

Sustainable Mobility

Development in Tarapoto, Peru



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**Title: Sustainable Mobility Development
in Tarapoto, Peru**

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Contents

I INTRODUCTION	I
2.1 BACKGROUND	
2.1 Background of Tarapoto	2
2.2 Tarapoto's Urban Transport System	4
2.3 Challenges	6
3 INTERNATIONAL CASES	
3.1 Kigali, Rwanda	7
3.2 Bogota, Colombia	9
3.3 Ji'an, China	11
4 PRINCIPLES AND FRAMEWORK	13
5 INTERVENTIONS	
5.1 Micro-Level: Improve the Mototaxi's Sector	15
5.1.1 "Keep Green" Action	
5.1.2 "We are Professional" Action	
5.1.3 "Digital Tarapoto" Action	
5.1.4 Impact Analysis	
5.2 Meso-Level: Improve the Roads	20
5.2.1 "Paving the Roads" Action	
5.2.2 "Street for Life" Action	
5.2.3 Impact Analysis	
5.3 Macro-Level: TOD	23
5.3.1 TOD at Different Levels	
5.3.2 Impact Analysis	
6 CONCLUSION	26
REFERENCES	27

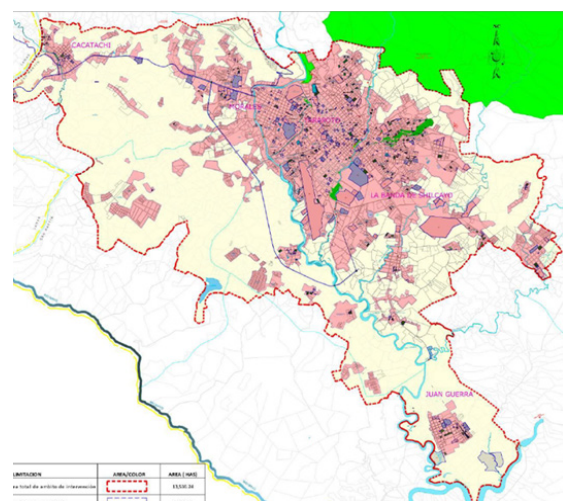
1 INTRODUCTION

The structure and characteristics of an urban transport system are determinants for the development of a city. They are capable of improving livelihoods or creating barriers, exclusion, or spatial segregation.

The city of Tarapoto has developed an urban transport system according to its particularities. In this context, the mototaxi's industry has assumed a leading role when defining the city's transport face. While this system has become popular for its practicality, not much attention has been given to the development of a more sustainable and inclusive transport system.

This report is intended to develop a series of recommendations for Tarapoto that may help to improve the conditions of its transport system while fostering inclusive and sustainable mobility. This will be oriented by international cases and the current work deployed by the San Martín's Municipality (MPSM) in its Master Plan.

In section 2, we describe the background of Tarapoto and the main challenges faced by its transport system. Section 3 describes the experience of three different cities while leading with some challenges in their transport systems. Section 4 elaborates a framework of analysis that will guide our interventions. Specific interventions are presented in Section 5. Finally, the report ends with a summary of our analysis in Section 6.



2 BACKGROUND

2.1 Background of Tarapoto

The city of Tarapoto is located in the department of San Martín and the province of the same name. It is located in the north-east of Peru and the high-jungle sector.

As the territorial organization of Peru is divided into departments, provinces and districts, the city of Tarapoto is conceived as the conurbation of five different districts, three of them connected as an urban unity (Morales, Tarapoto, and La Banda de Shilcayo) and two additional districts that are economically related and dependent of them (Cacatachi and Juan Guerra) (MPSM, 2019:19).

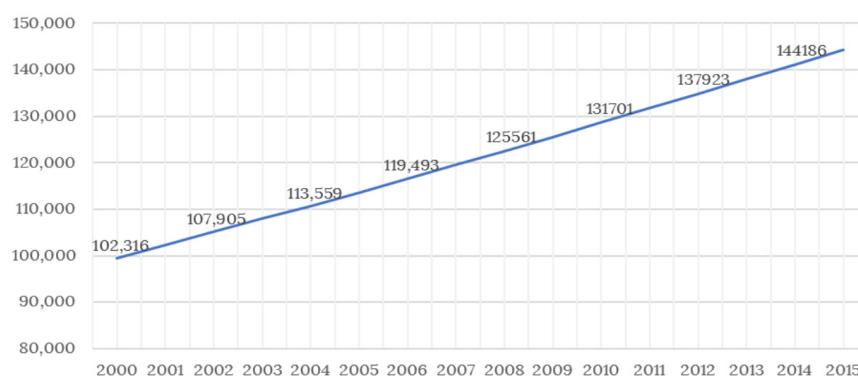


Figure 2.1: Urban growth in Tarapoto (Source: Authors, based on INEI, 2017)

N°	DISTRITO	Población					Tasa de Crecimiento			
		1972	1981	1993	2007	2017	1972-1981	1981-1993	1993-2007	2007-2017
1	TARAPOTO	22,051	36,256	54,581	68,295	76,122	5.7	3.5	1.6	1.1
2	CACATACHI	1,105	1,445	2,219	2,978	3,604	3.0	3.6	2.1	1.9
3	JUAN GUERRA	2,632	2,873	3,142	3,224	3,907	1.0	0.7	0.2	1.9
4	LA BANDA DE SHILCAYO	4,006	6,682	13,558	29,111	43,481	5.8	6.1	5.6	4.1
5	MORALES	3,532	4,920	14,241	23,561	33,067	3.8	9.3	3.7	3.4

Table 2.1.1: Distribution of the Population (Source: MPSM, 2019)

In 2017, the city of Tarapoto reached a population of 160,181 people (MPSM, 2019:40). Figure 2.1 depicts the trend of the population's growth, while Table 2.1.1 shows the population's distribution between the five districts that integrate the city.

There are almost 75,000 people that integrate the economically active population. The majority are located in the three main districts of the city, while a small proportion is located in the dependent districts of Cacatachi and Juan Guerra. Almost 38% of these people identify themselves as independent workers (MPSM, 2019:96), where the mototaxi's drivers represent the highest share of such sector. Table 2.1.2 (MPSM, 2019:96) shows the distribution of the workforce between districts and activities.

