

Rethinking Basic Infrastructure: French Aid and Metro Development in Postwar Latin America

Andra B. Chastain

ABSTRACTS

In der zweiten Hälfte des 20. Jahrhunderts entstanden in lateinamerikanischen Metropolen acht neue U-Bahn-Systeme, darunter in Mexiko, Brasilien, Chile und Venezuela. Welche Faktoren können diese dramatischen Veränderungen in urbanen Räumen erklären? Der Aufsatz argumentiert, dass dafür französische Akteure verantwortlich waren. Während internationale Entwicklungsagenturen grundlegende Infrastrukturprojekte wie Häfen oder Dämme förderten, bot sich Frankreich urbanen Modernisierern an. Die Beziehungen zwischen lateinamerikanischen Planern und französischen Investoren kamen französischen Herstellern und lateinamerikanischen Befürwortern von U-Bahn-Systemen gleichermaßen zugute. Der Aufsatz basiert auf spanischen, portugiesischen und französischen Quellen, darunter Archivmaterial der Société française d'études et de réalisations de transports urbains (SOFRETU), lokalen Zeitungsberichten und offiziellen Stellungnahmen. Er hebt die Bedeutung bilateraler Entwicklungskooperation zwischen Frankreich und lateinamerikanischen Ländern hervor.

Postwar Latin America witnessed a remarkable wave of metro construction as eight new urban rail transit systems opened in Mexico, Brazil, Chile, and Venezuela in a span of less than twenty years. What explains this dramatic transformation in the built environment of Latin American cities? This article argues that French metro boosters played a crucial role in the Latin American transit boom between the 1960s and the 1980s. While international development agencies favoured what they considered more basic infrastructure projects such as ports or dams, France constituted a key source of aid for modernizing urban planners in Latin America. Relationships between Latin American planners and French funders benefitted French manufacturing interests, in addition to Latin American metro proponents. This article draws on sources in Spanish,

Portuguese, and French, including archival sources from the French Company for the Design and Construction of Urban Transport (*Société française d'études et de réalisations de transports urbains, SOFRETU*), local news articles, and official reports by Latin American metro agencies. It highlights the role of bilateral aid between France and Latin America, thus complementing work on multilateral organizations and US influence in the region.

Since the late 1960s, the city of Santiago de Chile has built one of the largest metro systems in Latin America, second in size only to that of Mexico City.¹ Its six lines cover more than 100 kilometres, and millions of riders rely on it each day to get to work, school, or home. For a metropolis of seven million people that sprawls across a valley ringed by mountains, the metro is crucial to keeping cars off the streets. Santiago's air pollution – which is particularly intense in the winter months and causes serious damage to public health – would be much worse without the essential human and material infrastructure of the Santiago metro.²

Yet the system's status has been in question throughout much of the project's history. The high quality of materials and construction methods “frequently surprised and even confused the visiting foreign experts [...] some of whom could not associate such achievements with an underdeveloped country.”³ Such comments offended the planners behind the project not only because they had poured their lives into the metro, but because they had battled for years to convince domestic audiences that this massive investment would benefit national development. Within Chile, experts had debated the question of whether the metro constituted essential infrastructure and whether it was a higher priority than projects such as highways, ports, or dams. These debates were especially heated during the military dictatorship of Augusto Pinochet, when free-market ideology reigned within the government and economists revised the criteria for funding public works.⁴

Chilean urban planners, engineers, and economists were not alone in their struggles to define what constituted basic infrastructure and the role that a metro system could play in urban and national development schemes. In fact, postwar Latin America witnessed a remarkable wave of metro building as new urban rail transit systems opened in Mexico City (1969), São Paulo (1974), Santiago (1975), Rio de Janeiro (1979), Caracas (1983), Porto Alegre (1985), Recife (1985), and Belo Horizonte (1986). Moreover, many cities

1 The Santiago metro is the longest in South America by track length, while São Paulo's metro has higher ridership. In 2017, Mexico City had 226 kilometres and 5.3 million passengers daily, on average; Santiago had 103 kilometres and 1.8 million passengers daily; and São Paulo had 92 kilometres and 2.5 million passengers daily (M. P. Salas, *Radiografía de las redes del Metro en América Latina*, in: *La Tercera*, 17 June 2017, <http://www2.latercera.com/noticia/radiografia-las-redes-del-metro-america-latina/> (accessed 1 October 2018)).

2 P. Pino et al., *Chile Confronts Its Environmental Health Future after 25 Years of Accelerated Growth*, in: *Annals of Global Health* 81 (2015) 3, pp. 354–367.

3 M. Muñoz, *Vocación y creatividad en el servicio público*, in: M. I. Pavez Reyes (ed.), *En la ruta de Juan Parrochia Beguín: Premio Nacional de Urbanismo, Chile 1996, Santiago 2003*, p. 44.

4 See, for example, the metro debates in the press in late 1975, 1980–81, and 1983–85, in A. B. Chastain, *Vehicle of Progress: The Santiago Metro, Technopolitics, and State Formation in Chile, 1965–1989*, Ph.D. dissertation, Yale University, 2018.

– such as Lima, Bogotá, and Montevideo – hosted long-running debates about the need for a subway to serve their rapidly growing populations.⁵ Until the 1960s, the Buenos Aires *subterráneo* (underground), which dated from 1913, was the only subway in the region.⁶ Yet in a span of less than 20 years (1969–1986), Latin America suddenly boasted eight new systems, with others proposed and discussed. What explains this dramatic transformation in the built environment of Latin American cities?

