A snapshot of the informal organization of public transport operators in the Caribbean: Tap-Tap services in Port-Au-Prince

Daniel Oviedo
Development Planning Unit
University College London, London, United Kingdom, WC1H 9EZ
Email: daniel.oviedo@ucl.ac.uk

Yisseth Scorcia Tenjo
Independent Consultant
London, United Kingdom, SW1P 2QB
Email: yiyascorcia@gmail.com

Pablo Guerrero
Senior Transport Specialist
Infrastructure and Energy Sector, Inter-American Development Bank
Washington, D.C., 20577
Email: PABLOGU@iadb.org

Michael Delandsheer
Senior Consultant
Infrastructure and Energy Sector, Inter-American Development Bank
Washington, D.C., 20577
Email: michaelde@iadb.org

Raul Rodriguez-Molina
Senior Transport Specialist
Infrastructure and Energy Sector, Inter-American Development Bank
Washington, D.C., 20577
Email: RAULR@iadb.org

Raphael Dewez
Transport Specialist
Infrastructure and Energy Sector, Inter-American Development Bank
Washington, D.C., 20577
Email: RAPHAELD@iadb.org

A snapshot of the informal organization of public transport operators in the Caribbean: Tap-Tap services in Port-Au-Prince

ABSTRACT

Literature about transport in the Caribbean is scarce. Furthermore, the lack of studies exploring the complexities associated with informality in transport in cities of the Caribbean stands in contrast with the wealth of literature about cities in the neighboring Central and South America. This knowledge gap has led to limited evidence and methods tailored to the region to inform transport policy, public investments, and regulation. This paper seeks to partially address this gap by presenting a snapshot of public transport supply (and suppliers) in Haiti's Metropolitan Area of Port-Au-Prince (PAP), an urban context marked by acute poverty and inequality social vulnerability. The paper frames the analysis in three dimensions of informal organization of transport supply: functional, space-time, and social, building on a literature review of informal transport in the Global South. The study builds on a survey conducted in 2018 to 461 drivers of Tap-Tap, privately-owned and operated modified pick-ups providing collective transport services to a large share of PAP's public transport demand. We construct a profile of the modes of organization and operation of Tap-Tap services under the three dimensions in the framework. The paper finds low levels of representation and organization, a limited role of drivers' associations, an overwhelmingly old fleet, and a masculine, unequal and exploitative system for operations. We also find that personal relationships play a significant role in the profitability of support functions of informal transport services. Such findings can inform policy and regulation in a highly dependent context from international development assistance, providing much-needed evidence for addressing pressing urban transport planning investment priorities.

Keywords: Informal Transport, Haiti, Organization, Inequality, Operations

1. INTRODUCTION

Informal public transport, also addressed as "paratransit," refers to flexible passenger transport modes that do not follow fixed operation schedules or adhere to specified service spans. In most cases in the Global South, regulatory and service gaps have created spaces for private, predominantly unregulated services that grow without state intervention and often dominate transport markets (Ferro et al., 2015). Informal transport services provide a demand-responsive alternative for people who depend on public transport to reach key opportunities while representing an income source for low-skilled workers and the only alternative for areas with no formal public transport supply (Cervero and Golub, 2007). With notable Latin American exceptions, these forms of public transport are the norm in most developing countries rather than the exception. The attention they receive in the academic literature relative to mass fixed-route public transport is disproportionately small.

When comparing the research landscape across other developing regions, the Caribbean remains the least studied context concerning informal public transport (Boutueil et al., 2020; PHUN et al., 2016). Such a gap has consequences for policy and practice in a region challenged by social tensions and slower development trends than other countries in the Americas. Limited availability of evidence and methods tailored to the specific urban, social and functional realities of Caribbean cities thus represents a challenge for informing policy, practice, and regulation in contexts marked by weak governance and high dependency from international development assistance.

Poverty and inequality decreased more slowly or stagnated in the Caribbean despite sizeable decreases across the region in the previous decade (Andreano et al., 2020). Caribbean countries have also ranked below the average for Latin America -and below the aggregated category of low-income countries- in the World Bank's Worldwide Governance Indicators for 2018 (WGI, 2019). These conditions underpin the day-to-day urban and transport structure of cities in such countries and the capacity of local planning and regulatory institutions to produce reliable evidence about informal transport that can inform decisions for their integration with the urban and social fabric, strengthening and regulation.

This paper contributes to closing this gap by presenting a snapshot of informality in the supply of public transport in Haiti's Metropolitan Area of Port-Au-Prince (PAP). With almost 60% of its 11.1 million inhabitants in 2019 (The World Bank, 2020) living under the economic poverty line, Haiti stands out as the poorest country in the Americas. Haiti is also classified under the "Least Developed Countries" category of the DAC list for Overseas Development Assistance of the OECD (OECD, 2019), which places it in a priority spot for international development funding. Such a situation is compounded by the devastating earthquake suffered by the country in January 2010, which increased investment in the country through humanitarian aid (Dewind and Kinley, 2019).

A recent product from the Inter-American Development Bank (IDB) in technical assistance in Haiti was a survey conducted in 2018 with 461 drivers of Tap-Tap, privately-owned and operated modified pick-ups providing collective transport services to a large share of PAP's public transport demand. A public regulator assigns Tap-tap routes, and fares are negotiated with the state. However, their economic activity is primarily informal, with no written contracts, agreed rules, organizational structures and limited to no compliance with tax regulations. Formality and informality have been treated as a dichotomy in transport research and practice. However, research suggests they are a continuum of state regulation and unwritten but generalized rules and practices that emerge from established and changing social norms and traditions (Ehebrecht et al., 2018). The degree to which these services operate with public authority sanction, declare income, and are tax compliant are only a few of the conditions that determine whether they are 'informal.'

This paper constitutes the first attempt at characterizing informality in public transport supply in the local context, setting a relevant precedent for research. Our paper builds on this dataset to present a case study of Tap-Taps in Haiti to illustrate the complexities of public transport in Caribbean cities concerning their organization, operation, and social implications. Based on a literature review on informal public transport in the Global South, the paper proposes an analytical framework to structure evidence from the survey under three dimensions: functional, space-time, and social. The article also draws insights

into the gaps and limitations of existing methods based on a critical analysis of locally available secondary information. Our findings provide an overview of key trends and descriptive relations between features of informal transport that can inform further research and give insights for decision-making and contrast between PAP's informal transport and findings from previous research in the Global South. The paper also summarizes learnings for the study of informal paratransit in similar contexts in the Caribbean.

The paper critically examines levels of representation and organization in traditional public transport provision, interrogating the role of drivers' associations in the configuration of operations. Furthermore, we present evidence on frequent aspects discussed in previous research on informal paratransit such the socioeconomic make-up of the operators, inequalities between actors involved in the provision of transport and whether there are exploitative systems in place. The paper also argues that personal relationships may play a significant role in the definition and impacts of different roles in the operation of informal transport services. We provide novel information on a case not previously studied such as Port-au-Prince, while adding elements to wider debates about business practices, hierarchies and the role of tradition in this type of services.

2. LITERATURE REVIEW

Although they provide essential access for large portions of city populations, the quality of informal transport services in the Global South is often poor (Cervero, 2000; Cervero and Golub, 2007). While the nature and severity of service quality problems are no doubt contextually variant, there are some commonalities: service provider centers routes and profitability around the daily collection and not on passengers' needs or comfort; lack of basic fleet management techniques and knowledge prioritizes vehicles supply over network efficiency; drivers compete aggressively for passengers in the road-space, overloading vehicles and disobeying traffic laws; more lucrative routes can be overtraded, while service on less profitable routes or times of the day is not supplied; vehicles can remain in service too long, becoming increasingly unsafe and polluting; and in-lane vehicle boarding and alighting can reduce already limited road capacities.

Similar to the organization of informal transport in Africa and Asia, the separate vehicle owner and operator(s) model is standard in Latin American and the Caribbean (LAC), with many drivers and owners making it an industry with which it is challenging to coordinate and negotiate. Three models of owner-operators are identified: owner-operator (the owner operates the vehicle), owner-employer and operator-employee (the owner hires the operator), or owner-employer and operator-renter (the owner rents the vehicle). The latter is the dominant model of operation of urban transport in Haiti. Such arrangements are more common in low-capacity vehicles that provide unrouted services, such as shared taxis and motorcycle and bicycle taxis (Gamble and Puga, 2019; Heinrichs et al., 2017). In the more consolidated routed services, larger fleet owners are registered as private firms, or associations of owners and drivers form to strengthen their capacity to negotiate with local authorities. In some cases, associations represent the interests of specific groups and improve their standing to tender for formalized services (Cervero, 2013; Hidalgo and Huizenga, 2013; Venter et al., 2019).

While early research suggested informal public transport operators are politically weak (Cervero and Golub, 2007; Ehebrecht et al., 2018), a common practice across cities in the Global South is that operators create associations with a flat structure. Such associations help operators organize themselves and contribute to achieving better profitability, avoid inefficiencies, and implement organizational and social discipline (Cervero and Golub, 2007). Moreover, associations often become a mechanism to increase operators' influence, representation, and political capital.

Current research about associations' operation and degree of influence, their role in transport operations, representation of operators, and decision-making are not generalizable, pointing at marked differences depending on the context. For instance, salary agreements and structures in South Africa are decided by individuals, not associations based on two models, check-in or contracts (Woolf and Joubert, 2013). By contrast, in the Philippines, associations play a significant role in regulation, charge registration, and a monthly fee, and their functions include internal control, support members, and even

political representation (Guillen, 2009). Most associations incentivize operators to abide by laws and regulations, as well as define formal and informal codes of practice within the sector (ibid). In Uganda, Boda-Boda riders organized themselves in associations (Howe and Annabel, 2002) with the autonomy to decide its prices (Bradley Raynor, 2014) and considerable collective power.

Employment conditions in the informal transport sector are precarious, resulting from decades of operational arrangements with perverse incentives and uncontrolled competition. Formal employment with social security is provided in cases of large fleet owners and registered companies and associations. However, in most cases in the owner-employer and operator-employee/operator-renter category, vehicles are rented to drivers for a fixed daily fee with all revenues after rent and operating costs determining driver income. This incentivizes drivers to work long hours and compete for passengers in a 'cent war,' leading to rapid deterioration of vehicles, decreased quality of service, and marginal profits. One of the few (and old) references to informal transport in the Caribbean was found in Kingston, Jamaica, robot (local minibus) operators worked between 13 and 16 hours per day (Anderson, 1987). Operators in informal modes frequently lack social protection benefits and any formal contract (Guillen, 2009). They also have their health affected in the long term due to pollution, noise, and road conditions (Ehebrecht et al., 2018).