Category	Tarapoto	Cacatachi	Juan Guerra	La Banda de Shilcayo	Morales	Total	%
Total	37,082	1,438	1,589	18,296	14,869	73,274	100.00
Employer	2,704	83	42	1,076	994	4,899	6.7
Independent worker	13,335	732	628	7,339	5,225	27,259	37.2
Employee	15,318	306	426	5,931	5,869	27,850	38.0
Laborer	4,296	287	418	3,302	2,246	10,549	14.4
Worker in a familiar business	822	18	33	311	282	1,466	2.0
Home worker	607	12	42	337	253	1,251	1.7

Table 2.1.2: Distribution of the Workforce (Source: MPSM, 2019)

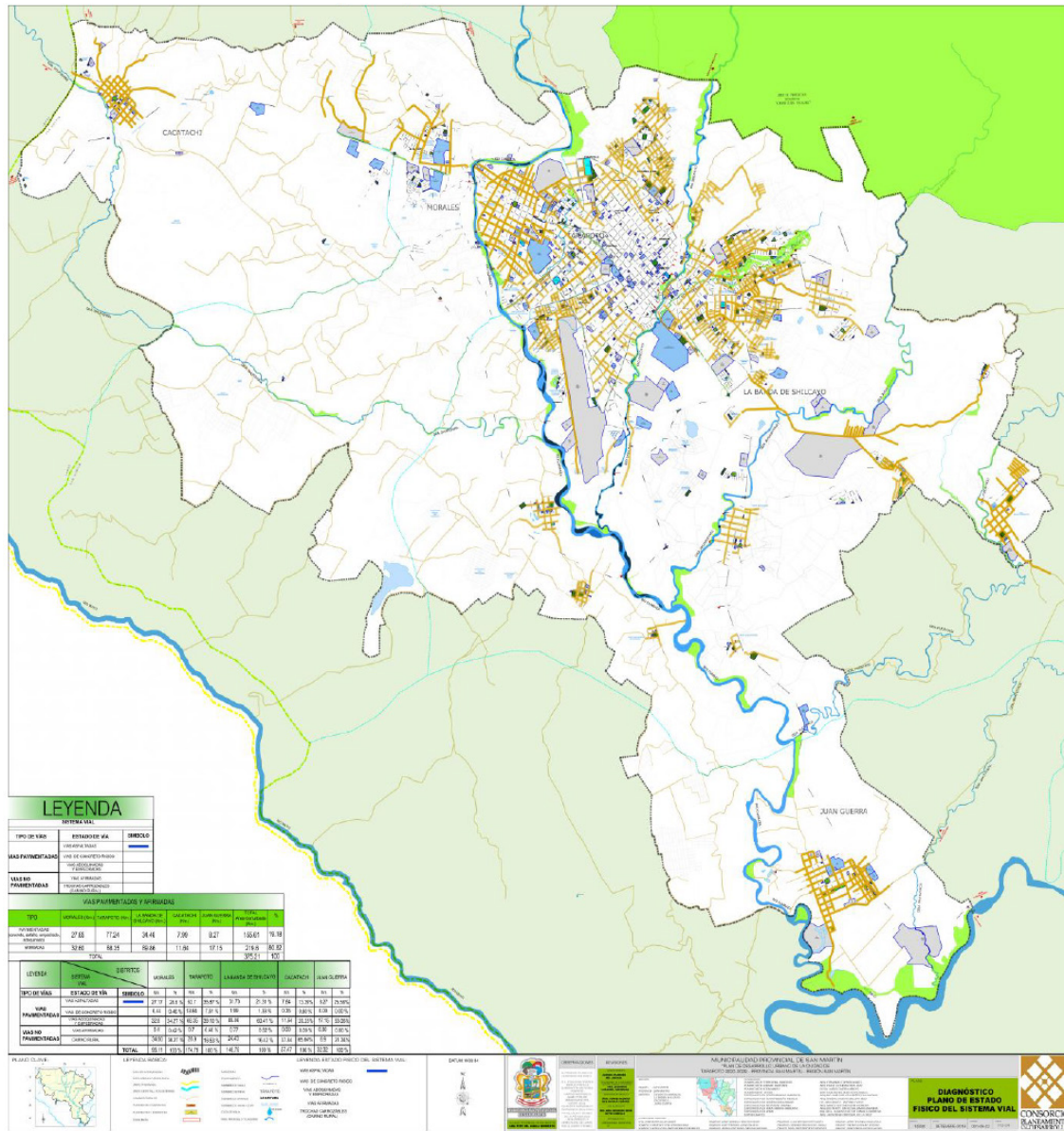
Finally, Tarapoto has high levels of poverty among its different districts. Those who are far from the centre present the highest poverty levels in the city. Meanwhile, in the Tarapoto district, poverty and extreme poverty levels are relatively low compared to the national indicators (MPSM, 2019:104). Table 2.1.3 contains the distribution of the poor and extremely poor people in Tarapoto, showing that there is huge spatial segregation in the city.

District	Population (2017 census)	Total poverty: Number of dwellers	% of population in poverty	Extreme poverty: Number of dwellers	% of population in extreme poverty
Cacatachi	3,604	943	26.2	158	4.4
Juan Guerra	3,907	2,763	7.7	1,100	28.2
La Banda de Shilcayo	43,481	11,476	26.4	2,200	5.1
Morales	33,067	8,350	25.3	1,447	4.4
Tarapoto	76,122	6,333	8.3	670	0.9

Table 2.1.3: Poverty Index (Source: MPSM, 2019)

2.2 Tarapoto's Urban Transport System

The transport system in Tarapoto is integrated by an interconnected red of interprovincial, interdistrict, and local routes that connect the five districts of the city. Most of those routes are not duly paved, being the proportion of unpaved routes higher the further it gets from the city centre (MPSM, 2019: 264-265).



Map 2.2: Unpaved Routes (brown) (Source: MPSM, 2019)

The organization of the transport system is oriented to the circulation of motorized vehicles. However, as recognized by Tarapoto's Master Plan, even for motorized vehicles, the urban transport equipment is insufficient to cover the needs of the population (MPSM, 2019:283).

Buses, "Ticos" and station wagon vehicles are primarily used in the interprovincial and interregional transportation. However, the local urban transport system is primarily dominated by mototaxis and private motorcycles (MPSM, 2019:283).

Approximately 30,000 mototaxis circulate in the city of Tarapoto (including registered and unregistered drivers). To be able to provide services, drivers must get a permit to transit and be registered before a mototaxi's association (there are 41 recognised associations). However, several drivers operate without being registered ("informal" drivers).



Image 2.2: Mototaxis in Tarapoto (Source: Emily Ding)

The success of mototaxis may be explained by different factors. According to the interviews performed, from the supply side, drivers need to make a little investment to get a traditional mototaxi (around US\$1,000 – US\$1,500), and they can access credit to finance their acquisition. Moreover, there are few and cheap regulatory requirements, so almost everyone can become a driver. The ease of access, the flexibility, and the possibility of generating revenue (estimated on US\$400 – US\$500 per month) makes it an economic relief for unemployed and under-skilled people.

On the demand side, there is a preference from people in using mototaxis as they are able to reach different parts of the city where other means cannot access (practicality), and the possibility of having a fresh trip as the traditional mototaxi is an open vehicle (adequate to Tarapoto's weather).

2.3 CHALLENGES

Several challenges are present in Tarapoto's urban transport system as it has been recognised in previous reports (Chiu et al., 2019:7) and by the interviewed stakeholders.

First of all, the ease of acquiring a mototaxi and entering into the sector, along with the preference of the population, has caused a considerable increase in the number of mototaxis in a city that does not have the adequate infrastructure and equipment to support the high amount of vehicles. Thus, traffic congestion, overcrowded roads and lack of walkable roads (especially in the city centre) are some problems that arise in the city (MPSM, 2019:196).

On the other hand, the absence of official parking lots for mototaxis or motorcycles causes that they usually need to invade public spaces. Consequently, many informal parking lots have been created, and drivers usually occupy the sidewalks or streets to park their vehicles, making a hostile environment for pedestrians.

