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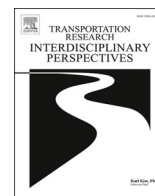
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Service contracting as a policy response for public transport recovery during the Covid-19 Pandemic: A preliminary evaluation

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ABSTRACT

We examine and assess the service contracting (SC) program implemented for the first time in Metro Manila, Philippines as a response to the impact of the pandemic on road-based public transport sector. We develop an evaluation framework, consisting of three indicators: social amelioration, increase in transport supply and performance improvement. These indicators are the purported objectives of SC. Using a mix of qualitative and quantitative methods, our evaluation suggests that although SC has brought positive impact in terms of the first two indicators, there is no robust evidence so far that may suggest that SC has improved the performance of public transport service delivery. We also find that while the primary objective of providing social amelioration to affected operators is appropriate during the time of the pandemic, this has also brought challenges in financially sustaining the program and in effecting improvements to public transport services. Our work aims to contribute as an empirical case study on the upsides and downsides of service contracting implemented as a business model for public transport provision during the pandemic.

1. Introduction

During the Covid-19 pandemic, several transport operators lost a significant part of their income, because of the reduced ridership demand and lowered vehicular capacity. This raised worries about the financial stability of their operations and their capacity to recover (Isa et al., 2021; Gkiotsalitis and Cats, 2021). As a result, many transport operators reduced their services due to the declined demand and loss of profits (Abdullah et al., 2021). Vickerman (2021) argues that in the light of the pandemic, which “has thrown most business models into disarray” (p. 101), there is a need to rethink the prevailing models of a deregulated competitive public transport.

A crucial issue for transport policy-makers concerns how high levels of service, which are required to maintain attractiveness and limit transmission risks, can be balanced with lower ticket revenues (Jenelius

and Cebecauer, 2020). A number of economic/financial measures have been implemented or proposed, including “monetary compensations paid to transport and logistics firms suffering from economic losses” (Zhang et al., 2021) and other forms of transport subsidy schemes (Benita, 2021). Worldwide, some governments and public agencies have paid subsidies to public transport operators to guarantee the economic viability of the transport system (Aloi et al., 2020). These subsidies are typically infused as part of stimulus funding packages by the governments to aid the recovery of public transportation systems (Rothengatter et al., 2021). Public transport services are crucial enablers of many business activities; their recovery is thus critical for the recovery of the economy from the Covid crisis (Rothengatter et al., 2021).

One of the economic schemes that may help transport operators recover from the pandemic is the adoption of a different model of service provision (e.g., Vickerman, 2021). For example, in the aviation industry,

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Table 1
The positioning of the current study with respect to the extant literature.

Theme	SC as an instrument of public transport system reform			SC as policy response during the pandemic
	SC in the context of formal PT systems	SC in the context of paratransit		
Significant concepts	Procurement of services through contracts as a result of deregulation and privatization in most developed countries (e.g. Israel, Australia, UK, Singapore, etc) <i>Section 2.1.</i>	Reorganization/ replacement of paratransit (bus or mini-buses) to support a transition to a trunk-feeder BRT (e.g. Latin America, Mexico, South Africa, Nigeria) <i>Section 2.2.</i>	Improvement of paratransit services, but without any transition to mass transit (e.g. Philippines) <i>Section 2.3.</i>	SC as a business model of PT service provision during the time of Covid <i>Section 2.4.</i>
Section in the manuscript				
Representative studies	Hensher and Stanley (2010); Pedro and Macário (2016); Ida and Talit (2017)	Plano et al. (2020); Asimeng and Heinrichs (2021); Gómez-Lobo and Briones (2014)	Kaenzig (2017); Sunio et al. (2021)	Ugay et al. (2020); Lima et al. (2020); Pontawe et al. (2021)
Positioning of the current study	–	–	The present research	

Table 2
Five regulatory regimes in public transport. Adapted from Dementiev and Han (2020) and van de Velde (1999).

	Private oligopoly	Private monopoly	Outsourcing (service contracts)	Regulated monopoly	Public monopoly
Ownership of asset	Private	Private	Private	Public	Public
Management / operations	Private (several)	Private (monopoly)	Private (competing operators)	Private	Public
Source of Initiative	Market initiative	Market initiative	Authority initiative	Authority initiative	Authority initiative
Regulatory contract	No (deregulated)	No (deregulated)	Yes	Yes	Yes
Competition in the market	Yes	No	No	No	No
Competition for the market	Free entry	No	Competitive tendering	No	No

Bauer et al. (2020) present a new business model that may generate a competitive advantage for airline operations in the midst of the pandemic. In the new mobility industry, car-sharing, ride-sharing and bike-sharing firms have adapted their business models in response to the pandemic (Turoń and Kubik, 2021). Potter et al. (2021) present a case of a city in the United Kingdom which has implemented a radical shift towards the replacement of conventional buses with demand-responsive transport (DRT), as a means of economic and social recovery amidst the financial pressures on public transport support. *With the above considerations in mind, the authors of this study take the position that a new model of service provision for road-based public transport is also needed and that service contracting (hereafter SC) may be a suitable model.*

As a case material, we use the SC program implemented in the Philippines during the pandemic. Under SC, the government pays the operators for the services stipulated in the contracts, ensuring adequate revenues to operate transport services for the public. In September 2020, a law was passed in the Philippines, called the *Bayanihan to Recover as One Act* (also known as *Bayanihan 2*). The objective of the new piece of legislation is to provide mechanisms and funding for the recovery of the Philippine economy. One such mechanism is service contracting, which was allocated a budget of P5.6 billion (110 M USD). The program was implemented from 26 September 2020 until 30 June 2021.

Service contracting is not a new concept. It has been extensively used by public transport agencies to provide public transport, such as buses, in the Global South (Muñoz and de Grange, 2010). In the Philippines, however, service contracting is an *innovation* – i.e., it is “new to the country” (versus “new to the world”) (Lee et al., 2019). Although suggestions had been made in the past to implement service contracting in the Philippines as a means to reform and modernize public transport (e.g. Sunio et al., 2021), it never gained traction. It was only during the pandemic that it was finally tried and implemented.

The objective of this study is to evaluate service contracting as a policy response during the Covid-19 pandemic. An evaluation framework, further described in Section 4, is developed to assess the changes in the public transport system attributed to the implementation of service contracting. A combination of vehicle location and interview data is used. Three main questions guide our evaluation:

- What is the impact of service contracting in terms of providing social relief and amelioration to affected public transport operators?
- How has service contracting impacted the availability and supply of public transport during the pandemic?
- Has service contracting improved the delivery of public transport services?

A lot of studies have already been published dealing with the impact of the pandemic on the transport sector (e.g. Kim, 2021). Focusing on papers from the Global South, these studies include: establishing the risk factors contributing to Covid (Rahman et al., 2021; Kartal et al., 2021); examining the changes due to the pandemic on travel behavior, mode use, mobility patterns in Bangladesh (Anwari et al., 2021; Zannat et al., 2021), India (Bhaduri et al., 2020; Pawar et al., 2020; Zannat et al., 2021), Nigeria (Mogaji, 2020; Ajide et al., 2020), Dominican Republic (La Paix, 2021), Philippines (Mayo et al., 2021) and China (Yang et al., 2021); and finally, assessing the effectiveness of policies and interventions on mobility restrictions or virus transmission (e.g., Khoir-unurrofik et al., 2021). The current study belongs to the category of research on Covid-related policy interventions. Nonetheless, the focus is not on policies for the restriction of movements, but those for the financial recovery of transport operators.

After this Introduction, we present the literature on service contracting as a means for public transport reform (Section 2), the case study context (Section 3), the data and methods used (Section 4), results (Section 5), discussion (Section 6) and finally, summary, limitations and conclusions (Section 7).

2. Review of literature on service contracting

In reviewing a number of studies related to service contracting as an instrument of public transport system reform, we consider SC in the context of: reform of formal PT systems (2.1), transition from paratransit to formal transport, such as bus rapid transit or BRT (2.2), and reform of paratransit, without being accompanied by a transition to formal transport (2.3). Next we review briefly a number of studies on pandemic-related policy responses, and situate SC as one of the suitable policy instruments (2.4). Table 1 shows a summary of the literature, and the positioning of the current study within this literature.