In general, informal public transport tends to be profitable due to its high adaptability to changes, especially in terms of customer's needs, and because it is provided at a low cost (Cervero and Golub, 2007). Associations are influential since they allow operators to lower the cost per seat and compete against larger companies (Cervero and Golub, 2007). However, schemes that lead to profitability come at the expense of considerable social and environmental costs (Cervero and Golub, 2007). First, due to the 'cent war,' operators are forced to fight for passengers in bus stops and terminals, leading to dangerous driving, affecting safety, and congestion. Second, operators work mainly in peak hours since they perceived this would increase their revenue. Third, lack of documentation in some drivers means they can avoid taxes. Fourth, some operators do not account (Golub, 2003), risking their financial stability in the long term. Fifth, due to low profitability, operators make minimum investments and even delay essential interventions for the sustainability of their business (e.g., maintenance, compensation of workers).

Profitability for individuals is achieved in different ways. Vehicle owners rent their vehicles to operators that pay daily/weekly rent. Therefore, revenue generation is usually not generated by the owner of vehicles but by operators, who pay a fee and assume all risks to collect it. Any additional income is his (Schalekamp, 2017). Owners and operators may sometimes agree on a commission if a minimum income is achieved (Schalekamp, 2017). The literature examining inequalities in labor conditions for informal operators and their drivers is scarce at best, with little research in LAC. Examples from the literature suggest that informal workers can experience inequalities driven by race differences in some contexts. In South Africa, stratification in the informal economy tends to mimic the formal economy (Woolf and Joubert, 2013).

Moreover, the degrees of organization of workers and the oversupply of unskilled labor tend to lead to power asymmetries in the negotiation of fees and distributions of revenues, as suggested by evidence from Tanzania (Mittal, 2019). The existence or absence of an association of transport providers can make a significant difference in the rights and representation of different actors in the supply chain. Moreover, it has been found that patronage or membership in relatively close networks plays a determining role in access to better employment conditions and rights, even as an informal worker.

Forms of operation and organization in informal public transport have led to inequalities among operators. Operators' access to commercial lines of credit is almost non-existence since banks perceive them as part of the underground economy and therefore demand impossible requirements for loans (Cervero and Golub, 2007). This forces operators to either get credits in the informal market or buying a vehicle as a family investment. In the first case, operators lease vehicles from street lenders who ask for high daily payments, making it almost impossible to repay them (Cervero and Golub, 2007). Additionally, as evident in Uganda, operators rent their motorcycles through wealthy individuals; but sometimes, accidents and theft make it impossible to ensure motorcycle ownership (Bradley Raynor, 2014). Also, the rental fee does not include fuel (Arosanyin et al., 2011), adding cost to the operator. In

the second case, entire families buy a car as an investment to use as a taxi (Woolf and Joubert, 2013). This is reflected in Davao, Philippines, where access to financing and credit lines occur through family, savings, or loan arrangement with vehicle dealers (Guillen, 2009).

Moreover, the literature across developing regions suggest that most informal transport operators work in this industry not by choice, but as a mean to provide to their families and in many cases as a temporary job. Other drivers of inequalities are gender, education, and housing. Most papers state that operators in informal transport are young males, suggesting a predominantly masculine industry that places its workers in unsafe and exploitative conditions (Bradley Raynor, 2014; Ehebrecht et al., 2018).

3. DATA AND METHODS

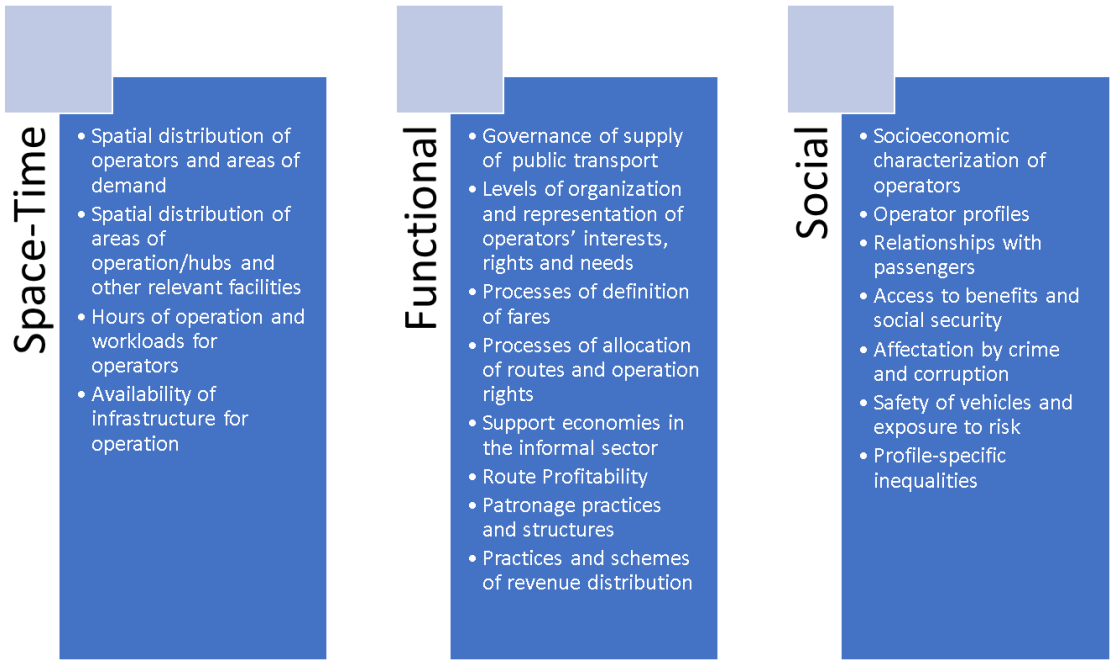
Our literature review presents some key themes that can inform the analysis of the PAP case, which are distilled in the analytical framework. In Haiti, the official languages are French and Haitian Creole. However, to a lesser extent, French -and English- is spoken only by elite groups, limiting the engagement of local research and practice to some literature in French, English, or Spanish. This limitation required partnerships with local researchers and practitioners, and interpreters in engagements with local stakeholders. By coproducing the narrative and meaning of the analysis, this becomes grounded in the local reality. The novelty and richness of the data, combined with a need for a structured overview of the conditions of Tap-Tap operators, led us to choose a case study methodology and qualitative analysis.

3.1. Analytical Framework

One of the paradoxes about informal transport in developing countries is that despite its dominant and pervasive presence in cities across LAC, Africa, and Asia, it remains difficult to access information about operators' lives. New approaches to research informal transport services must include such increasingly marginalized actors in transport planning processes presently focused on sustainability and modernity (Evans et al., 2018). Such ideas are supported by research on collaborative paratransit mapping, which suggests that scaling up the understanding of informal transport can contribute to close gaps in top-down planning and creating a more inclusive transport planning dialogue (Klopp and Cavoli, 2019).

Building on the literature and the analysis context, **Figure 1** shows the three main dimensions of analysis that encompass different aspects of the informal transport operation. Space-time refers to the geographies and temporalities of transport and its operation. Functional relates to the actors, relationships, and processes that determine the activity of informal transport and the role of different operators and users in the system. Finally, the social dimension addresses the potential inequalities driven by differences in social identities and individual sociodemographic characteristics, besides social dynamics that influence public transport operations such as crime and social practices. Incorporating such dimensions will make it possible to produce insights that inform decision-making processes targeting different scales of informal public transport operation in PAP.

Figure 1 Analytical Framework

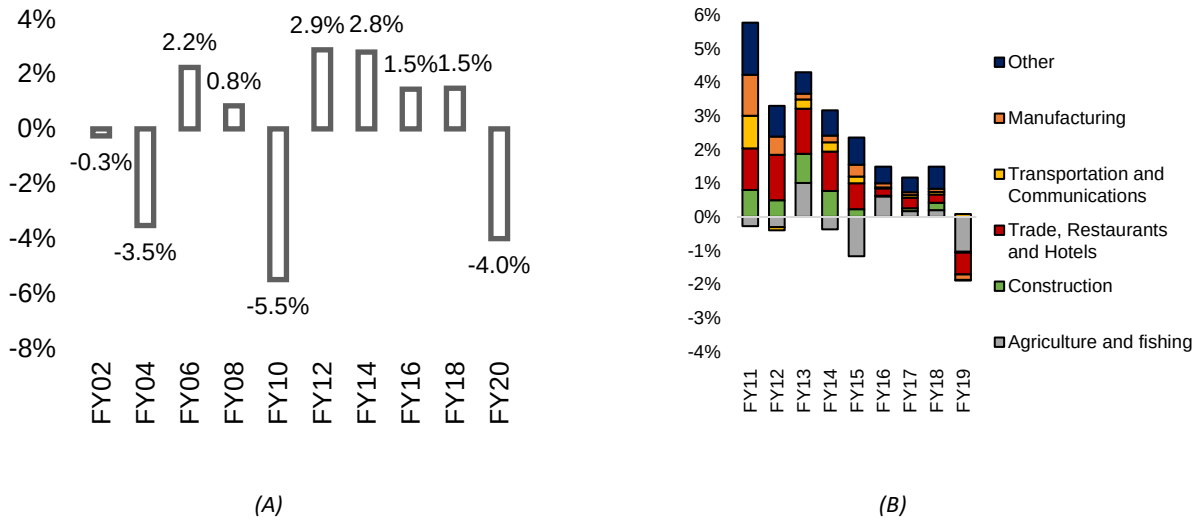


3.2. Context: Haiti and Port-au-Prince

According to the United Nations Human Development Index, Haiti, with the lowest GDP per capita in the Latin America and Caribbean (LAC) region (USD$1,245 in 2019) is classified as a low developed country. The Haitian economy is characterized by a high concentration of its productive base. It relies on services (more than 50% of GDP) and agriculture (more than 25% of GDP), which employs approximately two-thirds of the economically active population (International Monetary Fund, 2020a).

Real GDP growth averaged 0.8% between FY (Financial Year)1990 and FY2019, with a general downwards trend, with lows related to major disasters (natural or political) followed by rebounds fueled by international assistance. Growth has been hampered by recurring natural disasters (including the 2010 earthquake, droughts, and the 2018 hurricanes), recurring political unrest, corruption, poor administration, and insufficient public and private investment. For the past two fiscal years, Haiti has registered its worst economic performance in 30 years with contractions of 1.2% and 4% respectively in FY2019 and FY2020, while the population annual growth rate is estimated at 1.3% (International Monetary Fund, 2020b).