The bad condition of roads is another problem. A high number of roads are not paved, especially in areas not connected to the city centre. This problem may create disconnections and exclusion between different parts of the city, cause accidents, and even affect vehicles' lifespan, generating additional costs to the owners. Furthermore, the unsatisfactory condition is also translated in the absence of adequate transit signals and traffic lights (MPSM, 2019:279). This contributes to the congestion, chaos and may be a factor that increases the number of accidents on the roads.

We can identify in Tarapoto many of the concerns related to the informal transport system. For instance, the non-scheduled supply, absence of control, lack of training, no tax payment and the deficient control of the quality and security of vehicles (Cervero and Golub, 2007:450; Diaz Olvera et al., 2016:170). This challenge is bigger when considering the large number of drivers and mototaxis that do not comply with obtaining a transit permit and registering before a mototaxi's association. However, we should consider that the presence of the mototaxi's industry is the response of the city to the absence of a formal and massive transport system (Shittu, 2014:76).

Finally, several environmental issues are related to the high number of vehicles and the congestion in Tarapoto areas (especially in the city centre). Issues like the absence of green spaces, pollution and noise contamination, or even road accidents result from the use of non-sustainable means of transportation and the presence of inadequate transport infrastructure (MPSM, 2019:282).

3 INTERNATIONAL CASES

Bogota, Colombia

Kigali, Rwanda

3.1 Innovation in Kigali, Rwanda

Kigali is the capital of Rwanda, with a population of around 1 million people in 2015. Motorcycle-taxi is the main mode of transportation with 20,000 to 30,000 units in the city (Bright, 2019). Kigali is a city located in a tropical environment where tourism is one of the main activities. As Tarapoto, it has the challenge of having a large proportion of roads in bad conditions. Other challenges that face the city include air pollution, noise pollution and a high rate of road accidents.

In this scenario, firstly, the local authority encouraged the introduction of apps into the motor-taxi market (Bright, 2019). Safemoto, developed in 2015, is an App that connects drivers with passengers. This App also has embedded features of monitoring drivers (Petri, 2018). Registered drivers in Safemoto have to comply with safety requirements and with an annual inspection of their vehicles. Also, the app collects data by recording drivers' speed and running location (Bright, 2019).



Image 3.1.1: Mototaxis in Kigali (Source: Bright, 2019)

Secondly, as new energy driven motorcycles can reduce pollution and noise, while generating savings to the owners, Kigali's government proposed a series of policies to replace and reduce gasoline motorcycles with electric ones (Bright,2019). The local government designed an appropriate transition period and program for moving to e-motors. Furthermore, the local government sought for foreign investments (Germany's Allianz and Indonesia's Go-Jek) to subsidise the replacement to e-motor-taxis.



Image 3.1.2: Training class in Kigali (Source: Petri, 2018)

Thirdly, the local government has fought the existing informal system of motorcycle taxis. Local authorities have imposed heavy penalties on unlicensed motor-taxi drivers. Moreover, the Kigali government has limited the number of motor-taxi licences to control their number. The government has also introduced some policies to enhance the coordination with the touristic sector (as the wages for drivers in this sector are higher), ensure traffic safety by local authorities, and train drivers to improve driving skills and ambulance training (Image 3.1.2).



3.2 Redesigning streets in Bogota, Colombia

Bogota, the capital of Colombia, faces similar traffic issues as Tarapoto. One of these problems are the presence of unsafe streets and low-quality roads. As shown in Figure 3.2.2, around 68% of streets do not have sidewalks or have informal paths. Low-quality roads and limited mobility are two main reasons for traffic accidents. This is particularly important in the Latin American context, where traffic accidents are one of the main causes of death (Figure 3.2.1) (UNICEF, 2019). Alongside these problems, there is an increasing concern on the poor quality environment in Latin American cities due to the current trend on transport design (UNICEF, 2019:14).

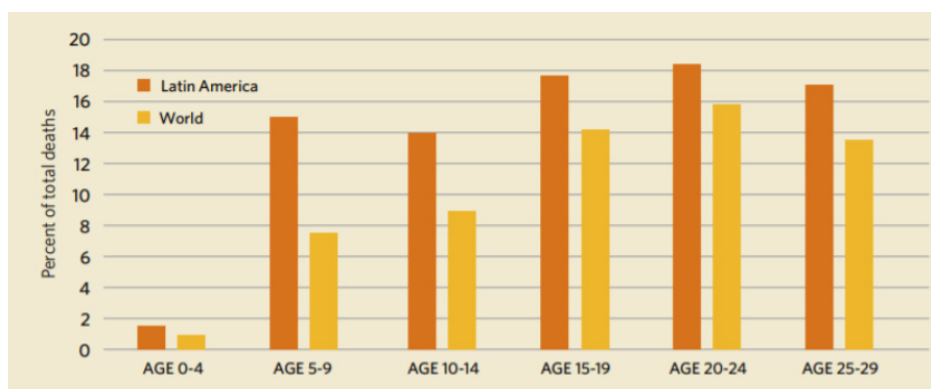


Figure 3.2.1: Death rate of children by age group in Latin American compared to the rest of the World (Source: UNICEF, 2019)

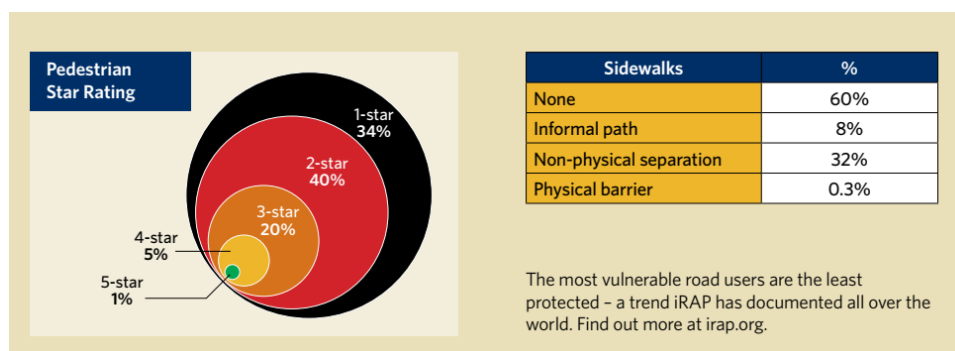
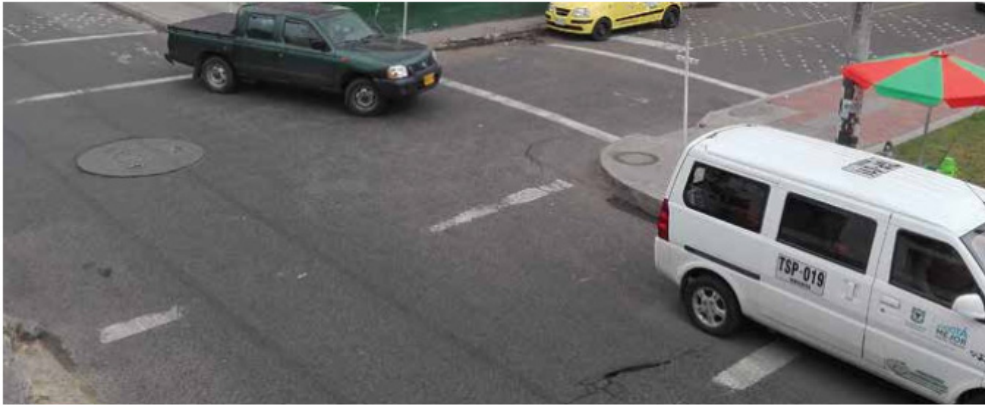


Figure 3.2.2: Road quality and sidewalks in Latin American (Source: UNICEF, 2019)

BEFORE



AFTER



Image 3.2.3: Street for life in Bogota (source: UNICEF, 2019)

One of the strategies developed by Bogotá's local authority is the coordination of huge investments in improving the quality of the roads. For this purpose, Bogotá's government has sought the collaboration of the private sector and foreign investments in order to improve the road's infrastructure and build high-quality roads (BURban, 2019). In addition, the government has increased the investment in public transportation.

