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Developing a Transit-Oriented Development Strategy for the Lima Metro: Challenges and Opportunities

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Abstract

In this paper, we explore how the benefits of transport infrastructure investments could be amplified by improving urban planning, land use and development of neighborhoods surrounding Metro stations in Lima, Peru. Concretely we propose actions in the following 3 areas: (a) the cadastral system of Lima to support the land value capture of potential TOD and urban renewal areas; (b) the development of land value capture instruments to be applied; and, (c) the strengthening of the capacity of the local authority in charge of the formulation and development of a potential TOD project.

Key Words: transit oriented development, land value capture, cadaster

I. Introduction

Economic and institutional reforms have paved the way for Peru's recent period of sustained socio-economic progress. Between 2000 and 2014, economic growth reached an annual average rate of 5.3%. Thanks to this economic dynamism, by 2008 Peru reached upper middle-income status. Starting in 2005, Peru saw the positive impacts of growth on poverty reduction: between 2005 and 2009, poverty rates declined from 48.7% to 34.8% and reached their lowest level of 21.8% in 2015.

Despite its successful path, the country now faces new challenges to complete its economic transition to a high-income country - leveraging higher productivity and supporting new drivers of growth and employment creation. About 80% of the GDP per capita gap between Peru and the 17 richest OECD countries is explained by low labor productivity. In addition, the country must close its large spatial social and economic disparities. Despite the impressive poverty reduction of the last decade, at least 40 percent of the population is still vulnerable to falling into poverty and there remain large gaps in income and human development across the socio-economic spectrum.

With over 23 million people (close to 80 percent of the total population by 2015) living in urban areas, cities will have a central role in facilitating Peru's transition. City governments can play an important function in turning urban spaces into engines of growth. To help create a conducive environment for the generation of information exchange networks, education, and job opportunities, cities need to have to access to the necessary resources – including financial, technical and institutional capacities.

One of the ways to leverage financing is to capture the increase of land value generated by major infrastructure works in the surrounding areas and utilize these resources for the provision of goods and services. For example, the building of public transit systems creates opportunities to foster Transit Oriented Development (TOD) by including these works in the city development plans and applying different land value capture instruments. In the Lima Metropolitan Region (LMR) the ongoing construction of the second line of the Metro system (Metro Line 2) provides such an opportunity. Unfortunately, various institutional barriers, capacity issues at the municipal level, and the lack of instruments to manage land in urban areas currently hinder land value capture by the public sector, thus allowing such value increases to benefit primarily the private sector.

This paper explores the interplay between land administration and transit oriented development. Banking on years of sustained economic growth, the Peruvian Government is intending to modernize Lima – a thriving but chaotic capital city – by developing a functional mass transportation system. Urban regeneration projects require complex land assembly processes for their implementation. Hence, clear and updated cadastral information about land rights and real estate, sound land administration tools, and efficient land management capabilities and coordination mechanisms among the different levels of government could facilitate the investment in public infrastructure. At the same time, the capture of value generated by mass transportation projects could enable the transformation of Lima into a more organized and environmentally friendly urban space and improve the living standards of its citizens.

The objective of the study is to review the status and options for improvement of three main components of a transit oriented development (TOD) strategy for the LMR, using the Metro Line 2 as a basis; these components include: (a) the cadastral system of Lima to support the land value capture of potential TOD and urban renewal areas; (b) the development of land value capture instruments to be applied to help finance urban infrastructure and services in the TOD area; and, (c) the strengthening of the capacity of the local authority in charge of the design and implementation of a potential TOD project. The methodology applied includes a desk review, interviews with key public and private stakeholders, legal and institutional analysis, and field work in the Lima Metropolitan Region in the municipalities of Santa Anita, El Agustino, Lima and La Victoria.

In the first section of the paper we describe the context of the Lima Metropolitan Region; the second section reviews the bottlenecks and opportunities in terms of the development of the urban cadaster system, the leveraging of land value capture instruments, and the institutional framework that would be required to implement a TOD project in the LMR. In the final section we draw conclusions based on the analysis.