Figure 2 GDP Growth (%) (A) and Growth by sectors (2011 – 2019) (B)



(A) *(B)*

Source: (International Monetary Fund, 2020b, 2020a)

Haiti is classified as a fragile country, with a Worldwide Governance Index (WGI) of 13.5 out of 100 and ranking 13th out of 178 countries on the Fragile States Index (FSI) (The World Bank, 2020). For the past 30 years, Haiti has experienced several political crises and prolonged civil unrest, which have impacted the sustained implementation of public policies. In 2019, frequent protests resulted in a series of country-wide lockdowns where schools, courts, businesses, public services shut down for three months (Sept. 2019 to Nov. 2019), and economic activity came to an almost complete halt.

Haiti is a country with acute poverty levels, with almost 60% of its inhabitants living under the economic poverty line (The World Bank, 2020). Social conditions are characterized by poverty, inequality, and lack of access to essential public services. Haiti is also one of the most unequal countries in the LAC region, with a Gini coefficient of 0.61 in 2012. Approximately 63% of the population has access to safe water (2015), life expectancy is 63 years, and the literacy rate is estimated at 62 percent. The recent political crisis coupled with the COVID-19 pandemic has added additional strains on the population, particularly the poor, considering the high cost of living and shortages of essential goods and public services (The World Bank, 2020).

However, this is an incomplete picture to understand the processes that have generated this phenomenon. In the 1950s, an oppressive and isolationist regime led by François Duvalier built a government monopoly with high levels of corruption (Payton, 2016). Duvalier had the support of the United States for several years, but this changed due to structural disagreements (Payton, 2016). The United States, still interested in influencing Haiti, structured a new system through NGOs, in which aid money would come from a dispersed number of agencies (Payton, 2016). This system, therefore, retained control over the priorities and distribution of funds (Payton, 2016). This is now known as the "Republic of NGOs" since it created a parallel state that ensures Haitian institutions were weak in comparison (Payton, 2016). More recently, and after the 2010 earthquake, NGOs have grown (more than 10,000), and around $8 billion was donated (Tse, W. C., & Makkar, 2021). This generated expectations of relief and stability for Haiti, but on the contrary, the influence in local affairs of NGOs and IGOs have intensified wealth disparity and violence (Beeton, 2012).

The country suffers from significant underemployment and insufficient income. It is estimated that 60% of the working population has incomes below the minimum wage and that women earn 32% less than men. Employment is dominated by self-employment (77.4%). The public sector contributes 2.8% to employment, while the private sector contributes 11%. More than 65% of households receive private transfers from workers residing abroad, mainly from the Dominican Republic and the United States (International Monetary Fund, 2020a). According to estimates from the World Bank and the International

Labor Organization, the unemployment rate remaining structurally very high, estimated at 13.9%. Unemployment hits the younger population hardest, affecting 61.9% of the 15-19 age group and 50% in the 20-24 age group (International Monetary Fund, 2020b).

Haiti witnesses a rate of 58.6% of urbanization, which increases by 3.78% every year. Urban mobility in Port-au-Prince (PAP) remains a challenge, with transport expenditures above 30% of the city's dwellers' income. Estimations point at only 43% of the transport demand is met (Gandini et al., 2021; Jaligot et al., 2017). Privately-owned companies provide public transport or individuals using buses, modified pick-ups, and motorcycles (Jaligot et al., 2017). Moreover, there have been unsuccessful attempts to set up publicly managed transport services over the last decades. Beyond governance and incentives, one of the critical factors leading to sub-optimal transportation is the lack of paved roads and missing data about the demand for public transport. There is only a limited amount of available data on urban mobility in PAP, and estimations vary significantly between sources.

Although research and data in and about PAP are scarce, some studies shed light on the city's accessibility and urban mobility challenges. The population density in the city differs from the usual pattern in western countries since the rich prefer low-density hills with abundant vegetation, leaving the poor in overcrowded areas. This pattern differs from other Western cities as coastal proximity in Port-au-Prince is considered a disadvantage due to risks of flooding, landslide, and tidal surge, despite comparatively better access to the center (Joseph et al., 2014).

Haiti's challenges in terms of connectivity, planning, and financing have negatively affected its degree of urban development (Lozano-Gracia and Garcia Lozano, 2017). In the planning dimension, constraints for resilient urban growth are linked to limited and unfairly distributed access to essential services. Data related to population distributions and home-to-work commuting patterns in cities is scarce (Sreenivas, 2011), which has rendered mapping of spatial patterns of commuting to understand the link between access and economic opportunities a challenging task. Zagatti et al. (2018) developed a methodology to construct an OD matrix to determine commuting patterns in Port-au-Prince and Cap-Haïtien based on mobile phone Call Detail Records (CDR). Rapid unplanned urbanization has created several urban mobility challenges, including job market fragmentation and decreased quality of life in the city. Furthermore, limited financial resources for planning at the local scale can further constrain urban development and governance processes (Zagatti et al., 2018). One of the critical factors leading to sub-optimal transportation is the lack of paved roads and missing data about the demand for public transport.

Figure 3 Image of Tap-taps in PAP

Source: Wikimedia, Creative Commons (2006)

Tap-tap (**Figure 3**) is the most common form of transportation in the Metropolitan Area of Port-au Prince, covering around 56% of passenger transport (Sreenivas, 2011). The permits to operate tap-tap

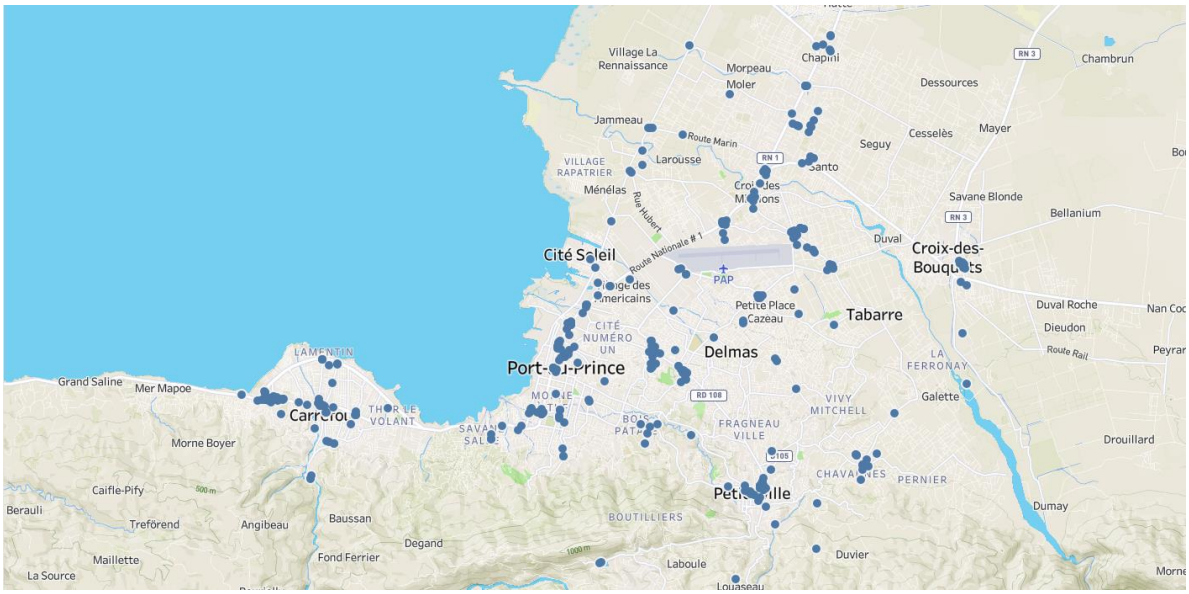
routes are controlled and given by Haiti's Ministry of social affairs and labor (ministère des Affaires Sociales et du Travail d'Haïti). The fares associated with each route are fixed by this institution but are adapted by the operators based on the duration and length of each passenger's trip. The absence of public transportation planning and structuring within the metropolitan area of Port-au-Prince has made way for private and very partially regulated service providers to fill in the gaps and respond to the mobility needs of the citizens. The weakness of the state and the fragmentation of the public transportation organization are also acting as catalysts for informality both in the structure of the offer and in the provision and operation of the services. Services provided are driven solely by rentability for the operators and leave very little or no regard for the users regarding transportation options, accessibility, affordability, reliability, efficiency, comfort, and security.

3.3. Data sources

Our results were obtained through a survey conducted between May and June 2018 on 461 tap-taps drivers and assistants in the PAP Metropolitan Area. The questionnaires for the survey were administered in Haitian Creole by 36 trained enumerators and six supervisors between hours where most operators work (6 A.M. and 9 P.M.) on the geographical location inside the study area. The survey design guaranteed two key factors: All routes were represented in the sample. Each route is represented in the survey proportionally to the number of Tap-taps serving the area. The sampling frame consisted of 94 tap-taps stations ad 162 routes. Routes served by more tap-taps are surveyed more often, while observations in less busy routes are not as frequent. A highlight of the survey is that all respondents were male. There was no systematic or unintentional omission of women operators. The recruitment of participants was randomized across different corridors.

The survey consisted of 60 questions to be completed in 15 minutes using face-to-face interviews conducted by enumerators with adult participants working as Tap-Tap drivers. The questionnaire administered to the drivers covered three main topics: sociodemographic information, labor market participation, and technical questions related to the vehicle. Interviews were conducted in Tap-taps stations or on the route. Some interviews took place at the tap-tap station while waiting for departure, while others took place on the route, talking to the driver in the front seat. Enumerators used calibrated tablets with a customized ESRI program developed for the study. The use of digital tools improved the overall quality of the information by facilitating monitoring and easing data collection.

Figure 4 Geographical distribution of Tap-taps surveys



The study covers 312 Km^2 across seven municipalities (communes), and its boundaries were based on the current urban sprawl and considering the travel patterns of the residents to the city center (**Figure 4**). The study sample of 461 valid interview results from a one-stage survey design, stratified by the route. Out of 638 submissions, only nine interviews (1%) were reported incomplete because respondents refused to participate. Furthermore, 174 interviews (27%) were considered invalid for quality reasons. The result of this validation process results in observations across the seven municipalities: Port-au-Prince [93], Delmas [77], Carrefour [84], Pétition-Ville [59], Cité-Soleil [11], Tabare [85] and Croix-des-Bouquets [52] for a total sample size of 461observations. Limitations identified in the questionnaire included better representation of gender, lack of questions to adequately compare the city with others in similar situations, such as level of education of operators and previous jobs. It is also important to highlight that although it is common to find minors involved in different roles in the provision of Tap-Tap services, the sample only consists of adults who have given explicit consent for participation and who are reporting on the configuration of their business practices, including, at times the age of their assistants or whether they share family or friendship ties. This approach was adopted to reduce the potential ethical implications of involving minors in the study.