Secondly, the National Association of City Transport Officials and Global Designing Cities Initiative proposed the "Street for Life" strategy in Bogotá. The Bogotá authority cooperates with Bloomberg Philanthropies to choose 16 high risk traffic areas in Bogotá (UNICEF, 2019) and improve their urban environment. Streets and sidewalks in these areas have been redesigned and resignalized to make them more walkable and clearly separate spaces for pedestrians and vehicles (see Image 3.2.3). Redesigning the roads can reduce vehicle's speed by 20% to 30% and improve the walking environment to attract people. According to a traffic report of Bogotá (2019), "Street for life" has not only improved local mobility but also has significantly reduced traffic risk.

Bogota, Colombia

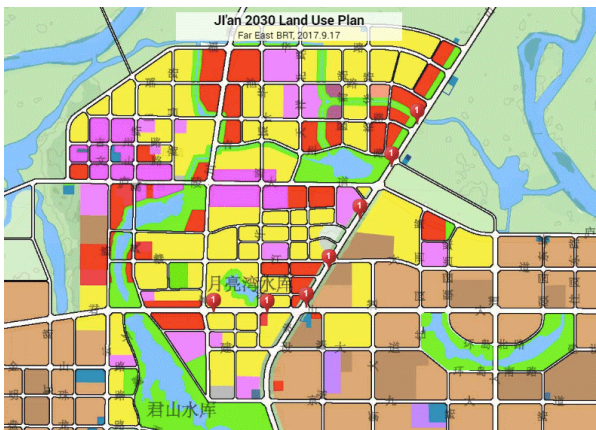
Kigali, Rwanda

Ji'an, China

3.3 Transit Oriented Development - TOD in Ji'an

Ji'an in Jiangxi province is a fourth-tier city of around 500 thousand citizens in China. The GDP per capita in Ji'an is around \$ 6500, which is similar to the \$6900 GDP per capita of Peru (CEIC, 2018). Tourism is one of the main industries in Ji'an. Motor-taxi used to be the main means of transportation in this city. With the development of the city, the problems of the transport system gain the attention of the local government (traffic congestion, invasion of public spaces, environmental issues and so on).

Therefore, the local government proposed a new urban planning strategy - Transit-oriented development (TOD). This intends to create a compact city that maximizes and makes more efficient the distribution of residential, commercial and leisure areas, by concentrating them in zones that are at walkable distance to the public transport (Calthorpe, 1993). A typical TOD has a central transit station such as a bus stop or subway station, which is surrounded by a high-density and mixed-use neighbourhood. The main instruments for this purpose are the regulation of land use and zoning.



Map 3.3.1: Ji'an land use plan 2030 (Source: Far east mobility, 2017)



Map 3.3.2: Road network map in Ji'an (Source: Far east mobility, 2017)

This city received investment from the Asian Development Bank to build a Bus rapid transit (BRT) network. From this start point, the government designed the BRT network and the accessory connection network as is shown in Map 3.3.2. Then, the local government reshaped the zoning and land use regulations in order to encourage the mix-use of the area and high-density land development, especially around the bus station, by increasing floor area ratio (FAR) (Far east mobility, 2017) (as shown in Map 3.3.1). Thirdly, local authorities built more walkable streets to connect residential leisure areas and transportation nodes (as shown in Image 3.3.3).

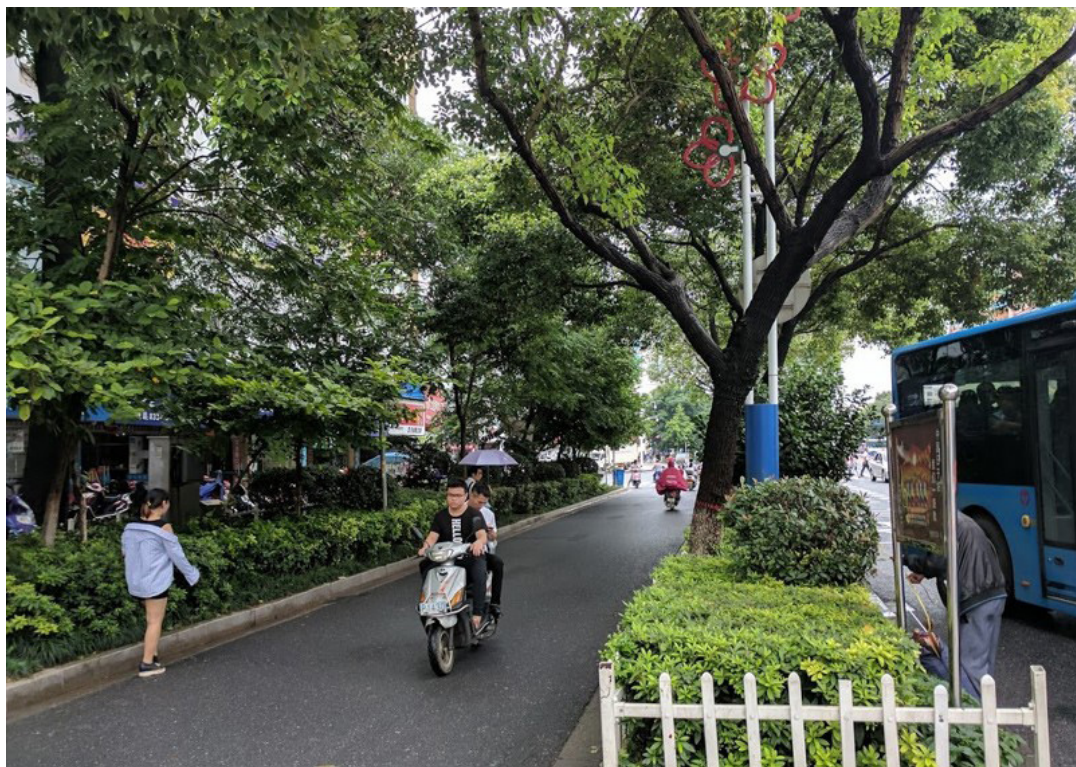


Image 3.3.3: Shaded road in Ji'an (Source: Far east mobility, 2017)

TOD has had a positive impact on reducing the number of motorcycles and decreasing the growth ratio in private vehicles, as shown in Figure 3.3.4.