This article argues that French metro boosters played a crucial role in the Latin American transit boom between the 1960s and the 1980s. While debates about the role of a metro system in broader urbanization and modernization schemes played out at the local and national levels, the construction of these massive infrastructure systems required international financing. At a time when international development agencies such as the World Bank favoured what they considered more “basic” infrastructure projects, such as ports and dams rather than urban transit systems, France constituted a key source of aid for modernizing urban planners in Latin America. Relationships between Latin American planners and French funders benefitted not just metro boosters in Latin America, but French manufacturing interests. More broadly, this article shows that Latin American urbanization was shaped by trans-Atlantic networks of expertise and financing.

The story of Latin America’s metro boom demonstrates how urban history and the history of international development are closely linked. The influence of European urban planning traditions on Latin American cities is well known, particularly for the period of rapid urban growth in the late nineteenth and early twentieth centuries.⁷ With the rise of US hegemony in the hemisphere since the War of 1898, the impact of US planners and technocrats in Latin America also increased, particularly in the context of the 1930s and 1940s with the New Deal and Good Neighbour Policy.⁸ After World War II, the growth

- 5 Plans for a metro in Lima date back at least to the 1960s: see Lima tendrá transporte subterráneo, in: La Tarde, 13 April 1966. Line 1 was inaugurated in 2011; see L. Santolalla Huerto, El tren eléctrico: Lima tuvo que esperar 25 años para inaugurar este sistema de transporte, in: La República, 11 July 2011, <https://larepublica.pe/sociedad/555393-el-tren-electrico-lima-tuvo-que-esperar-25-anos-para-inaugurar-este-sistema-de-transporte/> (accessed 3 April 2020). In Bogotá, metro proposals date back to the 1940s, and the project continues to be debated and planned; see A. M. García, La interminable historia del metro imaginario de Bogotá, in: Vice, 28 September 2017, https://www.vice.com/es_co/article/43a7yn/interminable-historia-metro-imaginario-bogota (accessed 3 April 2020). Despite proposals for a Montevideo metro dating back to the 1940s and the more recent creation of a fictional metro by graphic designer Marco Caltieri, Montevideo does not have an actual subway; see La verdadera historia del Metro de Montevideo, in: El Observador, 16 December 2011, <https://www.elobservador.com.uy/nota/la-verdadera-historia-del-metro-de-montevideo-2011121620170> (accessed 3 April 2020); and Subterráneo en Montevideo: La alternativa que nunca llegó, Montevideo Subterráneo, <http://proyecto2018.um.edu.uy/subte/> (accessed 3 April 2020).
- 6 For an in-depth history of this system, see D. Zunino Singh, The History of the Buenos Aires Underground: A Cultural Analysis of the Modernization Process in a Peripheral Metropolis (1886–1944), Ph.D. dissertation, University of London, 2012, https://www.academia.edu/5620996/The_history_of_the_Buenos_Aires_Underground_A_cultural_analysis_of_the_modernization_process_in_a_peripheral_metropolis_1886-1944_ (accessed 3 April 2020).
- 7 A. Almandoz (ed.), Planning Latin America’s Capital Cities, 1850–1950, New York 2002; J. E. Hardoy, Theory and Practice of Urban Planning in Europe, 1850–1930: Its Transfer to Latin America, in: R. M. Morse / J. E. Hardoy (eds.), Rethinking the Latin American City, Washington, DC 1992, pp. 20–49.
- 8 A. B. Chastain / T. W. Lorek (eds.), Itineraries of Expertise: Science, Technology, and the Environment in Latin America’s Long Cold War, Pittsburgh 2020; G. M. Joseph, Close Encounters: Toward a New Cultural History of U.S.-Latin

of international development agencies focused more attention on the problems of what was then called “underdevelopment” in Latin America, including the region’s rapidly growing cities and informal urban settlements.⁹ While there has been growing research on the history of international development and urbanization in Latin America, the story in this chapter differs from existing studies in two ways: it focuses on transportation as an important facet of urban policy, and it highlights the role of bilateral aid between France and Latin America, in contrast to the predominant emphasis on US influence in the region.

1. A Global Wave of Metro-Building

In the wake of World War II, global economic growth paved the way for the construction of urban rail systems around world. Broadly speaking, the first era of metro construction, in the late nineteenth and early twentieth centuries, had witnessed the opening of subways in Europe, the United States, and Japan.¹⁰ After a halt during World War II, the construction of metros around the world took off. The rate of new metro openings in the 1950s and 1960s averaged eight per decade, double what it had been at the turn of the century. Then, in the 1970s and 1980s, the rate picked up to 23 and 27 new systems each decade, respectively – more than five times the rate from the turn of the century. Growth has been even more feverish since the start of the new millennium, led overwhelmingly by cities in Asia (see figure 1). While the recent expansion is remarkable and worthy of attention, this article instead examines why metro development took off in the decades after World War II. In particular, it focuses on the five largest postwar metro systems in Latin America: in Mexico City, São Paulo, Rio de Janeiro, Santiago, and Caracas.

American Relations, in: G. M. Joseph/C. C. LeGrand/R. D. Salvatore (eds.), *Close Encounters of Empire: Writing the Cultural History of U.S.-Latin American Relations*, Durham, NC, 1998, pp. 3–46.