II. The Lima Metropolitan Region – a growing megacity with a complex institutional framework in need of improved land use planning, urban mobility, and increased investment in infrastructure

The rapid pace of the urbanization process in Peru has hindered the ability of municipal governments to provide housing, infrastructure, and services to their growing populations. A considerable share of the urban population lacks adequate housing: 55 percent of Peru's households with two working members cannot

afford a formal house. Thus, only 30 percent of new housing supply is generated by the formal sector. Government's efforts in housing programs are still limited compared to the size of the housing gap: while public investment in housing (1999-2014) was US$3,300 million, Peru's estimated housing gap is US$34,000 million. Most of the population—both in Lima and in the main cities—solve their housing needs in the informal market by building or acquiring substandard units that have higher exposure to earthquakes, flooding and landslides. Cities are also characterized by deep infrastructure gaps. For example, despite high levels of public investment in water and sanitation, access to water can be inequitable, as it costs up to 65 Soles (S/.) per 5 cubic meters in informal urban settlements, compared to only S/.12 in residential areas.[1]

Historically, the capital city of Lima, located on the Pacific coast, has been at the center of economic and political activity in Peru. Today, Peru is one of the countries with the highest primacy in the world; the Lima Metropolitan Region (LMR) is home to more than 9 million people, and accounts for 32 percent of the population (40 percent of urban population) and 45 percent of the national GDP. Unplanned urbanization and internal migration have increased disparities between the city's affluent neighborhoods and the informal urban dwellings on the urban fringes. Lima has grown tenfold since the 1950s. The capital has become a sprawling city where the cost of delivering services is becoming higher due to low-density expansion. In addition, Lima has one of the lowest ratios of access to green spaces per capita compared to other cities in the region, with only an estimated 2 square meters of green spaces per person.

Per the decentralized framework in Peru, local governments are responsible to plan and finance local level investments, while the national government sets the policy direction and plans and finances investments that are national priorities (e.g., the Lima Metro system). The institutional framework for the management of the LMR is complex, characterized by multiple actors and limited coordination. The LMR is comprised of 43 districts; each with its own budget, governance structure and investment plans. This fragmentation of actors, and a low capacity of a coordinating governance structure at the metropolitan level, complicates infrastructure investment, service provision, mobility and traffic management, and urban planning.

Only a few district municipalities within the LMR, such as San Isidro, Miraflores and San Borja, have the capacity to plan investments in a strategic and integrated manner. There are overlapping spheres of authority among local and national government agencies regarding critical components of urban land development, especially for land use planning (e.g., legal approvals, regulatory oversight, and timing and amount of

[1] Systematic Country Diagnostic. Peru. Report # 112694-PE. February 2017.

capital funds). Furthermore, there is a lack of alignment of incentives between sectors, the municipality and the private sector to work together to encourage vibrant mixed land-use developments and affordable housing.

To become a more livable, sustainable city, Lima needs to increase its own-source revenue generation capacity, introduce Land Value Capture (LVC) mechanisms, improve its asset management capacity, and increase the involvement of the private sector to finance urban infrastructure. The districts in the LMR are reliant on fiscal transfers from the national government and do not have a framework or agency in place to manage their municipalities' land assets to attract private sector investment. Limited financial capacity to carry out strategic infrastructure investments (e.g. urban mobility, basic services, housing), and insufficient urban planning and management instruments to attract and partner with the private sector in urban renewal projects are barriers to increasing the productivity and the livability of the LMR.

A prerequisite for success in the introduction of this modern urban management instruments is the existence of an updated cadaster. A well-functioning cadaster system empowers actors at all levels, whether the individual homeowner who can demonstrate legal tenancy of their housing, or the municipal or provincial government that is able to plan appropriate areas for a city or metropolitan region's future growth. The strengthening of urban cadasters can help local government improve their city planning and land use management by clarifying the rights, restrictions and responsibilities over real estate assets. For example, urban planning tools can help municipal governments address issues such as densification, protected areas or areas at risk of flooding, etc. as well as areas that could be targeted for future growth and expansion.

In terms of urban transport, major investments such as the Rapid Transit Bus system (BRT, known locally as the *Metropolitano*, 23 km) and the first line of the Metro system (34 km) have been operating since 2011. The *Metropolitano* and Metro Line 1 carry approximately one million passengers daily, which represent 9% of the transit trips in the city. To improve the quality and scope of the mass transit system in the city, in 2010 the National Government adopted a Plan for the Metro Network in Lima and Callao (DS No. 059-2010-MTC). This plan includes the current Metro Line 1 and five new lines, for a total network of 168 km. Currently 27.3 km of Line 2 and a segment of 7.7 km of Line 4 are being built. The Metro and the BRT investments have been important steps in the process of modernization of the transport system of Lima, which have reduced travel times and improved citizen accessibility to jobs, markets, and public services.