2.1. Service contracts in the era of privatization and deregulation of formal transport systems

Service contracts between a public transport authority and several transport operators have been used as instruments by national governments to reform public transport systems (e.g. [González-Díaz and Montoro-Sánchez, 2011](#); [Dementiev and Han, 2020](#)). Table 2 presents five regulatory regimes in public transport, private oligopoly, private monopoly, outsourcing, regulated monopoly, and public monopoly ([Dementiev and Han \(2020\)](#)). Outsourcing, which includes service contracting, is the regime which strikes a good balance between full State regulation and market deregulation.

In many developed countries, after a period of public transport service provision by public administrations (e.g. public monopoly and regulated monopoly regimes), the years that followed saw the privatization of government-owned enterprises and/or deregulation (e.g. private oligopoly or private monopoly regimes) ([Pedro and Macário, 2016](#)). This was motivated by the need for greater economic efficiency and improvement of service levels, which state agencies may not be competent enough to deliver. Because of deregulation, the provision of public transport service was subjected to market forces and competition. However, due to concerns that complete deregulation and privatization can result in lack of coordination and integration of services, public authorities also saw the need for some supervision. Eventually, some governments opted out of supervision, and instead resorted to contracting (e.g. outsourcing regime) ([Sheng and Meng, 2020](#)). Nowadays, competitive tendering has become the dominant model for the supply of public transport services (e.g. Israel, Australia, UK, Singapore). In competitive tenders, the state awards a service contract to the winning operator to provide the service for a defined time-limited period ([Ida and Talit, 2017](#)). By now, there have been a lot of studies on contracting of public transport services, including systematic and critical reviews (e.g. [Hensher and Stanley, 2010](#); [Pedro and Macário, 2016](#); [Sheng and Meng, 2020](#)). These studies provide lessons on ways of better managing public transport, such as bus/tram and metro/rail in the era of deregulation.

2.2. Service contracting and the transition from paratransit to formal transit

Another strand of SC literature, drawn from studies in the Global South, concerns the reorganization or replacement of paratransit in support of transition to mass transit system (e.g. BRT). In many cases, the government undertook a massive public transport reform program to eliminate penny wars, consolidate several operators into corporations, and organize public transport around trunk-feeder BRT systems ([Gómez-Lobo and Briones, 2014](#)). In this reform program, service contracts were awarded to consolidated operators to provide services in any of the routes in the new PT system. We can cite examples of SC as an instrument of paratransit reform from Latin America, Mexico, South Africa and Nigeria ([Plano et al., 2020](#); [Asimeng and Heinrichs, 2021](#); [Gómez-Lobo and Briones, 2014](#); [Paget-Seekins et al., 2015](#)).

Among these examples, one highly studied case is Transantiago ([Muñoz et al., 2014](#); [Muñoz and Gschwender, 2008](#)). According to some scholars, Transantiago is an instructive reference on transit reform ([Muñoz et al., 2014](#)). In the 1970s, the bus system in Santiago, Chile was entirely operated by the private sector. In the 1980s, the industry was totally deregulated, resulting in fierce on-street competition for passengers. In the 1990s, there were attempts to address the problem through a competitive tendering process ([Beltran et al., 2013](#)). In 2007, the Transantiago was implemented based on the concept of integrating transit networks on a structure of trunk and feeder services. Trunk and feeder services were tendered to private companies, and these companies would enjoy exclusive provision of services in each of the areas or zones of the city. The revenues of the operators depended on their compliance with the performance metrics stipulated in the service contracts ([Beltran et al., 2013](#)). While Transantiago was beset with

numerous issues with regards to its implementation, it has arguably brought some positive changes to public transport in Chile ([Muñoz and de Grange, 2010](#)).

2.3. Service contracting and the reform of paratransit

Reforming the public transport system in developing countries is a challenge, given the limitations in the availability of useful data and metrics that may be the basis for PT performance monitoring and evaluation. Although there are innovative methods proposed in the literature (e.g. Data Envelope Analysis; [Naim et al., 2021](#)), the implementation of SC requires that data be associated with each operator offering the service.

Unlike the cases cited so far from countries in the Global North and South, SC in the Philippines represents a unique case, in the sense that its objective is the improvement of paratransit service delivery. As early as 2013, a reform program was conceptualized to upgrade public transport, including jeepneys. The objective is to modernize the operations of jeepney, not phase them out, through service-based contracts. In 2017, the Philippines launched the PUV Modernization Program (more in Section 3), which aims to reform the land-based PUV sector. One of the components of PUVMP is consolidation of several operators serving the same routes into a single entity (cooperative or corporation). With full consolidation, it would be possible for a public transport authority to enter into a service contract with cooperatives or corporations ([Sunio et al., 2021](#)). Another component of PUVMP is fleet modernization, which aims to replace old jeepney units with modern ones that are equipped with latest technologies. [Kaenzig \(2017\)](#) proposed a way for the government to implement service contract in the context of PUVMP.

2.4. Service contracting as a business model during the pandemic

Various measures and schemes in response to the pandemic have been proposed and implemented ([Zhang et al., 2021](#)). A very common policy response by most governments worldwide to COVID-19 is full or partial lockdowns. This is the measure implemented, for example, in the Philippines, Indonesia and Colombia (e.g. [Mayo et al., 2021](#); [Khoir-unurrofik et al., 2021](#); [Guzman et al., 2021](#)). Besides lockdowns, other non-pharmaceutical interventions – which may be less drastic – include containment strategies such as the declaration of general holidays; closure of educational institutions, markets and malls; and restriction on religious gatherings, as was done in Bangladesh ([Zafri et al., 2021](#)).

With very few exceptions, no extant literature has yet considered service contracting as a potential policy response to the Covid-19 crisis. One study does consider service contracting ([Lima et al., 2020](#)), but in the context of renegotiating the terms of the contract due to the pandemic. In the Philippines, the pandemic has caused a severe impact on the operations of public transport. As a response, the government implemented service contracting ([Ugay et al., 2020](#); [Pontawe et al., 2021](#)).

3. Case study context

In this section, we provide brief contextual information on the following: the PUV Modernization Program (3.1), effect of the pandemic of PUV operations (3.2) and the design of the service contracting program (3.3). This is needed to understand better the impact of SC as a response to the pandemic.

3.1. The PUV modernization program

When SC was implemented in September 2020, it had already been more than three years since the launch of the PUV Modernization Program (PUVMP), a nationwide program by the Department of Transportation (DOTr) and the Land Transportation Franchising and Regulatory Board (LTFRB). The objective of the program is a system-

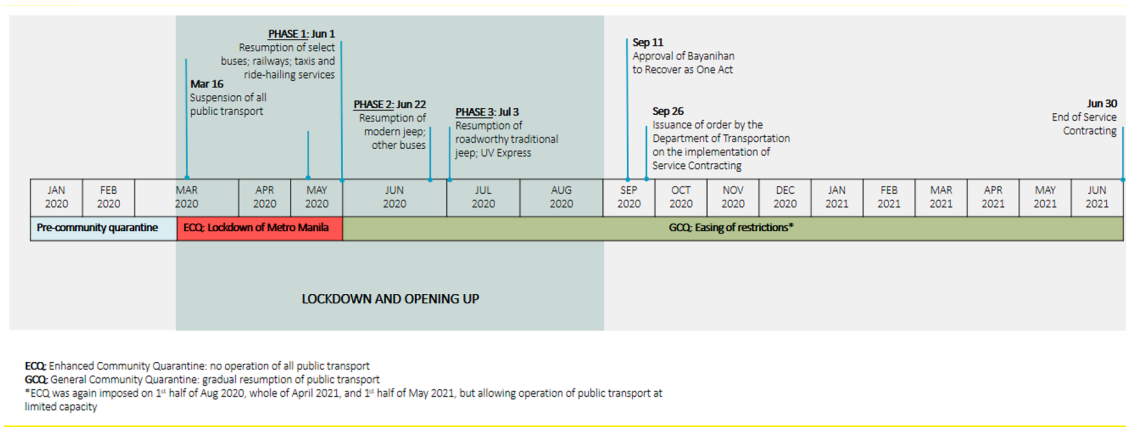


Fig. 1. Timeline of significant events related to public transport disruption and resumption, and policy responses for recovery. . Adapted from Sunio and Mateo-Babiano (2022)