- 9 For a critical history of international development, see G. Rist, *A History of Development: From Western Origins to Global Faith*, 4th edn, London 2014. On US housing aid around the world, see N. H. Kwak, *A World of Homeowners: American Power and the Politics of Housing Aid*, Chicago 2015. For recent work on urban informality and international housing programmes in Latin America, see L. Benmergui, *Building the Alliance for Progress: Local and Transnational Encounters in a Low-Income Housing Program in Rio de Janeiro, 1962–67*, in: A. K. Sandoval-Strausz/N. H. Kwak (eds.), *Making Cities Global: The Transnational Turn in Urban History*, Philadelphia 2018, pp. 71–97; B. Fischer/B. McCann/J. Auyero (eds.), *Cities from Scratch: Poverty and Informality in Urban Latin America*, Durham, NC, 2014; M. Healey, *Planning, Politics, and Praxis at Colombia’s Inter-American Housing Lab, 1951–1966*, in: Chastain/Lorek (eds.), *Itineraries of Expertise*, pp. 199–216; and A. C. Offner, *Homeownership and Social Welfare in the Americas: Ciudad Kennedy as a Midcentury Crossroads*, in: Sandoval-Strausz/Kwak (eds.), *Making Cities Global*, pp. 47–70.
- 10 The literature on the subways of Paris, London, and New York is wide-ranging. A classic cultural history is B. Bobrick, *Labyrinths of Iron: Subways in History, Myth, Art, Technology, and War*, New York 1986. On the Moscow metro, see A. Jenks, *A Metro on the Mount: The Underground as a Church of Soviet Civilization*, in: *Technology and Culture* 41 (2000) 4, pp. 697–724; and T. Vujosevic, *Soviet Modernity and the Aesthetics of Glean: The Moscow Metro in Collective Histories of Construction*, in: *Journal of Design History* 26 (2013) 3, pp. 270–284.

Decade	# New Metro Openings	Decade	# New Metro Openings
1860–69	1	1940–49	0
1870–79	0	1950–59	7
1880–89	0	1960–69	9
1890–99	4	1970–79	23
1900–09	4	1980–89	27
1910–19	3	1990–99	25
1920–29	2	2000–09	30
1930–39	2	2010–19	45

Figure 1. New Metro Systems Worldwide by Decade¹¹

The postwar wave of metro-building touched nearly every continent. Before 1990, Western Europe and Asia were by far the most impacted by this metro boom, with 20 systems opening in the former and 17 in the latter. The Soviet Union and Eastern Europe also made a significant mark, with 11 metros opening here between the start of the Cold War and the fall of the Berlin Wall.¹² Many debuted in capital cities of the Soviet Socialist Republics – such as Tbilisi (Georgia), Baku (Azerbaijan), and Tashkent (Uzbekistan) – which suggests that the projection of political power was not always far removed from more pragmatic concerns.¹³ The potential to project power and prestige was present in the capitalist west, as well: in Canada, the Montreal metro opened in time for the 1967 World's Fair, whereas in the United States, the Washington D.C. metro embodied the ethos of Lyndon B. Johnson's Great Society.¹⁴

But what was arguably the most striking feature of this worldwide wave of metro-building was that it included the Global South and non-aligned countries: not only the eight new Latin American metros that opened prior to 1990, but also the metro systems in Cairo and Istanbul, Beijing and Tianjin, Seoul and Kolkata. In some ways, the boom in urban infrastructure makes sense in light of the rapid urbanization occurring in Latin

11 Source: International Association of Public Transport, Statistics Brief: World Metro Figures 2018, Brussels 2018, p. 4, <https://www.uitp.org/world-metro-figures-2018> (accessed 8 April 2020).

12 I am using the geographic distinctions made by the International Association of Public Transport (UITP). See International Association of Public Transport, Statistics Brief: World Metro Figures 2018, Brussels 2018, p. 4. The notable exception was sub-Saharan Africa, where the first metros opened in Addis Ababa, Ethiopia (2015) and Abuja, Nigeria (2018). See International Association of Public Transport, Statistics Brief: New Urban Rail Infrastructure 2018, Brussels 2019, p. 1; International Association of Public Transport, New Light Rail System in Addis Ababa, 7 October 2014, <https://www.uitp.org/new-light-rail-system-addis-ababa> (accessed 4 April 2020).

13 On Soviet metros, see O. Hatherley, Metro, in: *Landscapes of Communism: A History Through Buildings*, New York 2015, pp. 250–309.

14 On the Montreal metro, see D. Gilbert/C. Poiras, "Subways Are Not Outdated": Debating the Montreal Metro, 1940–1960, in: *Journal of Transport History* 36 (2015) 2, pp. 209–227; for a comprehensive history of the Washington, DC, metro, see Z. M. Schrag, *The Great Society Subway: A History of the Washington Metro*, Baltimore 2006.

America, Asia, and Africa in the second half of the twentieth century.¹⁵ Certainly, metro-boosters sought to depict a natural correlation: by this view, as cities grew – particularly after they surpassed one million people – they reached a point where a metro became a necessity.¹⁶ But the line of causation was not so simple. In fact, metros were extremely expensive in terms of up-front costs, although planners argued that these costs would be made up over the long run. Many cities lacked the resources to undertake such ambitious urban infrastructure projects, even if they were experiencing rapid growth.

The dilemma of how to fund a potential metro pointed to a thornier issue: whether such projects should even be considered basic infrastructure by the state, the public, or potential investors. Scholars of infrastructure have shown that the category is not static or self-evident. Historian William Rankin argues, for example, that the concept of infrastructure emerged in tandem with debates about international development aid in the 1950s, and that it quickly expanded to mean not only physical structures such as railroads or hydroelectric plants, but also social services such as education and health.¹⁷ For our purposes, it is important to note that multilateral lenders such as the World Bank did not typically fund metro projects, likely because the expected rate of return was too low.¹⁸

Just as importantly, the concept of a metro in the capital of a developing nation contravened theories of modernization in the 1950s and 1960s. According to economist Walt Rostow, societies progressed through five “stages of economic growth”, from traditional to modern, in a sequence modelled on the historical trajectory of England and the United States.¹⁹ For many observers both domestic and foreign, metros in places like Mexico City and Santiago scrambled linear modernization narratives because Latin American countries were perceived to be in the middle “take-off” stage, where investments should be targeted in strategic industries; only later, during the “drive to maturity” and “age of

15 Urbanization since 1950 has been rapid in Latin America and the Caribbean, Western Asia, Eastern Asia, and sub-Saharan Africa, and somewhat slower in Northern Africa and South-Central Asia; see United Nations Department of Economic and Social Affairs, Population Division, *The Speed of Urbanization Around the World*, in: *Population Facts 2018* (2018) 1, p. 2.

