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China's Expansion into Brazilian Digital Surveillance Markets

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Abstract

A number of countries in the global South have adopted anti-China rhetoric in recent years. Here, we seek to assess the relation of such rhetoric to procurement of Chinese digital systems. We use the example of Brazil during the Bolsonaro government, examining whether Bolsonaro's anti-China stance impacted procurement of Chinese surveillance technologies by sub-national (state/city) governments. We find that there has been broad and sustained procurement of Chinese surveillance technologies across the political spectrum; both among local governments politically allied to Bolsonaro and those from the opposition. Combined with acquisition at federal level, this suggests anti-China rhetoric does not feed through into procurement realities. Nor can China be singularly associated with diffusion of surveillance technologies as Western democracies have also been suppliers.

A. Introduction

In 2019, Brazil witnessed the rise to power of far-right, authoritarian-leaning political leaders both to the Presidency, with Jair Bolsonaro, and some of its local (state- and city-level) governments. Just 15 days after the beginning of Bolsonaro's government, an entourage of parliamentarians, all of them at the time members of Bolsonaro's then political party (Partido Social Liberal, PSL), arrived in China by invitation of the Chinese embassy in Brazil. The objective of the visit was for the lawmakers to learn about China's facial recognition-based surveillance system (Rebello 2019). During the visit, the parliamentarians expressed the intention to present a bill on their return to Brazil that would make facial recognition mandatory in public spaces to support public security.

These events are emblematic as they display the Brazilian far right's eagerness for surveillance technologies intersecting with the high potential for Chinese exports of such technologies. Stated in more general terms – that is, the existence of authoritarian-leaning political forces demanding surveillance technologies and China's willingness to supply – this conjunction has been increasingly interpreted by US think tanks and foreign policy as China's export of "digital authoritarianism" (Polyakova and Meserole 2019; US Senate 2020). This visit, however, did not unfold as one might imagine on the grounds of some sort of supposedly "authoritarian affinity" of the political forces in question: the visit was met with criticisms from Bolsonaro's close allies, while the President said he was "surprised" (Sadi 2019).

Bolsonaro, who was elected with an anti-China platform (Spring 2018), tended to automatically align with the Trump administration (2017-2021), which condemned Chinese surveillance hardware and software companies, banned US companies and nationals from doing business with these enterprises without governmental approval, and pressurised allies to do the same (BIS 2019a, BIS 2019b). Bolsonaro was not alone in this, with leaders in a number of global South countries adopting anti-China rhetoric of varying degrees and particularly during elections; for example, in Ghana, Indonesia, Kenya, Malaysia, Zambia and Zimbabwe among others in recent years (Sibiri 2020, Sibiri 2021, Schipani 2022). Such rhetoric necessarily comes into contact with China's sizeable and growing digital presence in the global South. In Brazil, for example, China already had a significant footprint in the supply of generations of surveillance cameras for public security, dating from when Brazil started implementing such technologies at scale in 2014 for the FIFA World Cup (Venturini and Stepanovich 2016).

Even though these systems are not exactly new in Brazil, the country – like many others in the global South – has recently witnessed the accelerated proliferation of high-tech digital surveillance systems, particularly those embedded with facial recognition. Such proliferation occurred in a context in which the pursuit of austerity policies by the federal government

rapidly worsened Brazil's social and economic indicators, provoking a major economic and social crisis (Carvalho 2022), which aggravated the country's extreme wealth and income inequality responsible for making the country one of the most violent societies in the world. As Brazil's urban violence has been treated as a matter of public security, so these systems have found fertile ground to spread. Hence, digital surveillance markets in Brazil have been booming under a government with authoritarian inclinations, whose head of state holds that "the enemy is not external, but internal [...] in a fight between good and evil" (Bolsonaro *apud* Casado 2022). For foreign enterprises in countries with surveillance-related technological capabilities, this situation presents a great opportunity for profits.

For China, however, the opportunity may be stunted if Bolsonaro's government and its anti-China position pose political obstacles for China's digital expansion. In this context, the present paper aims to study China's expansion in digital surveillance technologies in Brazil, particularly but not exclusively in surveillance cameras with facial recognition, during Bolsonaro's government (2019-2022). In doing so, it helps illuminate a topic little-researched to date: the relation between anti-China rhetoric and digital expansion realities in the global South. It also makes two further contributions to the existing literature on China and its export of digital surveillance technologies. That literature has to date mainly focused on national governments, neglecting local governments, even though for public security systems, local governments are the relevant level of policy decision, as "it is especially important to note that the officials who make the initial decisions on platform adoption are often subnational officials — typically municipal mayors, provincial governors, or the heads of public safety departments for various jurisdictions" (Greitens 2020, p. 8). Because of this, we here expose and analyse the role of sub-national (state- and city-level) governments, of varying political inclinations, in procurement of Chinese surveillance technology. In addition, we join the body of emerging literature that challenges viewpoints that associate supply of digital surveillance technologies to regimes in the global South solely with China.

To achieve these goals, the present paper is divided into four other sections. The next section is dedicated to reviewing the literature on digital authoritarianism that argues an exceptional role for China in export of digital surveillance. Analysing "digital authoritarianism", the section highlights how this concept has been operationalized by the US and its close allies with a view to containing China's digital expansion in foreign markets, and how this has particularly found an echo in Bolsonaro's government. The following section discusses the analytical methodology used in the paper i) to assess whether this echo has affected Brazil's procurement of Chinese surveillance technology at the local level, through Bolsonaro's political alliances with local governments, and ii) to characterize the political status of both demand and supply in Brazilian governmental surveillance markets in order to verify if China has been single-handedly propagating "digital authoritarianism".

Findings relating to these aims are next and the paper ends with discussion and conclusions sections.