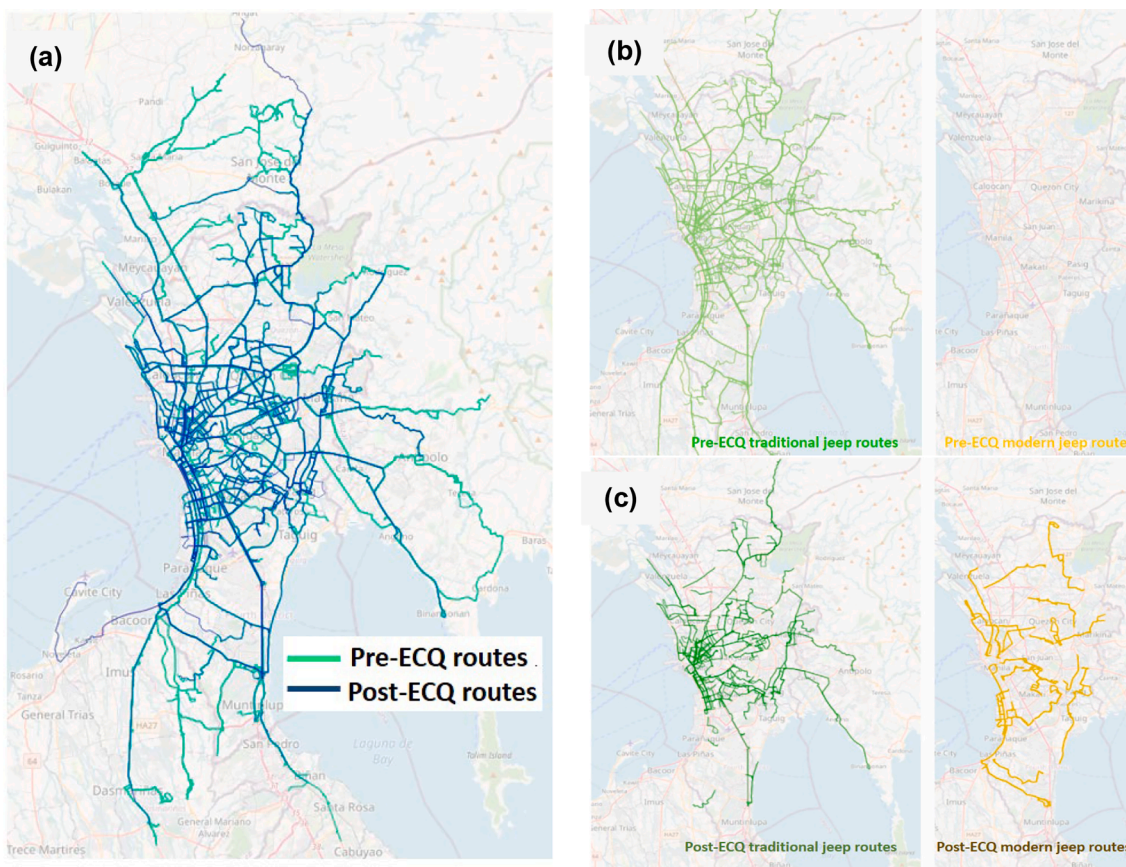


Fig. 2. Changes of transportation network in Metro Manila. (a) Map showing Pre-ECQ and Post-ECQ road transportation routes; (b) Pre-ECQ (before March 16) of TPUJ and MPUJ; and (c) Post-ECQ (September 15) of TPUJ and MPUJ. Limited data is available for Pre-ECQ MPUJ routes, so they are excluded. Source: Sakay.ph.

wide reform of the road-based public transport sector. Though PUVMP covers all road-based public transport (i.e. bus, jeepney, and vans), a great portion of PUVMP is concerned with the modernization of jeepneys, which are the most dominant modes of road-based public transport (Sunio et al., 2021; Sunio, 2021).

One of the thrusts of PUVMP is fleet modernization. Fleet modernization refers to the “replacement of old, polluting and inefficient jeepneys with cleaner and more efficient vehicles” (GIZ, 2016). This means transitioning from *traditional public utility jeepney (TPUJ)* to *modern public utility jeepneys (MPUJ)*, which are equipped with the latest technologies (e.g. GPS, CCTV and automatic fare collection system).

Even after four years since the PUVMP was first launched, the pace of its implementation is generally slow (e.g. Sunio et al., 2021). Prior to the pandemic, the number of routes with modernized jeepney is limited. One of the reasons is the lack of financial capacity on the part of operators to acquire the modern units. To financially help the operators, the government has provided equity subsidy equivalent to 5% of the total acquisition cost. At the same time, a loan package of up to 95% of the cost was issued by government-controlled banks (the Development Bank of the Philippines or DBP, and Land Bank of the Philippines or LBP). Borrower-operators can pay their loans within up to seven years. When the pandemic hit, the reduction in their daily revenues due to mobility

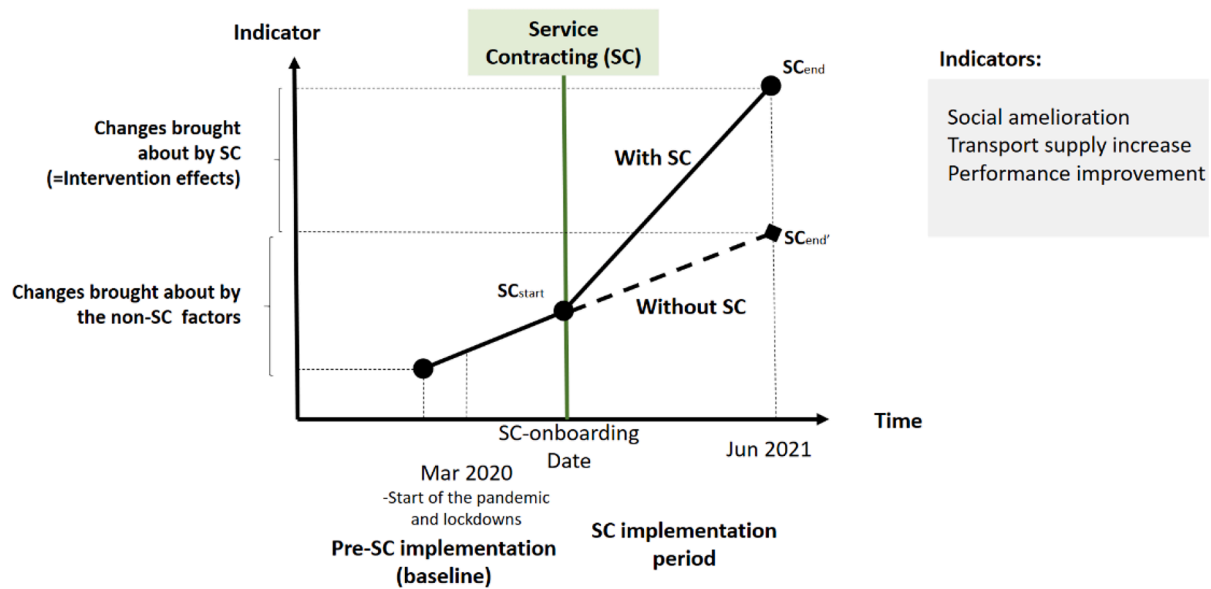


Fig. 3. Evaluation framework. SC_{start} represents the point at the time of SC-onboarding and SC_{end} is the point at the conclusion of the SC. We also consider a counterfactual case that the SC were not implemented, which is represented as $SC_{end'}$.

restrictions severely impacted the ability of most operators to pay their monthly amortization (Sunio and Mateo-Babiano, 2022).