These types of large scale urban infrastructure and transport investments typically trigger redevelopment processes. Line 2 of the Lima Metro provides an opportunity to redesign and redevelop areas near the stations and to capture the value of real estate development resulting from the construction of such infrastructures. Hence, the city blocks around these stations become strategic areas for the development of transit-oriented development (TOD) projects to promote local redevelopment (e.g., upgrade urban infrastructure and amenities, promote densification, mixed land use), if the institutional arrangements and the urban instruments were in place.

III. The cadastral system of Lima – an opportunity to strengthen land management and promote TOD projects

Local governments could greatly improve the effectiveness of development policies and investment planning by leveraging updated cadastral information and spatial data in urban areas. This type of data and information on land parcels is also a basic requirement for utilizing land value capture instruments as well as developing TOD projects. In Peru, a main obstacle for engaging the private sector is the lack of robust cadastral systems at the district level that allow for the identification and valuation of existing real estate assets, which in turn limit the potential for the city to be able to leverage land value capture instruments (World Bank, 2014). Based on a review of the 43 districts in the LMR, most have outdated cadasters: they include an incomplete number of the properties, and do not include current infrastructure. Moreover, land values do not reflect actual prices. A few municipalities in the LMR have their own cadasters, some more updated than others. There is, however, no platform that would allow integrating cadastral information across municipal boundaries.

According to Peru's Organic Law of Municipalities, enacted in 2003, urban cadasters are decentralized and are the exclusive responsibility of the municipalities. According to the law, all cadasters - regardless of the size of the municipality - must comply with the same technical standards established at the national level. This "one size fits all" system design, coupled with lack of knowledge, technical skills, and funding, along with the lack of enforcement mechanisms at the SNCP disposal have resulted in districts with very low capacity to use cadasters, either for the introduction of standards, for urban planning, or for tax collection purposes. Only eight urban municipalities (which are primarily located in the LMR) currently have updated cadasters and the remaining 522 have outdated or non-existent cadastral information, and most of them lack the capacity to improve it. As a result, property tax collection is not a significant source of income at the

municipal level. Peru has one of the lowest levels of property tax revenue in the region: about 4.2% of local government income comes from this source. In comparison, in Chile and Brazil municipal collection accounts for 25-30% of municipal revenues, respectively.

The institutional framework for the implementation of the urban cadastral system in Peru consists of a committee that comprises representatives of more than 15 national and local agencies. The National Integrated Cadastral Information System (SNCP) was created by Law Nº 28294 of 2004, with the basic purpose of regulating the integration and unification of standards, nomenclature, and technical processes of the different cadaster generating agencies. After more than 10 years, the SNCP has not achieved significant results in its mission to promote the development of cadasters, achieve national coverage, consolidate existing information, achieve its integration with registries, or its application for planning purposes.

In reviewing the opportunities for improvement in the LMR, the team analyzed cases from other countries. For example, in Bogota, Colombia, the local government has developed over time a multipurpose cadaster system that respond to different city planning and taxation needs. A multipurpose cadaster should have applications including: territorial mapping and planning, preservation of environmental areas, property registration and property ownership, a real estate observatory, and support for the control and collection of revenue for municipalities. Likewise, the development of the cadaster may be carried out in phases, including: i) a cadaster for purely tax purposes, followed by ii) an intermediate cadaster incorporating tax and registration aspects, and over time, iii) a multipurpose cadaster that incorporates fiscal and planning aspects.

In the case of Peru, strengthening municipal cadasters requires national leadership that combines several aspects, such as: i) the improvement of the institutional framework (regulations and procedures to ensure the production of cadasters with acceptable standards and integrated with public registries); ii) the strengthening of key technical aspects for the improvement of tax collection such as the land and property valuation methodology to better reflect market prices and the system of property tax rates to allow modifications at the local level, and (iii) the creation of incentives and the strengthening of technical capacities at the municipal level for the creation, updating and use of multi-purpose urban cadasters.

