closer to the countries of South America (SPYER, 2013). The famous phrase "America for Americans" summarizes the dispute for protagonism in geopolitics at the turn of the century, with the rise of the United States from historic European dominance.

With strong American influence on the local industrial bourgeoisie, Type A countries in dependent capitalism are precisely those of older industrialization. In these

countries, the process of industrialization of reinforced concrete found fertile ground to develop. Hence, they became, a few years later, the icons of Latin American modern architecture after the Second World War. During this period, US hegemony in the two types of Latin American countries, A and B, was guided by the control of raw materials and the conquest of markets, and by investments in the industrial sector through multinationals. The modernization linked to the development of national industry, although with foreign capital, which began in the Vargas era, was consolidated in the period of Juscelino Kubitschek, whose slogan was "50 years of progress in 5 years of government". It profoundly escalated during the business-military dictatorship, with the so-called "dictatorship of contractors" (CAMPOS, 2012). The rise and consolidation of reinforced concrete, together with the construction site-type work, as a constructive system chosen by hegemonic power for the 20th century implements an entire economic, productive and lobbying device, which feeds and is fed by power structures. Although with different contours, the ideology of development, in our view, reverberates to the present day, now under the aegis of neo-developmentalism, as we will see below.

Sérgio Ferro refers to construction companies, when analyzing the brutality and exploitation of labor at the construction site in the construction of the country's new capital (2006). In the works in Brasília, the exploitation of workers on construction sites caught Ferro's attention. Consequently, the architect began to analyze in depth the existing production relations in Brazilian civil construction – but not only in it –, based on the role that the construction site and design play in these production relations (ibidem)<sup>19</sup>. It should be noted that, after Brasília, during the business-military dictatorship, Brazilian civil construction consolidated this construction site-type work, closely related to reinforced concrete and unhealthy conditions at

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<sup>19</sup> Sérgio Ferro introduced, in an unprecedented way, a perspective of analysis that until then (and perhaps until today) no other work has addressed. The figure of the architect, separated from the construction site and dedicated to design, shaped the area for centuries and established the foundations of the education in architecture as established in the 19th century. The hegemonic figure of the Renaissance architect was not shaken by modernism either. The emptying of the social content of modern architecture, in the following decades, undermined any possibility of revising professional practice or the role of design (KOPP, 1990).

construction sites. In this period, the precariousness of labor was strongly linked to the northeast-southeast and rural-city migratory flow, for which “civil construction was above all a large outlet for cheap labor (mostly black), because it was not qualified” (GONZALEZ and HASENBALG, 1982: 13). In the so-called leaden years of the military regime, data pointed to around five thousand deaths per year in civil construction in the country, officially registered (CAMPOS, 2014: 65) and work accidents were around 1.5 million per year (ibidem: 72). The terrible working conditions and safety in these large construction sites, including Brasília, lead to the death of several workers, most of them certainly black. However, architecture has been ignoring the debates about its responsibilities for such lives<sup>20</sup>.

Furthermore, the serialization of civil construction, with its brutal construction sites, was accompanied by the serialization of education resulting from the dictatorship’s University Reform, which had an immense impact on education. The standardization of education in construction areas resulting from the reform took place through mathematical abstraction – characteristic to the calculations of the reinforced concrete beam-column system –, forming professionals who knew little about working with other materials and technologies (SANTOS, 2008), regardless of the urban or rural context, or of biomes as distinct as the Amazon, the Caatinga or the Pampa. The hegemony of reinforced concrete implied a very adaptable teaching model that homogenised biogeophysical diversities (MOASSAB; CUNHA, 2020; SANTOS, 2008).

Nevertheless, it must be recognized that the presence of labor exploitation in civil construction is not a

novelty or exclusivity of the reinforced concrete construction system, neither of the technoscientific logic that accompanies it, nor of the production relations contained in its construction site-type work. Exploitation is historical and structuring of capitalist production relations, including of the modernity-colonial duality. Therefore, it has been present since the 15th century, as evidenced by the well-known episode of the strike that Filippo Brunelleschi faced, more than five centuries ago (FERRO, 2006: 334). However, there is a technological leap in this exploitation that is also of scale; there is a modernization of domination relations by means of the highly specialized knowledge – although it is not synonymous with high-quality training, especially in relation to the workers’ manufacture in construction site–, and by means of the industrialized knowledge demanded by reinforced concrete<sup>21</sup>. Explicitly in dependent countries, this technological and scale leap, which occurs in convergence to the advance of capitalism itself<sup>22</sup>, when interwove constructive technology with the serialization of production, it imposes a greater precariousness of work and labor alienation, and it is accompanied by the a-critical standardization of education (MOASSAB; CUNHA, 2020).

In this sense, the understanding of constructive technology within the capitalist model of labor exploitation cannot be separated, in Latin America, from an analysis of colonial violence, considering that non-white populations occupy the jobs at the construction sites. The enslavement of black people and the slave trade were the material and racialized bases for the birth of capitalism and the financing of the Industrial Revolution, confirming Malcolm X thesis that “there is no such thing as capitalism without

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<sup>20</sup> When asked what he thought about the massacre of workers of Brasília’s construction site, who were demanding better working conditions, Lúcio Costa, told filmmaker Vladimir de Carvalho that he would not have given the slightest importance to the episode if had known at the time (apud CARVALHO, 1992).