3.2. Effect of the pandemic on public transport operation

In this section, we describe how the pandemic and the lockdowns impacted the services of public transport, especially jeepneys, in Metro Manila, the geographical context of the study. Metro Manila, the capital of the Philippines, encompasses an area of 620 km², which is roughly 0.18% of the country’s total land area (Sunio et al., 2021). Fig. 1 shows the various events from January 2020 until June 2021 in Metro Manila, divided into three main periods: pre-community quarantine, enhanced community quarantine (ECQ) and the general community quarantine (GCQ) (see the Appendix). The description in this section focuses on the period of March – September 2020 (“lockdown and opening up” in Fig. 1), since this is the period directly prior to the start of the service contracting program.

On 16 March 2020, the government imposed a lockdown and restricted community mobility, including public transportation usage. In 1 June 2020, a phased resumption of public transportation was implemented. Following the hierarchy of public transportation, the DoTr/LTFRB prioritized the resumption of mass transit (e.g. trains and buses) and ride-hailing, followed by MPUJ, and finally, TPUJ. Traditional jeepneys have been at a disadvantage because they are last prioritized in the resumption. Some TPUJ operators have alleged that the pandemic has been exploited by the government to fast-track the phase-out and modernization of jeepney, which the DoTr/LTFRB denies. On 11 September 2020, Bayanihan 2 Law was passed, which mandates the implementation of service contracting until 30 June 2021.¹

Using a unique dataset from Sakay², we compare the public transportation network within Mega Manila (Fig. 2). This comparison was

¹ “to effectively implement...service contracting of public utility vehicles” and “there shall be no phase-out, at the national and local level, of any modality of public utility vehicle as the industry transitions to a new normal” (p.31, Bayanihan 2 Law).

² <https://sakay.ph/>. Sakay is a web and Smartphone application which provides public transit directions. In order for Sakay to provide reliable results to its users, the team behind the application regularly updates the transit data. The authors have access to the dataset by Sakay.

done by analyzing “snapshots” of the ground public transportation network. The snapshot is a geospatial map for all active routes across different transportation modes. “Active” routes are defined as routes that are “operational”, i.e. they have been allowed by the government agency to resume their operations.³ We use this information to compare the service coverage before and after the ECQ. Service coverage refers to the geographical coverage of the operational routes, and not to the levels of service (e.g. frequency, kilometers traveled).

The pre-ECQ snapshot considers the status quo prior to the 16 March 2020 lockdown. The post-ECQ snapshot considers the active ground transportation network on 15 September 2020. Fig. 2a shows all the active routes for all public transport (i.e. bus, TPUJ and MPUJ) pre-ECQ (light teal color) and post-ECQ (darker teal color). Comparing the combined pre-ECQ and post-ECQ public transport routes suggests a reduced service coverage in post-ECQ. Drilling down into the TPUJ and MPUJ service route coverage, we see that the routes of TPUJs prior to ECQ (light green) and after ECQ (dark green) indicate a decrease in the TPUJ route service coverage, suggesting that some of these routes, previously served by TPUJs, are now operated by MPUJs. Before the ECQ, there were approximately 55,000 TPUJs serving the public, but as of 15 September 2020, only 18,000 of those were operating (Rappler, 2020). The shift in the mode of transportation from TPUJs to MPUJs seems to be the result of the fleet modernization program and the phased resumption of services.

3.3. Service contracting program

The primary objective of service contracting is to provide aid/subsidy as a form of social amelioration to the critically impacted transport sector. Two types of service contracting are presently implemented. The first scheme is the “net cost”: the operator charges fares from the

³ Beginning June 2020, the government agency (i.e. LTFRB) allowed the gradual resumption of jeepney operations. Memorandum circulars (MC) were issued, listing the routes that were allowed to resume operations. For example, MC 2020-023 (issued 6/22/2020), MC 2020-026 (issued 6/28/2020), MC 2020-029 (issued 7/27/2020), MC 2020-035 (issued 8/14/2020), and so on. Route information from these paper-based MCs were then digitized by Sakay, i.e. transformed into geospatial format. This enables the researchers to derive information on the route service coverage.

Table 3
Indicators used for evaluating SC.

Indicator	Description	Rationale for inclusion of the indicator in the evaluation criteria
Social amelioration	Service contracting is implemented first of all as a form of aid to critically impacted industries, including public transport. ¹ In SC, drivers and operators are to receive “weekly payout”, which is distributed as follows: Driver (30%) and Operator (70%). Authorized persons outside residence (APOR) are also the target beneficiaries of the SC. Medical frontliners and APORs enjoy free rides.	The primary objective of SC is to provide aid to drivers, operators and frontline workers. The evaluation should thus include this indicator. However, for this study, we primarily consider social amelioration from the perspective of operators.
Transport supply increase	Another purpose of the SC is to raise “the level of service of the modes of public transport covered by this program” (Department Order 2020–017). The pandemic may have caused several operators to temporarily halt the operation of their services, affecting the mobility of the general public. The SC is supposed to address this problem.	Since one of the major problems during the pandemic is the lack of available public transport, the evaluation should look into the impact of SC on the possible increase in transport supply.
Performance improvement	SC is also meant to improve the performance of public transport system. Operators and drivers are paid based on their compliance with some performance indicators. To implement SC, a mechanism to monitor service delivery is necessary. This requires that routes and franchise data are digitized.	SC has a lot of potential in reforming and improving the current public transport systems - if the contracts are designed properly. Thus the evaluation should also check if there is an improvement in service delivery as a result of SC. This is of interest to government regulators.

¹ Per Department Order 2020–017 by the Department of Transportation issued on 26 September 2020, the Bayanihan 2 Act “mandates a comprehensive program to address multifarious needs of the Filipino people to recover from the COVID-19 pandemic which includes the adversely affected transport sector”. In the said Act, “the DOTr is directed to coordinate and negotiate for partial subsidized service contracting of public utility vehicles (PUVs) as a form of temporary relief to adversely affected workers in the public transportation sector”.

Table 4
Data sources, availability, scope and limitations.

Data	Description	Availability/Limitations
Automatic vehicle location (AVL) data generated via Smartphone app	Transport cooperatives onboarded in the SC program are required to use the Smartphone app for drivers so the DoTr/LTRFB can keep track of the routes taken and the km-run traveled	AVL data is available only during the duration of the SC; no pre-SC data. Moreover, no AVL dataset from those that did not onboard the SC. We use data from 6 routes, which show the successes and issues in the implementation of SC. These 6 routes are plied by transport cooperatives, operating MPUJ/TPUJ.
Interviews	Since pre-SC AVL data are not available, we resorted to qualitative interviews to solicit responses related to the implementation of SC.	Transport cooperatives / operators operating on 6 routes were approached and contacted for interview.

passengers and receive as well a partial subsidy from the government. The second type is “gross cost”, which refers to the arrangement wherein no fare is charged from the passengers; the revenue from the provision of the service is sourced entirely from the government budget. Initially, for the first few months, service contracting was implemented as “net cost”, but eventually the “gross cost” option was also implemented. The shift from net to gross cost option is most evident in Section 5.3 below, which shows a dramatic increase in km-run traveled by jeepneys upon onboarding into the latter option.

The service contracting under Bayanihan 2 law ended in 30 June 2021. In September 2021, a new service contracting program under a different law was implemented. *The current study only considers the first SC.* Although the geographical context of our study is Metro Manila, the PUVMP and the service contracting program have been implemented nationwide.

4. Material and methods

4.1. Evaluation framework

To assess the effectiveness of service contracting, we use the framework shown in Fig. 3. We assume some changes on the transport system based on three pre-identified indicators (social amelioration, transport supply increase, performance improvement) during the period of implementation of SC from 26 September 2020 to 30 June 2021. These changes are brought about by both SC and non-SC factors. In order to ensure a robust evaluation, we must isolate the impact of SC from the effect due to other non-SC factors.

In the same figure, the three indicators of social amelioration, transport supply increase, and performance improvement were chosen as indicators of evaluation based on the stated objectives of the program (Table 3).

4.2. Data sources

One of the major constraints in this study is the availability of data. In order to perform a robust analysis, data must be obtained at various points (SC_{start} , SC_{end} or SC_{end}) of the evaluation framework.