B. Digital Authoritarianism: A Rhetoric of China's Digital Surveillance Export Exceptionalism

According to a Report of the Minority Staff of the US Senate Committee on Foreign Relations entitled "The New Big Brother: China and Digital Authoritarianism", published in July 2020, China's expansion in information and communication technologies (ICTs) is not merely economically-motivated, seeking to gain market shares and outpace the US technologically (US Senate 2020). China's expansion is "also a push to establish, expand, internationalize, and institutionalize a model for digital governance that this report describes as "digital authoritarianism"" (US Senate 2020, p. 6).[1]

What exactly constitutes digital authoritarianism? The report tells us, based on a Brookings' paper (Polyakova and Meserole 2019), that digital authoritarianism is "The use of ICT products and services to surveil, repress, and manipulate domestic and foreign populations." (US Senate 2020, p. 6). According to an analysis published by the Lowy Institute, an Australian think tank dedicated to international political, strategic, and economic issues, importing Chinese technology per se would ultimately pose a threat: "The danger for other countries importing Chinese technological solutions is that it will result in a growing acceptance of mass surveillance, habituation to restrictions on liberties, and fewer checks on the collection and use of personal data by the state […]" (Khalil 2020, p. 1). Hence, in this interpretation – shared also by other sources within a tranche of literature that particularly emerges from US think-tanks (e.g. Shabaz 2018, Cheney 2019, Hemmings 2020) – the expansion of China's digital technologies means the expansion of digital authoritarianism.

Ironically, the definition operationalized by the US Senate stems from the institution of a government that has used ICT products and services along with its allies – including Australia – to massively surveil both domestic and foreign populations, as proven by the Snowden revelations[2] (Greenwald 2014), in a sense making the US sort of the "Older" Big

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[1] "China's digital efforts erode democratic values and enable the rise of digital authoritarianism around the world. At best, China is selling digital technology that has remarkable capacity for surveillance and control to authoritarian or authoritarian-leaning countries with no second thought for the consequences. At worst, China is pairing its economic investment with aggressive outreach and training on Internet governance and domestic regulations to further inculcate authoritarian values and methods of social control." (US Senate 2020, p. 26)

[2] If any discussion on digital authoritarianism and the threat of Chinese technologies is to be taken seriously, then one should set the record straight regarding the threats posed by the competing technologies available in the market, for it has been demonstrated that importing US technology has meant mass surveillance and use of personal data by the US state. Snowden revealed that the US international surveillance system, in

Brother. The Brookings paper (Polyakova and Meserole 2019) gives a slightly different definition of digital authoritarianism, applying it only to authoritarian governments, which means that "democratic" governments can engage in all these activities and still not carry the label. Yet the danger of mass surveillance "and the collection and use of personal data by the state" aiming at social control (Khalil 2020, p. 1) is very far from being a particularity of China or of authoritarian regimes. All of this significantly reduces the scope for making distinctions between democracy and authoritarianism.

Nation-states across the world – democratic and authoritarian – have been implementing vast apparatuses of digital surveillance cameras across the urban fabric, making it every day more difficult to find a state that does not engage in mass surveillance. Although China seems to be the dominant supplier in surveillance cameras and highly competitive in "safe city" solutions, it is not the sole supplier of explicit surveillance technology to the capitalist periphery, as Woodhams (2020) and Lugt (2021) have shown in Africa, and Venturini and Garay (2021), Pisanu et al. (2021), and Reis et al. (2021) have shown in Latin America. Enterprises from both democratic countries like the US and authoritarian countries like China are supplying both democratic and authoritarian-leaning political regimes, as they are driven by the profit motive and compete for market share. Western states' singular association of "digital authoritarianism" with China hence does not match reality since those same states a) implement international mass surveillance systems, b) engage in domestic mass surveillance, and c) export surveillance technology to the capitalist periphery irrespective of regime.

What appears to draw so much attention to China in the supply of surveillance technology as to deserve the accusation of exporting digital authoritarianism, despite the existence of multiple suppliers from democratic countries doing exactly the same, is that Chinese companies are extremely competitive in surveillance hardware and embedded software and can dominate markets, particularly in the global South. The "concept" of digital authoritarianism has thus been operationalized by the US and its close allies in an attempt to contain China's digital expansion in foreign markets. According to a "Report Prepared on Behalf of the U.S.-China Economic and Security Review Commission", democracy curiously hinges on US market access: "if U.S. market access decreases, then so does the U.S. government's ability to promote democratic values and human rights through smart cities channels […]" (Atha et al. 2020, p. 110). As Greitens (2020, p. 8) recognizes, another huge

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cooperation with the other Five Eyes members (intelligence agencies from Australia, the UK, New Zealand, and Canada), operated in all the distinct layers of the telecommunication system: from the physical layer, with submarine fiber optic cable taps through collaboration with "intercept partners" (Guardian 2013a), i.e. commercial cable operators such as British BT and Vodafone Cable, and American Verizon Business (Guardian 2013b); passing through cooperation with telecom operators such as AT&T to couple surveillance equipment to the operator's routers and switches and redirect data to the National Security Agency (Gallagher and Moltke 2016); up to the application layer, in partnership with Internet service providers such as Google, Yahoo, Facebook, Skype, Microsoft, Apple, YouTube, AOL and Paltalk, in Prism's framework (NSA 2013).

problem for those competing with China in policing and public security platforms is that "Chinese companies appear to be outpacing the United States, and other countries, in setting emerging global standards for the use of these technologies". As the capitalist periphery of the global South becomes a new frontier for technological competition including the export of digital surveillance systems, so too, operationalization of the digital authoritarianism "concept" reaches that periphery to counter China's digital expansion. Brazil presents a pertinent example of these tensions.

In Brazil, US foreign policy and rhetoric against China's exports of surveillance technology has found an echo in Bolsonaro's government, which was situated directly under the US sphere of influence during the Trump administration. Emblematically, in a debate at the World Economic Forum, Bolsonaro's Minister of Foreign Affairs stated that Brazil was attempting to hinder the "techno-totalitarianism" of countries with "different models of society" through alliances with democratic countries, in a veiled criticism to China, according to Gross et al. (2021). More directly, Bolsonaro himself and those close to him have been critical both during his election campaign and after his election of Chinese investment in Brazil, of the effect of trade with China, and have joined US criticism of Chinese 5G technology, including accusing China of using 5G as a platform for spying (Spring 2018, Magalhães 2022, Vasquez 2022).

