Report Number: ICRR0022985

1. Project Data

Project ID P133114	**Project Name** Heilongjiang Public Transport
Country China	**Practice Area(Lead)** Transport

L/C/TF Number(s)	**Closing Date (Original)**	**Total Project Cost (USD)**
IBRD-83460	30-Jun-2020	200,000,000.00
Bank Approval Date	**Closing Date (Actual)**	
28-Mar-2014	30-Jun-2021	

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	200,000,000.00	0.00
Revised Commitment	200,000,000.00	0.00
Actual	200,000,000.00	0.00

Prepared by	Reviewed by	ICR Review Coordinator	Group
Elisabeth Goller	Vibecke Dixon	Kavita Mathur	IEGSD (Unit 4)

2. Project Objectives and Components

a. Objectives

The project development objective (PDO) as stated in the Financing Agreement and the Project Appraisal Document (PAD) is to upgrade the quality and efficiency of public transport services in selected public transport corridors in the project cities.

For the purpose of this review, the PDO will be assessed as follows in line with the Implementation Completion and Results Report (ICR): (i) to upgrade the quality of public transport services in selected public

transport corridors in the project cities and (ii) to upgrade the efficiency of public transport services in selected public transport corridors in the project cities.

b. Were the project objectives/key associated outcome targets revised during implementation?

No

c. Will a split evaluation be undertaken?

No

d. Components

Component 1. Public Transport Corridor Improvement (cost at appraisal: US$165.16 million, including contingencies; at the 2019 restructuring: US$106.23 million, including contingencies; at project close: US$80.57 million) to improve three designated public transport corridors in Harbin and five in Mudanjiang. For both cities, this included (i) improve pavement conditions and develop new lane configurations on existing pavements for dedicated bus-priority lanes, bike lanes, and pedestrian facilities; and (ii) install bus stops, provide heated indoor bus waiting facilities, install limited underground conduits and pipelines, provide sidewalk, and improve roadside parking. For Mudanjiang, it also included (iii) improve one non-motorized transport (NMT) corridor in downtown .

During the 2019 restructuring, Harbin replaced two of the three corridors with other corridors because they overlapped with the planned metro line 3. This decreased the total length of its corridor improvements (2019 Project Paper (PP), para 9). Mudanjiang dropped one corridor improvement because its function changed from a public transport corridor to a fast link to the high-speed rail station (PP, para 10.a).

Component 2. Public Transport Infrastructure Improvement (cost at appraisal: US$178.79 million, including contingencies; at the 2019 restructuring: US$127.39 million, including contingencies; at project close: US$126.27 million) to finance in Harbin and Mudanjiang (i) cleaner-fuel and accessible buses; (ii) the construction of passenger hubs/terminals, depots/garages, and maintenance, safety education, and bus driver training facilities; (iii) Information Technology Services (ITS) applications and other information technology to improve the efficiency and management of bus operations.

During the 2019 restructuring, Mudanjiang dropped the three bus hubs/terminals because of changes in the city's land use planning and the availability of recently-built and planned bus terminals and hubs, which were to guarantee the quality of bus services even without these project investments (RP, 10.b).

Component 3. Traffic Management and Safety Improvement (cost at appraisal: US$54.53 million, including contingencies; at the 2019 restructuring: US$47.90 million, including contingencies; at project close: US$46.87 million) for equipment and civil works for traffic management in Harbin and Mudanjiang. It comprised of (i) a traffic control system, including traffic signals with bus priority functions; (ii) a traffic monitoring and violation detection system; (iii) real time traffic information and traffic guidance systems; and (iv) a traffic safety education facilities.

During the 2019 restructuring, Mudanjiang dropped the traffic safety education center expansion because the existing center met the demand.

Component 4. Road Maintenance and Emergency Response Equipment (cost at appraisal: US$11.92 million, including contingencies; at the 2019 restructuring: US$10.21 million, including contingencies; at project close: US$9.39 million) to help Harbin develop an effective emergency response and road maintenance system, including (i) road, bridge and tunnel inspection equipment; (ii) an underground utility detector; (iii) road maintenance equipment; and (iv) emergency response equipment.

Component 5. Capacity Building (cost at appraisal: US$8.42 million, including contingencies; at the 2019 restructuring: US$7.62 million, including contingencies; at project close: US$6.19 million) to finance (i) urban transport related studies, including to evaluate and optimize bus services in cold weather regions, provide transport planning and management strategies, and develop a new ownership and regulatory structure for public transport operations in the project cities; and (ii) project implementation capacity building for local municipal governments, consulting services and incremental operation costs for project management, and support domestic and international training/study tours.

e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project Cost: The actual total project cost was US$282.68 million, which is 66 percent of the appraisal cost estimate of US$431.01 million and 94 percent of the 2019 restructuring estimate of US$299.35 million (ICR, Annex 3). The significant lower project end cost is due to the changes in project scope described in section 2.d, exchange rate gains, and favorable prices through competitive bidding.