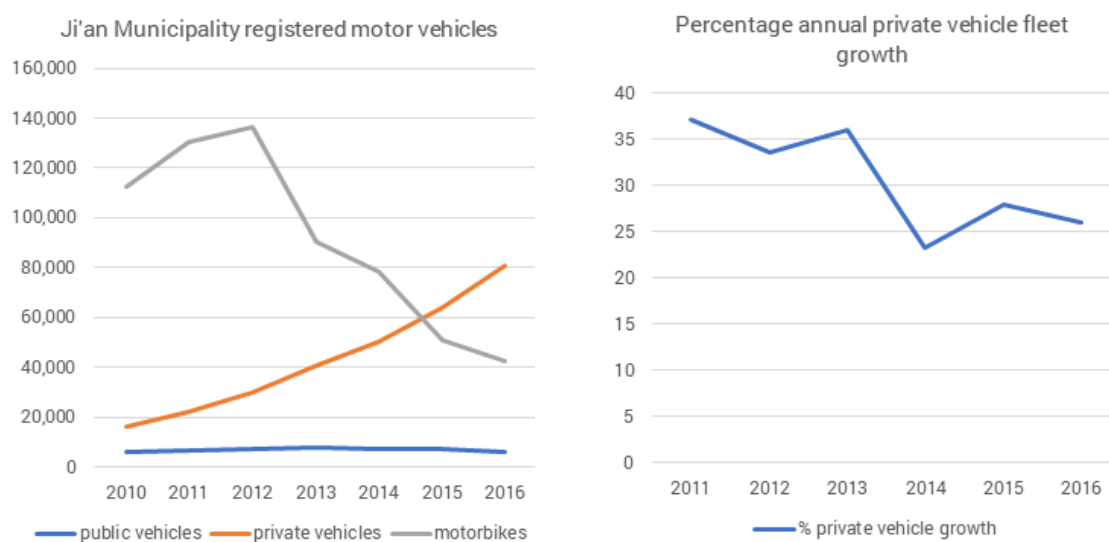
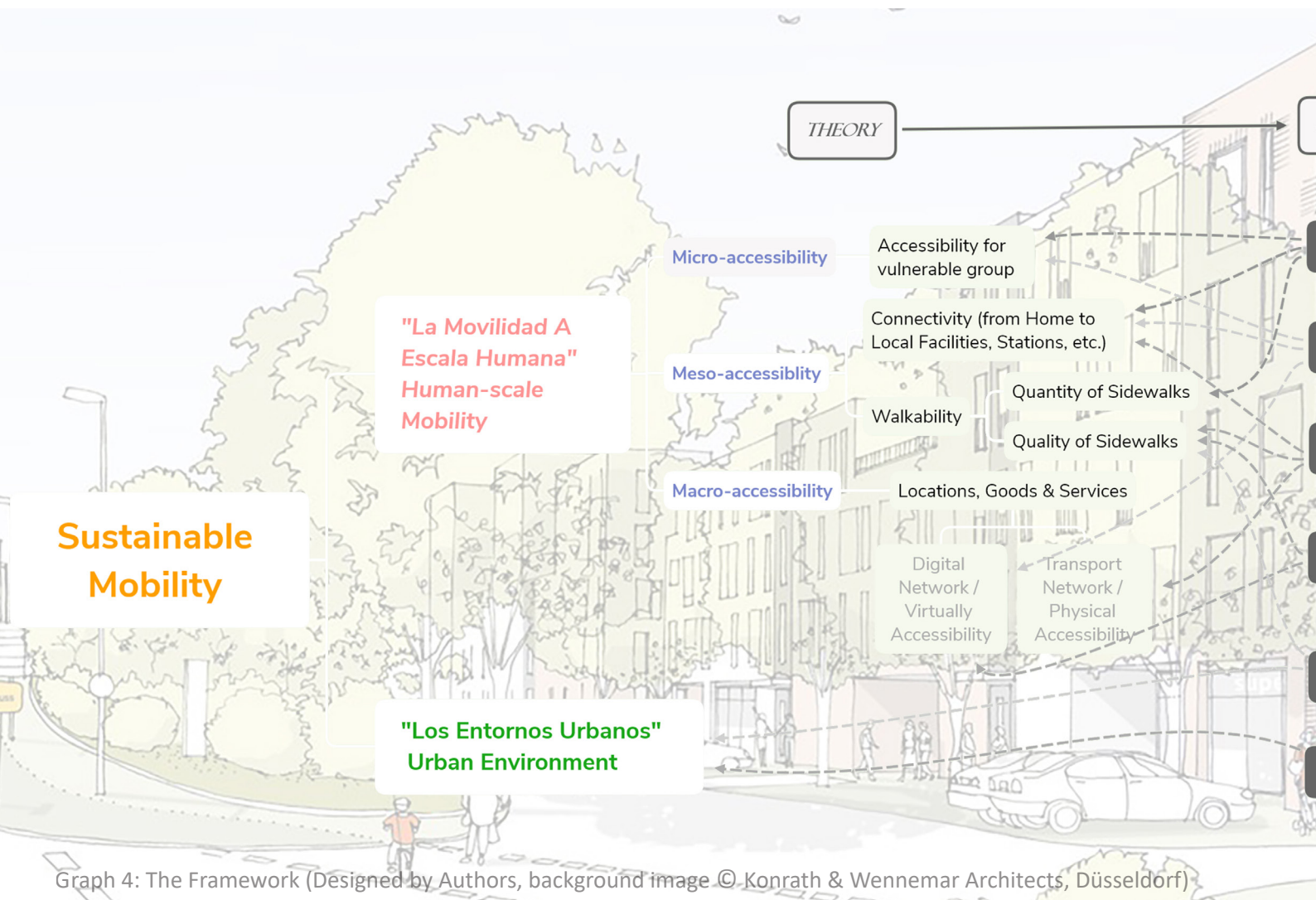


Figure 3.3.4: The changes of number of vehicles (Source: Far east mobility, 2017)

4 PRINCIPLES & FRAMEWROK



Graph 4: The Framework (Designed by Authors, background image © Konrath & Wennemar Architects, Düsseldorf)