Hence, the enormous potential for China's expansion in surveillance technologies might have found political and diplomatic obstacles posed by Bolsonaro's government. Whatever the impact at federal level, one outcome was growing sub-national relations between China and Brazil, involving both state- and city-level governments. According to Belasques et al. (2020), "the aggressive rhetoric directed against China by high-level government officials, as well as the bad management of the bilateral relations by the Minister of Foreign Affairs Ernesto Araújo, have led the management of the interactions between Brazil and China to be in practice transferred from the Foreign Ministry to other actors with more pragmatic view, among them stand out the subnational units, individually or in consortium".

In seeking to contribute to the literature on China's export of surveillance technologies, this paper therefore has two objectives. First, we seek to understand whether political tensions arising from the rhetoric of digital authoritarianism – understood as a strategy to contain China's digital expansion that was both echoed and endorsed by Bolsonaro's government – have impacted procurement from China. Arising from the points just made, our focus will be sub-national governments, attempting to differentiate whether China's expansion was facilitated or hampered by those governments' political alignment/opposition to Bolsonaro. Since China is not the sole supplier of digital surveillance technology, sub-national governments in theory have other options for their purchases. On the other hand, as Greitens (2020) argues, in their procurement decisions, local officials might not be as prone to incorporate the values of the US foreign policy such as anti-China views.

Therefore, whatever the rhetorical or real impact of anti-China views and US foreign policy within Brazil's federal government, these tensions might not carry through to the local level, and the expansion of China's surveillance systems might be unaffected by such political tensions at the local level. In order to assess this, we will analyse mainly acquisitions of digital surveillance systems, scrutinizing primarily the deals carried out at state and city level in a set of selected representative localities.

Second, instead of assuming the mechanical and univocal link that associates China's exports of digital surveillance systems to authoritarian political systems or to political leaders with authoritarian inclinations – a link that supposedly sustains the thesis that China is single-handedly propagating "digital authoritarianism" across the world through such exports – the present paper seeks to shed light on the multiplicity of suppliers and demanders with diverse political statuses that compose digital surveillance markets through the case study of Brazil. Given Brazil's political make-up then, at the relevant level of decision for the acquisition of public security digital systems, we can differentiate democratic and authoritarian-leaning political forces in Brazil; and by focusing on the multiplicity of foreign suppliers, we can differentiate them as coming from democratic and authoritarian countries.

C. Methodology

In order to achieve these objectives, the research was conducted through the triangulation of evidence from four sources: academic literature; grey literature in the form of trade journals and other outlets; primary documentation in the form of government policy documents, official announcements, and government bid and procurement records; and interviews with state government officials from the Northeast region (chosen, as explained below, because it was the one region largely populated by parties opposed to Bolsonaro). This therefore provided for both data and methodological triangulation (Flick 2004).

While there is a body of academic literature on digital authoritarianism, there are few academic papers on the implementation of digital surveillance technology in Brazil, particularly with a focus on Chinese technology. Hence, grey literature and primary documentation were fundamental to complement the existing academic literature on the theme and track the surveillance deals being made in Brazil, especially involving Chinese firms. Complementing these sources, we also attempted to conduct interviews with local officials who participated in negotiations and/or received technical missions from Chinese tech companies. However, a series of obstacles severely reduced the number of possible interviews:

    i.   Our research started in late March 2022 and 2022 was an electoral year in Brazil, with all officials who wanted to run for office required to have left government by April 1st. Hence, many of those who participated in the relevant negotiations had left government at the beginning of our research; they were campaigning and were unavailable to give interviews.

    ii.   In two states, the local official who had negotiated with the Chinese tech company had been accused of being involved in corruption relating to procurement from China. One of them was removed from office and neither was available for interview.

    iii.   In one state, the official who negotiated with the Chinese tech company was removed from office because he was filmed in the integrated surveillance centre, where the feeds of all city cameras are centralized, when the police brutally repressed a peaceful political demonstration occurring at the same time, begging the question if the order for this action came from him.

More generally, there was a lack of willingness of local officials to be interviewed in relation to issues deemed sensitive such as surveillance or relations with Chinese firms. Given these obstacles, despite seeking interviews with eleven officials, we were ultimately only able to interview four local officials: three in bureaus of public security in Pernambuco, Piauí, and Rio Grande do Norte, and one in "Consórcio Nordeste" (Northeast Consortium; see explanation below).

C1. Research design

The research was carried out in two stages:

    i.   The first stage examined, in general terms, the adoption of surveillance technologies, particularly surveillance cameras with facial recognition, in Brazil, through the analysis of selected politically representative localities, since the beginning of the presidential term of Jair Bolsonaro in 2019.

    ii.   The second analysed specifically the relationship between China and the state governments of the Northeast region, stronghold of political opposition to the federal government, in the adoption of these technologies.

In the first stage, we selected local governments based on the following criteria: i) the state or city has had relevant experience with surveillance technology including facial recognition; ii) the combination of states and cities is representative of the political spectrum; iii) the combination of states and cities is representative of the experiences of different macro regions of Brazil (South, Southeast, Midwest, North and Northeast). In enacting the second criterion, we wanted to ensure representation ranging from i) the institutional left[3] opposition to Bolsonaro, passing through ii) the right-wing opposition (or partial opposition

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[3] Includes the left and the center-left.

– that means, which may agree with several economic points in Bolsonaro's programme but remain part of the political opposition) to iii) local government allies on the far right.

Our political classification of states and cities was based on the party of the chief of the executive branch, as follows[4]:

i. Partido dos Trabalhadores (PT, Workers' Party), Partido Socialista Brasileiro (PSB, Brazilian Socialist Party), and Partido Comunista do Brasil (PC do B, Communist Party of Brazil) as the institutional left/center-left,

ii. Partido Social Democrático (PSD, Social Democratic Party) and Movimento Democrático Brasileiro (MDB, Brazilian Democratic Movement) as center-right,

iii. Partido da Social Democracia Brasileira (PSDB, Brazilian Social Democracy Party) as right,

iv. Partido Social Liberal (PSL, Social Liberal Party) as far-right.