16 This was the argument made by Austrian urbanist Karl Brunner when visiting Chile in the 1930s: see K. Brunner, *Santiago de Chile: Su estado actual y futura formación*, Santiago 1932. Similarly, the Soviet Union deemed cities eligible for a metro once they reached the one-million mark (Hatherley, *Metro*, p. 304).

17 W. J. Rankin, *Infrastructure and the International Governance of Economic Development, 1950–1965*, in: J.-F. Auger / J. J. Bouma / R. Künneke (eds.), *Internationalization of Infrastructures: Proceedings of the 12th Annual International Conference on the Economics of Infrastructures*, Delft 2009, pp. 61–75. See also A. Carse, *Beyond the Big Ditch: Politics, Ecology, and Infrastructure at the Panama Canal*, Cambridge, MA 2014.

18 A 1997 World Bank report noted that up to that point, the Bank had “financed only a handful of projects involving metros or similar public transport options”, and that most of these “involved rehabilitation and/or extension”, not new metro lines. See S. Mitric, *Approaching Metros as Potential Development Projects*, Transportation, Water and Urban Development Department discussion paper, no. TWU 28 (1997), p. 1, <http://documents.worldbank.org/curated/en/476621468335948071/Approaching-metros-as-potential-development-projects> (accessed 4 April 2020). Rankin observes that, in the mid-1950s, there was no multilateral lender that could offer below-market-rate loans – precisely the kind of economic assistance that would be needed for long-range infrastructure projects (Rankin, *Infrastructure*, pp. 68–69).

19 W. W. Rostow, *The Stages of Economic Growth: A Non-Communist Manifest*, Cambridge, UK 1990 [1960].

mass consumption”, would urban services develop.²⁰ Echoing this logic, a Chilean government planner argued in 1964 against a subway, drawing an analogy to family budgeting. Just as the “head of the household” should not “buy a car over the necessities of food, shelter, and housing”, a country should “obtain, first, the fundamental necessities and means of production that will allow it to achieve its basic income, until it has enough to acquire a metropolitan railway.”²¹ By this logic, a metro was not basic infrastructure, but an expense that only a more developed country could afford.

2. Latin America’s Metro Boom

Yet even without economic assistance from groups like the World Bank, cities with limited resources in Latin America nonetheless managed to build significant urban rail networks between the 1960s and 1980s. Mexico City led this boom when, in 1967, construction began on the first three lines of what would become the metro, formally known as the Collective Transport System (Sistema de Transporte Colectivo, STC). By this point, the capital city, located in a drained lakebed encircled by mountains, had already grown rapidly, reaching nearly seven million inhabitants. Like many Latin American capital cities in the mid-twentieth century, it concentrated the political power of the national government, the economic clout of elites and growing industries, and the expanding population that migrated from the countryside in search of better life prospects. The vast majority of Mexico City’s residents relied on public transportation, mainly buses and trolleybuses, but the system was slow and inefficient due to street congestion, increasing numbers of vehicles on the streets, and a lack of coordination among routes. Added to the material realities of congestion and population growth, there was political will: President Díaz Ordaz wanted to build a metro in time for the 1968 Olympics, to be held in Mexico City. The path was clear after he pushed aside the mayor, who opposed the project. There was also longstanding desire for a metro from the Mexican engineering conglomerate, Associated Civil Engineers (Ingenieros Civiles Asociados, ICA), which stood to benefit from the construction contracts.²²

Despite initial concerns about Mexico City’s watery subsoil and earthquake-prone geography, metro construction proceeded rapidly. The subway opened to the public in 1969,

20 In 1960, Rostow classified Chile, Mexico, Brazil, and Colombia in the “take-off” stage and noted that Venezuela might have recently moved into this category (Rostow, *Stages of Economic Growth*, p. 44).

21 The quotes come from Rosendo Caro, deputy director of the Ministry of Public Works at the end of Jorge Alessandri’s presidency (Construir ferrocarril subterráneo para Santiago equivale al presupuesto anual de Obras Públicas, in: *La Nación*, 18 July 1964).

22 L. Castañeda, *Choreographing the Metropolis: Networks of Circulation and Power in Olympic Mexico*, in: *Journal of Design History* 25 (2012) 3, pp. 293–294; D. E. Davis, *Urban Leviathan: Mexico City in the Twentieth Century*, Philadelphia 1994; O. González, *El Metro de Ciudad de México*, in: *Revista EURE* 14 (1988) 42, pp. 64–65; J.-C. Parpillon/G. Larraufie, *SOFRETU et le métro de Mexico: 25 ans d’un collaboration exemplaire*, in: *Revue générale des chemins de fer* 10 (1992), p. 50; W. Veeder, *El Metro: The History of a Monument in Motion*, Ph.D. dissertation, University of New Mexico, 2015.