<sup>21</sup> Not only does reinforced concrete demand specialized knowledge in civil construction. That is the case of the ultra-specialized production chain in the global north without the domination of reinforced concrete. The difference, in general, is the superexploitation of labor in dependent countries, with the predominant extraction of absolute surplus value, which the insertion and definitive consolidation of reinforced concrete in the subcontinent has masterfully ensured.

<sup>22</sup> The hegemony of reinforced concrete was imposed in such a way and with such depth that even interesting participatory and collective initiatives face many limits dictated by the dominant technoscientific logic. They are usually much more successful in reviewing the autonomy in the management of housing projects than in its technoscientific dimension, as we will address below.



racism”. To put it in another way, the technological choice, the constructive model and how it fits into the national context, perpetuates the exploitation of the black population and, in the case of other Latin American countries, also of the indigenous population. It is noteworthy that this model of development was similarly defended by the progressive field, as is the case of Vilanova Artigas, one of the main names in Brazilian modern architecture. In the critical analysis of the situation carried out by progressive field in the 1950s and 1960s, it was in still in vogue the bet on industrialization as a necessary stage of development for the subsequent overcoming of capitalism<sup>23</sup>. The Brazilian Communist Party would review this perspective decades later, although from the Cuban Revolution onwards the steps vision of the revolution had already proved to be problematic and has been confronted by MTD since its initial writings.

In terms of housing production, although the construction of large housing complexes started before the dictatorial period, it became an indiscernible relationship with construction companies, from Brasília onwards, and characterized, in the country, a housing policy based on the serial construction of enormous housing complexes, unrelated to the surroundings and with standardized houses, from north to south of the country. Notwithstanding the more than consolidated criticisms of this model, mass and serial housing brought about by reinforced concrete and intermediated by large contractors, continues to be on the agenda of all levels of government, in the most diverse countries, in the midst of the 21st century.

Despite this, and as the antithesis of the contradictions discussed above, the 1980s and early 1990s witnessed self-construction taking shape as public policy. This so far unregulated and spontaneous practice came to be recommended by international organizations such as the World Bank. One of the most significant cases was

the Program for the Construction of Housing Units under Popular Task-Force and Self-Management, carried out under the administration of Mayor Luiza Erundina (1989-92), by the Partido dos Trabalhadores – PT (Labour Party). This program was the result of an initiative of the municipal government with the movements of struggle for housing. It consisted in the execution of agreements for the construction of thousands of housing units on land owned by the city hall, land subject to expropriation and even areas belonging to associations of housing movements, with the use of the workforce of future residents. The construction of the houses was under the responsibility of community associations, which participated from the beginning of the process, from the choice of land to the design itself. The program was developed under a self-management regime. It had as its goal to produce housing at a lower price than the promoted by construction companies, but its scope and meaning were even greater. They represented conditions for the construction of citizenship through housing and for the use of alternative socio-technical practices of construction, which sought to combat social alienation at the construction site, as discussed later.

### **“Neodevelopmentalism” in class conciliation governments: expansion of the universalization of the reinforced concrete construction system and its technoscientific and productive logic**

The post-Brazilian business-military dictatorship period, with the constituent process of the 1980s in the country, was immersed in tensions. The end of this period occurred with its own deterioration, after an amnesty and an indirect election, largely in response to the designs of imperialism in its new stage of financialization of capital. In retrospective analysis, the subsequent New Republic with its constituent process has been recently re-evaluated. Through the reading of that times’ critical analyses of the situation and texts,

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<sup>23</sup> For Artigas, the national bourgeoisie was the subject of social transformation and, consequently, thinking about the bourgeois house, instead of the house of the working class, consisted in a progressive action (ARANTES, 2002).

there is a current understanding of that period as an update of the domination of the dictatorial regime transformed into a social pact around a conservative transition (RIBEIRO, 2020).

This aspect is fundamental to understand the last decades and the limits set in the class conciliation of several progressive governments in Latin America. However, before that, it is worth remembering that in the first democratic presidential elections in Brazil, the debate on the modernization and development of the country remained present, then disguised as the modernization of the State, defended by Collor de Mello. Neoliberalism took its first steps in the country with the National Denationalization Program, consolidating itself under the auspices of Fernando Henrique Cardoso and the vigorous application of the Washington Consensus, when many national companies were privatized, with the rise of a “rentist bourgeoisie” linked to international capital and the financial market. The sprawl of neoliberalism occurred throughout Latin America.

In urban planning, the city was transformed into merchandise through “strategic plans”, with repercussions on the policies of touristification of historical heritage, transforming parts of cities into “malls”. This is the case of the “revitalization” of Puerto Madero (Buenos Aires, 2010) and Pelourinho (Salvador, 1992), and the transformation of an old detention center in the Punta Carretas shopping mall (Montevideo, 1994), emptying the history of resistance against dictatorships in Latin America. In this direction, postmodern architecture spreads throughout the region in projects detached from local realities as well as it is at the head of real estate speculation, such as Banaven (Caracas, 1978); Stock Exchange (México, 1987); Banespa (São Paulo, 1992) among others. The echoes of those projects are still felt in the architecture of the digital-financial era (ARANTES, 2012), as is the case of the Museum of Tomorrow (Rio de Janeiro, 2015).