4. RESULTS

Findings from the analysis are structured under headings responding to the main dimensions of the analytical framework (**Figure 1**). A qualitative description of the case study is presented through data visualizations and correlations, suggesting links between relevant aspects reflected by the survey under each analysis theme.

Functional dimension

In PAP, according to the survey to Tap-tap, drivers associations play a marginal role, with comparatively low degrees of membership compared with other developing cities. **Table 1** presents the main characteristics of members and non-members of associations, including those who did not answer, suggesting that membership is low among Tap-tap drivers. The main differences are about the number of hours and days worked, with association members working marginally lower times and their assistants.

TABLE 1 Distribution of the sample by association membership of operators

	Drivers' association membership		
	Member	**Non-member**	**N/A**
Number of Records	19.0	432.0	10.0
Avg. Age in years	41.7	38.3	35.1
Avg. Experience Driver in years	9.3	8.6	8.3
Avg. Hours Worked Driver	10.7	11.7	12.4
Avg. Days worked in a week	5.3	6.1	6.1
Avg. Number trips per day	9.6	10.5	8.4
Avg. Trip price in Dollars	0.2	0.2	0.2
Avg. Age of the vehicle in years	25.5	27.0	31.0
Avg. Age of the vehicle at the moment of purchase in years	16.0	21.1	24.7
Avg. Age of service vehicle in years	9.7	6.9	4.7
Avg. Age Assistant in years	24.0	24.3	25.0
Avg. Experience Assistant in years	2.2	2.4	1.0
Avg. Days Assistant worked in a week	5.7	6.0	6.0
Avg. Hours Assistant plans to work on the day	7.7	10.0	14.0
Avg. Daily payment Assistant Dollars	8.4	8.4	6.1

Figure 5 Difference in average gross revenue between members and non-members

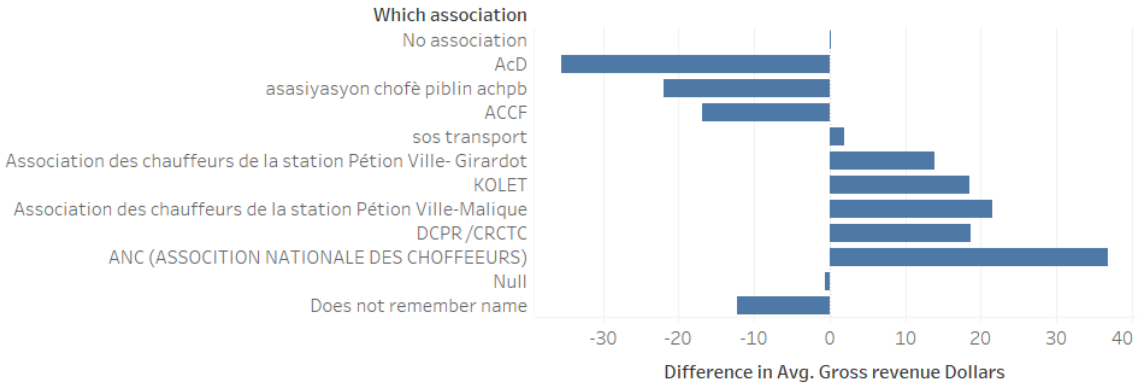
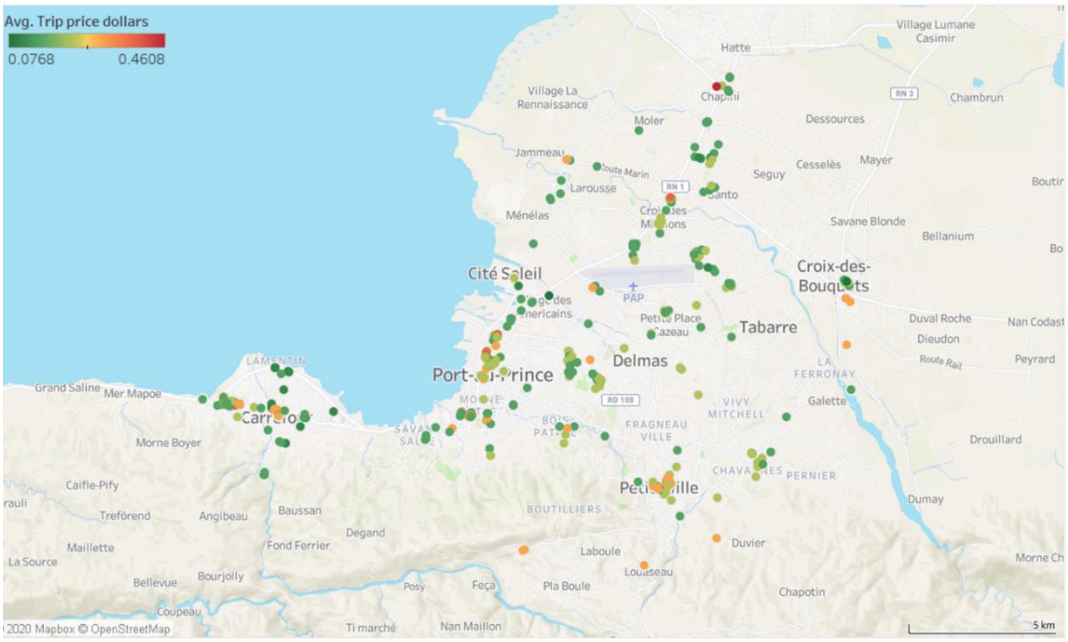


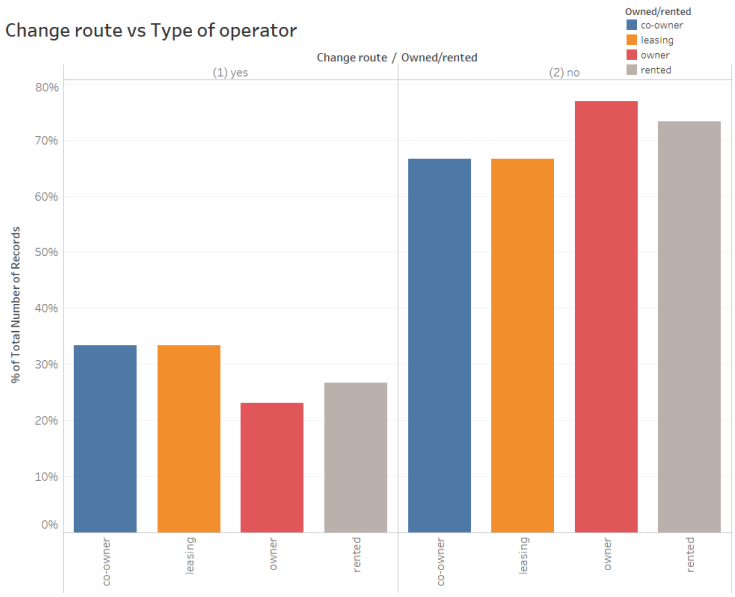
Figure 5 presents the differences in gross revenue between drivers not affiliated to any association and members of different associations. There are many associations, with some exclusive for owner-operators and others concentrating operators working specific routes or departing from specific city areas (e.g., Pétion Ville). The observed differences in gross revenue suggest that those associations where most drivers rent their vehicles show more considerable negative differences than those not affiliated with an association. Other factors connected with the differences observed in **Figure 5** between those earning more than drivers not affiliated with any association are the size of the membership and the routes of operation. For instance, the national association of drivers (ANC) has the highest positive difference in revenue. However, there is no evidence that drivers are aware of such differences in revenue. Evidence from observations in the field suggests that one of the main reasons not to change associations is a higher membership cost. Revenue is related to the allocation of routes to specific operators. Using trip price as a proxy, evidence in **Figure 6** illustrates the spatial distribution of trip fares across the city as reflected by individual prices reported by drivers at different stops. Given how the data was collected, it is not possible to trace the full extent of each of the routes. However, considering there is a diverse sample of routes covering PAP from different starting points, it is possible to establish that most trips in the central areas pay lower prices, while those in peripheral areas like Petition Ville, Carrefour, and Delmas have some of the higher prices for longer trips. Routes covering longer distances, an ending both in the outer and central areas of Port-Au-Prince, have higher fares.

Figure 6 Spatial distribution of trip prices in the sample



The above is connected with the behavior of operators concerning their route. Most operators do not change their route regardless of their mode of ownership **(Figure 7**). The categories that frequently change routes are co-owners and those leasing their vehicle, probably looking for better profitability. Analysis of the behavior of drivers changing routes suggests that the type of service (i.e., more extended line-haul services Vs. distributor services) may have a minor influence on the decision to change routes, as operators of shorter services, particularly of the sample of routes collected in the peripheries are more susceptible to interrupt services and change destinations while covering a specific route. Drivers also tend to interrupt routes at times of low demand, partially operating corridors where more people circulate to improve revenue.

Figure 7 Reported route change by type of operator



The behavior of operators related to the route is linked with gross revenue and the type of operator. Three types of operators are identified in the study: Owners and Co-owners, Leasers, and Renters. The first category corresponds to operators who are sole owners of the vehicle or share ownership with other investors. Leasers are operators that do not currently own the vehicle but have entered an agreement with the owner to enter a payment plan to eventually become owners of the vehicle on top of any renting fee for the right to operate the Tap-Tap. Renters pay a fixed amount to the owner for the right to operate their vehicle. Their net revenue is the total obtained after paying for the renting fee and other direct operating costs. **Figure 8** shows owners receive 30% more than other operators before discounting costs, with higher daily revenues above even those of co-owners. Renters' and leasers' gross revenue are almost the same since leasers pay a small contribution to buy the vehicle as part of the rent. Different types of operators can collect similar earnings from fares.

