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Financing low-carbon transport transition in the Philippines: Mapping financing sources, gaps and directionality of innovation

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ABSTRACT

Successfully achieving a low-carbon transition in the transport sector requires an understanding of the lending logics of the financial institutions in order to identify the financing directionality and gaps. However, in the transportation literature, there is a lack of attention on the relationship between financing sources and the direction of innovation. The present study seeks to address this by mapping the flow of finance from financial institutions to transport projects. Our dataset consists of 9 transport projects included in the Philippines' Nationally Determined Contribution (NDC). We consider different types of projects (rail development, bus rapid transit implementation, jeepney modernization) and various financial actors (multi-lateral banks, private and government banks). Through an analysis of loan portfolio composition and interview data, we uncover the underlying logics of each financial institution in lending to transport projects. Our findings suggest that the lending logics of many financial institutions is primarily driven by portfolio and borrower credit-worthiness considerations, and less by motivations concerning sustainability transition. As a result, with respect to the average, some transport projects are over-financed (e.g. rail development), while others – which have a high potential to accelerate decarbonization – are under-financed (e.g. jeepney modernization). All these have profound implications for the *directionality* of low-carbon transition. Deeper engagement of transition research with finance is a nascent field, and the current research contributes to the literature not only by presenting a comprehensive mapping of several financing sources and projects, but also of proposing three credit enhancement mechanisms to mobilize capital for under-financed projects.

1. Introduction

In recent years, several megacities in the developing countries in Asia have seen rapid economic growth, bringing with it challenges such as increased carbon footprint. To maintain or even accelerate such a growth, while at the same time mitigating climate change, investing in “low-carbon, climate-resilient” (LCR) infrastructures in the transport, power, telecommunications, water supply and sanitation sectors may be justified (Meltzer, 2016). This investment may address the so-called “infrastructure gap” in the region (Yoshino et al., 2018; Ra and Li, 2018). However, this is not simply a matter of building green infrastructures *in addition to* the existing high-carbon infrastructures, but of *reconfiguring* urban infrastructures towards low-carbon regimes (e.g. Bulkeley et al., 2014) – what some scholars call a ‘sustainability

transition’ (Köhler et al., 2019).

One of the major concerns in promoting low-carbon transition is how to obtain enough financing. There is a deficit between the current investment levels and the amount of financing needed for the transition (Hall et al., 2018). It is estimated that, in Asia, infrastructural development requires an investment worth USD \$26 trillion from 2016 to 2030. Currently, however, the region only invests an estimated \$881 billion in infrastructure each year. This infrastructure financing deficit is equivalent to as much as 5% of gross domestic product in some Asian countries (Abiad et al., 2019; Ra and Li, 2018). Of all the sectors, transport, which needs \$8.4 trillion worth of investment, has the biggest financing gap. To close the infrastructure gap as well as meet climate change commitments, capital allocation to low-carbon transition investments is urged (Hall et al., 2018).

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Currently, public sector finance comprises the bulk of infrastructure investment in Asia (Hasan et al, 2017). Since most governments face fiscal constraints, public sources are not enough to bridge the investment gap. The amount of financing needed must be met by other sources such as multi-lateral development banks, international development agencies, private banks, private equity firms, etc. *The challenge, however, is that different financial institutions have different appetites for different types of transport projects* (c.f. Mazzucato and Semieniuk, 2018). Consequently, capital does not always go to projects that need financing. This paper thus asks the following questions:

- (RQ1) What sort of transport projects are financed by various financial institutions (multi-lateral banks, international development agency, private and government banks)? And why these projects?
 (RQ2) What are the financing gaps and investment deficits?
 (RQ3) What can be proposed to mobilize financing for under-financed transport projects?

These are important questions, because finance is a decisive aspect in any transition (Steffen and Schmidt, 2021). In the sustainability transitions literature, one of the main topics in the agenda is “about the role of finance capital (private equity, hedge funds, pension funds, sovereign wealth funds etc.) in restricting or promoting change in a certain direction” (Köhler et al, 2019). Although capital mobilization and financing for low-carbon transition has recently dominated the finance and innovation literature, most studies focus on financing for *energy transition* (Grilli et al, 2018; Polzin, 2017; Polzin and Sanders, 2020). It seems there is a paucity of studies on financing for *transport transition and decarbonization*. This research seeks to map the flow of finance from financial institutions to transport infrastructure projects, identify gaps in financing and propose some schemes for capital mobilization.

In the next sections, we present a review of existing related literature (Section 2) as well as the context of this case study (Section 3), describe our methods and sources of data (Section 4), present/discuss our results (Section 5), and end with a summary and conclusion (Section 6).

2. Literature review

Before anything else, we first clarify how the following terms are defined in this paper:

- **Infrastructure** means “fixed assets seeking a return” (Hall et al, 2018). Broadly, infrastructures include: “roads, bridges, tunnels, railways, harbors, airports, tramways, subways, irrigation networks, dams and canals, water pipelines, water purification and treatment plants, potable water supply, power lines, power plants, power distribution networks, oil and gas pipelines, sanitation and sewage facilities, health and housing services, urban services, communications and telecommunications networks” (Kumari and Sharma, 2017). Transport, which is the infrastructure considered in this paper, is a type of “physical infrastructure” and includes roads, railways, airports, ports, waterways and pipelines (Kumari and Sharma, 2017). In this study, we consider two infrastructure projects (rail and bus rapid transit development) and one *non-infrastructure* project (jeepney modernization).
- **Innovation**, in the context of developing country, means “new to the country” (versus “new to the world”), and implies a process of “international technology transfer” (Lee et al, 2019). Hence, we can use “innovation” to refer to transport infrastructure projects such as rail and bus rapid transit, because these technologies are not much

available locally¹. Moreover, innovation also implies “new model”, and thus a project such as “jeepney modernization” can be considered an innovation (Sunio et al, 2019).

- **Finance** refers to the “vehicles through which money capital is transformed into fixed assets” (Hall et al, 2018).
- **Financial institutions** are defined as organizations which orchestrate “the activity of transforming money capital into fixed assets” (Hall et al, 2018). Examples of these institutions include “pension, insurance and wealth funds (also referred to as institutional investment), commercial banks, development banks, forms of crowdfunding (i.e. peer to business equity), venture capital etc” (Hall et al, 2018).