More important than precisely defining the content of this classification, this scheme indicates how, from a relative point of view, the different parties position themselves. In a simplistic and summarized way, the more to the right the party, the greater its tendency to support punitive policies and to increase ostensive repression in dealing with violence, and to support liberal policies in the economic field. In contrast, the more to the left the party, the greater the tendency to support less repressive policies and to focus on policies aiming at social inclusion, as well as to support a greater role of the state in the promotion of public policies. Such differentiation is common to the experiences of a number of other countries and, as will be seen, the important point highlighted is that adoption of surveillance technologies has been undertaken by governments right across the political spectrum shown above.

Table 1 displays the states and cities selected to represent Brazil's political spectrum in the first stage of the research, namely: a) at the far-right, Rondônia and Roraima, which are Bolsonaro's allies; b) as the partial opposition, São Paulo, which was initially an ally at the right but flipped, plus the city of Aparecida de Goiânia, and Foz do Iguaçu at the center-right; and c) as the opposition, Espírito Santo and the city of Campinas.[5]

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[4] Although not necessarily under the same rubric, the relative positioning of the parties presented above is consistent with the new ideological classification of Brazilian political parties presented by Bolognesi et al. (2021).

[5] This classification is not strictly rigid and was guided by the position of the states' and cities' governing parties relative to Bolsonaro, even though, in some cases, one might find some statements from the local government chief executive in disagreement with the general line adopted by his/her party. Such are the cases of Campinas and Foz do Iguaçu over the latest years, when the mayors appeared to be more aligned with Bolsonaro and/or his political allies.

Table 1. Selected states and cities representative of the Brazilian political spectrum

Region	State/city	Population	Governing party	Political profile	Position relative to Bolsonaro
North	Rondônia [state]	1.8 million	PSL	Far-right	Ally
North	Rorâima [state]	0.7 million	PSL	Far-right	Ally
Southeast	São Paulo [state]	46.7 million	PSDB	Right	Partial opposition (flip)
Center-west	Aparecida de Goiânia [city]	0.6 million	MDB	Center-right	Partial opposition
South	Foz do Iguaçu [city]	0.3 million	PSD	Center-right	Partial opposition
Southeast	Espírito Santo [state]	4.1 million	PSB	Center-left	Opposition
Southeast	Campinas [city]	1.2 million	PSB	Center-left	Opposition

Source: Population data from the Instituto Brasileiro de Geografia e Estatística (IBGE, Brazilian Institute of Geography and Statistics) and data on the ruling parties from the Tribunal Superior Eleitoral (TSE, Superior Electoral Court). Elaborated by the authors.

The second stage of the research was dedicated to a particular political geometry that seems to be propelling China's digital expansion: the political relations between the Northeastern governments of Brazil and China. The Northeast (Figure 1) is the poorest region of Brazil. During the last presidential elections, it was the only one of the five macro-regions in Brazil where Bolsonaro lost in every single state, and all states have elected governments that oppose or partially oppose Bolsonaro's federal government (Table 2). The Northeastern states have formed, during Bolsonaro's government, a political forum called "Consórcio Nordeste". Among many other political actions, this forum acted as a way for the Northeastern governments to negotiate directly with China, bypassing the federal government. Hence, in the research's second stage, we analysed the digital surveillance deals made by the states of the Northeast region and particularly identified those that might be considered a result of political talks and visits to China.

Figure 1. Brazilian states and macro-regions

Source: IBGE, adapted by the authors.

Table 2. Northeast states' political profile

Northeast states	Population	Governing party	Political profile	Position relative to Bolsonaro
Bahia	15 million	PT	Center-left	Opposition
Pernambuco	9.7 million	PSB	Center-left	Opposition
Ceará	9.2 million	PT	Center-left	Opposition
Maranhão	7.2 million	PCdoB/PSB	Center-left	Opposition
Paraíba	4.1 million	PSB	Center-left	Opposition
Rio Grande do Norte	3.6 million	PT	Center-left	Opposition
Alagoas	3.4 million	MDB	Center-right	Partial opposition
Piauí	3.3 million	PT	Center-left	Opposition
Sergipe	2.3 million	PSD	Center-right	Partial opposition

Source: Population data from the IBGE and data on the ruling parties from the TSE. Elaborated by the authors.

D. Findings

Overall, the evidence we gathered showed the involvement of Brazilian state and city governments across the political spectrum in the acquisition of Chinese digital surveillance technologies, and not merely those with authoritarian inclinations, while we found not only China as a supplier but also Western democracies.

D1. Stage 1: the adoption of surveillance technologies with facial recognition in states and cities across the political spectrum in Brazil

On the far right, despite Bolsonaro's political tensions with China, both of the representative states allied with Bolsonaro's government acquired and/or implemented Chinese digital surveillance technologies. In 2021, Rondônia acquired police special vehicles with security cameras with facial and license plate recognition systems through a bid won by a consortium of local enterprises – TB and Tecway – that supplied Dahua products (Revista Segurança Eletrônica 2021).

The case of Roraima is of particular interest as it was Bolsonaro's government itself, in 2020, through the Brazilian Agency for Industrial Development – a federal agency attached to the Ministry of Economy – which donated Hikvision cameras with facial recognition to the state for the FronteiraTech project to monitor the frontier between Brazil and Bolivia (G1 2021; Hikvision 2022). Hence, not only did the political tensions with China and the echo of the rhetoric of digital authoritarianism in Bolsonaro's government not impede his far-right allies in local government from acquiring Chinese surveillance technology, but also his own government made such acquisitions, in blatant contradiction with its discourse. As a result, Bolsonaro's government and its local allies in state governments have been directly contributing to China's digital expansion in surveillance technologies.

The partial opposition includes both the traditional right that initially supported Bolsonaro but flipped due to his denialism of the coronavirus pandemic, represented by São Paulo, and the center-right, represented by Foz do Iguaçu in the state of Paraná and Aparecida de Goiânia in the state of Goiás. In all cases, there was implementation of facial recognition technology for public security. Aparecida de Goiânia contracted from Huawei the implementation of 600 km of fiber optics supporting surveillance cameras with facial recognition – a project for which the city was awarded a Smart City international prize (Tavares 2019; Cardoso 2019). In Foz do Iguaçu, the federal Brazilian Agency for Industrial Development was again responsible for implementing Hikvision cameras with facial recognition in the context of the FronteiraTech project; this time to monitor the frontier with Paraguay (Hikvision 2022).