The Santa Anita district in Lima was used as a case study of the proposed methodology to develop a municipal cadaster for a future TOD. Santa Anita is one of the districts that will be crossed by the Metro

Line 2 and has an estimated number of close to 50,000 cadastral units. The municipality is highly dependent on transfers from the national government as property tax revenues are small, mainly due to limited tax compliance. Given the anticipated increase of property prices associated with the Metro Line 2 investments, a simulation of the expected increase in property tax collection that could result from an updated cadaster and a streamlined process of revenue collection. For that purpose, the administrative processes were identified and the general costs, yields, and a financial plan were produced according to a timeline specific to the case of Santa Anita. While no valuation aspects were taken into consideration, at the current values, just with updated cadastral information, an improved collection process could help the district more than double its property tax collection and even recover the initial investment to build and update the cadaster in as fast as two years. This process also included the identification of lessons learned and recommendations for the implementation of the cadaster in other districts of Lima and more broadly in Peru. Box 1 presents information about cadastral development and property tax collection in the district.

Box 1: Case Study of the Santa Anita Municipality in the Metropolitan Region of Lima, Peru

Santa Anita is one of the 43 municipalities of the Metropolitan Area of Lima. It has a surface area of 1,069 hectares and a population of more than 215,000 people, of which around 25 percent lives in areas vulnerable to natural disasters. Five stations of Line 2 of the Lima Metro, which is currently under construction and will cross Santa Anita, are going to be built in the municipality. According to municipal estimates, Santa Anita contains 23,611 plots and 31,100 cadastral units. However, the National Statistics Agency estimates that there are approximately 47,000 housing and commercial units. The district's annual property income amounts to US$3.7 million. The tax compliance rate among small taxpayers (households) is around 50 percent.

Image 1. Location of the Municipality of Santa Anita, Metropolitan Region of Lima

Image 2. Aerial photography of Santa Anita

Based on the field work carried out in Santa Anita, a key recommendation is to allow for the staged development of the cadaster system, starting with the development of a fiscal cadaster to be used for property tax collection —and over time, the development of a multipurpose cadaster. The fiscal cadaster seeks to consolidate a cadastral database that matches the tax information of a territorial agency; in turn, the intermediate cadaster will define additional standards for its application, and the multipurpose cadaster will link the cadastral processes with the registry and will serve as an information system for land use planning processes, real estate observatories and the application of LVC instruments.

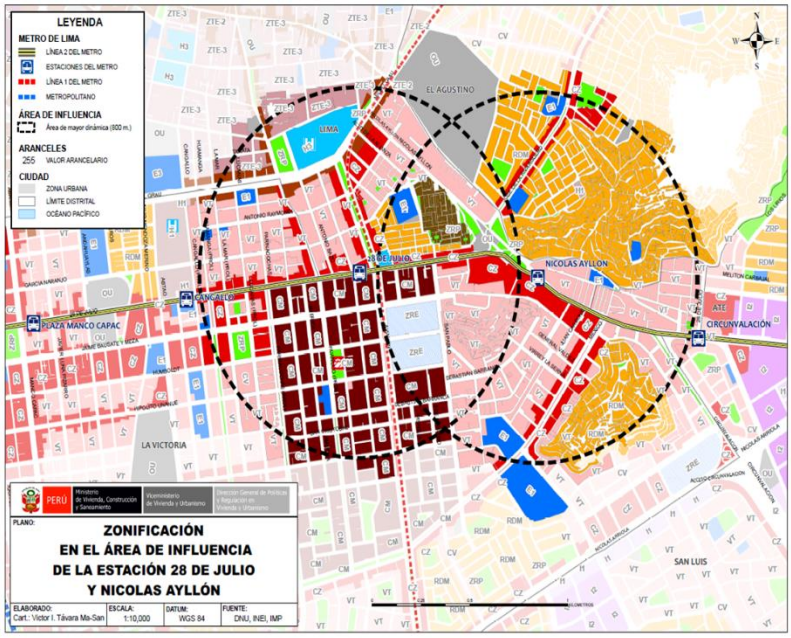
The first stage of the cadaster system development requires institutional strengthening at the municipal level. For example, using Santa Anita as a case study, we recommend the creation of an implementation unit, the building of an information system and standards, implementation support and monitoring would all be part of the first phase of development. The main organizational aspects included in the model are: i) the establishment of a project management unit under the mayor's office and the cadastral and revenue municipal branches, whose main functions are the operation of the cadaster, the provision of technological support, and municipal tax collection. Within this project management unit, it was also recommended to create a quality control and supervision office as well as to establish a team that performs the updating and synchronization of cadastral databases.