Table 4 lists the data sources available. The first is a rare automatic vehicle location (AVL) dataset generated by a Smartphone app used by drivers of transport cooperatives which on-boarded the SC program. This means that, with respect to the framework, *pre-SC AVL dataset or AVL dataset from transport cooperatives who did not join the SC is not available for this study.* Moreover, because of challenges encountered with the proper use of the Smartphone app, some AVL data obtained from transport cooperatives were messy.

The second is an interview dataset. The aim of the interview is to collect qualitative data on points SC_{start} , SC_{end} or SC_{end} . We accomplish this by asking the respondents the following questions (in no particular order):

- What are the objectives of the SC program?
- Under the program, how is your performance evaluated?
- What is the impact of the pandemic on the operations and financial flows of your transport cooperative? Please focus on the impact from March 2020 (the start of the lockdown) until the time your cooperative was SC-onboarded (Data at Point SC_{start}).
- Prior to the SC, how were your operations and financials like during the pandemic? (Data at Point SC_{start})
- Had your transport cooperative not joined SC, how would your operations and financials during the pandemic have been like? (Data at Point SC_{end})
- What are the positive and negative impacts of SC on your operations and financials? (Data at Point SC_{end})

The following transport cooperatives/corporations participated in

Table 5
Transport cooperatives/corporations interviewed for the study.

Route Code	Transport cooperative / corporation	Position of interview respondent	Duration of the Interview (min)
311	PM Jeepney Drivers and Operators Services Inc.	Chairman and Vice-chairman	60
414	Saint Rose Transit	Vice President	70
T403	San Dionisio Transport Service Cooperative	Chairman	90
302	A. Roces Transport Service Cooperative	Vice Chairman	70
201	Taguig Transport Service Cooperative	Chairman	70
305	Malabon Jeepney Transport Service Cooperative (MAJETSCO)	Chairman	60

Table 6
Analysis steps for each indicator and data source.

Indicator	Data source	Analysis steps
Social amelioration	Interview	<ul style="list-style-type: none"> Decide how to measure social amelioration (e.g. financial assistance) Determine the financial situation of the transport cooperative <ul style="list-style-type: none"> before the lockdown (first ECQ) after the start of the lockdown and before SC onboarding (pre-SC_{start}) after SC-onboarding until the end of SC (from SC_{start} to SC_{end}) had SC were not implemented (the counterfactual case from SC_{start} to SC_{end}) Compare the financial situation. SC is effective if it contributes to an improvement in the financial situation of the transport cooperative.
Transport supply increase	Interview	<ul style="list-style-type: none"> Decide how to quantify transport supply (e.g. number of units, number of round trips per unit/day) Determine the transport supply <ul style="list-style-type: none"> before the lockdown (first ECQ) after the start of the lockdown and before SC onboarding (pre-SC_{start}) after SC-onboarding until the end of SC (from SC_{start} to SC_{end}) had SC were not implemented (the counterfactual case from SC_{start} to SC_{end}) Compare the values of transport supply. SC is effective if it causes an increase in transport supply.
Performance improvement	AVL data	<ul style="list-style-type: none"> Since AVL data is only available from SC_{start} to SC_{end}, no comparison can be made between with-SC and without-SC. However, AVL data is available almost daily from SC-onboarding until the end of SC. Decide how to measure performance (e.g. compliance to contract, e.g. route alignment) Graph performance over time. SC is effective if it results to an improvement in performance over time.

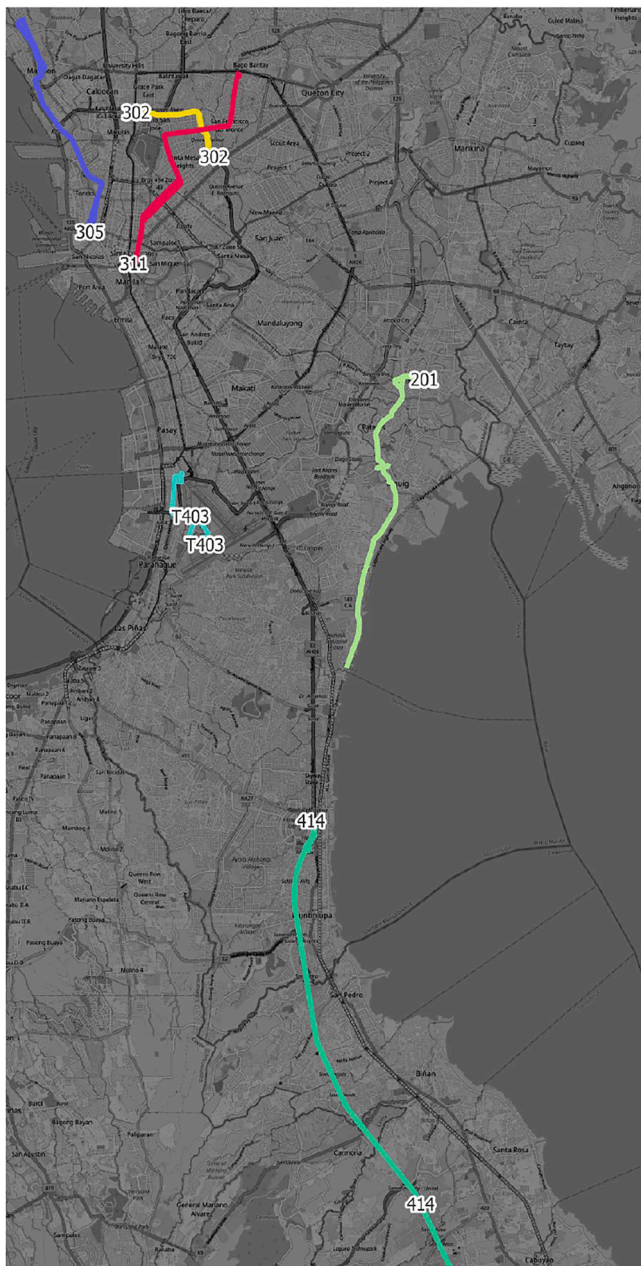


Fig. 4. Map showing the 6 routes included in the evaluation.

the interview (Table 5). These are the organizations that operate on the six routes selected for the study.

Because of limited availability of data, we cannot empirically demonstrate the effectiveness of SC via some experimental/quasi-experimental design (i.e. control all confounding effects so as to isolate the effect of SC on service improvements). Since a robust experimental design is not feasible at this point, a possible approach is a *case study approach*, using a mix of qualitative and quantitative methods. In particular, we focus our analysis only on 6 routes (Fig. 4).⁴ Moreover, we can only evaluate SC from the perspective of transport operators.

4.3. Analysis method

Applying the evaluation framework on our limited dataset, we analyze the data as follows. In general, we aim to compare the indicator values in both scenarios, with-SC and without-SC, in order to assess the effectiveness of SC as a policy response. To do so, we perform the

⁴ Initially, we considered 12 routes with the most AVL data for evaluation. The researchers contacted all transport cooperatives operating on these routes. Since only 6 cooperatives responded and participated in the interview, we decided to conduct the assessment only on these 6 routes. Normally, 6 to 10 theoretically diverse cases are needed for a solid qualitative research (Chandra and Shang, 2019). Although they are not representative of the entire population, they do represent a variety of cases (Eisenhardt and Graebner, 2007). These cases, as will be shown later, include: full, half and low compliance cases (see Section 5.3).

Table 7
Impact of SC on the financial standing of transport cooperatives.