and by 1970 a total of 41 kilometres had been built, which amounted to the stunning rate of one kilometre per month.²³ After a halt in construction during the Echeverría administration in the 1970s, construction picked up again after 1977. By 1988, the network totalled 141 kilometres and eight lines. It was very heavily used, as well: in the early 1990s, it ranked third in the world for passenger traffic, after the metros in Moscow and Tokyo.²⁴ It also emerged unscathed after the powerful 1985 earthquake that struck near Mexico City and killed at least 10,000 people.²⁵

Other metro systems grew more slowly, despite similarly rapid rates of urbanization. In Brazil, two metros opened in the 1970s: São Paulo's in 1974, and Rio de Janeiro's in 1979. The São Paulo urban area had grown dramatically since the late nineteenth century, driven by the region's booming coffee economy, the network of railroads that converged on the city, and waves of migration from within Brazil and from abroad. By the late 1930s, São Paulo was Brazil's industrial powerhouse, and by 1954, when the city celebrated its quadricentennial, its population reached three million.²⁶ Although there had been several proposals for a subway and much discussion about the need for a metro since the 1920s, the project did not take shape until the mayoralty of José Vicente Faria Lima in the late 1960s. Construction began in 1968, and, after some delays, the first line of the Companhia do Metropolitano de São Paulo opened to the public in 1974.²⁷ It remained a modest, limited system despite the city's continued growth. In 1978, when the city's population already exceeded seven million, there was only a single line, 14 kilometres long.²⁸ A second, east-west, line opened in 1979, and a third short line opened in 1991.²⁹ By 1999, when the network celebrated twenty-five years of operation and São Paulo had topped ten million people, the system was only 49 kilometres in length.³⁰ The trains were packed with passengers, and ridership was reportedly among the highest in the world in terms of passengers per kilometre.³¹ One of the main challenges that the metro faced was São Paulo's pattern of sprawling development, spurred by an early emphasis on road-building, the auto industry in the region, and high rates of car use.³²

23 Parpillon/Larraufie, *SOFRETI*, p. 51.

24 *Ibid.*, p. 52, p. 58.

25 *Ibid.*, p. 52.

26 J. R. Langenbuch, *A estruturação da grande São Paulo: Estudo de geografia urbana*, Rio de Janeiro 1971, p. 131; A. de Azevedo, *A cidade de São Paulo: Estudos de geografia urbana*, 4 vols, São Paulo 1958, vol. 1, p. 8, and vol. 2, p. 102, p. 243.

27 Portal Metrô Memória – Linha do Tempo, originally available on the website of the Companhia do Metropolitano de São Paulo, <http://www.metro.sp.gov.br/index.aspx> (accessed July 2013).

28 L. Guieysse/D. Sutton, *Les transports de Saint-Paul (Bresil)*, April 1978, Paris: Régie autonome des transports parisiens, RATP Archive, Box-Brésil.

29 Portal Metrô Memória – Linha do Tempo, pp. 8–12.

30 R. Miotto, *Trens do Metrô começaram a circular no mesmo dia*, in: *Metrô News* (São Paulo), 15 September 1999.

31 M. Uchôa, *Metrô faz 17 anos com superlotação*, in: *O Estado de São Paulo*, 14 September 1991.

32 The engineer and political scientist Eduardo Alcantara de Vasconcellos notes that the number of vehicles in the São Paulo metropolitan area increased sixfold between 1970 and 1999; see E. A. de Vasconcellos, *Urban Change, Mobility, and Transport in São Paulo: Three Decades, Three Cities*, in: *Transport Policy* 12 (2005), pp. 91–104; see also B. J. Godfrey, *Revisiting Rio de Janeiro and São Paulo*, in: *The Geographical Review* 89 (1999) 1, pp. 94–121.

The metro in Rio de Janeiro has also remained modest in size compared to the Mexico City system. The city had long been the political and cultural centre of Brazil and retained its importance after the capital was moved to Brasília in 1960. The city's unusual geography, situated along the coastline with vertical granite hills studding the urban fabric, made transportation more difficult, and trams and railways structured urban growth in the early twentieth century.³³ By the 1950s and early 1960s, there had been a number of proposals and studies for a metro system, but these did not materialize.³⁴ In the 1970s, however, Brazil's booming economy made conditions ripe for the project, and the first line opened in 1979. This expanded gradually, and in 1984 a second line opened.³⁵ However, as recently as 2009, the network was still small – only 37 kilometres in length.³⁶

The metro in Santiago, Chile, by comparison, has left a much stronger mark on the city. Since the 1920s, Chilean engineers and city planners had argued that a subway was necessary to alleviate congestion in the growing city, but early proposals foundered. As in Mexico and Brazil, debates about an urban rail system became more intense in the 1950s and 1960s, and by the time the proposal was being seriously considered by the Christian Democratic government of Eduardo Frei Montalva in the mid-1960s, many observers were sceptical that this time would be any different. Nonetheless, Frei was committed to the project, and he lent his support to metro architect Juan Parrochia, a Haussmann-like figure with a far-reaching vision for transforming Santiago's transportation system. The government approved a five-line metro plan in 1968, and construction began the following year. Amid the social and economic upheavals of Salvador Allende's socialist government, construction proceeded apace. After the 1973 military coup, the new regime accelerated construction, and the first line opened in 1975.³⁷

During the military regime of Augusto Pinochet (1973–1990), the metro at first remained relatively protected from the radical free-market reforms of the Chicago Boys, the government's neoliberal economic advisors. Nonetheless, by 1980 intense criticism of the project led to the curtailment of new construction and a lengthy campaign to transform the metro into a state corporation, which occurred in 1989 and paved the way for the privatization of certain functions. As of 1990, when Pinochet was forced to step down and cede power to the newly elected democratic government, the Santiago metro was relatively small, covering only two lines and 27 kilometres. Under the centre-left

33 B. Fischer, *A Poverty of Rights: Citizenship and Inequality in Twentieth-Century Rio de Janeiro*, Stanford 2008, pp. 27–29.