2.1. Challenges in mobilizing financing for low-carbon transition in transport and mobility

Since the Paris Agreement was adopted in 2015, many countries worldwide have committed to reducing the carbon emission from their transport sectors. Reduction targets vary, but in several countries, the magnitude reaches as much as 70% from the 2030 baseline scenario. Considering that transport is a key source of GHG emissions (contributing 23% of global GHG emissions), the decarbonization of this sector is also recognized as a key pathway for climate change mitigation. Table 1 shows some statistics from Southeast Asia (SEA). We focus on SEA because the region, together with East Asia, “will account for the majority of low-carbon investment needs through 2030” (Anbumozhi et al, 2018).

In order to meet these targets, these countries have rolled-out some projects and pursued a number of mitigation actions. In transport, these include: (inter-urban) infrastructure, fuels/vehicles and urban transport improvements, and freight logistics projects (Löhr et al, 2017). Some of these projects even form part of the respective country’s Nationally Determined Contribution (NDC) to the Paris Agreement.

Given the scale of the ambition, access to financing is fundamental.

Table 1

Carbon emission contribution of transport sector and emissions reduction target of countries in Southeast Asia. Source: <https://changing-transport.org/tracker/>.

Country	Carbon emission from the transport sector (% of the total)	Economy-wide emissions reduction target
Philippines	23.31%	“to a projected GHG emissions reduction and avoidance of 75%, of which 2.71% is unconditional (by 2030)”
Indonesia	22.54%	“up to 41% reduction of emissions by 2030”
Malaysia	25.43%	“GHG emission intensity of GDP 35% below 2005 by 2030”
Laos	2.21%	“60% GHG emission reductions by 2030 compared to baseline scenario (BAU)”
Myanmar	43.80%	None found
Thailand	25.22%	“Up to 25% below 2030 BAU scenario”
Cambodia	33.84%	“27% below 2030 BAU scenario”
Vietnam	12.66%	“25% below 2030 BAU scenario”
Singapore	12.74%	“36% below 2005 levels by 2030, and stabilize emissions with the aim of peaking around 2030”
East Timor	36.84%	None found
Brunei	21.65%	“To reduce GHG emissions by 20% relative to BAU levels in 2030”

¹ The Philippines, through the agency Department of Science and Technology, has locally developed some trains (e.g. hybrid electric trains and automated gateway transit). Strictly speaking, there is local expertise available, but the deployment is limited.

The implementation of NDC requires the effective deployment of a full array of domestic and international financial resources. Finance sources include: “domestic budgetary allocation, private sector finance (both national and international), bi-lateral and multilateral finance mechanisms and development assistance” (NDC Partnership, 2020). Moreover, a number of innovative financing mechanisms and instruments are also available, such as green bonds, climate investment fund, public–private partnerships, and assistance from development banks (Oteh et al, 2021). Unfortunately, many countries still face challenges in securing the needed finances and accessing funds from these sources. Limited access to the required financing still remains to be the chief constraint.

2.2. Sustainable financing and the greening of financial institutions

Fig. 1 shows the traditional sources of financing for infrastructure projects (Inderst, 2016). First, there are public sources, which include financing from the government and development institutions (e.g. multi-lateral banks and international development agencies such as World Bank, International Finance Corporation, and Asian Development Bank). Second, there are private sources, which come in two main forms: corporate finance (CF) and project finance (PF). In CF, the corporation (which is the parent company) provides direct capital to the project or sponsors a credit guarantee to the project lenders. On the other hand, PF mobilizes financing for the project, using non-recourse or limited recourse financial structure, relying primarily on the project’s future cashflows for repayment. Within corporate finance, we can distinguish between publicly listed and private/unlisted companies. In project finance, two possible modes are private–public partnerships (PPP) and non-PPP arrangements (Inderst, 2016). Regan (2017) provides a very comprehensive overview of these financing modalities, in the Asian context, as well as their strengths and limitations, without however mapping these to the types of projects that they typically fund.

In the Philippines, the three biggest sources of financing for transport projects are: budget from national government (the budgetary allocation for the project is defined in the General Appropriations Act or GAA, which is a piece of legislation), Official Development Assistance (ODA) loan and grants from development institutions, and private–public partnerships (PPP) (Rosales, 2017).

One of the significant developments seen in recent years among financial institutions is the so-called “greening of the financial system” (Falcone et al, 2018). This is particularly evident in the banking sector (McCormick, 2011; Sunio et al, 2021). Many banks have begun adopting environmental, social and governance (ESG) disclosure frameworks (Busch et al, 2016) or started engaging in sustainable and responsible financing (Gianfrate and Peri, 2019). This trend is not limited to commercial banks alone. Other financial institutions, such as multi-lateral banks, investment companies, and international development agencies are also embracing this transformation. For instance, Temasek, The Hongkong and Shanghai Banking Corporation (HSBC), Asian Development Bank and Clifford Capital Holdings established recently a “new debt financing platform”, focused on financing sustainable infrastructure in Southeast Asia (HSBC, 2021). As these financial institutions pursue sustainability, they are taking stronger steps to steer the greater allocation of capital to markets which can further spur sustainable development (Busch et al, 2016). Given their intermediary role, these financial institutions may play a pivotal role in influencing sustainable practices in many other sectors, including transportation (Louche et al, 2019).

2.3. Finance flows, direction of innovation and justice implications

Mazzucato and Semieniuk (2018) have presented conceptual arguments and demonstrated heterogeneity in the financing decisions of different financial actors, creating directionality in innovations. Using a global dataset from the renewable energy (RE) sector, the authors found that “financial actors vary considerably in the composition of their

investment portfolio, creating directions towards particular technologies.” In particular, they uncovered that “some financial actors skew their investment to a subset of technologies (e.g. public utilities towards offshore wind), while others spread their investments more evenly over a wide portfolio of competing technologies, creating technology directions.” This created a skewed distribution of investment in the renewable energy, the implication of which is that some RE technologies are over-financed, while others are under-financed, with respect to the average.