In the case of São Paulo, facial recognition was introduced as part of an automated biometric identification system (ABIS) for the state's Civil Police (Governo do Estado de São Paulo 2020). The Civil Police acquired the facial recognition system through a bid won in 2019 by the French company Thales Dis (Governo do Estado de São Paulo 2020), whose large database of biometrics can be linked with images extracted from surveillance cameras dispersed throughout the state (Boselli 2020).

It is noteworthy that, in contrast to surveillance cameras in which Chinese providers seem to predominate, in the supply of facial recognition technology in ABIS, French suppliers stand out in Brazil. Not only did Thales Dis provide the São Paulo system, but also Bolsonaro's government acquired through a bid, in 2021, an ABIS for the Brazilian Federal Police from a consortium formed by Iafis Brasil and the French multinational Idemia[6] (Telesíntese 2021). According to Tagiaroli (2021), such a system "will be capable of crossing the biometric data, as fingerprints and images of cameras with facial recognition, of 50 million Brazilians in the next 48 months […] it can be expanded to reach 200 million – almost the totality of the Brazilian population"[7]. Hence, in the provision of facial recognition software, we can find enterprises of a democratic country without discrimination supplying surveillance technology for both democratic political forces at the local level and authoritarian-leaning political forces at the federal level.

Regarding the opposition, at the center-left, represented by the state of Espírito Santo and the city of Campinas in the state of São Paulo, both localities were involved with Chinese surveillance technologies. In the case of Campinas, the city received a donation of surveillance cameras with facial recognition from Huawei to be tested in 2019 – in order to become an open-air laboratory – but eventually decided not to invest due to the high rate of misidentification in open spaces with huge flows of people (Reis et al. 2021). This is not the sole instance in which Chinese firms donated surveillance technology to Brazilian cities. For example, in 2017, the former mayor of São Paulo (and current governor of São Paulo) visited both Hikvision and Dahua. In each case, he asked for and was given a donation of 1,000 surveillance cameras and one drone for the city (Balloussier 2017). Additionally, in 2019,

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[6] "Morpho Safran, now called IDEMIA […] is a French multinational company dedicated to technology development, mainly focused on the sale of facial recognition products. The company has been criticized by Amnesty International for exporting digital surveillance technology to China, due to the human rights risk involved. IDEMIA was blamed for problems with the general election in Kenya in 2017, which resulted in the National Assembly canceling its existing contracts and banning it from entering into new ones. The decision was repealed by the country's Supreme Court" (Venturini and Garay 2020, p.12)

[7] According to Zanatta (*apud* Tagiaroli 2021), this system may be used for political persecution, though it would be illicit were it to be used by intelligence agencies and its use not to remain strictly confined to specific investigations for which the data is gathered. Zanatta's worries are plausible, specially after it came to light that an intelligence agency under Bolsonaro started to put together dossiers of antifascist public servants, particularly in public security and universities, and the government contracted an enterprise to monitor journalists according to their published standpoints vis-à-vis the government (Valente 2020a, 2020b).

Mogi das Cruzes, a city in the state of São Paulo, received a donation of surveillance cameras with facial recognition from Dahua for a safe city project (Secretaria de Segurança de Mogi das Cruzes 2019; Reis et al. 2021).

In the case of Espírito Santo, the state implemented a call for the acquisition of surveillance cameras with facial and license plate recognition, and a consortium of two local enterprises – Perkóns and Velsis – along with Dahua, was the winner (Fardin 2022). However, the process was contested, with an accusation of corruption emerging in the Brazilian media through a supposedly leaked pen drive containing internal documents and emails of Dahua. This was said to show Dahua to have been involved in the specifications of the call before it went public in order to guarantee that only its products would fit the call's specifications (Gordon 2021; Rangel 2021). Despite the accusations, Dahua remained part of the contract consortium and has already implemented the first phase of the surveillance project, in which 1,160 surveillance cameras feed into a Dahua big data-based analytics platform (inforchannel 2022; Tostes 2022). Regardless of the validity of the accusations, this exemplifies the building of ties and expansion of surveillance deals by Chinese firms with democratic political forces in Brazil. This is particularly true in the stronghold of political opposition to the federal government, the Northeast region, as discussed next.

D2. Stage 2: Chinese surveillance technologies in the Northeast region

Chinese firms were already providing surveillance technology to the Northeast region prior to Bolsonaro's government and to the current state governments. In 2018, in the city of Salvador in the state of Bahia, a pilot surveillance project implemented cameras with facial recognition, updating and expanding on previous surveillance technologies implemented since 2014. This surveillance infrastructure involved a Spanish enterprise as distributor: El Corte Ingles; a Swedish camera provider: Axis; and Chinese camera suppliers: Huawei and Hikvision (Secretaria de Segurança Pública do Estado da Bahia 2019; Reis et al. 2021). In Ceará state in 2017, Hikvision provided surveillance cameras without facial recognition through a consortium with two local enterprises, IPQ Tecnologia and Sysdesign (Governo do Estado do Ceará 2017).

During Bolsonaro's government, these states experienced a massive expansion of their surveillance systems. In the case of Bahia, Salvador's pilot program was expanded to 77 other cities (Gonçalves 2021). The winning consortium was led by Brazilian firms, Avante SA and Oi SA, but according to Bahia's governor, the actual camera suppliers are Chinese enterprises (Governo do Estado da Bahia 2021). In the case of Ceará, a call for the implementation of surveillance cameras with facial recognition was opened in 2020, and a local enterprise distributing Dahua products, IPQ Tecnologia, emerged as the winner in 2022 (Governo do Estado do Ceará 2022). Similar to the case of Espírito Santo, the bid process was contested and was paralyzed for more than a year due to suspicions of Dahua

potentially benefitting through call specifications tailored by the state government to fit its products (Uellner e Silva and Santos 2020). These allegations appear in a context in which Dahua had built close ties with the state government since 2019, when the state governor and local officials visited Hangzhou, where the company is headquartered, and met with Dahua's CEO, Fu Liquan, and the state received a technical mission from the company (Governo do Estado do Ceará 2019).