34 See, for example, *Tudo pronto para as obras do Metrô*, in: *Tribuna da Imprensa*, 27 March 1954; *O futuro Metrô carioca*, in: *Manchete*, 25 February 1956; *Metropolitano do Rio de Janeiro*, in: *Correio da Manhã*, 20 February 1964. Abundant news clippings demonstrate the long-running debates about a Rio de Janeiro metro in Boxes 3D 11, 3D 12, and 3D 13, Archive of the Régie autonome des transports parisiens (RATP), Paris.

35 *História: Como tudo começou, Metrô Rio*, <https://www.metrorio.com.br/Empresa/Historia> (accessed 6 April 2020).

36 B. L. de Carvalho da Costa/F. C. de Carvalho da Costa, *The Evolution of the Rio de Janeiro Subway System*, paper presented at the 12th World Conference on Transport Research, Lisbon, July 2010, p. 8.

37 Chastain, *Vehicle of Progress*.

Concertación coalition, metro construction again became a priority, and the network expanded rapidly, tripling in size by 2006. It became further entrenched in the city's infrastructure after the 2007 transportation reforms known as *Transantiago*, which solidified the metro's role as the backbone of the entire transit system.³⁸

Lastly, the Caracas metro, like the systems in Brazil, emerged out of the economic boom of the 1970s, when Venezuela enjoyed surging oil profits. More than many Latin American cities, Caracas had embraced US-style road-building and car-oriented urban development.³⁹ Yet the desire for a subway was longstanding, and plans had existed for decades before the project began to take shape in the 1970s, during the governments of Carlos Andrés Pérez (1974–1979) and Luis Herrera Campíns (1979–1984). Construction began in 1978, and the first line opened in 1983. In addition to expansions on this first line, a second line opened in 1989, and two more lines were built in the 1990s and 2000s.⁴⁰ The system maintained a positive image as a public service that was clean, orderly, and well-functioning, at least until the most recent economic turmoil in Venezuela.⁴¹

3. French Aid and Technology

As the individual cases described above illustrate, Latin America witnessed a remarkable wave of metro construction between the late 1960s and the early 1980s. Although each system developed differently based on a host of factors, with some metros remaining poorly integrated with the rest of the city while others, such as Mexico City's, becoming the essential circulation system for the metropolis, they also shared certain elements. One notable feature was that in most cases, metro proposals, studies, and public debate on the issue had existed for decades prior to the project's realization. Why, then, did these projects happen when they did?

One possible answer is that rapid urbanization in Latin America was transforming the region's capital cities at an unprecedented pace, and such growth demanded forceful state intervention to "rationalize" urban populations. This dynamic certainly seems to be true for the arena of housing in Latin American cities at this time. As city populations

38 Ibid., chapter 6 and epilogue.

39 F. Violich/R. Daughters, *Urban Planning for Latin America: The Challenge of Metropolitan Growth*, Boston 1987, pp. 164–165; L. Blackmore, *Spectacular Modernity: Dictatorship, Space, and Visuality in Venezuela, 1948–1958*, Pittsburgh 2017, pp. 89–93. Caracas also embraced modernist high-rise apartment blocks, most dramatically with the construction of a massive housing project during the dictatorship of Marcos Pérez Jiménez in the 1950s, renamed the 23 de Enero project after his overthrow in 1958. See A. Velasco, *Barrio Rising: Urban Popular Politics and the Making of Modern Venezuela*, Oakland, CA, 2015.

40 D. V. Kingsbury, *Infrastructure and Insurrection: The Caracas Metro and the Right to the City in Venezuela*, in: *Latin American Research Review* 52 (2017) 5, pp. 775–791; Caracas Metro, *Railway Technology*, <https://www.railway-technology.com/projects/caracas-metro/> (accessed 6 April 2020).

41 The Caracas metro's orderly public image in the early 1980s is discussed in Kingsbury, *Infrastructure and Insurrection*, pp. 776–780. This is echoed more recently in N. Casey, *The Caracas Metro: Rat-Free and Only a Half-Cent to Ride*, in: *The New York Times*, 20 January 2016, <https://www.nytimes.com/interactive/projects/cp/reporters-notebook/moving-to-venezuela/metro-caracas> (accessed 6 April 2020).

swelled from rural-to-urban migration, the housing deficit sharpened, and thousands of poor families were pushed into overcrowded, unsanitary shantytowns. As Leandro Benmergui has shown for Buenos Aires and Rio de Janeiro, Cold War reformers from both the United States and Latin America targeted housing as a site for modernization; by turning slum-dwellers into homeowners, they believed they could promote a more modern mindset among the poor. By transforming individuals' living conditions, residents might be made into cleaner, more orderly subjects who would be open to reformist (not radical or populist) political change.⁴² Moreover, as Nancy Kwak demonstrates, US policymakers were concerned with promoting homeownership in the developing world as a tool for foreign policy.⁴³

Yet as politicians and planners well realized, vertiginous urban growth, even when combined with intense public debate and interest, did not a metro make. The long-running discussion about a metro for Bogotá, or the recent construction of Lima's first line, illustrates this point. What set Mexico City, São Paulo, Rio de Janeiro, Santiago, and Caracas apart? In all but one of these cases, French aid and technology played a crucial role.⁴⁴ Each project demanded massive funding, and by partnering with national governments, France assured a dominant role for itself in these projects while also enabling national dreams of progress.