With specific regard to conciliation governments, we will start from the Brazilian issue, paying attention to the directive aspects of the organization of labor, especially in relations of super-exploitation or cheap labor, employed in the construction site-type work, as pointed out. From the perspective of Ruy Braga (cf OLIVEIRA, F.; BRAGA, R.; RIZEK, C., 2010), Lula’s governments (2003-2010) would not be exactly a neoliberal example, like those of Fernando Henrique Cardoso, especially in his second term, because in some way he seemed to respond to certain repressed demands of social movements. Braga even used the notion of “social-liberalism”, trying to encompass the emphasis given by the Lula government on income distribution policies, combined and determined “by the reproduction of rentist orthodoxy” (BRAGA, p.10). In another work, the author dedicates greater attention and scope to the meaning of Lula’s policy, suggesting a new denomination: the “Lula’s hegemony” (BRAGA, 2012). This concept uses the sociology of work and is based on the idea that the Lula government cannot be confused with populism. In this way, its origins are linked to the reconciliation of the union bureaucracy, from the 1980s onwards, with the official union structure and with the capitalist state, after the distance between them, which occurred in the 1978-80 strike cycle.

It is worth remembering that since the late 1960s, international unions have created or managed pension funds (JARDIM, 2011). In Brazil, in the 1990s, during the Fernando Henrique Cardoso government, Brazilian unionism, previously critical of funds, saw them as a possible field of union action<sup>24</sup>. With the election of Lula, a former union member, to the federal government in 2003, some National trade union center such as Unified Workers’ Central (CUT), Union Force and the General Workers’ Central (CGT) not only joined the pension funds, but also spread the issue among unions (ibidem). In other words, this “new” union bureaucracy became the manager of

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<sup>24</sup> In 2001, congressional representatives from the Labor Party (PT) lobbied for the vote on Law No. 108/2001, on supplementary pension, and on Law No. 109/2001, which provides for the supplementary pension system (JARDIM, 2011).

workers' savings that financed capitalist development in recent years. It also took the reformist pacification of labor conflicts to the national level, instead of the authoritarian police form, as in populism, or the military authoritarian form, as in the Military Regime. In conclusion, for Braga (2012) Lula's hegemony is what allowed the coordination of the post-Fordist model of development in the country, without breaking the cycle of financial valorization, and at the same time, it pacifies or politically softens the sources of cheap labor, of the precariat <sup>25</sup>.

The notion of "Lula's hegemony" formulated by Ruy Braga (2012) is based on the dynamics of the labor world and the class struggle between the end of populism and Lula's rise to power. Thus, his works offer a broader explanation for the historical significance of this president's government, including for the electoral decisions of the precariat. Lula's hegemony did not put an end to the conditions of production of cheap labor. On the contrary, Braga states that 94% of formal jobs created between 2003 and 2010 had remunerations of at most a minimum wage and a half. Braga's concept reveals the continuity of the Lula administration in relation to the previous ones, namely, the reproduction of the conditions for the production of cheap labor, that is, precarious work. Cheap labor is the continuation line of the peripheral modernization process, which inhibits or limits the permanent renewal of the technical base of capital, feeding back into the dependency cycle. In the case of Lula's government, this favored the extraction of surplus value to find "less resistance among subordinates" (BRAGA, 2012, p. 226).

This approach can be complemented here with the notion coined by Francisco de Oliveira of "Hegemony in reverse" (OLIVEIRA, F.; BRAGA, R.; RIZEK, C., 2010). This conceptualization was created with the

aim of trying to describe the inversion that this author verified regarding the concept of hegemony discussed by Antonio Gramsci. Originally, Gramsci's concept explained the way in which the ruling classes exercise the moral and political direction of society, articulating around themselves a block of alliances to obtain the "passive consensus" of the directed classes and strata. The hegemony in reverse, in turn, is characterized by the political, intellectual and moral victory of the poor and traditionally excluded from power. After that, the social relations of exploitation for the benefit, not of oneself, but of the dominant social strata dialectically strengthens (ibidem). By way of explanation, with Lula's victory, the "intellectual and moral direction of Brazilian society" seemed to shift "in the direction of the subordinate classes", but it was observed that the bourgeois order proved to be "more robust than ever" (ibidem).

Oliveira also states that the political forces of the "age of invention", which provided the "moral direction of Brazilian society in its resistance to the dictatorship and raised the issue of poverty and inequality to the forefront of politics" (idem, p. 24), creating the PT and Lula themselves, would have suffered a political attenuation. The author states that Lula, when rises to power, began to treat these issues as an "administrative issue" (ibidem, p. 25). In addition, as part of the political effects of Lula's victory, Oliveira highlights the kidnapping of social movements and the organization of civil society, as well as the annulment of the left in Brazil. He asserts that the left would be unable to criticize, among other reasons, for ending up creating an identification with the "right" that stands as opposition to the government.

We could make the same efforts to identify the similarities and differences between Lula and other progressive governments: Dilma (2011-2016), in

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<sup>25</sup> The concept of precariate, that is, the precarious proletariat, was created by Ruy Braga, based on Karl Marx, to name that portion of the working population that is surplus and necessary to the capitalist mode of production. The relative overpopulation is agglutinated in three distinct but mutually permeable fractions: the floating population, which would be formed by those workers sometimes attracted, sometimes repelled by companies; the latent population, formed by young people and non-industrial workers waiting for an opportunity to leave the traditional sectors and work in industry; the stagnant population, formed by workers who occupy functions so deteriorated and underpaid that their living conditions would drop to subnormal levels of existence. The Precariate, therefore, is the lowest paid and most exploited fraction of the urban proletariat and of agricultural workers, whose income is situated by Braga between one and two Minimum Wages.