Figure 8 Average gross revenue by mode of ownership of the operator

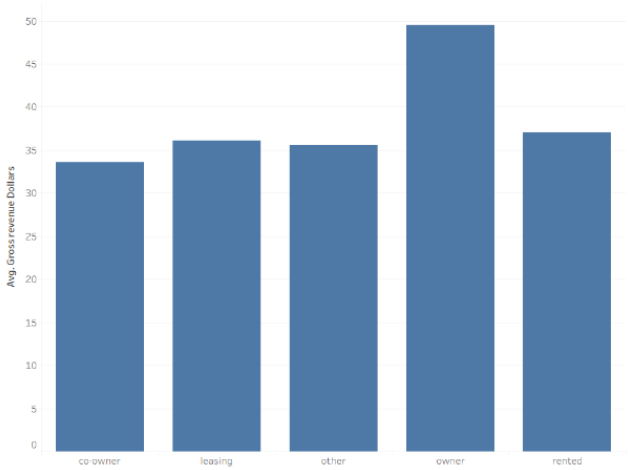
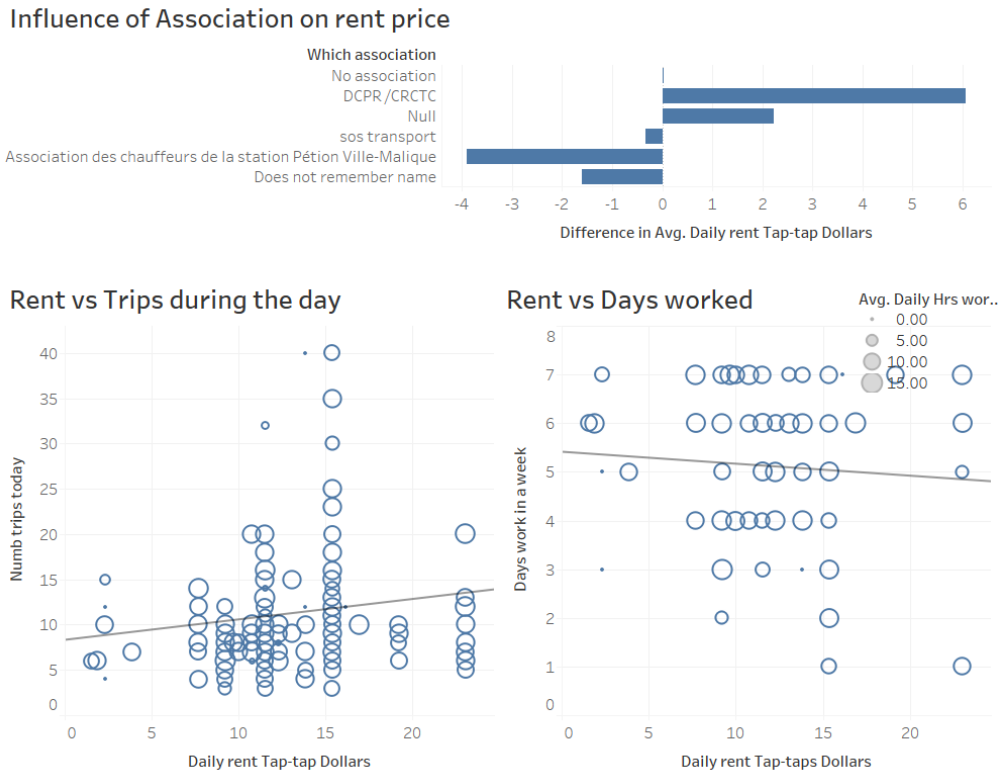


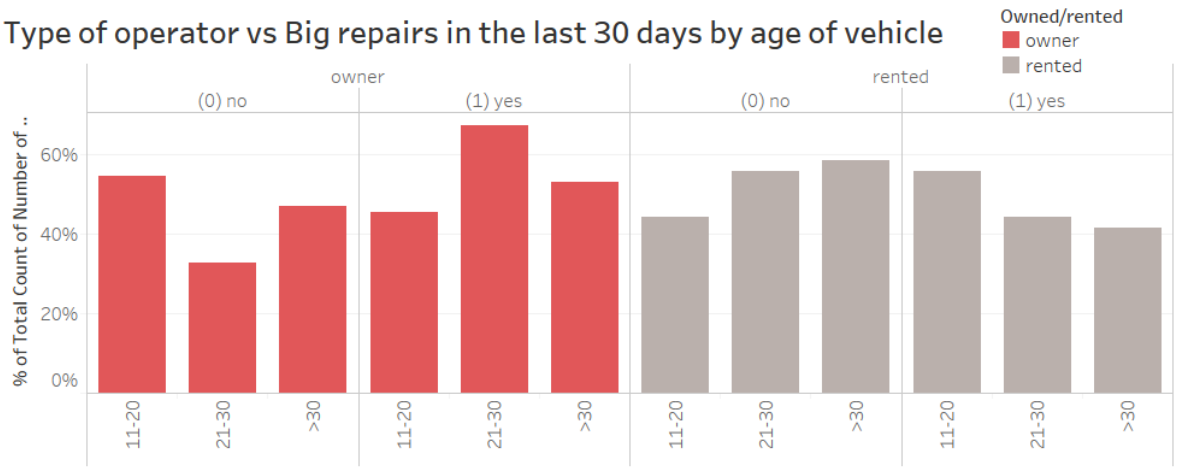
Figure 9 (above) shows that belonging to an association affects the rent price. Only in some cases is this beneficial for the operators. This is related to the association's focus, revealing those more concerned with workers' rights and those that support employers' interests. The rent price has implications on the number of days and the daily trips an operator makes. The general trend represented by the lines of best fit suggests that, for many operators, as the rent increases, operators tend to increase their daily trips and reduce the number of days they work in a week up to a specific point (15 USD approximately) (**Figure 9 -below-**). Lines of best fit presented across the manuscript are only an approximation to a complex relationship between prices and work intensity for drivers and do not seek to emphasize the linearity of the relationship. The range between 15 and 20 USD in rent prices shows much lower daily trips rates than lower rent prices, suggesting the relationship is not necessarily linear. The relatively mild slope of the trendline in the rent vs. days worked figure suggests that, on average, most drivers work between five and six days a week, with rent becoming one of the main differentiators of operators' net revenues and indicating significant inequalities among drivers concerning the costs of accessing their primary means of work.

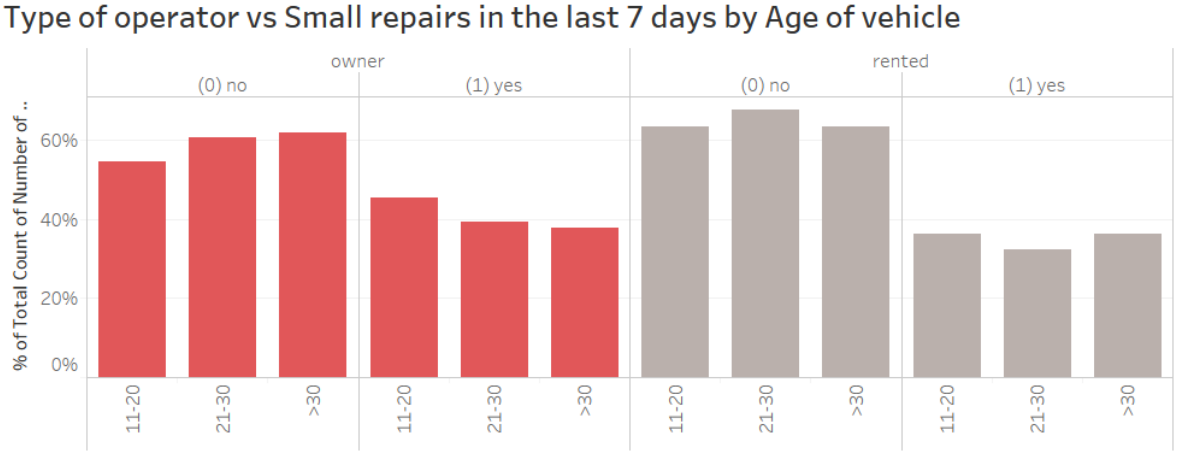
Figure 8 Price of rent of Tap-Tap (above), Rent cost Vs. Trips made during the day (left), and Rent cost Vs. Number of days work in a week (right)



A frequent source of variable costs in the operation and business model of Tap-taps are repairing. The survey defines two categories for this item. Big repairs fix damages that put the vehicle out of operation. These are more frequent on renters with vehicles aged between 11-20 years but decrease as the vehicle gets older. The opposite occurs when the operator is an owner since the number of big repairs increases as the vehicle gets older. Small repairs, which can present problems but pose minor risks of immobilizing the vehicle, are frequently carried by the operator and can be related to tires, brakes, and electronics. These happen sporadically and are less frequent as the vehicle gets older, probably as the big repairs increase. It is interesting how owner-operators tend to carry out more repairs altogether. Interviews with local practitioners and some owners suggest that this is due to an effort by renting operators to maximize profits, sometimes ignoring minor mechanical faults until they become a big issue when the vehicle owner needs to cover the costs (see **Figure 10)**.

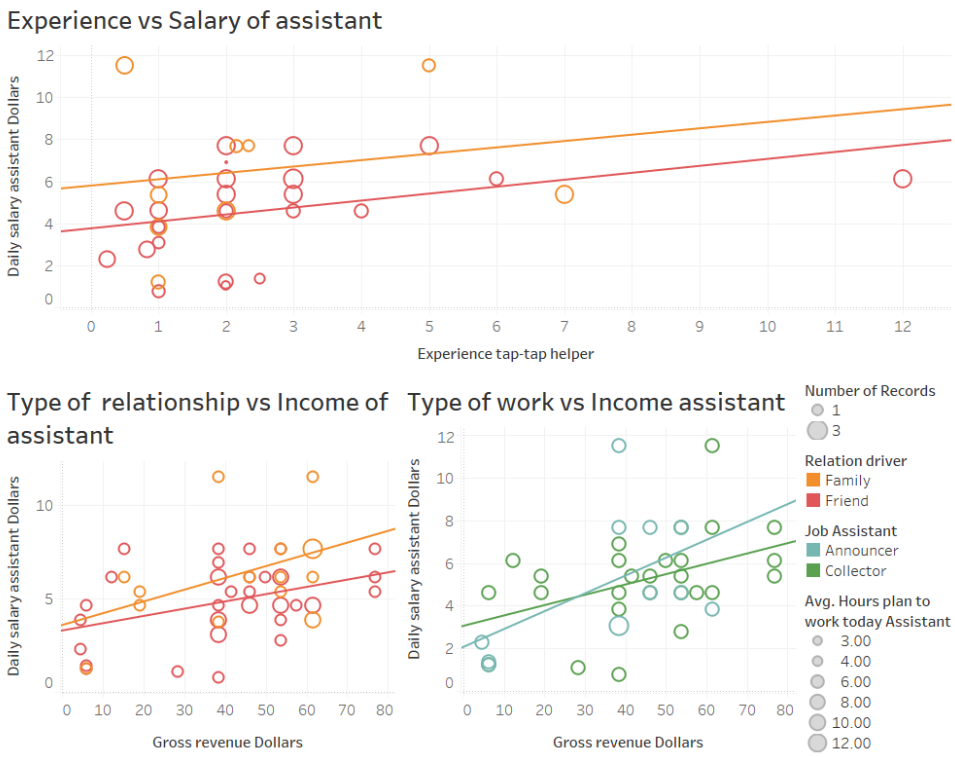
Figure 10 Repairs by mode of ownership and age of vehicle: big (above) and small (below)





Assistants support operators with daily activities related to the operation, such as announcing the route, collecting the fare and helping moving passengers into the vehicle, as well as handling loads passengers might carry with them. Assistants can be announcer or collector, the second type being a more 'senior' position within the mini-universe of the Tap-tap enterprise. These categories make explicit a hierarchy in the daily activities of the provision of public transport, which starts with the owner at the top and ends with the most junior assistant. However, at the lower levels of such hierarchy, personal relationships play a significant role. Experience and salary were found to be highly correlated, mediated by the type of relationship the assistant has with the operator (**Figure 11 - above**).