Transport operators	Pre-ECQ	Pre-SC ECQ _{start} - SC _{start}	without-SC SC _{start} - SC _{end}	with-SC SC _{start} - SC _{end}	Main impact of SC
PM Jeepney	Operations were financially viable	Reduced incomes	Only breakeven	Provided stable income and incentives for the drivers and operators	Guaranteed income for the cooperative
Saint Rose Transit	Stable income	Not at all financially viable to operate any services; the cooperative had to retrench some of its drivers	At most, it would have been only a break-even. Still struggling no guarantee of income	Assured income of driver and operators	Guaranteed income for the cooperative
San Dionisio	High passenger demand, which resulted to high revenues	Zero TPUJ operation so no income was generated. During this time, the cooperative purchased 30 MPUJs through a bank loan. The cooperative had low capitalization, so there was a lot of difficulty paying the loan.	Sure losses for the transport cooperative without the SC.	There were pay-out issues, so even though the cooperative joined the SC program, this did not give it a significant financial relief.	Not much financial relief because of pay-out issues, but at least sure losses were avoided
A. Roces	Revenues from the operations were very good	Break-even or even a net loss in the operations. The coop could not pay its monthly amortization.	Service operations would have continued, but could not have paid the monthly amortization.	Able to pay the bank loan of P3.6 M.	Payment to banks of monthly amortization of loan incurred as a result of purchase of MPUJs
Taguig TSC	Highly positive income	At this time, it was also difficult to pay for the monthly amortization of the MPUJs purchased through bank loans. For the purchase of 88 MPUJs, the coop had to secure a loan of P150M from DBP (a government bank).	If there were no SC, it would have been quite hard to pay the loan	Loan payments were done according to the amortization schedule	Payment to banks of monthly amortization of loan incurred as a result of purchase of MPUJs
Malabon Jeepney Transport Service Cooperative (MAJETSCO)	The income generated was good, which enabled the cooperative to save	There was a lot of difficulty paying the bank of the monthly amortization. Thanks to the good income saved pre-pandemic, the coop was still able to pay.	There would have been difficulty in paying monthly amortization	Monthly amortization was paid promptly	Payment to banks of monthly amortization of loan incurred as a result of purchase of MPUJs

Table 8
Impact of SC on transport supply.

Transport operators	Pre-ECQ	Pre-SC ECQ _{start} - SC _{start}	without-SC SC _{start} - SC _{end}	with-SC SC _{start} - SC _{end}	Main impact of SC
PM Jeepney	21 MPUJ	From June 2020-Feb 2021, 21 units are deployed, but they only make 4 roundtrips	Maybe same number of units deployed but 4 roundtrips only	21 units deployed, making 7 roundtrips	Increase in the level of supply (in terms of number of roundtrips only)
Saint Rose Transit	15 MPUJ	Only 3 out of the 15 units were in operation, providing free rides to frontliners	Perhaps at least 3 units and at most 8 units would be in operation.	Back to 15 units	Increase in the level of supply (in terms of the number of units deployed)
San Dionisio	30 TPUJ	March 2020 – September 2020: zero operation since TPJUs were not yet allowed to resume operations. Cooperative purchased 30 MPUJs to replace the 30 TPUJs. In January 2021, only 15 MPUJs were deployed.	15 MPUJs	Still 15 units only. No increase in the number of units because of pay-out issues.	No impact on the transport supply (because of pay-out issues)
A. Roces	17 MPUJ (in Jan 2020)	10–12 units	Would have continued operating all 17 units just to get a break-even.	Able to operate all 17 MPUJ.	Not much impact on the transport supply
Taguig TSC	88 MPUJ	Beginning, June 22, 2020, when MPUJs were allowed to resume operations, all 88 units were dispatched. However, because of competition with other jeepneys, from 88, only 40 units were eventually deployed.	If there is no SC, only 20 (and not 40) units would have been dispatched.	60 units were dispatched on the average.	Increase in the level of supply (in terms of the number of units deployed)
Malabon Jeepney Transport Service Cooperative (MAJETSCO)	23 MPUJ	Still 23 MPUJs were running, but maybe at a loss	Same level of service (number of units, and roundtrips) but at a loss	Still 23 MPUJs. No reduction in level of service	No impact on the transport supply

following steps shown in [Table 6](#):

In deciding how the above three indicators may be measured, we are guided by data availability. Social amelioration refers to a form of financial relief, which we can infer by examining the transport operator’s financial situation over time. Here we limit social amelioration

from the perspective of transport operators. An ideal source of data on the operator’s financial situation is financial reports. Unfortunately, the researchers are not allowed to access the reports. Hence, we resort to simply asking the operators to describe the financial status of their cooperative at different points in time and the impact of SC on it.

Table 9
Trip classifications and corresponding description.

Classification	Symbol	Description	Validity
Perfect	P	Perfect alignment between route and actual trajectory	Complete
OK	O	One or two missed stops in the trip	Complete
Cut	C	Designated route not completely plied by the jeepney	Incomplete
Reverse-cut	R	A return trip after a cut trip	Incomplete
Deviated	D	Actual trajectory of the jeepney diverged from its prescribed route	Incomplete
Subsegment	S	Cut trip on both ends, usually dead runs	Incomplete
Degenerate	—	The trip is too short to be considered valid	Others
No Match	X	Usually means wrong assigned route information	Others

Table 10
Normalized kilometer-run per route. “Complete” (blue), “Incomplete” (orange), and “Others” (gray).

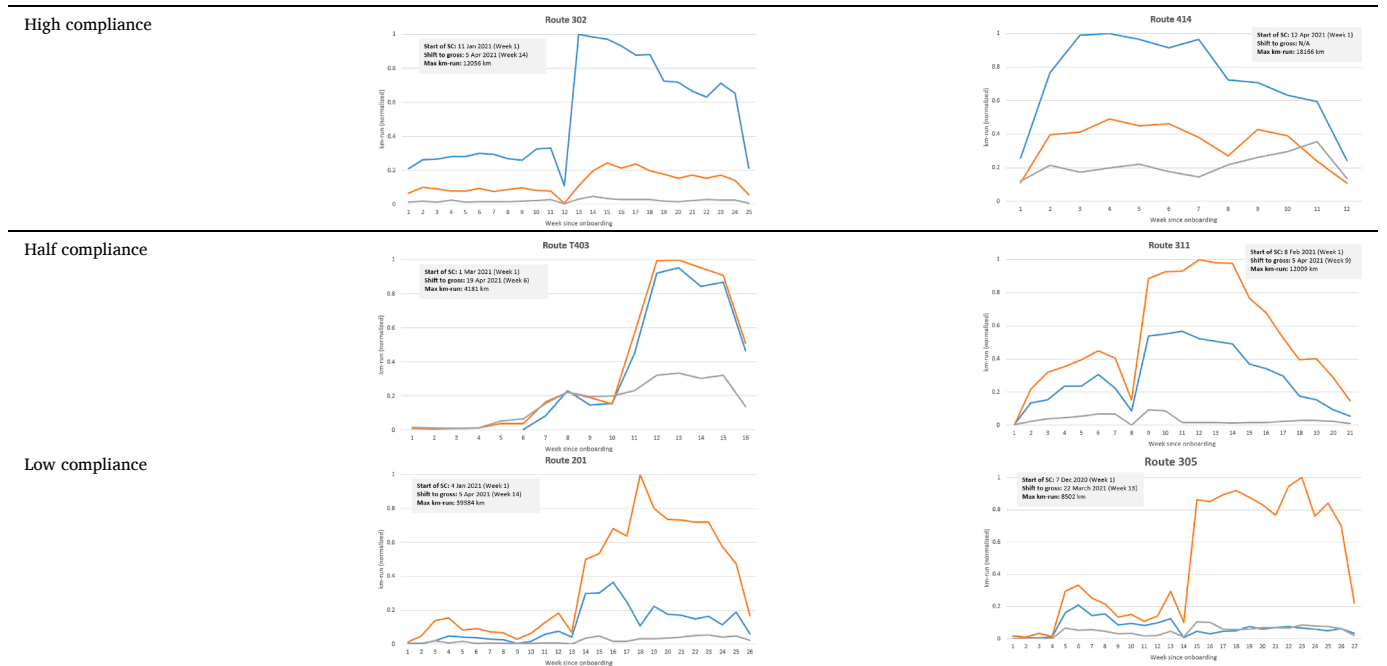


Figure 5. From left to right: Full compliance (route 302), half compliance (route 101), and low compliance (route 201).

Fig. 5. From left to right: Full compliance (route 302), half compliance (route 101), and low compliance (route 201). In the case of half compliance, it seems the jeepneys took an unnamed street to get to the other side. In the low-compliance case, vehicles took a different corner. Solid line is the alignment, dotted lines are actual trajectories.