This brings to the fore two issues regarding finance flows and directionality. First, some scholars draw attention to the issues of justice associated with the skewed financing distribution in low-carbon energy transitions (Hall et al, 2018). Diversification of the RE portfolio is necessary since it typically helps build resilient energy systems (Sinsel et al, 2019). Second, since “different investments attract very different types of investors” (Polzin et al, 2021), important consideration should also be placed not only on the total amount, but on the mix in which finance is disbursed or made available to different projects and technologies.

In the transport sector, the broad literature on transport infrastructure investment/financing rarely, if at all, considers this perspective. The dominant focus of many studies is on the impact of transport infrastructure on economic development (e.g. Rokicki and Stępnik, 2018; Wang et al, 2020; Lee, 2021), and funding options, for instance, through value capture (Yen, Mulley and Zhang, 2020; Roukouni et al, 2018; Medda, 2012). There seem to be limited studies in the formal literature tackling the finance needed for transport decarbonization as required by the Paris Agreement; what have emerged recently are studies from the grey literature (e.g. Huizenga et al, 2017; Abante et al, 2022).

3. Case study context

A recent estimate by Vergel et al. (2022) using a bottom-up approach puts the baseline transportation energy demand of the Philippines at 12,956.1 ktOE in 2016. It is projected to increase even further in the coming years, exacerbating carbon emissions. In April 2021, the Philippines submitted its Nationally Determined Contribution (NDC) in accordance to the Paris Agreement. Developed through a whole-of-government-and-society approach, the Philippines “commits to a projected GHG emissions reduction and avoidance of 75%, of which 2.71% is unconditional and 72.29% is conditional, representing the country’s ambition for GHG mitigation for the period 2020 to 2030 for the sectors of agriculture, wastes, industry, transport, and energy” (UNFCCC, 2021). This commitment is referenced against a projected business as usual (BAU) cumulative economy-wide emission of 3,340.3 MtCO₂e for the same period.

Data obtained from the Department of Transportation (DoTr) indicates that from a baseline of 24.02 MtCO₂e in 2010, the GHG contribution from the transport sector (combined road, rail, air, water) is projected to grow to 87.10 MtCO₂e (in 2030) and 166.07 MtCO₂e (in 2040) under the BAU scenario.² Based on initial calculations, transport projects being pursued by DoTr can contribute to a GHG reduction of 10.03 MtCO₂e in 2030 and 14.34 MtCO₂e in 2040, which are equivalent, respectively, to 11.51% and 8.63% GHG reduction from the BAU. Disaggregating the total by projects, rail has the largest contribution to GHG reduction at 6.79% (2030) and 4.23% (2040), followed by Public Utility Vehicle (PUV) Modernization Program at 2.91% (2030) and 2.75% (2040), and Bus Rapid Transit at 0.72% (2030) and 0.61%

² Interview with a member of DoTr NDC team. The estimates of the DoTr team express these numbers in 2–4 decimal places.

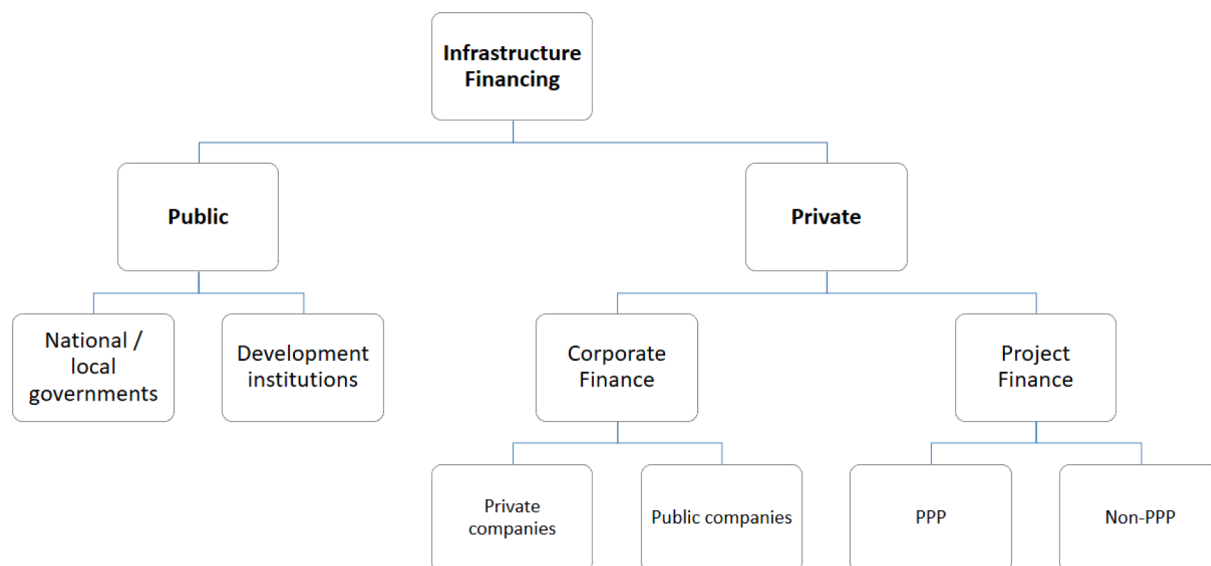


Fig. 1. Sources of infrastructure financing. Adapted from Inderst (2016).

(2040).³

Table 2 presents these projects included by DoTr in the NDC with a brief description of each project and their respective funding sources. Fig. 2 shows the rail networks, both existing and under construction.

4. Method and data sources

Fig. 3 summarizes the data and method of analysis. Our data comes from two sources: (a) Desk research; and (b) Interviews.

4.1. Desk research

We perform the desk research as follows:

- First, we retrieve all transport projects included in the NDC submission of the Philippines. Not all infrastructure projects contribute to low-carbon transition, so we only consider those which have been included in the NDC. Moreover, the NDC also includes *non*-infrastructure projects (e.g. PUVMP), so this is included as part of the list.
- For each NDC transport project, we collect data primarily on the total project cost and funding sources from the financial reports obtained from the official website of the Department of Transportation. If the project is PPP, we conduct further desk research on the website of the PPP Center.⁴
- After identifying the funding financial institution, we next gather data on the type of *transport* projects the financial institution *normally* finances in order to determine the *typical* composition of its loan portfolio. The composition of the loan portfolio is indicative of the underlying lending logic of the financial institution (Deyoung et al, 2015; De Haas et al, 2010). Moreover, we also collect data on the profile of the financial institution's typical borrower.