Figure 11 Salary of the Assistant by experience (above), relationship (left), and type of work (right)



As shown in **Figure 11**, the family earns better salaries than friends regardless of experience. The assistant salary is also positively related to the operator's gross revenue and confirms again that assistants who are family-related will benefit more from this (**Figure 11 -below-left-**). Moreover, assistant salary increases for both categories, although the increasing rate is higher for the announcer. Out of those drivers that reported kinship relationships with their assistants (14% of the total sample), 30% had a family relationship between driver and assistant, and the remaining 70% were reported as friends. Three out of the four assistants reported aged 18 or under had family ties with the driver. Most assistants in both groups are aged over 19, which does not support a hypothesis of labor exploitation in the public transport sector in PAP.

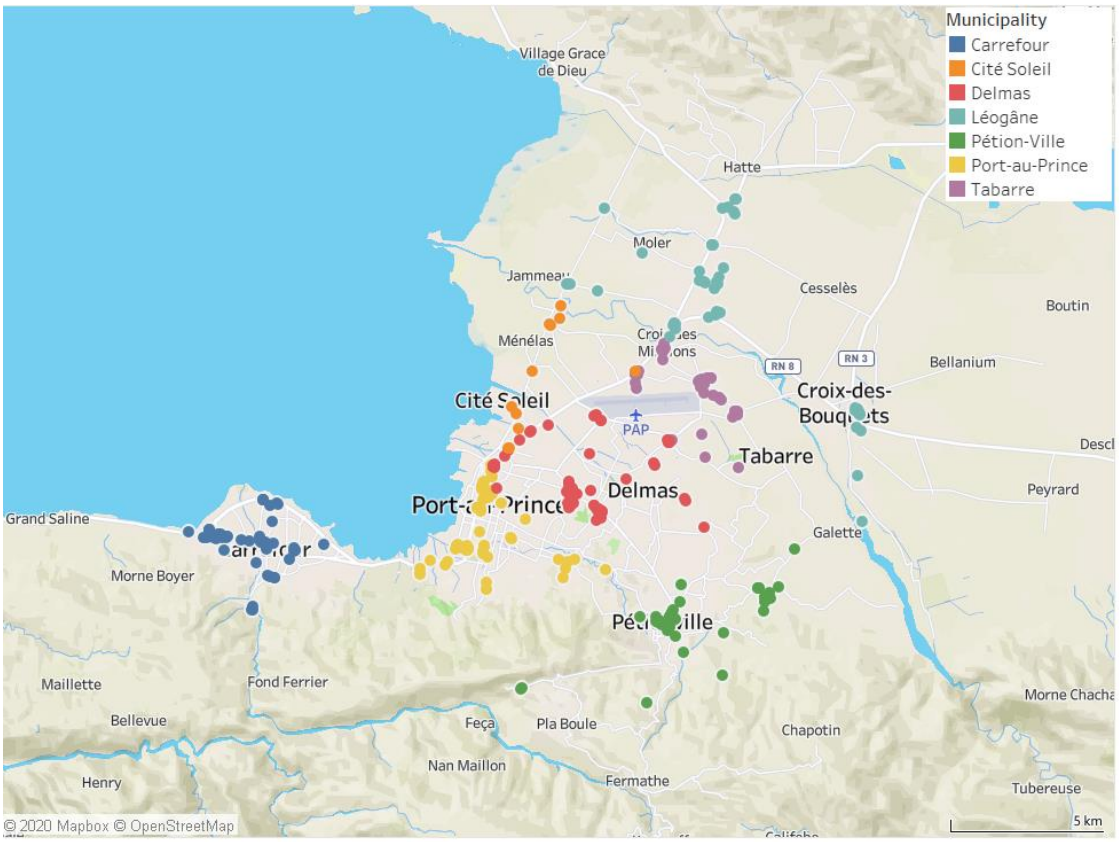
Space-Time Dimension

The space-time dimension links some of the aspects of the organization and operation of Tap-taps mentioned in the previous section with the operators' workloads and the main factors influencing their work patterns. Almost generally, Tap-tap operators work very long days and for most of the week. The survey shows that most operators work six or more days a week on average, but the number of hours a day depends on the number of days worked and the type of operator (**Figure 12 -above-**). Owners tend to reduce the number of hours they work when working more days, while renters maintain the number of hours worked (roughly 10 hours/day) regardless of how many days they work. A test of differences in means suggests that the difference in days vs. hours worked for owners and renters are statistically significant. Such differences suggest that job security associated with ownership of the vehicle adds an element of flexibility to operators, while those at a different stage of their career within the business may find themselves forced to longer working days and weeks. This aspect is worth exploring further in more detailed qualitative research. **Figure 12** (below) complements this finding with a daily matrix with a start and finish times of operations for respondents on the previous day. This reveals that most operators start at around 5-6 A.M and finish somewhere between 5-8 P.M.

Figure 12 Days vs. Hours worked (above) and time matrix (below)

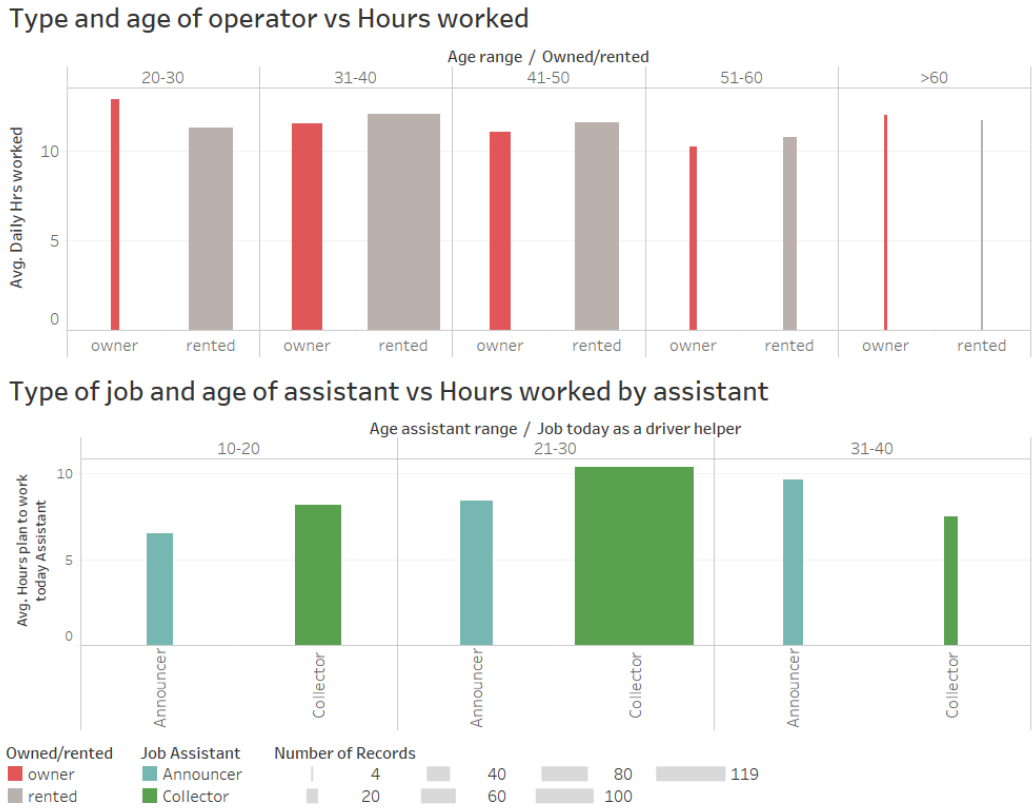
Figure 13 shows the spatial distribution of operators based on the origins of their services in the Metropolitan Area of PAP based on the seven municipalities in the city and the location of the survey. It shows a similar comparative coverage of Tap-taps across the seven municipalities. It is not possible to display route alignments using this data as the surveyors did not necessarily trace the whole route during each survey. This proxy for the spatial distribution of the supply combined with the results of **Figure 6** suggests a center-periphery pattern of operation and a similar level of competition in different areas of the metropolitan area. Such spatial patterns determine long journeys for individual routes and could explain the long working hours of operators.

Figure 13 Spatial distribution of the sample by municipalities across PAP



In PAP, hours of work by assistants vary significantly depending on age (**Figure 14**). Young assistants (10-20 years old) work less than 8 hours while assistants between 21- and 30-years old work more than 10 hours (almost the same amount as operators) in the role of collectors, and more senior assistants (31-40 years old) work less than 8 hours as a collector and almost ten as announcers. This has implications not only in terms of the operations and the way available assistance can influence the performance of a given Tap-Tap. This finding can also open spaces for discussion about child labour in the sector and the informality in working relationships between drivers and assistants, which seems to also be mediated by their kinship.

Figure 14 Daily working hours for operators (above) and assistants (below) by age and type

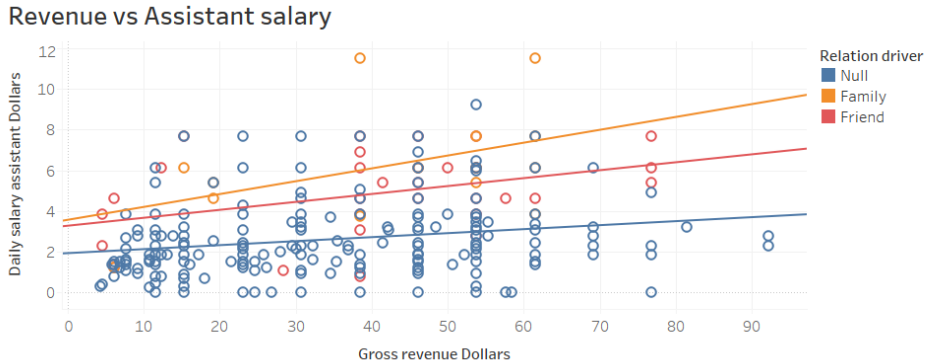


Social Dimension

The sample of operators and assistants in the survey is all males. There was no female operator or assistant in the study. From a social perspective, this is a crucial finding. Most operators are renters (65%), followed by owners (26%). Owner-operators are older than renters and have, on average, two more years of experience. Operators stay in the industry for a large part of their life. On the other hand, assistants have around 3-5 years of experience but start at ages between 14 and 33 years. Owners, co-owners, and others make one more trip than other types of operators.