The main organization behind this wave of Latin American metro-building was the French Company for the Design and Construction of Urban Transport (*Société française d'études et de réalisations de transports urbains*, SOFRETU), an affiliate of the Paris transit authority (*Régie autonome des transports parisiens*, RATP). SOFRETU's first major project in the Americas was the Montreal metro, which opened in 1966, followed by the metros in Mexico City and Santiago. All three systems used rubber-tyre rolling stock, an innovation developed for the Paris metro that allowed French experts to promote their technology as cutting-edge in their negotiations with overseas officials; rubber-tyre metros were billed as providing an especially smooth, quiet ride, and for allowing tighter turns, sharper inclines, and faster starting and stopping times. SOFRETU also provided consulting and equipment for the Rio de Janeiro and Caracas metros, although these systems used traditional metal rolling stock. SOFRETU's footprint, in fact, extended far beyond Latin America. It was also active in promoting metros in the

42 L. Benmergui, *The Alliance for Progress and Housing Policy in Rio de Janeiro and Buenos Aires in the 1960s*, in: *Urban History* 36 (2009) 2, pp. 303–326.

43 Kwak, *A World of Homeowners*.

44 São Paulo was the exception. French engineers sought out this market, but São Paulo's project was awarded instead to a German-Brazilian consortium. On SOFRETU's "many years of effort" to establish itself in São Paulo, see the memo from R. Arasse to the President and General Director of SOFRETU, 28 April 1976, Box 3D 13, Archive of the *Régie autonome des transports parisiens*, Paris. The German-Brazilian consortium published its feasibility study for the São Paulo metro in 1968: *Hochtief-Montreal-Deconsult, Mêtro de São Paulo: Sistema Integrado de Transporte Rápido Coletivo da Cidade de São Paulo*, 2 vols, São Paulo 1968. On West Germany's development aid policies in the Third World, see H.-I. Schmidt, *Pushed to the Front: The Foreign Assistance Policy of the Federal Republic of Germany*, in: *Contemporary European History* 12 (2003) 4, pp. 473–507.

Middle East, and by 1983 it had a truly global reach, with activity in over 40 cities around the world.⁴⁵

The French metro agency was quite candid about its desire to export a certain kind of urban mass transit system around the world. In 1971, it published a six-page advertisement in *Life* magazine. “METRO: The Paris subway adds a stylish line,” it read, a reference to the new Regional Express Network (Réseau express régional, RER) being built in Paris. The emphasis on style was undeniable, with gleaming escalators, light glinting off the geometric design overhead, and a spacious expanse filled with light but few people. This was not merely a utilitarian mode of mass transit, but a space of style. The accompanying text read: “Métros for Export. With the success of the Paris Métro system, the French have become the most sought-after subway engineers in the world.”⁴⁶ For their part, French metro engineers were acutely aware of their role in promoting global metro construction. As the president of SOFRETU noted in 1982, “Paris leads the world in generating exports” of subways; the same year, the agency’s sales director boasted that it had, until recently, enjoyed a “world monopoly of subway exports.”⁴⁷

Crucial to French dominance in this industry was the French government’s willingness to provide and guarantee loans to help cover the massive price tag of these projects. In the case of Mexico City and Santiago, the French government worked directly with the Mexican and Chilean governments to provide hefty sums in exchange for the agreement to purchase French-made equipment. By 1973, French loans for the Mexico City metro had totalled 999 million francs (about \$225 million), from both the French government and private French banks.⁴⁸ In Santiago, loans had reached \$110 million by 1974, with more loans granted later that decade.⁴⁹ Journalists also noted that the French government’s “cut-rate loans and credits” to partnering governments gave it an edge in the competition for the metro market.⁵⁰

The export of metros to Latin America simultaneously served economic and political aims. It generated a market for French rail manufacturers while reinforcing French influence and prestige abroad. In fact, SOFRETU’s work, which began in the 1960s, can be seen as an outgrowth of Charles de Gaulle’s efforts to restore French “splendour.” Following the humiliations of World War II, the Algerian War, and decolonization, de Gaulle sought to rebuild French grandeur through major initiatives in science and technology.⁵¹ Most well-known was France’s development of nuclear weapons and nuclear

45 A. Jeux, L’expérience de SOFRETU et de la R.A.T.P. dans le domaine du transfert de savoir-faire, in: Revue générale des chemins de fer 102 (1983), pp. 401–412; M. Whitaker, The Metro Rules the World, in: Newsweek, 15 November 1982; P. Lewis, French Lead Way in Subway Exports, in: The New York Times, 18 October 1982.

46 Metro: The Paris Subway Adds a Stylish Line, in: *Life*, 7 May 1971, pp. 84–89, <https://books.google.com/books?id=LUAEAAAAMBAJ&printsec=frontcover#v=onepage&q&f=false> (accessed 8 April 2020).

47 Whitaker, *The Metro Rules the World*; Lewis, *French Lead Way in Subway Exports*.

48 J. E. Ulloa, *La Construcción del Metro*, in: *Sistema de Transporte Colectivo – Metro, El Metro de México: Primera Memoria*, México, DF, 1973, p. 19.