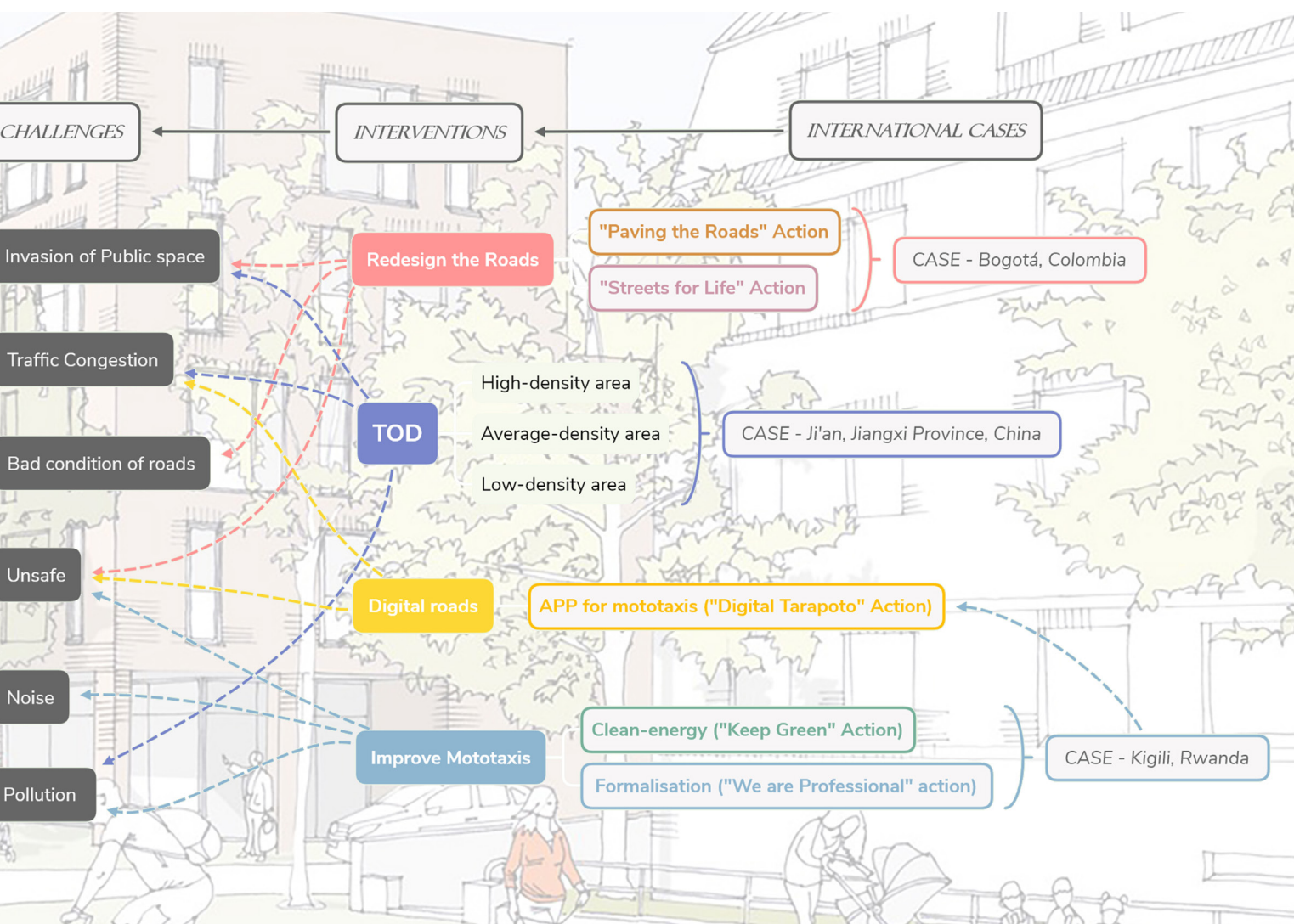
Taking into account the background of Tarapoto and the international cases, here we design a framework of analysis that will orient our interventions in the goal of achieving the development of a sustainable mobility in Tarapoto.

For that purpose, we believe that a change of perspectives in the principles that guide the design of policies in the mobility sector. In that sense, authorities should consider that the transport system should not only be designed to ease the movement of vehicles, but consider that the organization of the transport sector has an actual influence over the

residents' livelihood, allowing or constraining their expressions and development (Malone, 2002:167).

Thus, as depicted in Graph 4, to achieve sustainable mobility in Tarapoto, we consider necessary to improve the accessibility and the urban environment of the current context of the city. By doing this, we coincide with the goals of the MPSM established in the Master Plan, that consider a more walkable city as ideal for Tarapoto (MOSM, 2019:254).

Accessibility is defined as the "ability to reach desired destinations, given the available



opportunities and impedance” (Bocarejo & Oviedo, 2012). In that sense, accessibility should consider the possibility and challenges for people to move across the city. This reflects that the improvement of accessibility should consider urban transport planning, social-economic structure and urban form.

Following Oviedo and Urbano (TUMI, 2020), accessibility can be measured at different scales. Macro, Meso and Micro accessibility (Jones et al., 2019). Digital and physical networks are the main development direction of Macro accessibility. Connectivity and walkable streets are important components of

Meso accessibility. Micro accessibility focuses on the direct access to the transport system by users. On the other hand, for improving the urban environment, the infrastructure provision and its design allowing an active mobility (TUMI, 2020:93) with consideration of the social and environmental effects in the city, are key for achieving a sustainable transport system.

Starting from this theoretical perspective, and as shown in Graph 4, the following section moves towards the specific interventions.

5 INTERVENTIONS

5.1 Micro-level: Improve the Mototaxi's Sector

As mototaxis have become the most important transport method in Tarapoto, interventions will mainly target the improvement of this sector.

5.1.1 “Keep-Green” Action

(3 months to prepare; longer-term to perform and improve)

According to a performed interview to an owner of a mototaxi's spare parts retailer, 60% of mototaxis in Peru works with gasoline, 20% with LPG, and 20% with CNG. In Tarapoto, nearly 100% of drivers choose gasoline mototaxis. This trend may be explained by:

- Topography characteristics

The topography of the region may cause an inadequate performance for electric or gas mototaxis in some areas of the city.

- Supply and maintenance services

Supply and maintenance services are not adequately provided for alternative powered mototaxis.

- Price and conversion fee

Although electric vehicles provide lower long-term cost, conversion is not affordable for drivers.



Possible interventions to incentivize the use of cleaner-energy are listed below:

1. Measure and design roads with a slope lower than 15% to encourage the use of CNG/LPG/Electric/Solar energy mototaxis. Promote the introduction of hybrid mototaxis (oil and gas for different terrains).
2. Promote the introduction of new e-bikes and e-scooters for providing a more sustainable transportation option.
3. Change the structure of the existing permits system, issuing more permits to clean-energy mototaxis by the local authority.
4. Provide subsidies and coordinate with private companies and financial institutions the creation of prime rate loans and one-years warranty services for drivers who intend to convert to electrical mototaxis.
5. Seek for foreign capital to incentivise or support innovative local clean-energy mototaxis companies.
6. Advise and subsidy to mototaxi's associations that encourage the use of new technologies.
7. Conduct environment propaganda and education for citizens.

Stakeholders: Local authority, mototaxi's associations and private sector.

Funding: Tax revenue, PPP



5.1.2 “We are Professional” Action

(1 year to prepare; longer-term to improve)

Challenges such as overcrowding are partially caused by the informal operation of mototaxis in Tarapoto. Although there are fines for unregistered drivers, this measure seems to be not enough. Further actions might be taken:

1. The professionalisation of the mototaxi’s sector:

- Education for registered drivers

The authority might collaborate with associations or NGOs to provide training modules like languages, first-aid and some other modules for drivers. This might improve the quality of the services.

- Health services and safety education

Provide health examination service and insurance. Deliver safety education booklets to raise safety awareness.

2. Foster the connection and clustering between the mototaxi industry and the tourist sector.

3. Combine the future plan for the interdistrital bus line and the touristic cable-car project with the mototaxi sector.

4. Provide “Bad weather subsidies” and “Care subsidies” to encourage more drivers to provide services on days with bad weather and provide further care services for vulnerable groups special needs.

5. Regulation:

- Gradually reduce the number of permits to an appropriate level according to estimated population

- Improve the annual inspections on vehicles

- More strict penalties for informal drivers (without license or permit) and more police; encourage customers to report unregistered mototaxis.

Stakeholders: Local authority, mototaxi’s associations, private sector and users.