Brazil; Evo Morales (2006-2019), in Bolivia; and Rafael Correa (2007-2017), in Ecuador. However, this would go beyond the limits of this work. What is important to emphasize in terms of similarities is that such governments marked an expansion of capitalism with some real improvement in the living conditions of the working class, which many called “neo-developmentalism”. That is, governments that bet on “financialization that characterizes neoliberalism, and nationalism associated with developmentalism” (SANTOS, 2016: 57). Unlike the previous decade, nationalism and a greater emphasis on productive activities characterized the period, in a “spurious and contradictory association between the supposedly healthy aspects of neoliberalism with those nostalgic for the old developmentalism” (ibidem, p. 58). With regard to the construction system and the technoscience that accompanies it, there was no impact on the hegemony of reinforced concrete, nor on its corresponding construction type-site work. In fact, there was greater space, as we will see in an example below, for the development of other socio-technical construction practices, with the implementation of national policies and programs and the establishment of the Secretariat of Science and Technology for Social Inclusion (SECIS/MCTI), through Decree No. 4,724, in 2003, which made possible local productive arrangements in several regions of Brazil. Even the critical debate in the field does not usually propose a technoscientific review and is mostly guided by the reality of large cities, for which reinforced concrete and the serial and mass solution of architectural production, specifically housing, seem to be adequate.

However, more than 70% of Brazil and more than half of Latin America are formed by other territorialities, by small and medium-sized cities, where urban and rural culture are often not clearly defined (MOASSAB, 2013). It is also where relations with nature and with the neighborhood establishes, at the same time, other ways of living, for which reinforced concrete is far

from being the most appropriate techno-constructive solution, and defines other production relations in the construction work<sup>26</sup>. Even worse, reinforced concrete, in many cases, can be a big problem. In these contexts, by no means negligible, neither numerically nor qualitatively, non-standardized techniques can be a successful possibility. Additionally, even if reinforced concrete remains a valid constructive and technoscientific option in large cities, it is essential to problematize the analysis on the production chain and identify the enormous environmental and social impacts on its production, which are not usually located in the big city. That is, it is a solution that externalizes many of the problems of the construction process, ranging from obtaining raw material to its manufacture and distribution, in addition to its use and disposal.

In 1986, the BNH (created in 1964) was integrated into Caixa Econômica Federal (CEF), a national bank that started to guide policies and the budget for housing in the country. With the end of the BNH, national housing policies underwent institutional decentralization that accompanied the restructuring of the Brazilian State. The establishment of an institutional logic based on several focused housing programs began, from the Fernando Henrique Cardoso government onwards. This perspective was unaltered by the Lula and Dilma governments. In this sense, the largest of the programs, the “My House My Life” program – PMCMV, linked to the Civil House, was launched in 2009 (CUNHA, 2014). The conservative macro-policy adopted by the government in the years 2003-2016 did not change the characteristic financialization framework of neoliberalism, seeking to link it, in a contradictory way, to the old developmentalism, coming to be understood as a “developmentalist simulacrum” (SAMPALIO JR, 2012) or “neo-developmentalism”.

The hegemony in reverse of the Lula administrations, under the technoscientific point of view, which we have emphasized so much in this text, played a key

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<sup>26</sup> We chose not to use “construction site” or “construction site-type work”, because both notions already presuppose, in their own way, to a very specific relationship of production and work organization, which in part does not find direct correlates in indigenous villages, or quilombos (Brazilian hinterland settlement founded by people of African origin), for example.



role and closely linked to its own contradictions, as well as the likewise left wing oriented Latin American governments that we also call class conciliation governments. On the one hand, Lula's government favored the expansion to new locations and territories of the hegemony of the construction system of reinforced concrete, its techno-scientific logic and its construction site-type work. On the other hand, such hegemony allowed the diffusion, albeit to a lesser extent, of constructive solutions that used cement or reinforced concrete under a different constructive logic and with changes in production relations. In the case of the former, the PMCMV is an example of housing production that took a unique housing model, with a construction system impervious to regional differences (Figure 1), submitted to the logic of scale production. This program uses the massive employment of manufacturing based on the super-exploitation of the labor force typical of the construction site-type work, finally amplifying the reach of the coloniality of this technoscientific production.

In the second case (Figure 2), we could include the cement slab cisterns distributed in the semi-arid region of the Northeast as a policy to fight hunger and access to water. In this situation, the choice of materials and construction system with cement in slabs proved to be more correct from a climatic and techno-scientific point of view. They were produced with local labor, in a decentralized manner and with possibilities for families to participate in the production process, unlike the polyethylene cisterns, used for a period during Dilma's first government.

In the global financial scenario, the years 2007-2008 went through an enormous crisis predicted for the capital, in a domino effect resulting from the bankruptcy of a traditional American investment bank. Aiming to curb or at least minimize the effects of the crisis in Brazil, in the antagonistic combination of policies, the PMCMV even disregarded the National Housing Plan, then in the process of being published, after a long process of debate with various social and

*Figure 1: MCMV-PNHR houses for the indigenous communities of Barra do Corda and Jenipapo dos Vieiras, in the state of Maranhão, 2020. Source: <https://luiscardoso.com.br/acoes/2020/03/comunidades-indigenas-agradecem-a-roberto-rocha-por-habitacoes-viabilizadas-por-acao-parlamentar/>*



*Figure 2: Cement slab cisterns in the Brazilian semi-arid region. It is an appropriate use of a technoscientific cement solution to the local reality. Source: Jornal GGN, 2012. <https://jornalggn.com.br/politicas-sociais/comunidades-criticam-as-cisternas-de-plastico/>*





governmental actors. Indeed, the program was guided much more by economic policy than housing. The relationship of PMCMV with the market (rather than with the access to housing rights) was revealed in two main ways: with the centrality of civil construction companies in the program and with the application of public funds to promote the development of business in this sector, whose reinforced concrete and cement were protagonists (CUNHA, 2014).