Several other states introduced facial recognition-enabled surveillance camera systems for public security during the period under scrutiny, for instance, Sergipe, Rio Grande do Norte, and Paraíba. In the case of Paraíba, the initial provider was a British company, Facewatch, whose system was installed in 2019 by a private enterprise for a large popular festival. Nonetheless, when the state entered the scene and opened a call for bids for purposes of public security, Hikvision emerged as the major winner and dominated the market, surpassing Facewatch (Pisanu et al. 2021, p. 13; Reis et al. 2021, p. 14). In Rio Grande do Norte, surveillance cameras with facial recognition were first introduced in 2019 (Tribuna do Norte 2019). A local enterprise, Interjato, won the bid and supplied Hikvision's and Huawei's cameras to the state (interview Rio Grande do Norte 2022). However, the facial recognition software was not Chinese; instead, Interjato supplied Intellect, a program developed by the Russian enterprise Axxonsoft (interview Rio Grande do Norte 2022). Other states, such as Pernambuco and Piauí, are seeking to introduce these technologies, and opened calls for bids in 2022 (interview Pernambuco; interview Piauí).

Regarding the sources of funding for the acquisition and implementation of these surveillance infrastructures, a multiplicity of sources has been observed. In Rio Grande do Norte, acquisition of the Chinese and Russian facial recognition surveillance technologies (via the local enterprise Interjato) was financed with funds from the World Bank (Tribuna do Norte 2019; interview Rio Grande do Norte). In Pelourinho, in Salvador in the state of Bahia, a project to implement facial recognition surveillance technology used resources from the Inter-American Development Bank (Alves 2021). In both instances, surveillance technologies were thus funded by established institutions of development finance dominated by the democracies of the global North.

Beyond international sources of funding, and those provided by local-level budgets, there have also been national funds allocated for the implementation of surveillance systems. For instance, the Brazilian Development Bank (BNDES), in the city of Teresina in Piauí, funded a "project that has as a focus, regions with high rates of criminality" (BNDES 2020). Alongside its role noted above in other regions, in the Northeast, the Brazilian Agency for Industrial Development has funded a smart city project in Petrolina in the state of Pernambuco (Hikvision 2022), as well as a project in the city of Itabaiana in Sergipe (Connected Smart Cities 2022) and the city of Campina Grande in Paraíba – the latter in partnership with the Northeast Development Superintendence (Sudene) (Ministério do Desenvolvimento

Regional 2022). Additionally, the National Fund for Public Security has been earmarking funds for the implementation of facial recognition since 2019 (Martins 2020) by means of ordinance nº793, through which the federal government regulates financial support for actions to combat violent crime, "fostering the implementation of video surveillance systems with facial recognition solutions, by optical character recognition - OCR, use of artificial intelligence or others" (our translation) (Diário Oficial da União 2019). These funds have been used to support a pilot project in each region of the country (Peduzzi 2019).

At least in the case of Petrolina – as well as in the initiatives of FronteiraTech discussed in the previous subsection – Brazilian federal funds, through the Brazilian Agency for Industrial Development, were spent on Chinese surveillance technology. In contrast, in none of the surveillance projects researched in this paper, and from neither interviews nor documentation, was it possible to identify any Chinese funding, even though we could not rule out the possibility that such funding existed.

As expected in the Northeast, due to the underdevelopment of the region, one of the major constraints for the spread of digital surveillance technologies is the lack of proper infrastructure. Meanwhile, the demand for surveillance technologies itself becomes a vector for the development of such infrastructure. In this context, the operations of Huawei and ZTE in the region should be differentiated from those of Hikvision and Dahua. While these are all providers of surveillance cameras with facial recognition, Hikvision and Dahua have a surveillance-only strategy, that means, to just provide cameras and facial recognition software. By contrast, Huawei and ZTE, which operate in multiple layers of the ICT stack, have an integrated approach to expansion in the region and are able to implement both vertical and horizontal integration strategies, as explained next.

According to Bruno Zitnick, the director of Public and Government Relations at Huawei Brazil:

> "Huawei has a range of options for smart cities devices such as security cameras and facial recognition and license plate cameras, solutions for city control that bring cost savings to public management, and for that connectivity is essential. We are seeing in the current scenario everyone talking about the arrival of 5G, but we also have to understand that the expansion of fiber optics in the infrastructure of cities and that the implementation of these technologies makes cities smart" (Zitnick *apud* Prefeitura de Aracaju 2021)

As this quote reveals, smart cities are largely conceived as surveillance technologies, and the development of fiber optics appears as a means for the development of surveillance infrastructure. In this context, surveillance cameras can be seen as the first (and preferred) application by which these Chinese tech firms that operate in different layers of the stack seek to expand into the application layer after they have built a foundation in the network

equipment and telecommunication infrastructure layers. Hence, their strategy is to vertically integrate from their infrastructural foundations into applications.

Those infrastructural foundations, from which both companies are seeking to expand into surveillance applications, are strong in the Northeast region. The region hosts the transatlantic link to Africa built by Huawei in 2018 in the city of Fortaleza, Ceará (Huawei 2018). Meanwhile in Piauí, where a bid was open at the time of writing for the acquisition of surveillance cameras with facial recognition (interview Piauí), ZTE – along with Cisco, Gemelo, and Furukawa – provides the fiber-optic infrastructure for the public-private partnership program, Connected Piauí (Piauí Conectado), that seeks to connect the whole state (Piauí Hoje 2020). Due to this program, Piauí, despite being one of the poorest states of the country, has the fastest internet in Brazil (Méliuz *apud* Governo do Estado do Piauí 2021). Piauí's program is a model for a similar program for the whole of the Northeast region under discussion by Consórcio Nordeste – Connected Northeast (Nordeste Conectado) – in which both Huawei and ZTE may well be involved (interview Consórcio Nordeste). Furthermore, following the many visits made by Northeastern governors and officials to China in 2019, the state of Alagoas consolidated further investments to double the capacity of the Chinese ZTT Cable fiber optics factory hosted in the state, which serves not only the region but also the whole country (Pimentel and Buarque 2019).