Regarding assistants, co-owners do not have one. Daily payment to the assistant is around 8 Dollars with the exemption of leasing assistants who earn 4 dollars more per day and are 3-4 years younger than other operators. Experience in the Assistant varies between the type of operator and the number of days and hours they work.

Figure 15 Revenue vs. Assistant salary



The survey reveals assistant who is family earns more as gross revenue increases than if the assistant is a friend or has no personal relationship with the operator (**Figure 15**).

The survey reveals that assistants receive non-monetary rewards, which depends on the type of relationship they have with the operators. Family rewards include vehicle maintenance and repairs training, driving lessons and clothes, and informal loans, while friends only received informal loans.

Driver characteristics are not different for operators who have had accidents or not during the last 30 days. However, vehicle characteristics, especially about repairs, show a higher amount of significant and minor repairs and a higher rate of accident insurance among those that reported an accident in the past month.

5. DISCUSSION

One of the main aspects of informal transport organization and operations in the literature is the role of associations of operators concerning revenue, political representation, and operational and functional efficiencies. Haitian public transport is, for the most part, regulated by the government from an operational perspective, with set routes and controlled fares. However, the practices around the transport provision business share many activities in the informal economy. For example, agreements for the vehicle rental and work either as a Tap-tap driver or assistant are verbal, with no guarantees, access to social security, or protection for the employee. Such conditions are very similar to what previous research has suggested in similar contexts, particularly in early forms of collective transport in Central and South America and Africa (Guillen, 2009).

Findings presented under the framework in **Figure 1** suggest that, from a functional perspective, associations play a limited role for most operators. Two types of associations concerning Tap-tap are identified. On the one hand, some associations represent vehicle owners and have power and influence over decision-making. Such owners' associations negotiate fares, the definition of routes, and other regulatory matters with public authorities. On the other hand, associations of drivers serve as a mechanism for self-organization and representation of operators. Drivers' associations seek to improve their collective position for influencing regulations as well as improving working conditions.

The survey mainly focused on the second type of association, as the driver reports membership. Our findings suggest that a small percentage belongs to the associations and that most members of the associations owned the vehicle they operate (**Table 1**). This perspective is relevant in the interpretation of the findings of the analysis. For example, when comparing the gross revenue between members and non-members of drivers' associations, the results show that in most cases, operators belonging to an association have higher gross revenue (**Figure 5**). International research on paratransit in other parts of the global south suggests the associations in PAP play a role of political representation of owners rather than mediate as syndicates for all operators as in Sub-Saharan Africa, contributing to imbalances in power within the industry (Cervero and Golub, 2007; Ehebrecht et al., 2018). As demonstrated across the results section, different modes of vehicle ownership can be found among drivers of Tap-tap. The most frequent is the operator that rents the vehicle for its commercial exploitation. As shown, a minimal share of the sample leases the vehicle. Leasing implies that operators make a small contribution as part of the rental price to buying the vehicle. The survey also showed evidence of a co-ownership model, where the operator interviewed shares ownership with a relative, friend, or business partner. The second most frequent mode of ownership among operators after the renters is the driver that owns his vehicle. Unlike other cases in the literature, such ownership modes seem closer to unrouted forms of paratransit than the routed type of service that Tap-taps provide (Gamble and Puga, 2019; Heinrichs et al., 2017).

While the data analyzed does not give a clear indication of the different routes in operation, the distribution of trip prices across stations where the respondents' locations were reported reflects the differences in the income perceived by operators (**Figure 6**). For renters, the value of the fee charged by the owner will depend on the route where the vehicle can operate. Owners that have secured rights to operate in the most profitable corridors tend to set higher fees for hiring the vehicles. Moreover, operators who report higher rent fees also work on roads with steep slopes and in worst conditions, assuming the added cost of maintenance that the vehicle owner is likely to incur as part of their rent. When adding the

costs of fueling, maintenance, staff, and rent, analysis of the survey found that owner-operators can have 5 or 6 times more net revenue than renting-operators. Strategies for profitability echo the conditions found by Schalekamp (2017) in the pre-reform paratransit services in Cape Town, suggesting PAP is likely in a similar trajectory that further regulations and reform could steer.

Conditions for renting have a knock-on effect on the distribution of working times and hours of operation across operators under different ownership modes (**Figure 9**). Owners and co-owners have higher autonomy for choosing the times and length of their daily workload. By contrast, renters tend to work longer days and lower average days a week. Despite high degrees of informality in the economic activities surrounding the provision of transport, drivers tend to maintain a fixed pattern of operations and respect their assigned routes (**Figure 7**). As shown in the analysis of role changing by type of operator, a small share of drivers admits changing their designated routes after they have started operating in them. This is not just an indication of compliance. This suggests a form of social control within the system that seeks that operators remain in their assigned routes. The level of stratification and social control suggest a similar structure for regulation to what has been found in other services mimicking features of the formal economy in the analysis of paratransit in other realities (Woolf and Joubert, 2013).

Modes of ownership govern almost every dimension of the organization and decisions in public transportation in Haiti. When comparing the incidence of both big and small repairs (**Figure 10**), the burden of day-to-day maintenance is more frequent in renting drivers. In contrast, structural repairs have happened at least once for a larger share of operators in the group of owners, particularly in older vehicles.

The advanced age of vehicles reflects a very active market of imports of used vehicles exploited as public transport in Haiti (Lozano-Gracia and Garcia Lozano, 2017). Vehicles older than ten years are commercialized to start a new 'productive life' as Tap-tap, sometimes finding vehicles nearing 40 years still in operation. This market is incentivized by continuously trading increasingly older vehicles among operators and owners in the Tap-tap business, maintaining ancient vehicles in the system for a long time. The oldest vehicles become the main point of entry to asset ownership for operators that have been renting. Similar to the findings related to assistants in the service, family and other social ties play a role in the transference of vehicles (**Figure 11**).

Findings in the space-time dimension suggest that long working hours and weeks are the norm rather than the exception. Those in more vulnerable situations -such as operator-renters paying a high rent fee- are forced to engage in exploitative conditions of long working days at the expense of their health and well-being. Findings also suggest that there is dynamic nature of the work of the assistant throughout the day. In high-demand hours, more assistance is required, sometimes needing more than one aid for specific times of the day. There is another implicit degree of inequality in this regard. As shown, leaser-operators do not hire assistants, which implies either higher workloads or avoiding the most valuable times of operation altogether. This adds insights to the only other reference about informal transport operation in the Caribbean (Anderson, 1987) while reflecting that documented conditions in a similar context decades ago still share some similarities with the current features of Tap-tap operation in PAP.

The analyses of the social dimension help to complete the understanding of Tap-taps and the complex inequalities and structural factors governing the way they operate and get organized. The social capital aspect and a more detailed examination of assistants suggest that the family's involvement in the activities around operation turns the vehicle into an asset for the driver's household (**Figure 15**). This is reflected by the non-monetary compensation that assistants receive, put into perspective with previous findings. Benefits such as lessons in driving and mechanics pave the way for the entry of the assistant to the business, giving him new skills that are relevant for the activity in the higher roles of the operation.

6. CONCLUSIONS

The paper finds low levels of representation and organization, a limited role of drivers' associations, an overwhelmingly old fleet, and a masculine, unequal and exploitative system for operations. Personal relationships play a significant role in the profitability of support functions of informal transport services. When looking at the entirety of the evidence, we found that in the case of

Port-au-Prince, the business practices are hierarchical, closed, and traditional. From the functional perspective, the business of providing transport via a Tap-tap places constant trade-offs between working hours, days, and operational costs to maximize revenue.

Findings from all dimensions suggest that the Tap-tap industry rewards those with capital first, given their ability to own vehicles, organize in syndicates to influence decision-making, and have the most profitable operational schemes. It rewards those with sizeable social capital within the public transport business second, allowing those with connections to have better conditions and payment. This makes it a close industry where membership and participation can be mediated by power and relationships, even at the lower levels of operation. Such structure perpetuates hierarchies and sets a system of internal social mobility within the business that may explain some operators' very long years of service. Being an industry with low entry requirements, it becomes a viable source of livelihoods for young men in a country with high unemployment rates and formal job supply. The possibility to climb in the internal hierarchy and the availability of a relatively steady source of income implies that many operators become Tap-tap workers for life. Such a trend leads to a self-contained industry and the internal transference of knowledge and practices, including perverse practices against service quality. The high level of tradition also poses barriers to introduce innovation and technology, with those in the higher levels of the hierarchy being older and having consolidated perspectives and practices. From a policy perspective, this is a significant challenge to tackle in modernizing public transport supply in this and other similar contexts. Understanding operators and their practices can become an entry point for designing strategies for coproduction policies and actions that respond better to their needs and consider their perspectives.

The analysis of PAP's Tap-taps presents a paradox for analyzing the social and functional contributions of such services. On the one hand, Tap-taps, like many other systems in the Caribbean, enable social mobility for its workers and become a reliable source of income and livelihood in a country challenged by poverty, low degrees of education, and unemployment. However, the same structure that rewards capital and social connections also closes itself to innovation and natural evolution, passing practices as old as the vehicles they operate to newcomers. The user unavoidably absorbs the inefficiencies and externalities stemming from such a system. There is a clear need to understand the value and incentives these informal industries offer to those working there to design forms of organization and operation that can preserve many of its benefits while reducing social costs. Future research needs to examine further the spaces for participation and representation and coproducing alternatives with both users and providers.

Policy responses to the current structure of Tap-taps in PAP in the short and medium-term can be classified in the three categories presented in **Figure 1**. In the functional dimension, stronger regulation that incorporates further entry barriers to the industry can contribute to regulating supply. Such regulation can make considerations for restricting the maximum age of vehicles for commercial operation, restricting operation of Tap-taps based both on the overall age of the vehicle and their service time for commercial use. This means setting a threshold for the maximum age at which a "new" Tap-tap can be introduced to the market and enforcing age limits for Tap-taps already in operation. The latter responds to the high frequency of big and small repairs that jeopardize the sustainability and safety of the vehicle, contributing to road safety risks. At the core of such policies, there is a need for a thorough vehicle registry explicitly designed for commercial vehicles, which can build on some of the features of the data collection instrument developed for this study. Strengthening information for planning and enforcement can contribute to developing tailored regulation for Tap-tap operations and overall public transport coordination.

The space-time dimension reflects imbalances in the distribution of operators across the day and the metropolitan area and their workloads depending on the type of vehicle ownership and assigned route. From a policy perspective, ensuring public transport supply to shift workers and night-time activities can contribute to broader social and economic goals. However, this can only be achieved by designing and implementing incentives and disincentives for the temporal concentration of supply and operators' overworking in search of additional profit. One such incentive is the development of subsidies to less

profitable routes and times of the day, which lead some operators to choose such routes and times. Moreover, regulation and enforcement are necessary for the protection of operators by introducing caps for hours of operation, incentivizing owners and operators alike to develop shifts that allow for improving the working conditions of drivers. This can contribute to the redistribution of supply, improvement in quality of life, and reduction in risks.