Financing: The Bank was expected to contribute and contributed US$200.00 million to the cost of the project through an IBRD loan.

Borrower Contribution: The expected borrower contribution at appraisal was US$231.01 million. It was reduced to US$99.35 million at the 2019 restructuring. The actual contribution was US$82.68 million, which is 36 percent of the appraisal estimate and 83 percent of the 2019 restructuring estimate.

Dates and Project Restructuring: The project was approved on March 28, 2014, became effective on August 18, 2014, and was expected to close on June 30, 2020. The project was restructured in August 2019 to (i) change and drop project activities, as explained under 2.d above; (ii) adjust the project costs accordingly; (iii) relocate loan proceeds between disbursement categories and increase the disbursement percentage; and (iv) update the final targets of six intermediate indicators in the result framework (PP, section II).

The loan closing date was extended in March 2020 for one year, to June 30, 2021 to account for the initial slow implementation and delays due to COVID. This restructuring also revised the (i) completion dates for the indicator targets; (ii) disbursement estimates; and (iii) the implementation schedule (RP, section II).

3. Relevance of Objectives

Rationale

Context at Appraisal. The number of vehicles in China increased from 5.5 million in 1990 to 120 million in 2010. Therefore, at appraisal in early 2014, accelerated urbanization and continued economic

growth were expected to further increase motorization and transport demand in Chinese cities. Although this was expected to facilitate economic development, it was also to lead to increased energy consumption, local air pollution, greenhouse gas (GHG) emissions, and road fatalities and injuries. At that time, cities were mainly focusing on expanding the road network to accommodate demand. This was not sufficient, and congestion, air pollution, and road safety worsened. In addition to these problems, Harbin and Mudanjiang also faced the challenge of providing public transport services in an extremely cold climate, with heavy snow and icy roads during winter. Specific public transport-related challenges in these two cities included (i) inadequate capacity, (ii) old buses running at low speed and with low punctuality because of poorly designed infrastructure and lack of modern traffic management, (iii) limited use of ITS, and (iv) lack of transport facilities, such as depots and terminals. It resulted in long waiting times for buses in cold temperature, overcrowding especially during peak hours, and delays and additional fuel use to start and warm up bus engines.

Previous Sector Experience. Harbin was one of the pilot cities in the GEF Large City Congestion and Carbon Reduction Project (P127036) approved in 2013, which was expected to complement this project by developing a comprehensive travel demand management system, including better parking policies and transit-oriented development plan.

Relevance to Government Strategies. At appraisal, the PDO was in line with the 2011-15 Five Year Plan and various government documents calling to foster urbanization and increased domestic consumption to promote a steady and rapid economic development, while at the same time safeguarding the environment, ensuring social inclusion, and reducing income and regional disparities (PAD, para 1). Harbin was a pilot city of the Ministry of Transport's "Transit Metropolis" initiative aiming to increase the public transport share from 30 percent in 2012 to 45 percent by 2020. In Mudanjiang, public transport was among the four key industries to be developed and the city planned to increase the public transport modal share from 15 percent at appraisal to 35 percent by 2020 (ICR, paras 6 and 7). At completion, the PDO remained in line with the 2016-20 Five Year Plan, which focused on promoting low carbon transport. It also remained aligned with China's 2021-25 Five Year Plan, which aims at a sustained and healthy economic development with improvements in quality and efficiency.

Relevance to Bank Strategies. At appraisal, the PDO was in line with Bank's FY2013-16 Country Partnership Strategy for China, which, among others, focused on supporting greener growth. At completion, the PDO remained in line with engagement area 2. Supporting greener growth of the Bank's FY20-FY25 Country Partnership Framework, which strives towards low-carbon transport.

The PDO statement was outcome-oriented and clear. It was timid in addressing the real development challenge in these cities, which was to increase public transport ridership and reduce individual motorized mobility. The project did, however, measure increased bus ridership.

On balance, **relevance of objectives is rated substantial**. This rating reflects the PDO's high relevance in the country context and the full alignment with government's priorities and Bank priorities, on the one hand, and its only indirect coverage of the cities' real development challenge in the sector, on the other hand.

Rating

Substantial

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

To upgrade the quality of public transport services in selected public transport corridors in the project cities.