To scale this model to the national level, institutional adjustments would be required to allow the creation of a national unit or agency that undertakes a governing role for urban cadasters; however, this agency would need to operate within the country's decentralization framework. Its role would be to provide technical assistance, support institutional capacity building of municipalities, and seek ways to make urban cadasters and their operation more flexible and cost-efficient. For example, this agency should promote partnership schemes between different municipalities / districts to leverage economies of scale and reduce transaction costs for cadaster development, which would enable more cost-efficient service provision. Furthermore, this agency could generate the basic products for cadastral management (satellite imagery, parameterization of an integral management system, software licensing, implementation of the national geodetic network, implementation of good practices, development of new models of property valuation, implementation of real estate observatories, among other activities that would allow for a cost-efficient support to the districts in the preparation and updating of their cadasters.

IV. Potential Land Value Capture Instruments

The implementation of a TOD strategy in Lima requires a strong urban planning and management regulatory framework, which would include the use of Land Value Capture Instruments (LVC). This type of instruments enables the government to capture a percentage of the maximum value of the land that is a result of an urban redevelopment, infrastructure, or real estate project. For example, the reconfiguration of the urban environment of the Metro stations in Lima translates into the generation of a greater value of the adjacent land, given the accessibility improvements that the Metro System produces in the surrounding areas, which promote real estate valuation dynamics. The recovery of this greater value involves mobilizing, for the benefit of the community, part or all the increase in the value of the land that has been generated by actions unrelated to the owner, such as the construction of transport infrastructure or the decisions on modification of land uses.

Figure 1: Zoning Map of the 28 de Julio Metro station



Source: Ministry of Housing, Construction and Sanitation, 2016

Given the complexity of the institutional framework from the national, regional and local levels affecting the LMR, the team carried out an in-depth review of the land value capture options. For this part of the work, we used a Metro station (28 de Julio) as a pilot to test which land value capture instruments could be applied. The selection of this pilot Metro station was based on a series of criteria, including the availability of data related to land parcels, the potential for private investment, and since this station already benefits from mixed land use and commerce in the surrounding area; it is also located in the center of Lima and spans three municipalities – Lima, El Agustino, and La Victoria. Figure 1 shows the zoning map of the 28 de Julio metro station, while Box 2 provides more details on the potential projects that could form part of a TOD pilot in this area.

Box 2 - Key variables for selecting the 28 de Julio Metro station as a pilot

Variable	Status
Municipalities	Lima, La Victoria, El Agustino

Zoning	Public recreation area, education, hospital, commercial areas, demarcated area with special regulations, housing, medium residential density, other land uses.
Relevant information	▪ The cost of expropriations will be approximately US$20 million, according to our estimates. ▪ The area of influence of the station is known to be a deteriorated area, and an intervention associated with the Metro line could catalyze its revitalization.
Strategic Projects	Road improvements along Jr. Huánuco, tramo Av. 28 de Julio - Av. Grau y and internal road improvements along Avs. Grau, Aviación, 28 de Julio y Jr. Huánuco, Distrito de Lima, Provincia de Lima
	Road improvements along AA.HH. Manzanilla II, bordered by Nicolás Ayllón, 28 de Julio, Aviación y Vía expresa Grau, Distrito de Lima, Provincia de Lima
	Building of the Parque del Migrante, distrito de La Victoria, Provincia de Lima
	Urban Uprgading along La Av. Bauzate Y Meza Tramo: Av. Paseo De La Republica Y Av. México, Distrito de La Victoria - Lima

Source: Authors and JFP y Asociados, 2017

In addition, we reviewed the following documentation: i) the land use master plan in the area where a potential TOD investment could occur, ii) the specific urban regulations applicable to the development of a real estate project around the Metro station, iii) the existing urban land management and acquisition procedures; and iv) the administrative regulations for local authorities for implementing LVC instruments.