49 Chastain, *Vehicle of Progress*, p. 228, p. 254.

50 Whitaker, *The Metro Rules the World*.

51 T. Stovall, *Transnational France: The Modern History of a Universal Nation*, Boulder, CO, 2015, pp. 404–413. For

power, which went hand in hand with its diplomatic independence from the United States.⁵² Another key initiative was the modernization of the Paris metro system and the construction of the RER. The innovation of rubber rolling stock, developed through these Paris-based projects, could then be exported through the efforts of SOFRETU.⁵³ Moreover, France's presence in the sphere of metro construction was not unique. As Clément Orillard has shown, the late 1960s witnessed a flurry of French technical aid missions in urban planning in Argentina, Brazil, and Bolivia, a phenomenon that he terms "geopolitical urbanism." The coming together of France and Latin America in this decade – symbolized most memorably by de Gaulle's tour of Latin America in 1964 – was shaped by strong developmentalist governments in Latin America and by France's search for new markets and cultural influence in the wake of decolonization.⁵⁴

* * *

How should we interpret this transnational process that brought together Latin American urban planners and French metro developers in cities as far-flung as Santiago and Mexico City, Rio de Janeiro and Caracas? Was this a case of French economic neocolonialism, another instance of Latin American dependence on foreign technology and capital? There is truth to this view. The metro partnerships opened up new markets and benefited French manufacturers. They also entailed major foreign loans that tied Latin American governments to France, requiring that much of the money be spent on French services and equipment.⁵⁵

Yet this is not the whole story. The construction of metro systems, as critics alleged, was not about indulging in a luxury that these cities struggled to afford. In fact, many of these systems became essential infrastructure, relied upon by millions of residents of all social classes and critical to the survival of Latin America's most dynamic metropolises. They have reduced these cities' reliance on fossil fuels and helped to curb dangerous levels of air pollution.⁵⁶ Moreover, the Latin American-French technical partnerships have re-

more on French foreign policy in this period, including a chapter on de Gaulle in Latin America by Joaquín Fernandois, see C. Nuenlist, A. Locher, and G. Martin (eds.), *Globalizing de Gaulle: International Perspectives on French Foreign Policies, 1958–1969*, Lanham, MD, 2010. On French development aid in Africa, see G. Bossuat, *French Development Aid and Co-operation under de Gaulle*, in: *Contemporary European History* 12 (2003) 4, pp. 431–456.

52 G. Hecht, *The Radiance of France: Nuclear Power and National Identity after World War II*, Cambridge, MA, 1998.

53 Lewis, *French Lead Way in Subway Exports*.

54 C. Orillard, *Nueva generación de consultorías francesas y políticas desarrollistas en América Latina en los años sesenta y setenta*, article submitted to *Revista Iberoamericana*, 2020. I thank Orillard for kindly sharing his work in progress with me as I drafted this chapter.

55 This is true for the Mexico City and Santiago cases. While there is less documentation for Rio de Janeiro and Caracas, there is no reason to think that SOFRETU would have operated differently in these cases.

56 In 1992, Mexico City was deemed the most polluted city in the world. It has made major strides since then in combatting air pollution, including through improvements to public transportation systems (buses and metro) and restrictions on car use. See Mexico City-Harvard Alliance for Air Quality and Public Health, *Air Quality Surveillance*, 2014, <https://www.hsph.harvard.edu/cdmx/about-us/air-quality-surveillance/> (accessed 6 April 2020). While Santiago continues to struggle with air pollution and rising car use, changes to its public transportation system – including tighter vehicle emission standards and the integration of metro and buses – have helped mitigate the impact of vehicular pollution. See L. Gallardo et al., *Evolution of Air Quality in Santiago: The Role of*

sulted in the transfer of technology and expertise. While the benefits to local or national industries were uneven, these partnerships in some instances supported the development of domestic metro manufacturing industries, as in Mexico and Brazil.⁵⁷ And, not least, the maturation of metro systems in Latin America since the 1960s has generated new transnational collaborations – not just between France and Latin America, but within Latin America. Mexican machines and engineers were sent to Santiago, for example, and Brazilian experts observed the Santiago system as Rio readied its own line for operation. More recently, Santiago has provided consulting expertise in Buenos Aires and Caracas.⁵⁸ At a time when organizations like the World Bank did not fund metros in the developing world because they were not considered basic infrastructure, French funders had no such qualms. French metro boosters, organized and channelled by SOFRETU, constituted crucial protagonists in the broader story of Latin American urbanization in the mid-twentieth century. Nevertheless, they would not have been able to achieve such success without the existence of longstanding material realities and political demand for modernized forms of transportation in the region's rapidly growing cities. It was at the local and national level where metro proponents had to make the case that these systems were essential infrastructure, not a frivolous luxury. Once these arguments were won, and national funding secured, French metro experts were waiting.

Mobility and Lessons from the Science-Policy Interface, in: *Elementa: Science of the Anthropocene* 6 (2018) 38, p. 15.

- 57 On the increase in Mexican-made metro components, see Parpillon and Larraufie, SOFRETU, pp. 58–59. Concaril, the Mexican state railway manufacturer, supplied metro cars to Mexico City in the 1970s and 1980s; in the early 1990s it was sold to the Canadian firm Bombardier; see A. Escamilla Trejo, *Privatización y reestructuración de la industria de equipos ferroviarios en México (1993–2012): El caso de Concaril-Bombardier*, in: *Economía Informa* 395 (2015), pp. 70–106. In Brazil, Mafersa manufactured the first cars for the São Paulo metro in the 1970s; see D. Priscila, *Relembra a história da antiga frota A do Metrô de São Paulo*, in: *Rede Noticiando*, 20 June 2019, <https://noticiando.net/frota-a-historia/> (accessed 6 April 2020).
- 58 On Mexican engineers and machines in Santiago, see *Abren paso al metro*, in: *El Mercurio*, 28 July 1970. On Brazilian experts in Santiago, see *Metro de Santiago: Uno de los más completos del mundo*, in: *El Mercurio*, 5 March 1978. On Santiago consulting elsewhere in Latin America, see A. Mardones, interview with the author, 12 March 2015, Santiago, Chile.