Funding: Tax revenue, NGOs



5.1.3 “Digital Tarapoto” Action

(half-a-year to prepare; 1-year to promote)

In 2019, an App named CIR Tarapoto was introduced. However, due to the limited information about its activity, it seems that it has not had the expected success. Several customers regarded it as a reliable and safer choice, while some drivers thought it could create new opportunities. However, some comments indicated that Tarapoto was not large enough to use this kind of App.

The benefits of developing this kind of innovative initiative may not only improve the experience of customers, but also may help to professionalize the mototaxi’s sector while serving as a data collector for further interventions.



1. The authority could participate and provide support through a public-private partnership to promote an App for mototaxis.
2. Provide free smartphones with data plans by tech-companies or collaborate with local mobile operators to attract drivers.
3. Simplify the process of registration, establish an online registration system.
4. Provide information about parking lots on the App, with an online booking system.

The App could also cooperate with the financial sector to tackle other challenges like payment, taxation, and even safety issues:

5. Facilitate the coordination with insurance companies to provide travel insurance for customers through the App.
6. Encourage the creation of a market for prepaid and/or seasonal cards for customers (one day card for tourists, for instance). This will encourage people to get used to paying by card or phone. Therefore the revenue might be easier to track, and tax might be easier to collect.
7. This app could also book e-scooters and bikes

Stakeholders: Private sector (supported by Local authority).

Funding: PPP, NGOs

5.1.4 Impact Analysis

Tackle challenges:

- Pollution
- Noise
- Unsafety
- Difficulty in the collection of taxes
- Accessibility in remote areas

Limitation:

- The resistance of the driver to change from the traditional mototaxi's system
- Collaboration and Participation willingness of drivers and local residents
- Not friendly to the elders (App)

5.2 Meso-level: Improve the Roads

Quality of roads in Tarapoto is another issue that may be determinant to other kinds of problems such as traffic congestion and hostility to pedestrians.

5.2.1 “Paving the Roads” Action (1 year)

The primary step of developing a high-quality transit network is to pave and reinforce roads. The Master Plan has shown the current situation of road quality in Tarapoto, where 69.3% of the roads have not been paved.


RESUMEN		Simb.	MORALES		TARAPOTO		BANDA DE SHILCAYO		CACATACHI		JUAN GUERRA		TOTAL	
			KM	%	KM	%	KM	%	KM	%	KM	%	KM	%
PAVIMENTADA Paved	Asfaltada													
	Concreto		28.48	5.60%	77.24	15.20%	34	6.69%	7.99	1.57%	8.27	1.63%	155.98	30.7%
	Adoquinado													
NO PAVIMENTADA Not paved	Asfaltada		67.1	13.20%	97.25	19.14%	114.29	22.49%	49.48	9.74%	24.05	4.73%	352.17	69.3%
	Rural												508.15	100.0%

Table 5.2.1: Status of the Roads in Tarapoto (Source: MPSM, 2019)



Image 5.2.1: Example of Road Conditions: Cross of Circunvalación Av. and Jr. Federico Sanchez. Access to the Brisas del Shilcayo Settlement. The quality of road in Tarapoto (Approx. 8 blocks from the city center, pic from Google map).

There are several new roads designed in the Master Plan, which might need longer time. Starting from paving existing roads will increase the transit capability in the short term and help to reduce the spatial segregation and exclusion of the poorest sector. The authority should continue with this work but:

1. Make a diagnosis of the strategic roads that allow a more inclusive and integrated transport system and focus in those places.
2. Use new materials (like hollow concrete water drainage substrate) to build porous pavements in the early stage of building up a road network (allowing the development of a sponge city in the future).

Stakeholders: Local government

Funding: Regular Fiscal Budgets

5.2.2 “Streets for Life” Action

(Half-a-year for first-time design; reorganise participatory activities in following years)

Inspired by cities like Bogota, there might be some short-term and cheaper interventions to increase the walkability in existing roads. An example of this proposal is made in Image 5.2.2. The intervention might consist on:

1. Micro-interventions in the form of paintings, signings and plants on walls, through participatory processes, to enhance the walkability of streets and reduce hostility to pedestrians.
2. Pocket parking lots for mototaxis hidden between trees
3. Broaden the sidewalks and connect them to parks and public spaces
4. Facilities in public spaces for children and disabled people
5. Promote the participation of dwellers (especially local artists and children) in this initiative.

The key to these interventions is participation, which might lead to diversified street view.

Stakeholders: Local government and residents

Funding: Regular Fiscal Budgets; Volunteers from Neighbourhood

5.2.3 Impact Analysis

Tackle challenges:

- Unsafe
- Invasion of Public space
- Absence of formal parking lots
- Bad condition of roads
- Accessibility in remote areas

Additional Benefits:

- Increase attachment of the community
- Advertisement of local culture and attract tourists

Limitation:

- Participation willingness
- Intense traffic regulations

Jr. Miguel Grau (nearby the city centre)

After



Image 5.2.2: Example of intervention (Source: Google map, redesigned by Authors)

5.3 Macro-level: TOD

TOD has been regarded as a valid plan for tackling the challenges at its source and preventing further challenges.

In the case of Tarapoto, we believe that the principles of a TOD can be applied based on the current plan of developing a monocentric city and designing new bus stations. For that purpose, local government could use the existing instruments recognised in Tarapoto's Master Plan such as zoning (High-density area: RDA; Average-density area: RDM; Low-density area: RDB; Commercial zone: CZ), land use, and Transferable Development Rights (TDRs) (MPSM, 2019a:14).

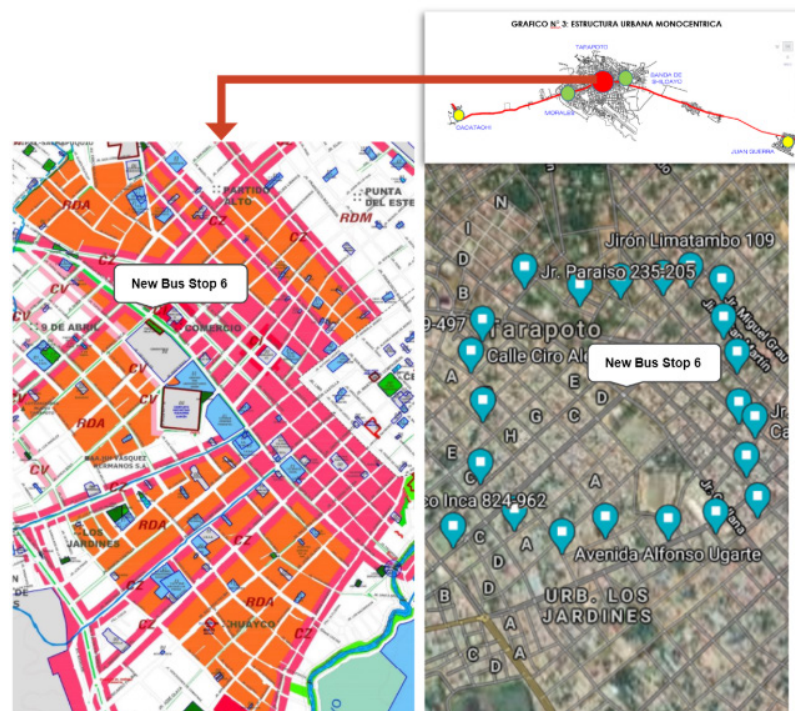
5.3.1 TOD at Different Levels

(long-term intervention but need to start as early as possible)