Based on this analysis, we determined the following main opportunities for LVC:

- **Leverage the existing land use plans to determine potential uses and opportunities for LVC.** The Metropolitan land use plan of Lima (PDM) is the instrument that should govern the city's development process and contain the main policy aspects regulating urban conditions and activities. Although the infrastructure of the Metro System is considered a part of the National Railway System, the fact that it is physically located in the LMR and affects the development and expansion or densification of the city should justify its inclusion in the PDM. Moreover, the areas surrounding the Metro Line 2 should be defined in the plan as urban redevelopment corridors. However, upon review of the documentation, the LMR does not have an updated, approved PDM in place that meets these criteria. Nevertheless, it is to update the Municipal Development Plan of Lima to include these points and to define the generating and receiving areas for transfer of development rights. This is applicable when t the city decides not to develop an existing land plot for whatever reason/ In this case, the rights can be transferred to another location where the city wants to promote development.

- **Identify urban regulations that are applicable in the proposed project area.** The formulation of a TOD strategy including LVC instruments needs specific urban conditions for its area of influence around the transport corridor that is being targeted for redevelopment to be able to assign differential urban uses and enable the incidence of more profitable, mixed use land development. For this reason, it would be necessary to adjust the planned general zoning at the metropolitan level and the definition of specific development parameters by using mechanisms such as special regulatory zones (ZRE). These zones are specific areas where the urban regulations could be modified, as defined by the PDM of Lima or the Urban District Development Plans (PDU) that are supposed to be prepared by each district, in coordination with the Lima Metropolitan Region and adopted by the Planning Department of Metropolitan Lima (IMP). It is also necessary to define specific urban regulations as, “the zoning for the area of influence of the Metro System and its stations”.

- **Review Urban Land Management Mechanisms.** In addition to the zoning of a specific area that has been prioritized for urban redevelopment or TOD, the selection of instruments to be applied for urban land management and land acquisition is crucial for the success of the project. These instruments should guide the urban management process by selecting a specific area for land readjustment, proposing new urban regulations for that area, and identifying the public agency that will be responsible for managing those changes. In the case of Lima, there are three key instruments that appear feasible: a) the issuance of a project announcement (*anuncio de proyecto*) to single out a specific district for the implementation of an

urban redevelopment project and establish the baseline price of the land; b) the identification of a land management agency to champion this type of land management and acquisition, such as an urban land operator (*ente gestor-banco de tierras)* to enable either the national or local government to perform land acquisitions; and c) the readjustment of zoning areas, which specifies the uses permitted and the applicable regulations, as well as building height, size and location, use of open spaces, and other related land issues.

- **Identification of potential LVC instruments that could be used in the short term in a pilot TOD area.** The main LVC instruments that municipalities can use are defined in the Regulations for Territorial Conditions and Sustainable Urban Development (known locally as the RATDUS).[2] However, to be able to implement these instruments, the municipality must comply with additional national and metropolitan regulations. Notwithstanding, some LVC instruments could be applied in the short term by municipalities by changing their urban development plans (PDU), including: (a) special contribution for public works, (b) capital gains in those districts that have updated cadaster systems, such as San Isidro, Miraflores, San Borja, etc., and additional transferrable building or air rights. The identification of the destination of the additional development rights would serve as an incentive to developers to support the construction of urban infrastructure in the surrounding area of the Metro.

Table 1 presents the specific type of LVC instruments and the corresponding recommendations for their implementation in a TOD area.

Table 1: Types of LVC instruments and recommendations for their use

Type of LVC	Recommendation
The special contribution for public works is regulated at the metropolitan level, with specific conditions for its implementation.	This LVC should be applied by the construction of municipal and district infrastructure projects. Even though the instrument would not be applicable for the construction of the Metro System (since it is a national infrastructure project), it could be applied in the construction of urban infrastructure of a pilot TOD area

[2] Enacted by Supreme Decree N° 022-2016-VIVIENDA on December 22nd, 2016.

	(such as public spaces, local roads, local public facilities).
The Regulations for Territorial Conditions and Sustainable Urban Development (RATDUS) recognizes the possibility that municipal administrations could benefit from the capital gains generated by the development of a real estate project.	To put this instrument into practice, the Metropolitan Planning Institute of Lima (IMP), or the Office of Urban Development within the corresponding municipality of the LMR, would need to implement the capital gain tax.
The main objective of the Additional Transferrable Building Rights instrument is to promote urban development along the primary or metropolitan road systems in the areas identified in the municipality's Urban Development Plan (PDU). The following are considered as generating and receiving areas: • Generators: Premises located in areas reserved for the creation or expansion of urban facilities, public spaces and / or public recreation, construction or expansion of primary or metropolitan roads in the urban area of cities. • Receivers: o Plots of land located in front of primary or metropolitan roads. o Zones identified for urban development in the PDUs.	The definition of generating and receiving areas should be included in the PDM and specifically described as part of the municipality's PDU.