In addition, civil construction companies have exercised, in recent decades, a strong power in defining the use of public funds and the urban territorial occupation. This reveals how much the housing policy was conducted in favor of the capital interests, being all structured in a way to promote the market and limited to the role of distributing goods and services to society. Therefore, there is a “marketfication” of social policy, strongly linked to the “developmentalist simulacrum” materialized in constructive technology consolidated throughout the previous century. The “option” for conventional construction techniques is deliberate: the objective of the PMCMV was precisely to reactivate the economy, inspired by the Keynesian countercyclical mechanism.

The coloniality present in the technoscience of reinforced concrete fulfills the designs of the ideology of development and is not only present in the massification and serialization of the large housing complexes architecture, such as those of the PMCMV. Rural areas and traditional communities have been forced by national institutions, such as the CEF and the National Institute of Colonization and Agrarian Reform (INCRA), to use this constructive system and its respective technoscience in very poorly urbanized contexts, with other territorialities and living practices that are very different from large cities, such as quilombo communities and agrarian reform settlements.

In our academic praxis of teaching-research-extension, we have been, since 2014, working with the Quilombo Community of Apepu, in western Paraná, which received the National Rural Housing Program (PNHR), the rural component of the PMCMV's urban housing program, on which several critical works have been carried out (cf. MOASSAB and BASTOS, 2016). In Apepu, one of the most striking features of the houses is the existence of the front porch, a widely used space. Despite the importance of this space for the community's daily life, none of the houses proposed by the PNHR had a porch, which indicates a total disconnection of the housing promoted by the national program from the local reality<sup>27</sup>. The episode points out that the coloniality of knowledge is also present in the spatial ordering/arrangement, complementing the coloniality present in the choice of the construction system and its respective technoscience. The same disregard of housing policies is verified with the building techniques and materials used by the Mbyá-Guarani (a branch of the Guaraní people who live in South America), such as wood, wattle and daub, vegetal coverings and clay (CARRINHO, 2010).

With regard to INCRA, which operates mainly in the rural area of the country, the institution that more forcefully imposes the materials for housing in agrarian reform settlements. It strictly demands the use of materials only acquired in the civil construction market, prohibiting the employment of other materials in the region, even when available at low cost or even free (NOGUEIRA, 2020). This requirement is present in practically all contexts financed through credit granted to families settled in the “Acquisition of Construction Materials” modality, existing since 1985 (ibidem). There are several reports on the requirements of the CEF, even in contexts that do not technically justify this option – whether in the interior of the Southeast or in the Amazon region –, which contributes to the dissemination of what we have

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<sup>27</sup> Notwithstanding all the problems of the PNHR modality and the always small budget aimed at private non-profit entities within the PMCMV, the program was revoked and the last contracts signed by the previous government were suspended, including the six houses for Apepu that were never built (MOASSAB and BASTOS, 2020).

been designating “ideology of reinforced concrete”. In other words, housing policies have usually been based on a quantitative deficit, resulting in homogeneous proposals to meet absolutely different contexts. The coloniality of technological knowledge is also evidenced when the policies planned in large cities tend to standardize and naturalize the ways of living based on the metropolitan reality, undermining and hiding other ways of occupying the territory and spatializing life.

In Ecuador, the left-leaning government of Rafael Correa carried out fundamental achievements in the New Constitution<sup>28</sup>, by incorporating Buen Vivir and the indigenous agendas of the Andean peoples, as well as the cultural, economic and territorial diversity. Notwithstanding, in the field of housing, the critical conceptions in relation to technological processes, the organization of production and, finally, the confrontation of the construction site-type work contradictions were much less expressive. The advance of housing policies implemented by the Ministerio de Desarrollo Urbano y Vivienda, which accompanied the five-year development plans established with the new constitution, managed to promote greater access to housing and urban sanitation, for example. However, they disseminated a homogeneous housing model in terms of construction standards and ways of living. We are referring here to housing products from two programs to encourage housing production implemented in the country, such as the “Proyecto de Vivienda Casa Para Todos – CPT” and the Program “Barrio Nuevo” (EQUADOR, 2021). The latter even provided housing self-management, nevertheless, both presented conventional housing typologies and construction processes. These national programs insisted on the indiscriminate use of reinforced concrete, no matter if in poorly urbanized contexts in the Andean region of the country, such as in the province of Cotopaxi (CHICAIZA, 2019).

In the same sense, Bolivia was another case of consolidation of the new Latin American constitutionalism, integrating indigenous issues in its constitution and the recognition of a Plurinational State, accomplishments of extreme relevance and innovation in the field of rights. Likewise Ecuador, though, Bolivia was not able to transpose these innovations to housing policies. The Program Vivienda Social y Solidaria – PVSS, created in the first year of Evo Morales’ government, allocated 70% of its resources to the production of new homes, following the formula for combating the quantitative deficit. The other 30% were assigned to the qualitative problems of housing, such as improving living conditions, especially by means of self-produced housing betterment, which account for approximately half of the homes in Bolivia, that is, about one million (GUTIÉRREZ et al, 2020). Another aspect that reinforces our argument is that the PVSS has privileged financial entities and construction companies with profit purposes and high expectations of economic profitability, imposing a marketing character in accordance with the neoliberal economic model to housing policy (ibidem).