4.2. Interviews

We also conduct interviews with various financial institutions, including the Japan International Cooperation Agency (3

representatives; Respondents J1-J3), Asian Development Bank (2 representatives; Respondents A1-A2), Department of Transportation (2 representatives; Respondents G1-G2), transport planners (TP1-TP3), private banks (3 representatives; Respondents PB1-PB3), government-controlled banks (3 representatives; Respondents GB1-GB3), and transport cooperatives (5 representatives; Respondents TC1-TC5)⁵. Interviews are conducted for at least one hour. The purpose of the interview is to validate, supplement and enrich the data obtained through desk research. The combined data from desk research and interviews are presented in Tables 3 and 4. Since one of our aims is to uncover the lending logic of financial institutions, some interviews are also done to directly solicit perspectives related to lending motivations and mechanisms for credit enhancements.

4.3. Method of analysis

Our analysis is carried out to identify the financing directionalities (RQ1), gaps (RQ2) and possible policies/schemes (RQ3). For our first research objective, we identify the transport project portfolio composition and the profile of typical borrowers of various financial institutions and to understand its underlying logic. From this, we can infer which types of transport projects will continue to be financed, creating directionalities in innovation. For the second aim, we examine the alignment of the NDC project with the transport project portfolio composition of these financial institutions. We ask: Is the NDC project aligned to, and consistent with, the financial institution's mandate, lending policies or portfolio composition? Performing portfolio alignment analysis enables us to conduct a gap/deficit analysis and to identify the projects that are under-financed. Finally, for the last objective, we present results drawn from the interviews and literature review on possible mechanisms to enhance the creditworthiness of transport cooperatives.

5. Results and discussion

5.1. Directionality of innovation

Table 3 shows the project cost, implementing institution, borrower and key financier of each NDC transport project. Many of these projects

³ Not included in the study is the Motor Vehicle Inspection System (MVIS) with 1.05% GHG reduction contribution. Although MVIS is part of the NDC, we do not include it in the analysis since the aim of this program is not the low-carbon transition through the reconfiguration of transport.

⁴ <https://ppp.gov.ph/>.

⁵ Interviews with several respondents are done, but only select responses are reported in the paper.

Table 2

Transport projects under NDC-Transport. Legend: ODA (Official development assistance), PPP (Private-public partnership), GAA (General Appropriations Act, which defines the public funding allocation in the government budget).

NDC	Description	Funding Source
North-South Commuter Rail (NSCR)	The NSCR project consists of three phases. The first phase is the construction of 37.9 km of elevated commuter train line from Tutuban in Manila, going north, to Malolos in Bulacan with 10 stations. The second phase, which is called the Clark Extension phase, consists of the construction of a 53 km extension from Malolos, Bulacan to Clark, Pampanga. Finally, the third phase, known as the Calamba extension phase, is the construction of 56 km rail train to Calamba in the South of Metro Manila.	ODA (Japan and Asian Development Bank)
Philippine National Railways – South Long Haul	Construction of a 639-km long-haul passenger and freight rail connecting Metro Manila to the provinces that are south of the capital.	Foreign aid (China) ¹
Metro Manila Subway Project	Construction of a 36-km underground railway line serving as a north-south rail backbone for Metro Manila and the surrounding provinces.	ODA (Japan)
LRT 1 Extension	Construction of 11.7 km extension of an existing railway (LRT1).	PPP and ODA
LRT 2 Extension	Design and construction of 3.793 km east extension, and 3.02 km west extension.	ODA / GAA
MRT 7	22 km railway project connecting Quezon City to San Jose del Monte in Bulacan.	PPP
Mindanao Railway – Phase 1	100-km railway system in Mindanao, with the first phase linking Tagum-Davao de Norte, Davao City and Digos, Davao del Sur.	Foreign aid (China)
BRT – Quezon Avenue and Cebu	Provision of a 12.3-km of BRT infrastructure from Quezon Memorial Circle in Quezon City to Manila City Hall. Establishment of a 21.58-km corridor of dedicated and exclusive busways with 33 stations and 176 buses in Cebu City.	ODA (World Bank)
PUVMP – Jeepney Modernization	All jeepneys which are diesel-fueled PUVs made of surplus engines will be retired starting 2020. These will be replaced by Euro4-compliant PUV.	GAA Banks

¹ Strictly speaking, the foreign aid from China is not ODA, as defined by the Development Assistance Committee of the Organisation for Economic Co-operation and Development or OECD. So we just refer to the aid from China as foreign aid.

are capital-intensive (e.g. railways), implemented by a national government agency, with multi-lateral banks and international development agency as key lenders. Railway development is a type of infrastructure that is complex, large-scale, and capital-intensive (Regan, 2017). Typically, it requires huge amount of financing that is beyond the budget of many governments or the balance sheet of the private sector.

It is readily seen that JICA is the top lending institution of ODA for railway projects. Out of the 7 railway projects, 4 are financed by JICA. This is followed by the China government, which finances 2 rail projects. Rail projects under PPP are financed by private banks.

Looking at Table 4, we see that the ODA portfolio by JICA to the Philippines is dominated by rail projects. In fact, since the 1970 s, JICA has a long history of providing loans to rail projects by governments, in Southeast Asia and the Philippines. While China ODA is relatively only recent and has been disbursed only to a few projects, its portfolio is also dominated by rail. It seems that for Japan and China, infrastructure financing and the export of infrastructure systems, which include rail, forms a crucial part of both countries' foreign policy, seeking greater geo-political influence in the Southeast Asian region (e.g. Yoshimatsu, 2017; Zhang, 2019).

Aside from rail, another transport infrastructure project financed through ODA is BRT, supported by the World Bank. Although the World Bank finances other types of urban transport projects, BRT seems to be prominent in its portfolio (e.g. Mitric, 2013), not only in the Philippines but in Southeast Asia as well.