Source: Authors and JFP y Asociados, 2017

Even though the Peruvian regulatory context is not very conducive for the inclusion and regulation of instruments for value capture, there are some additional instruments at the metropolitan level that could

facilitate the implementation of strategies aimed at this purpose. For example, a land use plan or "*plan especial*,"could be developed to target a specific area. It could include guidelines for local public spaces, the road system, and public facilities and the use of LVC instruments as a financing source for TOD local infrastructure. The development of these plans in the surrounding area of the Metro stations would also help identify opportunities for the construction of TOD pilot projects. The picture below shows the current density and use of land near the 28 de Julio Metro station.

Area surrounding the 28 de Julio Metro Station: Intersection of Av. 28 de Julio and Av. Aviación

Source: JFP Asociados

Finally, municipalities in Lima could work with national government agencies to take the following key actions for land value capture: i) first, launch an urban regeneration program around a Metro station under the responsibility of municipal-level agencies (such as EMILIMA[3], PROLIMA).[4] This could be carried out in coordination with the Ministry of Housing, Construction and Sanitation (MVCS), which can provide support during the process; ii) second, designate an agency as a land bank or public urban operator with the ability to buy and sell land and to manage urban and transport components in the TOD area; this could be done by leveraging existing agencies and institutions so as to avoid the creation of a new agency (potential actors could include the Autonomous Authority of the Electric Mass Transportation System for

[3] Empresa Municipal Inmobiliaria de Lima (Lima Municipal Real State Company)
[4] Programa Municipal para la Recuperación del Centro Histórico de Lima (Municipal Program for the Recovery of the Historic Center of Lima).

Lima and Callao -ATTE,[5] and/or the Ministry of Housing's Program for Urban Land Management - PGSU[6]), and iii) develop an urban revitalization program that includes components such as social housing development, which would be included in the PDM and in the target municipality's PDU.

V. Building the capacity of local authorities to pilot TOD projects

The development of an institutional arrangement is one of the first steps to strengthen the capacity of local authorities for implementing a TOD project in the area of influence of a Metro station. As previously mentioned, Peru has a complex multi-level institutional framework; various institutions at the national, sub-national and district level share similar roles for urban land use planning, urban management and transport system implementation. According to Suzuki et al. (2015), decisions and actions to enable the implementation of TOD should focus on the definition of mechanisms and instances that guide the coordination among different actors, considering the complexity of the implementation of systems of transport and urban development. Fragmented institutional structures and traditional institutional arrangements with agencies with highly specialized sectoral competencies (transport, taxation, planning and land use) are one of the greatest obstacles to integration between transport and land use.

To determine a viable institutional arrangement for a pilot TOD project in the LMR, we reviewed relevant legislation and consulted government agencies at the municipal, regional and national levels to review: (i) their administrative roles and functions, (ii) their roles in the application of the different instruments, plans and administrative procedures, and (iii) their role in the building of the Metro infrastructure and in the urban development investment decisions that were made in target areas.

The diagnostic of the institutional arrangements for the Metro system, urban planning and development, and LVC instruments, highlights a lack of coordination among the different levels of government, across sectors, and among various instruments, complicating the implementation of TOD in the LMR. The main limitations for constructing the Metro system in coordination with the city's urban development efforts result from systemic institutional issues. For example, AATE is in charge of working with the Ministry of Transportation and target municipalities on the construction of Lima Metro Line 2. However, this agency

[5] Autoridad Autónoma del Sistema Eléctrico de Transporte Masivo de Lima y Callao (Autonomous Autority of the Mass Electric Transportation System of Lima and Callao), a national level agency under the Ministry of Transportation and Communications.
[6] Programa de Generación de Suelo Urbano (Urban Land Generation Program) of the Ministry of Housing, Construction and Sanitation.

has no role in the implementation of urban development programs in the area of influence of the Metro, because these programs fall under the purview of the municipal government. This means in practice that if a Metro station is constructed, the district municipality where the station is located is ultimately responsible for providing connecting urban infrastructure; this is not considered in the Metro contracts or by AATE. In addition, plans and decrees at the national level regulate the construction and operation of the Metro system, while municipal decrees regulate urban planning and development around the Metro lines. A third issue is the lack of clarity regarding which entity or instrument determines the area of influence of the Metro line and the corresponding actions required to promote real estate development and land value capture in that target area.