In general, Bolivian housing typologies and construction processes follow what we observe in Ecuador or Brazil: they are “conventional”, using the reinforced concrete construction system and its characteristic construction site-type work and technoscience. We may perceive, therefore, how housing policies implemented by the governments of different countries, even when left-wing oriented, are much more concerned with “economic policies” than housing. They aim at the growth of the real estate market and the civil construction production chain, related to the cement industry and dominated by few companies in the countries.

In the Brazilian case, the Lula government’s commodities policy, as well as its investment in

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<sup>28</sup> The New Constitution of Ecuador was approved by referendum in September 2008 and entered into force in 2009.

infrastructure, including housing, economically favored the entire construction sector, both nationally and internationally, in this case, with subsidies from the BNDES (Brazilian Development Bank). The difference in relation to other commodity production chains is that, given its logistics, to be competitive, the production and sale of cement needs to be decentralized and relatively close to large consumer centers, unlike agribusiness, for example. For this reason, the international operations of the cement companies are fundamental, as Votorantim has done. Regardless of its extremely high environmental impact, cement is one of the world's main commodities, used also as an indicator of growth.

With respect to the real estate market, one of the hallmarks of Brazilian neo-developmentalism is the association between financial capital and real estate capital. In this new post-Fordist “financial era”, the real estate market assumes a very prominent role: the reproduction of urban space is one of the ways in which finance capital is accomplished, through the production of a new space in the form of real estate products. The city becomes more and more an eminent product of the speculative need of real estate capital in its valorization process. The securitization of the real estate sector was one of the mechanisms that allowed a closer proximity of real estate production to financial capital, as it improved the liquidity of business in the sector (PAIVA, 2007). The transformations initiated by Fernando Henrique Cardoso in the real estate sector were consolidated by various regulations carried out by the Lula and Dilma administrations, revealing once again their contradictions. In short, securitization, a strong characteristic of the accumulation of financial capital, directly related to civil construction, is, nowadays, indiscernible from the constructive system and from the technoscience of reinforced concrete.

Complementarily, the greater liquidity given to properties promoted changes in the supply and demand arrangement, in their design, production and circulation, which also altered the structure of the conflict and the terms of the dispute for social

wealth (FIX, 2011). The nearness of real estate capital to the capital market raises the level of speculation and modifies the temporality of operations and accumulation. In general, the increase in the price of real estate assets becomes mandatory, as happened with real estate in the USA, because as much as possible the reversal of the speculative cycle and, consequently, an explosion of the speculative bubble is avoided (ibidem).

With the financialization of capitalism, the subordination of dependent countries in the global economy deepens. As Mariátegui (2008 [1928]) has clearly shown, the Latin American bourgeoisies were never committed to the working class or to a project of national autonomy. On the one hand, national developmentalism, the so-called modernization of the country, deeply linked to the technological model adopted for civil construction, imposed precarious working conditions, especially on black people. On the other hand, in the neodevelopment and the class conciliation pact period, despite the contradictory desire for the “humanization of capitalism” that underlay it, there was no rupture capable of sharing the socially produced wealth, nor of consolidating the social rights fixed by the Citizen Constitution (Federal Constitution of 1988).

### **The omnipresence of the technoscientific and productive logic of reinforced concrete in popular-based housing policies**

Contrary to what the ideology of development advocates in relation to the 1980s, seen as the “lost decade” (ECLAC, 1992), we recommend a revisitation to this period from the perspective of the social, popular and union movements and also from point of view of the entire struggle around the constituent process in Brazil and other equally relevant debates in this regard, in other countries on the continent. The Brazilian constituent process, although taking place within the scope of a conservative transitional social pact, brought significant advances to social rights, within the limits of dependent capitalism. In

relation to architecture, it was a fundamental decade in Brazil to invigorate the debate on the social function of the profession. In a certain way, it has had some influence from housing experiences from Uruguay, Cuba and Argentina. Despite being a marginal issue until today, those years were a milestone in several Brazilian fronts in the struggle for housing rights. There were the formation of the first joint efforts and technical assistance to social movements, which are equally tributaries of the first critical reflections on the production relations of the construction industry and work conditions on the construction site, carried out in the previous decade by Sérgio Ferro. His debate, converging with others of his time, echoed in the vigorous struggles for housing that took place in parallel to the constituent process itself and as part of it. In a way, these authors provide contributions to dismantle consensus and processes that seem self-evident and “natural” in the work of the architect.

In Uruguay, housing cooperatives have been, since the 1960s, an important social actor in the field of housing construction. The FUCVAM – Federación Uruguaya de Cooperativas de Viviendas por Ayuda Mutua (Central for housing cooperatives) has been responsible for thousands of houses since its organization. It also established an important focus of resistance to the dictatorship installed in the country from 1973 to 1985 (BASTOS, 2019). In the 1980s, the Uruguayan experience influenced the struggle for housing in Brazil and other Latin American countries, becoming a reference for communal housing practices throughout the subcontinent.

A different path from Uruguay’s was traced in Cuba by the “Arquitectos de la Comunidad” program, coordinated by the architect Selma Díaz and the Argentinean architect Rodolfo Livingston<sup>29</sup>. The program was established in 1994, although its method dates back to the 1960s, a period in which the Argentine architect worked with the community of Baracoa, advising workers in the construction of their own

houses (NOGUEIRA, 2010). In Cuba, his method, organized in a book in the 1990s, gave rise to the program, which to this day provides technical support to families building or renovating their homes based on mutual help. The “Arquitectos de la Comunidad” program, institutionalized by the government, maintained its proximity to the community and the capacity for immediate responses that allowed for significant results, having already assisted more than five hundred thousand families<sup>30</sup>. In addition, Livingston’s method has been applied in several Latin American countries such as Uruguay, Argentina, Mexico, Chile and Ecuador, linked more to NGOs or academic programs and less to government programs, also with equally satisfactory results (ROUCO, 2017).