The foregoing suggests that the directionality of innovation (i.e. the type of projects implemented or deployed) by the national government is very much influenced by the loan portfolio composition of the lending financial institution. This is easily seen in the case of JICA, China government and the World Bank, which seem to have a bigger appetite to lend to predominantly rail and BRT transport projects implemented by national governments.

Under the PPP arrangement, two rail projects (LRT 1 Extension and MRT 7), which are implemented by the private sector, are heavily financed by private banks (RCBC, Security Bank, First Metro, Bank of America Merrill Lynch, Standard Chartered Bank). Checking the loan portfolio of these banks (in particular, RCBC, Security Bank, First Metro) indicates no strong track record of lending to clean transportation. This means that their lending to the rail projects is not driven by any track record in their loan portfolio. Moreover, they tend to lend only to big corporations (e.g. Light Rail Manila Consortium and San Miguel Holdings Corporation), and not to small transport cooperatives/corporations. *This suggests that the directionality of innovation is influenced by the credit-worthiness of the borrower or proponent. Loan is provided to the transport infrastructure projects on the strength of the profile of the borrower-proponent.* As we will point out below, one of the main obstacles in the successful roll-out of the jeepney modernization, a project with transport cooperatives as the borrower, is the lack of financing from private banks to small transport cooperatives.

What these seem to imply is that the lending logics of many financial institutions is primarily driven by portfolio and borrower credit-worthiness considerations, and less by motivations concerning sustainability transition. The result of this is that, with respect to the average, some transport projects are over-financed (e.g. rail), while others are under-financed.

5.2. Gaps in financing

One NDC Project, focused on jeepney modernization, merits deeper attention. The projected cost is PHP 400 billion, yet capital mobilization by the government is only PHP 30.6 billion (government budget) and the combined amount of credit facility by the two government banks (LBP and DBP) is only about PHP 20 billion. *There is obviously a huge financing shortfall.* Although one private bank, BDO, is reported to have provided financing to one transport company, the number of units funded is only five. *It seems that one reason for the deficit is the fact that no substantial financing for jeepney modernization is coming from the private banks.*

Although possibilities are present to mobilize financing from private banks with their recent issuances of green bonds for eligible projects, *outstanding green projects rarely include clean transportation.* In Table 4, we can see that, with the exception of RCBC, the two other banks which have issued green bonds (i.e. BPI and BDO) have not yet allocated funding from the proceeds to any clean transportation project. Moreover, although in principle green transportation is an eligible project, access by small transport cooperatives to such financing remains a significant hurdle. *What the foregoing seems to imply is that in general, lending to jeepneys owned by small cooperatives seems not really part of any private*



Fig. 2. Rail networks comprise the bulk of transport infrastructure projects being pursued by the national government. Many of these rail projects are part of the NDC submission by the Philippines. Source: Department of Transportation.

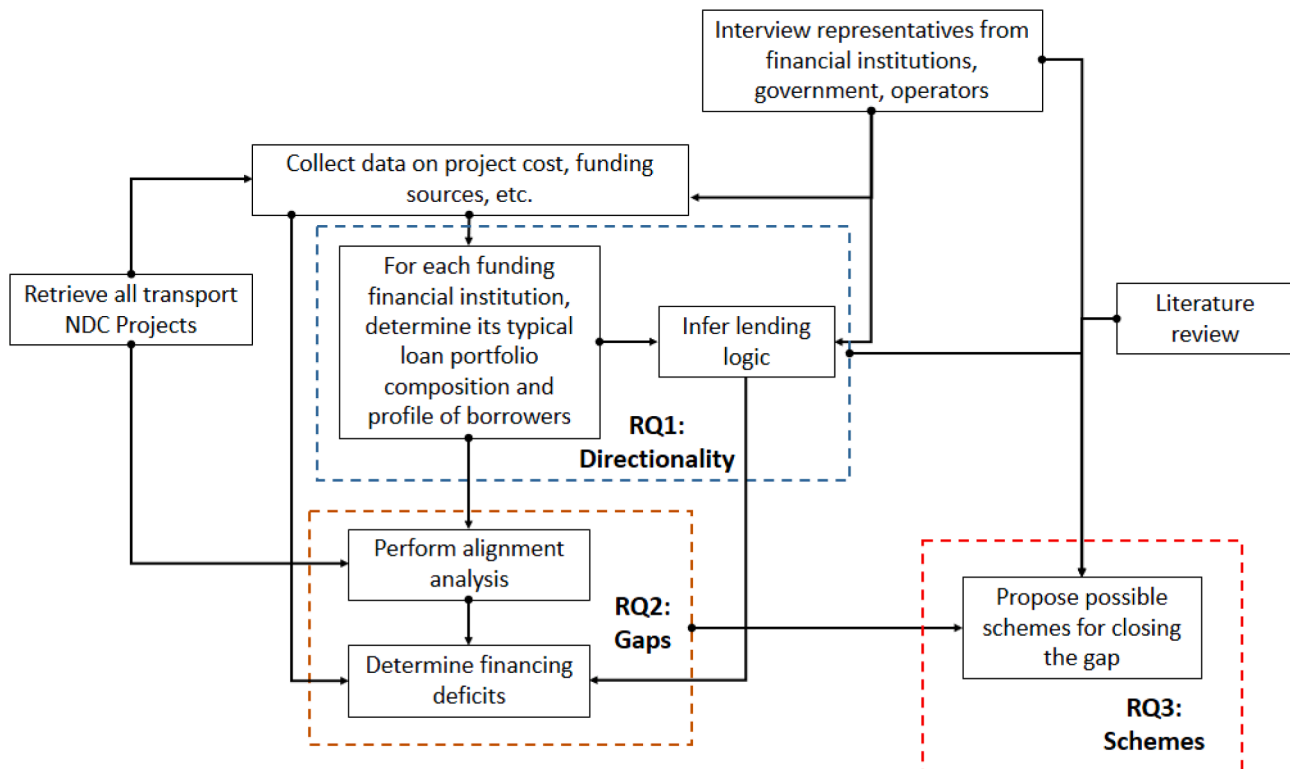


Fig. 3. Data collection and analysis.

bank's mainstream corporate program (Respondents PB1-PB3). Despite recent developments related to the so-called “greening of the banks”, it seems this has not influenced much the bank lending logics (Sunio et al, 2021). In our interview with the representatives of private banks (Respondents PB1-PB3), we find that their lending logics is dominated by credit frameworks grounded on evaluating the risk-return profiles of the projects (c.f. Polzin et al, 2019). Because of the unattractive risks and return associated with lending to jeepney transport cooperatives, deals originating from them are often not bankable for most private banks. In other words, lending to jeepney cooperatives is perceived as a risky deal that no private bank is willing to take at this point.