Given that the responsibility for the regulation of the uses and land use near the Metro is assigned to the municipalities and the Metropolitan Municipality of Lima, any structuring - under the current legal framework –to develop pilot projects for the application of value capture strategies must have the participation of all of these levels of government.

Based on the review of the exiting legislation, the proposed mechanisms to improve the coordination of national-metropolitan and district level actors would include: i) the design of a TOD coordination mechanism between the Ministry of Housing (MVCS) and the relevant districts; this mechanism would be led by the Ministry as it has the responsibility to lead urban development programs and can promote programs that include urban mobility; ii) the adoption of an interinstitutional agreement that defines the role and activities of entities required for TOD implementation (such as the Ministry of Transport and Communications, ATTE, MVCS, Proinversion, the Lima Municipal Urban Development, IMP, and the Municipal Urban Transport Department, and iii) a TOD institutional framework that could include the establishment of an institutional and administrative committee, a technical committee, and an urban-transport development corporation (JFP y Asociados, 2017).

This proposed institutional arrangement seeks to establish a basis for effective implementation of specific urban projects associated with transport infrastructure. It provides a flexible structure that establishes a common roadmap for action where interaction is facilitated and cooperation between actors is encouraged as part of a learning process. Creating coordination groups and signing binding agreements to address issues

that cut across sectors and levels of government has also been a common practice in Peru for other issues; thus, it could be adapted to suit the needs of a TOD pilot in Lima. [7]

VI. Conclusions

In Peru, although national governments enact urban development strategies and policies, the metropolitan and municipal governments have the fundamental role of implementing these policies. Weaknesses of existing institutional and regulatory frameworks for coordination between transport and urban development, and the existence of many urban actors -including the multiple levels of governments and their agencies, private property developers, and landowners- make coordination between transport and urban development inherently complex. However, it must be done.

Going forward, the Government of Peru could take steps to conduct a land governance assessment that incorporates the dimensions of land use, ownership, value capture prior to investing in large scale transport infrastructure to crowd in private sector support. The government could also encourage better coordination among the national agencies working on transport and urban development to leverage future Metro investments (or other large-scale infrastructure investments) and to ensure the surrounding land values benefit the public sector and are not solely captured by the private sector, as is currently the case.

Political will and ownership are crucial for the success of a TOD project in Lima, which would be complex as it requires the participation of a series of actors at different levels, as well as to integrate the urban development and transport sectors. In addition, TOD project development requires the early engagement and active participation of local authorities (at the national, Metropolitan and district levels) to ensure that their knowledge of the area and its historical, social, economic, and cultural characteristics inform the design and implementation of the TOD intervention.

[7] The following can be referenced as examples:
"Multisectoral Commission for the recovery of the quality of the water resources of the Rimac River basin" attached to the Ministry of Agriculture. This commission was created by Supreme Decree No. 022 of 2012, with the purpose of coordinating, establishing, determining, carrying out follow-up actions, promoting the necessary investments and the issuance of technical reports, for the recovery of the quality of the water resources of the Rimac River basin. It has the participation of ministries of the national level and the Regional Governments of Lima, Callao, the metropolitan municipality of Lima, Provincial of Callao, Provincial of Huarochiri.
Permanent Multisectoral Commission to Combat Illegal Logging", created by Supreme Decree No. 052-2002-AG and adapted to Law No. 29158 - Organic Law of the Executive Power through Supreme Decree No. 076-2014-PCM. The purpose of the commission is to propose actions that contribute to the fight against illegal logging, in defense of forest resources and wildlife. The commission is chaired by the representative of the Presidency of the Council of Ministers.

As a starting point, the government could select a Metro station where the conditions for TOD appear to be beneficial (political interest, proximity to the Metro, availability of land parcel data, mixed use development, cadaster, etc.) and work with the private sector to launch a pilot urban redevelopment program. However, to do this, it will be important to identify an agency within the government to champion the initiative and assume the responsibility for a TOD project's implementation.

Finally, further exchange of lessons learned and opportunities for LVC needs to be carried out to sensitize district government officials to the potential uses and benefits of these instruments.

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