It is noteworthy that despite the valuable communal practice in Uruguay, the preferred construction system in housing constructions promoted by the FUCVAM is still reinforced concrete. Likewise, the various versions of the “Arquitecto de la Familia” program do not focus on the debate on materials or other construction systems. Although the Argentine architect’s method provides greater closeness between architects and communities, in the built houses, not even by Studio Livingstone, there are not directions for the use of materials other than reinforced concrete and related materials.

More specifically, despite the undeniable advances in housing self-management experiences, predominantly, at least two dimensions were not observed: (1) administrative and financial aspects, a fundamental contribution in terms of decommodification of housing, and (2) a critical perspective from a technoscientific point of view, deeply reconsidering construction practices, materials and tools for construction. Promoting a rupture in capitalist management, as happened in many experiences, after all, is insufficient for a profound social transformation. It seems that most of the popular-based experiences did not have the objective of reviewing in depth the

<sup>29</sup> The architect published his method in the books “Arquitectos de la Comunidad – El Metodo” (2006) and “Cirugía de Casas” (1990).

<sup>30</sup> Currently, the program has undergone changes in relation to its original character and work profile, becoming a state-owned company, which led to a distance from the community (ROUCO, 2017). This would deserve a separate debate.

construction procedures or the construction stages, that is, they did not reconsider the practices undertaken in the construction site-type work. Hence, there was a tendency to place less emphasis on changing socio-technical practices within the scope of construction techniques, construction materials and labor relations. Besides that, in many of these experiences, the hegemony of reinforced concrete, with its usual characteristic, was present (CUNHA, 2020)<sup>31</sup>.

The forms assumed by design and other functions in the division of labor are, roughly speaking, points that have been little addressed in critical historiography. The exception in this case, from a theoretical point of view, was Rodrigo Brotero Lefèvre, who, based on his 1971 text “the House of Juarez”, began a theoretical elaboration that would culminate in his doctoral thesis, in 1981, in which the technological issue assumes greater centrality when formulating the idea of the construction site as a school. Part of these elaborations, as is known, was the result of his constructive experiences in residences for the middle class with his colleagues Sérgio Ferro and Flávio Império (ARANTES, 2002). Probably, if Lefèvre had not passed away so prematurely, we could have seen further development of his ideas. It can be said that, in the terms we have presented here, these would be the first known proposals to rehearse a review of socio-technical practices, from the 1970s onwards. Moreover, this was one of the main reasons for the group’s disagreement with the education of the national bourgeoisie taste, as defended by Artigas (ibidem)<sup>32</sup>.

Furthermore, it remains little studied the criticisms of the particularities of socio-technical practices in civil construction in American lands, with its consequent racialization, as well as the mediation (or lack of) of construction process by design in the colonial period. To put it another way, the coloniality of knowledge similarly operates in the most radical critical perspectives. It must be pointed out that exercising the critique of

modernity from a theoretical perspective internal to modernity itself is very different from undertaking it from its exteriority and within the historical experience of coloniality, as does decolonial thought (PALERMO, 2020). This does not imply disqualifying the contributions such as Sérgio Ferro’s or Benjamin Coriat’s. On the contrary, it helps to understand the limits of the theoretical framework, the epistemological place of their criticism and, consequently, its scope.

In recent years, our work in architectural education, scientific research and university extension in a university as unique as the UNILA – Universidade Federal da Integração Latino-Americana (National University for Latin America Integration) has encouraged us to revisit these references, bringing to light the differences between both contexts, the new and the old world in their multiple and complex dimensions. This exercise is not to be confused with the literal replication of European production in *Nuestra America*, which has been ignoring or silencing the different constructive cultures and the local division of labor, in the context of colonial violence, and its role in defining the function of architectural design in past and present days. The task of historical reconstruction of such processes in the field of civil construction, from a Latin American perspective, is extensive and does not end here, constituting a continuous and constant effort guided by the Course of Architecture and Urbanism of UNILA, inserted in the singular vocation of this University. The abundance of experiences and reflections on the social production of housing in the rich 1980s in Brazil and other countries on the continent, from social movements – very different from their counterparts in the North –, provides us with enough input to contradict ECLAC’s assertion about the “lost decade”. Although impregnated with the “ideology of development”, it will probably be in a dialogue with such popular practices organized in the struggle for housing, which will emerge the necessary techno-scientific revision that we defend.

<sup>31</sup> In the case of technical assistance to social movements in Brazil, it is worth mentioning some initiatives to consolidate new socio-technical experiences, generally isolated, with the leading role of Usina — Centro de Trabalhos para o Ambiente Habitado [Center of works for inhabited environment], founded in 1990.

<sup>32</sup> It is important to highlight that the accomplishments of the Usina, discussed here, would be tributary to the reflection proposed by the Arquitetura Nova Group.