As a result, financing for jeepney modernization remains inadequate, which hampers the project's complete and large-scale roll-out. Without the needed financing, the roll-out of the project remains to be at snail's pace. *The financing gap is regrettable, since the jeepney modernization, if implemented successfully, has a big potential for GHG emission reduction (calculated to be 2.91% in 2030 and 2.75% in 2040, relative to the business-as-usual scenario).* Unlike most of the transport projects in the NDC,

which are pursued to address *primarily* the infrastructure gap, the implementation of PUVMP is driven for the most part by sustainability considerations, i.e. replacement of old, polluting vehicles with climate-friendly transport (Romero, 2017; Mettke et al, 2016).

5.3. Schemes to address the financing gap for low-carbon transition of jeepney paratransit

Given the low capital mobilization for jeepney modernization, we

Table 3

NDC projects and their respective project costs and key lenders. These are the latest estimates of the project (as of June 2020). Project costs may change. *Assumption: 200,000 units at Php 2 M each. Sources: Desk research of reports from the websites of the Department of Transportation (main) and of other institutions such as LBP, DBP, LRM and SMHC.

Nationally Determined Contribution (NDC) Project	Project Cost (PHP Billion)	GHG Reduction in MtCO ₂ e (relative to 2040)	GHG reduction to project cost ratio (MtCO ₂ e/Php trillion)	Government Budget (PHP Billion) *significant only	Implementing agency / company	Borrower	Key lenders (debt financing)
North-South Commuter Rail	777.55	1.13	1.45	–	Department of Transportation	Philippine Government	JICA
Philippine National Railways – South Long Haul	175.318	0.58	3.31	–	Department of Transportation	Philippine Government	ADB
Metro Manila Subway Project	356.974	0.65	1.82	–	Department of Transportation	Philippine Government	JICA
LRT 1 Extension	64.915	0.75	11.55	–	Light Rail Transit Authority	Light Rail Manila Consortium (LRMC)	RCBC
							Security Bank
							First Metro Investment
							JICA
LRT 2 Extension	19.62	0.85	43.32	10.12	Department of Transportation	Philippine Government	JICA
MRT 7	74.5	0.11	1.48	–	Department of Transportation	Philippine Government	JICA
					San Miguel Holdings Corporation (SMHC)	San Miguel Holdings Corporation (SMHC)	Bank of America Merrill Lynch, Standard Chartered Bank
Mindanao Railway – Phase 1	82	0.34	4.15	–	Department of Transportation	Philippine Government	China Government (China foreign aid)
BRT – Quezon Avenue and Cebu	21.8	1.01	46.33	–	Department of Transportation	Philippine Government	World Bank
PUVMP – Jeepney Modernization	400*	4.57	11.43	30.6	Department of Transportation	Transport Cooperatives/Corporations	LBP and DBP (total budget <20B)*BDO (though reported to have financed jeepney modernization, the total budget is not disclosed)
							**BPI (has not financed jeepney modernization, but has provided loans for point-to-point buses)

propose in this section three schemes that may address the gap.⁶

5.3.1. Implement service contracting

A respondent from the government (Respondent G1) suggests that one way to support the PUVMP is service contracting (SC). 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 the Philippines, SC was implemented for the first time in September 2020 as a form of social amelioration to affected transport operators with mixed success (Sunio et al., 2022). One positive impact of SC is that it decouples revenues from demand (e.g. ridership) by means of long-term contracts which ensures, to a certain extent, a stable income for the operators and service providers. In fact, when SC was implemented, one of its goals is to support the PUVMP: "...the service contracting program and the policy shift towards stable, long-term contracts and delivery of transport service will provide an additional and

necessary mechanism to support the public utility vehicle modernization program."⁷ It is uncertain, however, if SC will continue to be implemented post-pandemic. In the renewable energy (RE) sector, a kind of long-term contract – called power purchase agreement (PPA)⁸ – provides assurance to lending financial institutions such as commercial banks that borrowing RE developers, including independent ones that are not backed up by credit guarantees from large conglomerates, will be able to pay back their loans (Sunio et al., 2021). Service contracts in the transport sector are akin to PPAs in the energy sector. The government and the jeepney cooperatives can consider automatically allocating a fixed amount of the SC for debt servicing, with any remaining extra revenues to be further credited to the cooperative, further reducing credit risk for banks.

5.3.2. Increase the equity subsidy provided by the government and / or multilateral agency

Another possible scheme is for the government and / or multilateral agency to provide larger equity subsidy in order to lower the Debt-to-Equity ratio (perhaps debt at 60% of the total project cost) (Respondent TC3). This subsidy is given on the condition that the operators surrender their old jeepney units for scrapping or disposal. Currently,

⁶ We perform a comparison of the CO₂ avoided/cost for each project (MtCO₂e/Php trillion). Information has been added in Table 3. Comparing the jeepney modernization (11.43) and some urban rail projects indicates better performance by the former in some cases and worse in other cases (e.g. MRT 7 at 1.48 and LRT 1 extension at 11.55). Although it is possible that a greenfield rail system may yield higher GHG reduction, pursuing it may mean a phase-out of jeepney, which may be politically unfeasible and unjust (e.g. Sunio, 2021). Because of this, a pathway towards sustainable transition may be the modernization of jeepney, rather than its replacement by mass transit.

⁷ See Republic Act (RA) 11639. An Act Appropriating Funds for the Operation of the Government of the Republic of the Philippines From January One to December Thirty-One, Two Thousand and Twenty-Two Approved by the President on December 30, 2021.