Transport supply, on the other hand, refers to the number of vehicle units or the number of roundtrips/unit per day. An increase in transport supply then means an increase in the number of jeepney units deployed or the number of trips made by the jeepney. We obtain this information from the interviews. Finally, performance refers to contract compliance, i.e. observance of the terms stipulated in the contract. In this case, a trip is considered fully compliant if the entire km-run is aligned with the prescribed route. Only compliant trips get paid. Performance improvement thus means an increasing number of *compliant* trips over time. We can derive this information from the AVL data generated from the Smartphone app.

5. Results

In this section, we attempt to provide an evaluation of SC, guided by the following questions:

- What is the impact of service contracting in terms of providing social relief and amelioration to affected operators?
- How has service contracting impacted the availability and supply of public transport during the pandemic?
- Has service contracting improved the delivery of public transport services?

5.1. Social amelioration

Under the *Bayanihan 2*, various social amelioration programs were implemented to assist “critically impacted businesses,” including the transport sector. One such program is cash assistance for the drivers. Another program, intended primarily as a form of social amelioration especially for the transport operator cooperatives, is service contracting. [Table 7](#) presents information on the impact of SC on the financial situation of transport cooperatives. These impacts are avoidance of sure financial losses, guaranteed income, and assistance in the payment of loans. The last impact is significant. It can be recalled that because of fleet modernization, a number of transport cooperatives took on a hefty loan amount from government banks to purchase a fleet of modern jeepneys, payable in 7 years. This is under the assumption of 100% passenger capacity over the entire period. When the pandemic hit, many of them had difficulty paying their monthly amortizations. Partly because of the SC, they were able to make loan payments.⁵

5.2. Transport supply increase

Also negatively impacted by the pandemic is the supply and availability of public transport services. During the pandemic, transport cooperatives are hesitant to provide services because of unpredictable incomes brought about by reduced demand in ridership and the lowered vehicle capacity due to social distancing requirements. SC is seen to address this problem by providing guaranteed incomes for operators of jeepney units based on agreed performance indicators. We present the impact of SC on the supply of transport, measured in terms either of the number of units or the number of roundtrips.

We found that, compared to pre-lockdown (pre-ECQ) data, there is generally a reduction at pre-SC, even though during this period, jeepneys were already allowed to operate ([Table 8](#)). Moreover, because of onboarding in SC, there is an increase in transport services from the SC-

⁵ Although no data is presented in tabular form, results show drivers also benefitted from the SC. This is clearly seen in the distribution of the weekly payout, of which 30% is given to the drivers. In fact, under this SC, the government agency had to enter into contracts with each of the drivers. Additionally, frontliners (called the APOR or authorized persons outside the residence) are target beneficiaries as well of SC.

onboarding date. Finally, transport supply would have remained limited had the transport operators not on-boarded the SC program.

One cooperative that was interviewed mentioned that there is no change in the number of jeepneys it deployed before the lockdown, during the pandemic, and after SC-onboarding. However, while the pandemic did not affect the supply of transport, the guaranteed income from the SC did impact its ability to pay the bank of its monthly amortizations.

5.3. Performance monitoring and improvement

One of the main challenges in implementing a service contracting program is on the proper monitoring of service. Since pay-outs are based on compliance with the key performance metrics, it is essential that information on drivers, operators, franchises and routes be digitized and updated for ease of access and processing. Unfortunately, much of the franchise and route data with LTFRB are not digitized, readily machine-readable, or updated.

The first time that public transit data of Metro Manila were largely digitized by converting route data into GTFS format was only in 2014, through the assistance of the World Bank ([Krambeck and Qu, 2015](#)). Over the years, especially beginning 2017, when the PUVMP was launched which necessitated the rationalization of routes, there have been a lot of changes to the route alignments. However, these new routes were not yet converted into GTFS format.

When the SC program was implemented, a centralized franchise database of LTFRB had to be set-up first, which would allow a fast retrieval of franchise, route and operator data. Route alignment data from the PUVMP route rationalization were merged with other data such as terminal/stop locations and service frequency in order to construct a complete transit data in GTFS format. In short, the SC program forced the digitization of franchise and route data into a format that could be stored in a centralized and nationwide database. Furthermore, there has been no system which monitors the operations and services of *jeepneys*. Although the DoTr/LTFRB recently launched the Central PUV Monitoring System, it only covers buses. As a result of SC, real-time AVL data from a Smartphone application were also collected to monitor the service and operations of jeepneys (aside from buses).

Although the key performance indicator (KPI) under service contracting is mainly the km-run traveled, a thorough inspection and classification of each trip can also be done. [Table 9](#) shows the classification and its corresponding description.

In order to make an overall evaluation per day, we perform the following aggregations. P and O are combined into “complete”; C, R, D and S into “incomplete”; and – and X as “other”. Per policy of DoTr/LTFRB, only “complete” and “incomplete” trips are counted to KPI. In other words, both complete and incomplete trips are *paid trips*. [Table 10](#) shows the km-run traveled in each of the 6 routes disaggregated into complete (blue), incomplete (orange) and other (gray) trips. It can be seen that in 5 out of the 6 cases, there is a sudden increase in km-run traveled halfway through the program. This corresponds to a shift from net to gross cost SC. The only exception, route 414, does not show any increase because it opted right away for the gross cost option when it onboarded the SC program.

Using the results shown in [Table 10](#) we can provide a performance evaluation per route for the entire SC period: high compliance, half compliance and low compliance. For routes 302 and 414, an increase in volume of trips went to compliant trips. Hence, we classify both routes as exhibiting high compliance. Routes 311 and T403 show half compliance since complete and incomplete trips are almost equal in volume increase. Lastly, routes 201 and 305 exhibit low compliance because an increase in volume went to incomplete trips.

At this point, however, there is uncertainty on the causes of low-

compliance observed in some routes. It is possible that it may be due to factors, such as road closures due to localized lockdowns, imposed restrictions/re-routing by local government units or intermittent connections.⁶ A closer look and on-the-ground monitoring to ascertain the factors is merited. Fig. 5 shows the actual trajectories plotted against designated routes of jeepneys that are in full/half/low compliance.

Since SC is based on the idea of giving payouts to transport operators based on compliance with some performance measures, its strong potential lies in the fact that it can be used to deliver service improvements in the public transport systems. A major question to ask is therefore: Did the service of jeepney during the pandemic improve because of SC? Examining the route compliance data, it seems the results are mixed. While there are high-compliance cases, there are also cases of low compliance. Our results indicate that there is no robust evidence so far that may suggest that SC has improved the performance of public transport service delivery. Had SC resulted to performance improvement, we would have observed an increase in compliant trips (or decrease in non-compliant trips) for the routes over time.⁷

6. Discussion

In terms of social amelioration and transport supply increase, the results in the preceding section suggest a general positive assessment of the service contracting program initiated during the pandemic in Metro Manila, Philippines. Amidst the reduced demand and vehicular capacity during the pandemic, the nearly guaranteed income that the operators receive from public authorities is a sufficient incentive for them to provide the transport services. In order, however, for service contracting to be effective in delivering performance improvements, there is a need to carefully design the contract and to choose the appropriate performance indices.

Our findings are largely consistent with other studies on service contracts that have been implemented even prior to the pandemic. For instance, decoupling revenues from demand (e.g. ridership) by means of long-term contracts ensures, to a certain extent, a stable income for the operators and service providers. Gómez-Lobo and Briones (2014) argue that contracts and concessions matter for the success of transit reform because these schemes provide financial incentives to operators, which include fixed payments. Hensher et al. (2003) demonstrate the potential of bus contracts for ensuring service quality, including the number of buses arriving at bus stops. A study by Beltran et al. (2013) shows the impact of various compliance measures on the operation of Transantiago over the years, which suggests the need for carefully selecting the performance measures to meet service quality objectives (Godachevich and Tirachini, 2020).

As can be seen, the literature is dominated by research on service contracting implemented by governments worldwide as a pathway for public transport reform. Such a reform is being pursued in response to unhealthy market competition or industry fragmentation that arise from deregulation/privatization. Service contract strikes a healthy balance between state planning/supervision and service provision by the private sector. Crucial to this balancing act is the proper design of the

contractual arrangements (Hensher and Stanley, 2003). The results of the present study contribute to this literature by proposing that, apart from these aforementioned use cases of service contracting, another argument for a transition to SC is its suitability as a model in responding to the pandemic.