For RDA & CZ:

The Master Plan assigned the RDA and CZ zoning to the city centre, which includes the most important bus stop (6) in the new transportation plan. If we consider the 10-min walk distance to the bus station (traditional method of TOD design), we may see that the area coincides with the RDA and CZ area. High density and mixed-use buildings have been mentioned in the Master Plan to densify the area. It could be complemented with:

1. Promotion of affordable housing
2. Non-motorized transit and walkability
3. The deeper level of mixed-use of land
4. Participatory design in the public space
5. Recipient areas for TDRs
6. Increase the height limit of buildings
7. Encourage touristic services in the area
8. Use Tax Increment Financing (TIF) to raise funds

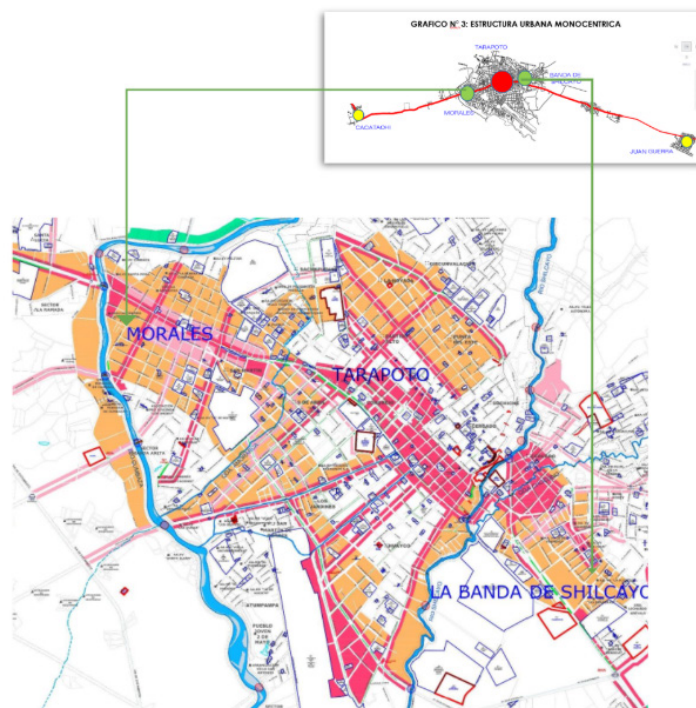


Map 5.3.1.1: First-Level of TOD (Monocentric city plan; RDA (dark orange area) & CZ (pink area); 10-min walk area from new bus stop 6) (Source: MPSM & Google Maps)

For RDM:

In the middle density residential area with the pink commercial area alongside main roads, the functioning idea is more clear in the Master Plan. We are suggesting that the development need also to be focusing on the key transit nodes, with more affordable housing in this area and provide rental vouchers for lower-income groups living in the periphery to move closer to job and education opportunities.

It might also be a good opportunity to build riverside walkable parks in this area, alongside the two rivers, to increase the quality of life, protect the environment as well as reduce the risks of flood.

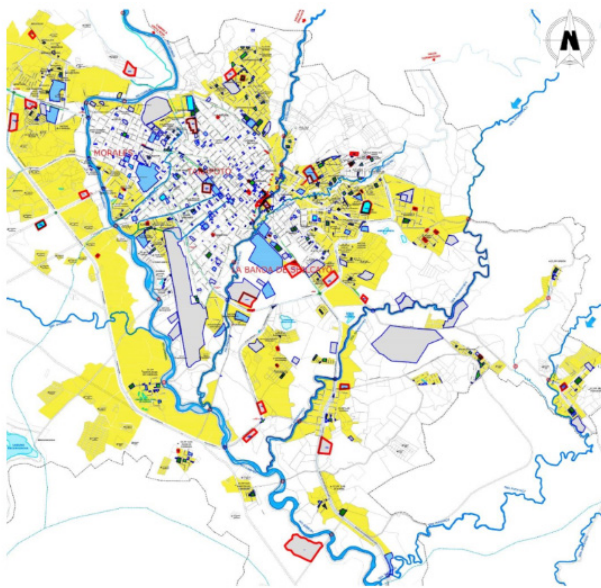


Mao 5.3.1.2: Second-Level of TOD (Monocentric city plan & RDM - light orange area) (Source: MPSM)

1. Promote affordable housing, inclusionary zoning and rental vouchers
2. Focus more on several vital nodes of the transportation system and increase density
3. Increase the non-motorized transit and walkability
4. The deeper level of mixed-use of land
5. Participatory design of public space

For RDB:

Finally, Tarapoto's Master Plan mentioned that the RDB area will provide houses for lower income citizens. We consider that the local government should discourage the settlement in those areas as this action might increase inequalities (increase of the commuting distance and costs for the poor). In the meantime, the sprawl of the city might bring more serious environmental challenges. The use of TDRs to protect agricultural spaces and protected areas and increase the density of more central areas might be a useful alternative.



Map 5.3.1.3: Third-Level of TOD (Monocentric city plan & RDM - light orange area) (Source: MPSM)

1. Ecological redline and strict restrictions on land development
2. Incentivise the progressive relocation of dwellers to mid or high-density areas
3. Generator areas of TDRs

Stakeholders: Local government

Funding: TIF; Regular Fiscal Budgets; NGOs

5.3.2 Impact Analysis

If no intervention:

- Gentrification and peripheralisation
- Less opportunities for the poor (Inequalities)
- Congestion and pollution
- Uncontrolled urban sprawl
- Affect agricultural and protected areas

Tackle challenges like:

- Invasion of public space
- Disorder and traffic congestion
- Absence of formal parking lots
- Pollution

Additional benefits:

- Can be combined with the promotion of a more walkable city
- Create new jobs to help improve livelihood of dwellers (including mototaxis drivers) (Short-term: through the construction of new infrastructures or housing; Longer-term: through services industry surrounding the transit nodes)

Limitation:

- High cost of construction
- Long cost recovery period
- Further development of public transportation

6 CONCLUSION

The development of the transport system in Tarapoto has been oriented to the transit of vehicles, where the mototaxi's industry has assumed a leading role. The purpose of this report has been to describe the current context and challenges of this transport system and, based on international experiences, formulate recommendations to improve this system.

We have oriented our research towards the goal of achieving a sustainable mobility. We believe that this can be done by switching the perspective of designing the transport system for vehicles, but seeking for more sustainable ways for people to move around the city. This has also been assumed by the Master Plan elaborated by the MPSM that recognises the need to make this change (MPSM, 2019:254-255).

From this principle, we developed a framework that depicted a path to this goal that flows through the improvement of the accessibility and the urban environment factors of the transport system. This framework recognised the necessity of the mototaxi's industry but also understood that a change in the current trend is necessary for sustainable purposes.

We recognise the necessity of the mototaxi's industry but also understand that a change in the current trend is necessary for sustainable and inclusive purposes. To reach our goal, an active local government's participation is required, but also an active involvement of the private sector, the mototaxi's associations, foreign capital and the drivers themselves.

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Carlos Lopez - Previous Chamber of Commerce Vice President

Neil Marina - Economic Administrator of the Municipality of Tarapoto

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