## The search for new sociotechnical construction practices with and without the use of reinforced concrete in the production of housing in dependent capitalism

Throughout this text, we seek to link some possibilities to broaden the debate on the instrumentalization of architecture in capitalism, specifically in dependent capitalism, (re)warning civil construction professionals once again about the ethical implications of design and technological choice in labor relations, which in Latin America need to be understood within the scope of colonial exploitation. The linking of architecture to the ideology of development in Latin American countries, those of Type A in Bamberger's categorization, plus Venezuela, took root through modern architecture. The modernist experience in these countries contributed to modifying the productive and economic base of civil construction, towards industrialization, which presupposed a new capitalist technological perspective, which we call here the technoscience of reinforced concrete. This technoscience carries, since its origins, the coloniality in its three dimensions (of being, knowledge and power), unveiled, for us, with the support of decolonial theoretical contributions. We showed, therefore, how the technoscientific hegemony of reinforced concrete was established and evolved in different phases of the development process of these countries, from the second quarter of the 20th century to the beginning of the 21st century.

Regarding the **coloniality of knowledge**, our arguments sought to demonstrate that the choice and use of certain constructive technologies represented a technoscientific homogenization in large Latin American territories. This standardization hides epistemicides promoted by technological choice, eliminating in many cases and compromising in others, the various pre-existing knowledge and constructive practices or those formed with the intersection of knowledge resulting from the colonial enterprise. The arrival of Columbus in the Americas, considered here as the founding moment of modernity and its contradictions, established the racialization of

non-European peoples. From this perspective, it is crucial to carry out a cognitive review that establishes itself, hence, in the dialogue with other ways of building and being in the world and other technical knowledge capable of envisioning spatialities and territories outside the racist-capitalist patriarchy. More than a solution, we propose a method to analyze and understand reality, based on decoloniality and dialectical historical materialism, which also operates in the field of constructive knowledge and socio-spatial practices in the different territories of *Nuestra America*.

In turn, the **coloniality of power** allows us to identify that the financial-industrial circuit of the construction sector is strongly imbricated in the institutions of the national states. In this direction, we can suggest whether its operation would not even constitute one of Althusser's (1992 [1970]) ideological state apparatus. With the association of real estate capital with finance companies and the lobbying force of civil construction in the Brazilian national congress, this hypothesis seems to gain strength today. We have not only seen government agencies direct or even impel the use of reinforced concrete, and with it a corresponding productive, logistical and construction-site rationality. Furthermore, there is often a rejection by communities of any technological alternative, due to the widespread belief that reinforced concrete would be a kind of guarantee of better living conditions.

Finally, in reference to the **coloniality of being**, we recall the Modern Architecture debate about educating the new spirit with the machine for living, the Existenzminimum and the serialization of architecture. The engagement of the vanguards in the different national-developmental projects in the region, the introduction of reinforced concrete and its adoption as a solution for housing policy are connected to the hegemony of the urban-being (DELGADO and RUIZ, 2014). In other words, the urban ethos undermines other ways of being in the world and becomes an exclusive representation of an "advanced" standard of life, whose mission is to overcome the "underdevelopment" linked to the

“ancestral” or “rural past”. Moreover, this equation is equally racialized, as the “retrograde” is usually the non-white person or knowledge.

The three constitutive dimensions of coloniality give a better finish to the arduous process of interpreting the reality of Latin American countries promoted by the MTD. Criticism of the merchandise, which also applies to the house, must be accompanied by an understanding of technological choices implications. In this text we were attached to the criticism of the ideology of development and of the role of architecture, reinforced concrete and the construction site-type work, which instrumentalized by capitalism, play a central role in the practically exclusive conversion of housing into a commodity. We emphasize, though, that we are not making an apology for precariousness or advocating for a single solution – equally hegemonic – or seeking new technoscientific universals. Far from it, we stand up for situated designs in accordance with the cultural, geo-biophysical and economic context, without excluding the use of reinforced concrete, when this is the most suitable solution, which probably is in large Latin American cities.

Similarly, the critique of the environmental impact of technology should not come apart from this conditioning of coloniality: technological choices have long disregarded respect for the nature of non-capitalist rationalities. The invasion of the Americas and the consequent racialization of the world has structured the foundations of society and of exploitation over the past five centuries that presupposes the separation of human beings from nature. Therefore, the current environmental crisis is the announced and predictable collapse of capitalist-racist patriarchy itself, with innumerable social implications and even for the

survival of humanity. It must be emphasized that the exploitation of labor and nature, as a self-designated right of domination by capitalism, is leading to the destruction of the planet and the death of thousands of people. In this nature-labor-technoscience equation, we take the productive model materialized in the territory as a relevant aspect. We believe it is crucial to comprehend how techno-science and industrialization are subject to capitalism, whose exploitation, in turn, hits with more intensity the working class of dependent countries, largely made up of the precariat composed mostly of black and indigenous people and women.

The desired transformation of society, with the overcoming of racist-capitalist patriarchy and the consolidation of another relationship with nature, will only be complete if we carry out a radical cognitive review of the technoscience used in its construction. It is extremely necessary to question the capitalist technoscientific rationality, as it is not enough to change the means of production and ownership, without the technology being cognitively rethought and without combating the “capitalist residues” of technology (DAGNINO, 2014). As much as we recognize the techno-scientific advances in non-capitalist countries as well, the rationality implied in this production seems to continue reproducing very precarious working conditions and the devastation of nature. It means that we need to historically build the conditions for the overcoming of these forms of production. We also need to make use of José Mariátegui’s designs for an indigenous Latin American knowledge, without denying the contribution that revolutionary processes in the 20th century have already made, adding to that the implications of gender-sexuality-race-class in this essential cognitive review of capitalist technoscience.

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