7. Summary, limitations and conclusion

In this study, we examine and evaluate the service contracting program implemented for the first time in the Philippines as a response to the impact of the pandemic on the public transport sector. We use three indicators for the assessment: social amelioration, increase in transport supply and performance improvement. Using mixed methods and several data sources, our analysis reveals that the impact of SC is generally positive. Aside from an increase in transport supply, social amelioration for transport operators is another significant upside of SC. This is important because a number of transport cooperatives have outstanding loans in the banks incurred from their purchase of modern jeepneys. During the pandemic, the reduced ridership and the limited vehicular capacity imposed by regulators have severely affected the ability of transport cooperatives to pay their monthly amortization. But because of SC, many of them have been able to pay the amortization fees. There is no evidence, however, that SC has caused improvements in the performance of jeepney services (in terms of compliance with route alignments).⁸

While the primary objective of providing social amelioration to affected operators is appropriate during the time of the pandemic, this has also caused challenges in financially sustaining the program and in effecting improvements to public transport services. First, the emphasis on social amelioration puts into question the financial sustainability of the SC program. Right now, SC is financed entirely by government budget appropriations. In both types of SC (gross cost and net cost), the government does not earn any revenue from the program. Second, social amelioration may have compromised the other objective of improving the service performance of jeepneys. Because SC1 was designed as a subsidy measure, this somehow implied that the budget was primarily a form of financial relief rather than a scheme for enhancing public transport services.

To address both of these issues, we recommend that future iterations of SC must do away with this *primary* objective of providing social amelioration. These can be done in two ways. First, service contracting may be funded through a collection of fare revenues from the passengers. In this regard, a central office can be established which maintains a fare collection system and performs appropriation of revenues to participating operator organizations based on specific performance indices. Second, the KPIs must be expanded to include other metrics besides route alignment (Godachevich and Tirachini, 2020): for example, measures that will encourage transport operator organizations to apply a common fleet management approach to improve service performance.

⁸ Despite its success in some fronts, SC has also been beset with a number of implementation issues. The first issue concerns the delays in payouts, which in some cases reach up to four long months. According to a report by a civil society coalition, "There is also a huge backlog in weekly payouts. Our transport workers diligently ply their routes and register their trips, expecting to receive their payout by the end of each week. Some onboarded in December 2020, but only received their first weekly payout in April 2021. This delay has pushed our transport workers into heavy debt and forced cooperatives into bankruptcy" (Move As One Coalition, 2021). The second concerns operation issues with the Smartphone device or the application, causing missing GPS data. Because of the malfunctioning of the device or app, some needed GPS data were not captured. Because payouts are based on the km-run as recorded via the app, this means that some operators cannot claim payments for services they actually delivered. Based on interviews with some cooperatives, the discrepancy between actual kilometer traveled and the distance recorded by the app reaches as high as 50%.

⁶ See, for example, Board Resolution No. 041 Series of 2021 issued by LTRFB on 28 April 2021.

⁷ Though not shown here due to space constraints, the authors also analyzed the headway data to examine the performance of jeepneys during the implementation of SC and found no indications of improved regularity of headways. This may be expected because the main KPI of SC is the km-run traveled. There is no performance index related to headway. Godachevich and Tirachini (2020) argue that the performance of public transport service is highly dependent on the index chosen. The next iteration of SC must explicitly consider other performance metrics apart from mere km-run traveled in order to unlock the potential of SC in reforming public transport systems. Metrics that encourage a common fleet management approach should also be considered.

The findings of the present study are limited primarily because of the limitations in the availability of quantitative data across multiple temporal points and several routes, preventing the researchers from conducting a robust evaluation of the SC. Furthermore, the metrics used to examine the impact of the program on financial relief, transport supply and performance improvement are limited only to a few measures. It would have been ideal to perform the analysis with more available data. Despite these limitations, the findings of the preliminary evaluation point to some successes of the program, which may suggest to the policymakers that a transition to service contracting model for paratransit in the new normal is warranted.

CRedit authorship contribution statement

Varsolo Sunio: Conceptualization, Methodology, Formal analysis, Investigation, Validation, Visualization, Writing – original draft, Writing – review & editing. **Wilhansen Joseph Li:** Conceptualization, Methodology, Software, Formal analysis, Data curation, Visualization. **Joemier Pontawe:** Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Albert Dizon:** Conceptualization, Methodology, Software, Visualization. **Joel Bienne Valderrama:** Conceptualization, Investigation. **Agnes Robang:** Visualization, Writing – original draft.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:
Some authors are affiliated with a company which has been contracted by the government to serve as the system manager. Other

authors are affiliated with the government agencies and are involved directly in the implementation of service contracting. While this may put these authors in an intimate position to know first-hand the issues with service contracting, it may also have influenced the objectivity of the assessment of the program.

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Appendix

In Metro Manila (and the rest of the Philippines), two major levels of community quarantine are implemented: the enhanced community quarantine (ECQ) and the general community quarantine (GCQ). The strictest of the two is the ECQ. There are variations to either, which typically are less strict, such as the modified enhanced community quarantine (MECQ) and the modified general community quarantine (MGCQ). MGCQ is the most lenient among the community quarantine levels (Appendix Table A1).

To see the impact of community quarantines on mobility, Appendix Fig. A1 presents the percentage change driven miles/kilometers by day. In general, there is a huge drop in the percent change during the ECQ, as can be seen in the portions of the graph that are highlighted in light yellow.

Table A1

The Covid-19 community quarantines in Metro Manila, Philippines from March 2020 until June 2021.

Community quarantine	Dates	Description
Enhanced community quarantine (ECQ), including Modified enhanced community quarantine (MECQ)	Extended period:16 March 2020 – 31 May 2020	Households are ordered to stay home and are prohibited to travel, unless for essential trips;Strict restrictions in mobility;Equivalent to a total or complete lockdown
General community quarantine (GCQ), including the modified general community quarantine (MGCQ)	Extended period:1 June 2020 – 31 June 2021Exceptions (short periods declared as ECQ):4 August 2020 – 18 August 20209 March 2021 – 11 April 2021	Less stringent than ECQ;Public transportation can operate at reduced capacity; Businesses can operate at lower capacity

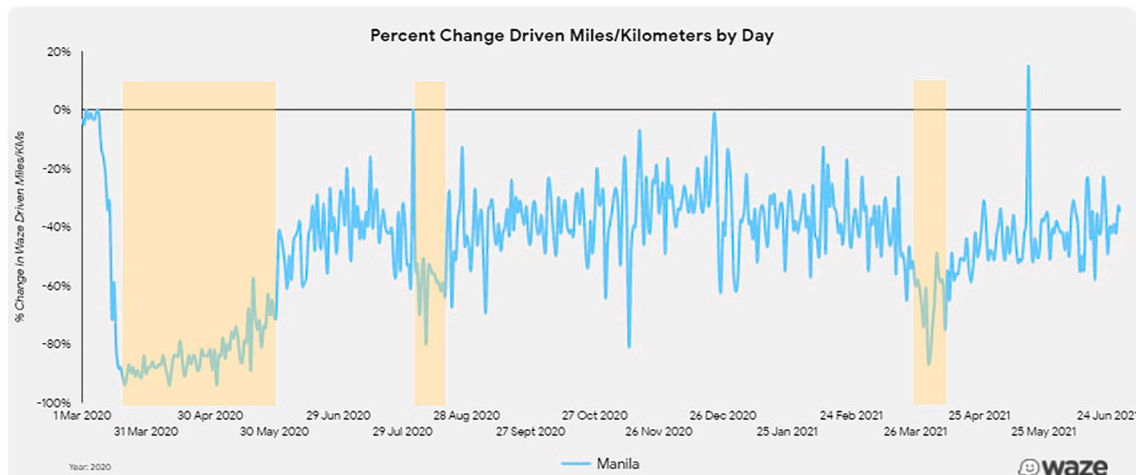


Fig. A1. Impact of community quarantine on driven kilometers by day. Credit: Waze Covid-19 Impact | Waze for Cities Dashboard.

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