If the surveillance and facial recognition market constitutes the preferred and first application through which Chinese conglomerates Huawei and ZTE target the application layer, this market also represents a "bridge" between the telecom infrastructure market and the broader multi-domain application market. The surveillance market is hence the entry point into the application layer from where they seek to expand further to other sectoral applications, in a horizontal integration strategy, particularly to other governmental services. For example, according to Ricardo Mansano, Huawei's solutions manager: "Our suggestion is for governments to start from the setting up of the part of public security and traffic, which can be adapted to other ends" (Mansano *apud* Balago 2021).

The horizontal integration strategy stemming from the surveillance market is particularly evident in the operations of Huawei in Bahia. Here, the state government started by acquiring surveillance technology from the company and, subsequently, moved to buy education and health "solutions". These acquisitions were so large that Huawei decided to open a South America technological demonstration center for government – which includes public security, education, and health – in Bahia to showcase its "solutions" for the continent (Gonçalves 2021).

Huawei's operations in Bahia – a state where, as noted, its surveillance system is being scaled out to 77 cities and where Huawei's horizontal integration strategy has thrived – is arguably the most successful and advanced case of a Chinese tech firm's digital expansion

into government at the local level in Brazil. Such expansion has been built through the development of close political ties between Bahia and China since 2019, when the governor visited China. According to Tian Min, General Consul of China in Rio de Janeiro:

> "The State of Bahia has been keeping a friendship and cooperation agreement with the Chinese government. The governor Rui Costa has been personally to China and has promoted even more this pragmatic bilateral partnership, and he has all our support. In this moment, both parts are striving to develop diverse projects, and the Chinese government supports the Chinese enterprises respecting the rules of the market to develop these projects in Bahia". (Governo do Estado da Bahia 2021)

Hence, the political relations between the governments of Bahia and China have not only propelled the digital expansion of Chinese firms into the governmental services of Bahia but have also acted as point of support for the further expansion of Chinese enterprises in the country and the continent through its demonstration center. Emblematically, Rui Costa, Bahia's governor, in a virtual seminar about digital technology hosted by the Chinese Embassy in Brazil and the Chinese General Consulate in Rio de Janeiro, stated: "I come here to give my extremely positive testimony about the relationship between Bahia and China, and say that possibilities are very large for the use of technology for the development of health and education, in the advancement of smart cities, in the pursuit of a better public security, using technological tools" (Governo do Estado da Bahia 2021).

E. Discussion

As evidenced in our review above, a significant tranche of literature on China's digital expansion in the global South is imbricated in a particular US-centric discourse that incorporates a rhetoric identifying China's digital exports as the epicentre of digital authoritarianism (Shahbaz 2018, Cheney 2019, Polyakova and Meserole 2019, Khalil 2020). Both influenced by and influencing this literature, US foreign policy has adopted a position and rhetoric that portrays China as a digital threat and this has found an echo in the politics of some global South countries particularly, but not solely, during election campaigns, with Brazil being a prime example. Some few papers have emerged challenging the notion of Chinese exceptionalism in export of surveillance systems that can be used for authoritarian purposes (e.g. Lugt 2021, Venturini and Garay 2021) but we found no in-depth investigation assessing whether anti-China rhetoric in the global South materialises in procurement decisions for digital systems.

Our main contribution to the literature, then, is the finding that there is no such materialisation in Brazil. It is beyond the scope of this paper to assess whether anti-China rhetoric in Brazil has been deliberately confected solely for public consumption but certainly we can see it has little material substance in terms of procurement. Despite the rhetoric of Jair Bolsonaro and allies against Chinese investment and trade, including specific criticism of

Chinese digital exports, we find that there has been a broad and sustained procurement of Chinese surveillance technologies in Brazil. This procurement includes those agencies of government specifically aligned to Bolsonaro: the federal government itself and local government allies of the far right. However, it also includes local governments right across the political spectrum, suggesting there is no real connection between rhetoric and procurement.

If "digital authoritarianism" as a concept and rhetoric was conceived as a US strategy to contain China's digital expansion in third markets, it does not appear to have worked in Bolsonaro's Brazil. Despite Bolsonaro's anti-China platform, the US foreign policy echo found in Brazilian foreign policy during the Trump Administration, and the political tensions that were generated with China, at the end of the day, these manifestations have mostly remained at the rhetorical level. Not only did any attempted US influence on Brazil's federal government not carry through to the local level, but also the federal government itself has not put its discourse into practice since it has been involved in many acquisitions of Chinese surveillance technology.

For those global South countries which are part of China's Belt and Road Initiative (BRI), including its Digital Silk Road components, the literature portrays digital procurement as significantly linked to actions of the Chinese state including Chinese state funding (Erie & Streinz 2021, Tugendhat & Voo 2021). Brazil is not an official member of BRI and, perhaps linked to this, we found little evidence of an overriding role for the Chinese state. The Chinese embassy in Brazil has been an important actor; for example, facilitating the invitations for local and other government agencies in Brazil to visit China. But the core activities have been visits by government officials to the headquarters of Chinese tech firms, and counter-visits of technical missions from these firms to Brazilian cities and states. It is thus the relationships between Chinese tech firms and Brazilian government agencies that have underpinned procurement, though sometimes with accusations that the relationships had become too close as in the case of Dahua in the states of Espirito Santo and Ceará. Funding has come from local, federal and international sources but with no evidence found, as least from the more-detailed investigation of the Northeast region, of Chinese state funding. At the least, this shows that China's digital engagements with global South countries are more varied than a picture of Chinese state-led activity would suggest.

US rhetoric and also some strands of the literature on China's digital expansion associate digital authoritarianism with China on the supply side, and with national authoritarian or quasi-authoritarian regimes in the global South on the demand side (Black 2019, Cheney 2019). Our key contribution in this regard has been to show that, in investigating the spread of China's digital surveillance systems, attention must be paid not merely to national but also to sub-national governments. Given they are the main bodies responsible for public security, it is city and state governments that have been the primary locus for the

procurement of Chinese surveillance technologies, their implementation and all associated issues.