The social dimension provides relevant insights for innovative policy avenues to emerge. In order to break the cycle of self-containment and traditional practices in the business of public transport, there is scope for the introduction of training programs and capacity building for young assistants, drivers, and new vehicle owners. While traditional approaches to training in public transport and approaches to modernizing paratransit have focused on road safety and operation perspectives, Tap-taps' organizational and social structure may benefit from a focus on management skills and the introduction of alternative ways to carry out the operation. Targeted programs for training aspiring Tap-tap owners in business management and operation can lead to better decision-making in the day-to-day operation. Moreover, training assistants and new drivers on maintenance, road behaviour, and organisational identity and marketing can help break cycles of inheriting practices from more experienced operators and owners. The example of Matatus in Nairobi (Klopp and Cavoli, 2019, 2017) can inform programs to increase ownership and identity of Tap-taps as more than a livelihood. Training in new technologies, technical and financial assistance to operators to adopt and develop platforms can also contribute to the modernization of service and progressive improvement in its quality. A subsidy for acquiring equipment and training in the use and development of apps can help with the self-organization of Tap-taps. References from the literature suggest technology can lead to transitions in practices that are often more efficient than traditional means, as seen in other parts of the global south in motorcycle taxis and jitneys (Medeiros et al., 2018; Tirachini et al., 2020).

REFERENCES

Anderson, P., 1987. Mini Bus Ride: A Journey through the Informal Sector of Kingston's Mass Transportation System. Inst. Soc. Econ. Res.

Andreano, M.S., Benedetti, R., Piersimoni, F., Savio, G., 2020. Mapping Poverty of Latin American and Caribbean Countries from Heaven Through Night-Light Satellite Images. Soc. Indic. Res. 1–30. https://doi.org/10.1007/s11205-020-02267-1

Arosanyin, G., Arosanyin, G.T., Olowosulu, A.T., Oyeyemi, G.M., 2011. Employment Generation and Earnings in the Informal Transport Sector in Nigeria. Int. Bus. Manag. 2, 139–148. https://doi.org/10.3968/j.ibm.1923842820110202.015

Beeton, D., 2012. Soldiers Without a Cause: Why Are Thousands of UN Troops Still in Haiti? NACLA Rep. Am. 45, 6–11. https://doi.org/10.1080/10714839.2012.11722105

Boutueil, V., Lesteven, G., Nemett, L., 2020. Toward the integration of paratransit in transportation planning in African cities. Transp. Res. Rec. 2674, 995–1004. https://doi.org/10.1177/0361198120933270

Bradley Raynor, 2014. Informal Transportation in Uganda : A Case Study of the Boda Boda. Indep. Study Proj. Collect. Paper 1923.

Cervero, R., 2000. Informal Transport In the Developing World, UN Habitat.

Cervero, R., Golub, A., 2007. Informal transport: A global perspective. Transp. Policy 14, 445–457. https://doi.org/10.1016/j.tranpol.2007.04.011

Cervero, RR, 2013. Linking urban transport and land use in developing countries. J. Transp. Land Use 6, 7–24. https://doi.org/10.5198/jtlu.v6i1.425

Dewind, J., Kinley, D.H., 2019. Aiding migration: The impact of international development assistance on haiti, Aiding Migration: The Impact of International Development Assistance on Haiti. Routledge. https://doi.org/10.4324/9780429043819

Ehebrecht, D., Heinrichs, D., Lenz, B., 2018. Motorcycle-taxis in sub-Saharan Africa: Current knowledge, implications for the debate on "informal" transport and research needs. J. Transp. Geogr. 69, 242–256. https://doi.org/10.1016/j.jtrangeo.2018.05.006

Evans, J., O'Brien, J., Ch Ng, B., 2018. Towards a geography of informal transport: Mobility, infrastructure and urban sustainability from the back of a motorbike. Trans. Inst. Br. Geogr. 43, 674–688. https://doi.org/10.1111/tran.12239

Ferro, P.S., Muñoz, J.C., Behrens, R., 2015. Trunk and feeder services regulation: Lessons from South American case studies. Case Stud. Transp. Policy 3, 264–270. https://doi.org/10.1016/j.cstp.2014.10.002

Gamble, J., Puga, E., 2019. Is Informal Transit Land-Oriented? Investigating the Links Between Informal Transit and Land-Use Planning in Quito, Ecuador Working Paper WP19JG1, Working Paper WP19JG1.

Gandini, C., Monje Silva, A., Guerrero, P., 2021. Gender and Transport in Haiti: Gender Diagnostic and Gender Action Plan | Publications. Washington DC.

Golub, A.D., 2003. Welfare Analysis of Informal Transit Services in Brazil and the Effects of Regulation, Civil and Environmental Engineering.

Guillen, M.D.V., 2009. Formal and Informal Public Transport Service Providers as an Occupation: A Social Investigation in Davao City. Proc. East. Asia Soc. Transp. Stud. 2009, 23. https://doi.org/10.11175/eastpro.2009.0.23.0

Heinrichs, D., Goletz, M., Lenz, B., 2017. Negotiating territory: Strategies of informal transport operators to access public space in urban Africa and Latin America. Transp. Res. Procedia 25, 4507–4517. https://doi.org/10.1016/j.trpro.2017.05.346

Hidalgo, D., Huizenga, C., 2013. Implementation of sustainable urban transport in Latin America. Res. Transp. Econ. 40, 66–77. https://doi.org/10.1016/j.retrec.2012.06.034

Howe, J., Annabel, D., 2002. Boda Boda: Uganda's Rural and Urban Low-Capacity Transport Services. Urban Mobil. all Proc. Tenth Int. CODATU Conf. 235–240.

International Monetary Fund, 2020a. Haiti. IMF Staff Ctry. Reports 20.

https://doi.org/10.5089/9781513541501.002
International Monetary Fund, 2020b. Haiti: Selected Issues. IMF Staff Ctry. Reports 2020. https://doi.org/10.5089/9781513541501.002.A001
Jaligot, R., Kemajou, A., Chenal, J., 2017. A new approach to spatial analysis of motorcycle taxis activities – the case of Port-au-Prince, Haiti. http://www.tandfonline.com/action/authorSubmission?journalCode=rupt20&page=instructions 5, 78–91. https://doi.org/10.1080/21650020.2017.1402697
Joseph, M., Wang, F., Wang, L., 2014. GIS-based assessment of urban environmental quality in Port-au-Prince, Haiti. Habitat Int. 41, 33–40. https://doi.org/10.1016/j.habitatint.2013.06.009
Klopp, J.M., Cavoli, C., 2019. Mapping minibuses in Maputo and Nairobi: engaging paratransit in transportation planning in African cities. Transp. Rev. 39, 657–676. https://doi.org/10.1080/01441647.2019.1598513
Klopp, J.M., Cavoli, C.M., 2017. The paratransit puzzle: Mapping and master planning for transportation in Maputo and Nairobi. Urban Mobilities Glob. South 95–110. https://doi.org/10.4324/9781315265094
Lozano-Gracia, N., Garcia Lozano, M., 2017. Haitian Cities, Haitian Cities. World Bank. https://doi.org/10.1596/29202
Medeiros, R.M., Duarte, F., Achmad, F., Jalali, A., 2018. Merging ICT and informal transport in Jakarta's ojek system. Transp. Plan. Technol. 41, 336–352. https://doi.org/10.1080/03081060.2018.1435465
Mittal, G., 2019. Taken for a Ride: Grounding Neoliberalism, Precarious Labour, and Public Transport in an African Metropolis Matteo Rizzo . Oxford University Press, Oxford, 2017, pp. xx +215 (ISBN 978-0-19-879424-0). , Singapore Journal of Tropical Geography. Oxford University Press. https://doi.org/10.1111/sjtg.12264
OECD, 2019. DAC list of oda recipients by income group. https://doi.org/10.1787/b11723c7-en
Payton, C.A., 2016. Building Corruption in Haiti. NACLA Rep. Am. 51, 182–187. https://doi.org/10.1080/10714839.2019.1617488
PHUN, V.K., Phun, V.K., 屋井鉄雄, YAI, T., 2016. State of the art of paratransit literatures in Asian developing countries. Asian Transp. Stud. 4, 57–77. https://doi.org/10.11175/eastsats.4.57
Schalekamp, H., 2017. Lessons from building paratransit operators' capacity to be partners in Cape Town's public transport reform process. Transp. Res. Part A Policy Pract. 104, 58–66. https://doi.org/10.1016/j.tra.2017.08.002
Sreenivas, A., 2011. Urban transport in Pune Urban transport.
The World Bank, 2020. Population, total - Haiti | Data [WWW Document]. Popul. Total - Haiti. URL https://data.worldbank.org/indicator/SP.POP.TOTL?locations=HT (accessed 8.2.20).
Tirachini, A., Chaniotakis, E., Abouelela, M., Antoniou, C., 2020. The sustainability of shared mobility: Can a platform for shared rides reduce motorized traffic in cities? Transp. Res. Part C Emerg. Technol. 117, 102707. https://doi.org/10.1016/j.trc.2020.102707
Tse, W. C., & Makkar, L., 2021. Haiti: An Ethnographic Study of the Effects of International Aid on Haitian Life [WWW Document]. Reinvention an Int. J. Undergrad. Res. URL https://reinventionjournal.org/index.php/reinvention/article/view/657/580 (accessed 6.14.21).
Venter, C., Mahendra, A., Hidalgo, D., 2019. From Mobility to Access for All: Expanding Urban Transportation Choices in the Global South, World Resource Report.
WGI, 2019. WGI 2019 Interactive [WWW Document]. Wgi 2019. URL https://info.worldbank.org/governance/wgi/Home/Reports (accessed 7.31.20).
Woolf, S.E., Joubert, J.W., 2013. A people-centred view on paratransit in South Africa. Cities 35, 284–293. https://doi.org/10.1016/j.cities.2013.04.005
Zagatti, G.A., Gonzalez, M., Avner, P., Lozano-Gracia, N., Brooks, C.J., Albert, M., Gray, J., Antos, S.E., Burci, P., zu Erbach-Schoenberg, E., Tatem, A.J., Wetter, E., Bengtsson, L., 2018. A trip to work: Estimation of origin and destination of commuting patterns in the main metropolitan regions of Haiti using CDR. Dev. Eng. 3, 133–165. https://doi.org/10.1016/j.deveng.2018.03.002