⁸ PPAs are legally binding agreement between a seller (e.g. RE developer) and a purchaser (typically a distribution utility) to exclusively purchase all the power from that project at a fixed price over a term of around 20 years.

Table 4

Financial institutions and their respective transport-related loan portfolios. Bank of America Merrill Lynch, Standard Chartered Bank and are not included in this table since information regarding investments in the Southeast Asia and the Philippines is not present in their annual reports. BPI is added in this table since it has lending record to transportation, though the projects are not included as part of the NDC. Sources: Mainly desk research of reports and databases of the financial institutions, validated, supplemented and enriched by interview data.

Financial institution	Description	Transport Projects financed/supported			Typical Borrower	Remarks
		Southeast Asia	Philippines	NDC		
Japan International Cooperation Agency (JICA)	International development agency by Japan, providing ODA to developing countries	A quick search in JICA's website retrieves a total of 113 railway and 193 road projects (expressways, bypass, highways) in Southeast Asia since 1970s ¹	18 railway and 57 road projects since the 1970s	Among the 18 rail projects, 3 are included as part of NDC (North-South Commuter Rail Phase 1, North-South Commuter Rail Phase 2 and Metro Manila Subway)	Government	JICA has a long history of providing loans to rail projects by governments which utilize rail technologies from Japan.
Asian Development Bank (ADB)	Multi-lateral bank	415 transport-related projects in Southeast Asia were retrieved through search. ² These projects include infrastructure and non-infrastructure projects, covering all modes (rail, buses, greenways, etc).	84 projects, including greenways, high-priority bus system, rail, terminals, innovation facility, etc.	North-South Commuter Rail is NDC project, financed by ADB.	Government	No preference for rail projects by ADB. Before 2017, the last involvement of ADB in the Philippine railway sector was by a loan approved in 1976.
China Government (China foreign aid)	–	China's aid seems active in Southeast Asia, including Indonesia (e.g. high speed rail), Vietnam, Philippines and Malaysia for large-scale railway projects.	Checking the ODA Portfolio of the Philippines ³ , China active loans are: 0 (2016), 2 (2017), 2 (2018), and 3 (2019). These projects include bridges and railways. Mindanao Rail Project is not yet included as active loan as of 2019. However, it is reported in news media that China is the source of funding for MRP. ⁴	PNR-South Long Haul and Mindanao Rail Projects.	Government	Loan portfolio of China for infrastructure is dominated by railway projects.
World Bank	Multi-lateral bank	183 transport-related projects were retrieved. ⁵ Under “urban transport”, there are 35 projects (which include BRT corridor projects in Vietnam, Philippines and Indonesia)	18 transport-related projects supported by World Bank (urban transport and roads). There are 3 projects under “urban transport”, 2 of which are BRT.	The 2 BRT Projects are part of NDC of the Philippines	Government	Though World Bank supports other transport projects, BRT seems prominent in its portfolio.
Land Bank of the Philippines (LBP)	Government bank	–	SPEED PUV Support Package for Environment-Friendly and Efficiently Driven PUV: Jeepney modernization iRESCUE Bus Lending Program: Buses for EDSA Busway	PUVMP – Jeepney is an NDC project.	Conglomerates / Corporations Cooperatives	LBP has not much track record of lending to transport projects, but in 2017, in support of the government's PUVMP, it put up a credit facility for the modernization of jeepneys of transport cooperatives.
Development Bank of the Philippines (DBP)	Government bank	–	PASADA Program: Jeepney modernization of cooperatives and large corporations	PUVMP – Jeepney is an NDC project.	Conglomerates / Corporations Cooperatives	The DBP PASADA Program started in September 2017 aimed at supporting the national government's Public Utility Vehicle Modernization (PUVM) Program.
Rizal Commercial Banking Corporation (RCBC)	Private bank	–	RCBC is one of the lenders of LRT 1 Extension Project. It has also issued sustainability bonds in 2019. “Clean transportation” is a category eligible for bond allocation. As of 2020, RCBC has helped finance passenger 1 rail infrastructure and 2	LRT 1 extension project	Conglomerates / Corporations	Lending seems to be provided only to corporations, and not to small transport cooperatives (e.g. jeepney operators).

(continued on next page)

Table 4 (continued)

Financial institution	Description	Transport Projects financed/supported			Typical Borrower	Remarks
		Southeast Asia	Philippines	NDC		
Security Bank	Private bank	–	public mass passenger transportation projects. This includes buses. Security Bank is one of the banks that lent to LRT 1 Extension project.	LRT 1 Extension	Conglomerates / Corporations	Not much history of lending to transport.
First Metro Investment Corporation	Investment banking arm of the Metrobank Group	–	First Metro provided a loan facility to the LRT 1 Extension project.	LRT 1 Extension	Conglomerates / Corporations	Not much history of lending to transportation.
Bank of the Philippine Islands (BPI)	Private bank	–	Since 2017, BPI has been lending for the purchase of point-to-point buses. In 2019, BPI issued green bonds, but as of 2020, outstanding green projects only include renewable energy and green building projects, and none on clean transportation.	None	Conglomerates / Corporations	Lending seems to be provided only to corporations, and not to small transport cooperatives (e.g. jeepney operators). Bond allocation for clean transportation is still lacking.
Banco de Oro (BDO)	Private bank	–	Funded the acquisition of modern jeepneys by one transport cooperative. In 2017, BDO issued its first green bonds. As of end of December 2020, BDO has funded 50 Sustainable Finance projects worth PhP400.9B. Though the portfolio includes clean transport, most projects are expressways/skyways.	PUVMP – Jeepney is an NDC project.	Conglomerates / Corporations Cooperative (few)	Lending to jeepney seems not really part of the bank's mainstream corporate program.

¹ https://www2.jica.go.jp/en/yen_loan/index.php.

² <https://www.adb.org/projects/country>.

³ <https://neda.gov.ph/official-development-assistance-page/>.

⁴ <https://www.philstar.com/business/2021/02/26/2080356/china-funding-eyed-mindanao-railway>.