In two ways, our findings here provide support for emergent research that has been critical of surveillance-focused literature about China's expansion in the global South. First, in supporting research that challenges the notion of a Chinese monopoly of surveillance exports (e.g. Lugt 2021, Venturini and Garay 2021). Our case research has shown that, while Chinese companies have dominated the Brazilian market for facial recognition-enabled surveillance systems, China is by no means the sole source for these technologies. Firms from Western democracies have provided – for example – facial recognition software to both private and public security forces, in the case of France and the United Kingdom; acted as distributors of Chinese surveillance technologies, in the case of Spain; and supplied surveillance cameras in competition with China, in the case of Sweden. It is notable, though, that we only found one example of a Western firm competing head-on with Chinese firms in supply of surveillance cameras; a market in which Chinese firms seem to have a strong competitive edge. Most Western firms were instead competing in complementary market niches such as software, distribution or systems integration. Building on this, our findings contradict any picture from the literature of Chinese surveillance firms as detached entities acting in isolation from other actors (Shahbaz 2018, Feldstein 2019). Chinese firms were part of consortia involving local and, not uncommonly, Western firms, and are thus one part of an ecosystem.

Our findings also support literature seeking to open up the simplistic association of Chinese surveillance technologies with un-democratic, authoritarian regimes of the global South (Feldstein 2019, Woodhams 2020). This applies in the general sense that Brazil is a democracy that has shown a good appetite for these technologies. It also applies more specifically, given we have shown that, while far-right governments in Brazil have been adopting Chinese surveillance technology, so also have those of the centre-right and centre-left. Any picture focussed solely on Chinese technology supply meeting undemocratic, authoritarian national government demand is shown to be far too simplistic, with multiple sources and levels of both supply and demand emerging from these cases, including some instances of demand in the absence of any Chinese supplier[8].

F. Conclusions

The implementation of widespread apparatuses of digital surveillance cameras across the urban landscape became commonplace in the higher-income countries of the world during the 2000s. From the 2010s, the countries of the global South became increasingly involved

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[8] Though we do acknowledge the argument that surveillance systems can introduce authoritarian tendencies into even democratic regimes (Hintz & Milan 2018).

in absorption of these infrastructures and their associated practices. With China's rapid ascent as a supplier of surveillance equipment, the global South then found itself part of a rush for markets and spheres of influence by the technologically-capable great powers, including US geopolitical and economic interests promoting the idea that China was exporting "digital authoritarianism" and should be blocked from so doing. This was part of a broader US-led attempt to resist the rise of China's engagement in the global South; an attempt that found echoes in the anti-China rhetoric of some global South regimes, including that of Jair Bolsonaro in Brazil.

Our findings, though, have found no evidence that the anti-China rhetoric of the Bolsonaro regime impacted procurement of surveillance technologies from China. Chinese firms have been the overwhelming beneficiaries of the active build-up of surveillance infrastructures in Brazil, supplying cameras, software and the associated infrastructure such as fiber optic cables to buyers across the political spectrum and at federal, state and city level. Invitations to visit China and Chinese tech firms and the building of relations with Brazilian political actors have occurred with far-right parliamentarians and sub-national officials, as well as for those of the centre-right and centre-left and also including the Northeast of Brazil, stronghold of political opposition to Bolsonaro's government. If it is a US device to limit Chinese exports then the construct of "digital authoritarianism" appears not to have worked as intended, at least in this one instance of Brazil. It is further undermined by the many-to-many pattern revealed, rather than it being China as the only supplier, and authoritarian governments as the only consumers. Instead, we found supply of surveillance technologies coming from many countries including a number of Western nations, and demand coming from many different types of government in Brazil including those with both more and less authoritarian leanings.

While the Chinese state, in the form of the local Chinese embassy, has played a role, it is Chinese tech firms who emerge as the dominant actor on the supply side. Firms such as Huawei and ZTE may prioritise full-stack, integrated strategies but others such as Hikvision and Dahua supply technologies that form part of an overall multi-source package that often includes Western technologies. Add in the lack of evidence of Chinese state funding, and this evidences a more varied and less Sino-centric model of technology exports to the global South than seen in much of the literature to date.

Indeed, the case presented here is more generally an argument to move away from Sino-centricity towards at least a more balanced view that understands the role of the domestic context in adoption and use of surveillance technologies. One result is that, rather than analysing just at the national government level as almost all past work has done, there was a need to incorporate the sub-national level because that is an important site for decision-making about public security.

Just as our broader understanding of demand for surveillance technologies in Brazil should be shaped by the domestic context, the country of origin of these technologies is less relevant than other associated issues. The fact that these technologies are Chinese, French, US, etc., is less important than the fact that they are being implemented at all. It is well known that the causes of crime and violence in Brazil are rooted in the extreme income and wealth inequalities of the country (Sachsida et al. 2010). To upgrade and strengthen the state repressive apparatus does not address that root cause, especially with these technologies currently criticised for violating privacy and having biases which, in particular, may reinforce the racism of police action in the country and may serve for political persecution. Such are the concerns about this that, in June 2022, a multiparty movement named "sai da minha cara" ("get out of my face") was formed by parliamentarians acting in state and municipal legislatives in 13 different states, seeking to present legal proposals to ban the use of facial recognition in public spaces (Nakagawa 2022). While, if successful, this would disproportionately impact Chinese firms, the bigger issue is surveillance technology and its use and regulation in Brazil, not the country of origin of the technology.

This case also speaks to another much broader and long-standing issue within Brazil, which is its dependency or otherwise on foreign technology (Adler 1987, Goedhuys & Veugelers 2012). Consuming technology should not be mistaken for development. If the productive structures and capabilities remain outside Brazil, then it does not develop its own capabilities and its technological dependency increases. If surveillance technologies – Chinese or otherwise – are just imported, then they will fit this pattern. This may be further reinforced if, as seen in the strategies of some Chinese firms, these technologies are the gateway to other digital "solutions" in sectors such as health and education. From this perspective, policies would be needed to counter the current approach; ensuring greater technology transfer from all foreign multinationals and greater investment in local research and development (and science and technology more generally) in order to build up local innovation and production capabilities.

In sum, while the expansion of Chinese surveillance technologies in the global South is an important issue, we must always recognise the broader domestic context and issues into which those technologies are inserted.

Acknowledgements

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