⁵ <https://projects.worldbank.org/en/projects-operations/project-search>.

under the SPEED PUV and PASADA programs of two government banks (Table 4), the loan is structured at 95% debt and 5% equity. The equity of 5% of the total cost is provided by the government. Although a debt of 95% is tolerable for government banks, it is too risky for commercial banks. One of our respondents from a commercial bank says that a 30–40% debt in the absence of contracts is tolerable (Respondent PB3). By increasing the subsidy for equity, the government may be able to increase the confidence of commercial lenders. Multilateral agencies can likewise consider matching the subsidy of the government to raise the overall equity contribution and reduce the nominal amount of the borrowed amount.

5.3.3. Promote consolidation of operators for area-based franchising

Another scheme, proposed by our interview respondents, is to consolidate the operators which ply within the same area or zone and then to implement area-based franchising (Respondents TP1, TP3). Currently, in the Philippines, industry consolidation is undertaken among operators for route-level franchising (Sunio et al, 2019). Initial assessment of the PUVMP shows that consolidation can yield increased economic performance (GIZ, 2019). The findings are consistent with the experience of paratransit operator consolidation in other countries such as Kenya (Behrens et al, 2017). By expanding consolidation from routes to zones and then implementing area-based franchising, cross-sharing of costs and revenues and fleet management can be done for the whole of public transport system. The possible improvement in financial performance of the cooperatives, due to expanded consolidation, may enhance

their credit-worthiness for commercial banks.

6. Summary and conclusion

Although some transport infrastructure projects such as rail require massive capital to implement, the appetite to lend to these projects from multi-lateral banks as well as private banks has been established. The fact that the Asian Development Bank approved \$2.75 billion worth of loans to finance the Malolos-Clark Railway Project, and bannered it as its “biggest project” in the Philippines or its single largest infrastructure project financing is testament to the feasibility and need of rail to address urban mobility and reduce environmental impacts of travel (ADB, 2019). We have also seen that multi-lateral banks, which have the expertise and balance sheet, played a key role in financing greenfield transportation projects. These projects entail more risks and thus need to be financed through long-dated loans.

The participation of private banks comes in urban rail projects, where they are able to finance credit-worthy conglomerates which have been awarded the contracts to build some of these infrastructure projects. While the private banks conduct their own feasibility study and due diligence to ensure the project on a stand-alone basis is economically bankable, there is also reliance on the strong balance sheet of the conglomerate parent that further brings comfort to their ability to lend to project proponents.

However, we do not see the same appetite in play when we look at small ticket items that nevertheless contribute to the Philippines' NDC

goals, such as the jeepney modernization program which aims to upgrade some 200,000 traditional jeepneys.

The government-controlled banks, such as LBP and DBP, have thrown support to the program, but the total budget allocated is way below the amount needed to finance such a large-scale transition. As of June 2021, LBP reported it has only released PHP1.8 billion in loans for modern jeepneys – funding the purchase of 849 modern jeepneys from 43 transport cooperatives and corporations. They are currently processing another PHP4.25 billion worth of loan applications that may potentially lead to procuring 1,833 units of modern jeepneys.⁹ On the other hand, as of March 2021, DBP has funded the purchase of 131 electric vehicles and 3,035 Euro-4 vehicles to 87 transport cooperatives/corporations with a total amount disbursed at Php 2.86 billion.¹⁰

Apart from LBP and DBP, a desk search of banks which have also participated in the jeepney modernization program only resulted to one private bank, BDO, financing 5 units of modern jeepneys. In aggregate, these numbers are insignificant compared to the number of units that need to be replaced despite efforts of the Department of Transportation to provide PHP160,000 worth of equity subsidy for each jeepney unit. According to a former DoTr senior adviser, “It is not realistic for the PUVMP to rely only on financing from the Development Bank of the Philippines and Land Bank of the Philippines. Given the magnitude of the program, all commercial banks should be encouraged to offer financing for vehicle replacement.” (Siy, 2021). More banks and financial institutions are needed to meaningfully accelerate the pace of the jeepney modernization project.

Some private banks, such as BPI and RCBC, have had some experiences financing larger bus companies, but have not confirmed lending to jeepney cooperatives (see Table 4). Both banks have been active in their sustainability efforts and have issued green bonds in the past, but have not disclosed proceeds of such to have been directly linked to funding jeepney modernization. Our study suggests that the absence of financing from private banks for the jeepney modernization is due to their lack of risk appetite for the sector.

How can we mobilize financing for the under-financed project, such as the jeepney modernization program? Risk mitigants, or credit enhancers, must be considered to get private banks to take a look at participating more seriously. The pandemic, and the lack of normal mobility, have further made banks risk averse to the sector, which is seen to struggle while lockdowns remain in place. Social distancing measures further aggravate the profitability of jeepney operators who take their respective routes without the usual full capacity they are allowed to take. Further, higher oil prices have also contributed to fixed costs.

The banking industry has already taken a hit with rising non-performing loans, as their customers – both retail and corporate – struggle to make payments because of the impact of the pandemic. They will need assurance that despite these outstanding concerns, jeepney operators will not default on their loans and further contribute to the bad loans they already have on their books.

The government can step in to provide further enhancements to the program. For instance, the government can implement service contracting to ensure stable income for operators, and thus, improve their credit-worthiness for commercial banks. Moreover, the government can explore extending partial guarantees to mitigate the risk for private banks and other lenders, or further raise their equity contribution to lessen the loan amount needed per modern jeepney. The government can also explore rationalizing franchise routes or even franchise areas to increase profitability for each cooperative or corporation, by re-distributing jeepney supply to increase the chances of maximized revenues per trip. Ultimately, a multi-sectoral approach is needed to further improve on the work already in place to support the jeepney

modernization program. Unless we are able to tap the capital parked in private financial institutions, jeepney modernization will continue to be a struggle.

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CRediT authorship contribution statement

Varsolo Sunio: Conceptualization, Methodology, Formal analysis, Investigation, Validation, Visualization, Writing – original draft, Writing – review & editing. **Jaime Mendejar:** Conceptualization, Formal analysis, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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⁹ Interview with Respondent GB1; validated in LBP website.

¹⁰ Interview with Respondent GB2.

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