Rationale

The theory of change for Objective 1 was that the activities to (i) improve public transport corridors; (ii) construct passenger hubs/terminals, depots/garages, and maintenance, safety education, and driver training facilities; (iii) procure cleaner buses; (iv) install ITS; (v) procure equipment and civil works for traffic management; (vi) procure emergency response and road maintenance equipment and devices; and (vii) prepare urban transport-related studies would have the following outputs: (i) improved public transport corridors; (ii) auxiliary facilities; (iii) cleaner buses and new performance and lease agreements; (iv) intersections with traffic management improvement and equipment; (v) emergency response and road maintenance equipment and devices; and (vi) urban transport-related studies. In terms of outcomes, this was to improve the quality of public transport services, including, among others, an increased share of buses arriving on time and increased bus speeds. It was also to lead to higher passenger satisfaction. The longer term outcome was to increase the modal share of public transport by making buses a more attractive alternative to cars. The main assumptions were that (i) the project management offices (PMO) had adequate capacity to oversee corridor implementation; (ii) private-owned companies agreed to the new performance and lease agreements; (iii) bus priority functioned efficiently; (iv) Harbin had adequate capacity to operate and maintain the emergency rescue and road maintenance equipment; and (v) an improved level of public transport service and the reduced impact of extreme weather conditions on public transport use and operation would enhance user satisfaction and thus the attractiveness of public transport services (ICR, para 9). It is plausible that, if the outputs and outcomes are achieved, the project will lead to the higher level outcome of increased public transport use as stated in the PAD (para 16), although it was not included in the PDO formulation.

Outputs:

The project produced the following outputs, captured by indicators in the results framework:

- Three bus corridors for a total of 17.72 km in Harbin, short of the originally target of 21.80 km, but in line with the revised target of 17.70 km;
- Four bus corridors for a total of 18.00 km in Mudanjiang, short of the originally target of 25.30 km and of the revised target of 24.80 km;
- Three passenger hubs and depots in Harbin, short of the originally target of five, but in line with the revised target;
- One passenger hub in Mudanjiang completed by project end, short of the original target of three and the revised target of two passenger hubs and depots. However, the borrower completed the Hualin bus depot in December 2021 and committed to complete the Daqing bus depot by June 2022, both part of the original project and financed with local funds;
- 200 cleaner vehicles in Harbin, in line with the original and unrevised target of 200;

- 123 cleaner vehicles in Mudanjiang, slightly more than the original and unrevised target of 120;
- 46 intersections upgraded with traffic signals with bus priority function and pedestrian crossings installed in Harbin, in line with the target of 46, and 110 intersections in Mudanjiang, in line with the target of 110. The Bank task team, in the interview with IEG*, explained that each intersection intervened was counted twice because they counted the roads and not the intersections. This mean that 23 and 55 intersections, but 46 and 110 roads were intervened. This was in line with what was planned from the outset.
- 104 emergency rescue and specialized road maintenance equipment in Harbin, in line with the target of 104; and
- 17 technical assistance activities, including the 13th five-year comprehensive transport plan in Harbin and the bus network optimization study in Mudanjiang and exceeding the target of at least on policy, plan or strategy issue by each city. The cities used many of the outcomes of these technical assistance activities (ICR, paras 46 and IEG's Bank task team interview*).

The project also produced the following additional outputs, not captured by indicators in the results framework:

- Performance and lease agreements for bus operators;
- Public transport command center, public transport data center, equipment for advanced traffic monitoring, enforcement, and information services, and road safety education center in Harbin;
- Advanced bus management and dispatching and Intelligent traffic management systems in Mudanjiang;
- "Three-Warm Program" in Harbin, including warm bus stops, warm vehicles and warm bus parking;
- "Warm-heart bus wait" voluntary program in Mudanjiang for which the project supported the installation of bus arrival information in shops near bus stops for passenger to wait in these shops;
- Universal accessibility features in buses, bus stops, and terminals;
- Technical trainings, for instance, on traffic safety knowledge for students, fire protection, traffic sign marking, and driver safety; and
- One international and 18 domestic study tours, exposing PMO staff to global and domestic good practice in Harbin.

Outcomes:

Note: For Harbin, a 2015 baseline is used for results related to project corridor improvements because the baseline in the PAD, which was not revised, does not reflect the replacement of two project corridors. For Mudanjiang, for results related to project corridor improvements, the baseline generally refers to the original five corridors and does not take into account that one corridor was dropped from the project, hence not improved. Results are reported for the four corridors improved. The Bank task team pointed out to IEG that most outcome indicators are in percentage terms, so this does not significantly affect the data accuracy. For numerical baselines, such as number of fatalities, baselines were adjusted proportionally whenever possible.

Project outputs, such as bus priority lanes, advanced bus management, and enhanced traffic management improved bus regularity and punctuality. This reduced passenger waiting times, which is especially important during cold winters. The share of buses arriving on schedule on the project corridors in Harbin increased from 61 percent in 2015 to 82.17 percent by project end, exceeding the target of 75.00 percent. If this target is adjusted to account for an increase equivalent to the increase between the original baseline and target, i.e. to

81.70 percent, the achievement is in line with the adjusted target. In Mudanjiang, the share of buses arriving on schedule increased from 87.00 in to 92.50 percent in line with the target of 92.00 percent. The Bank task team explained to IEG that bus operators regularly collect data on bus arrivals as part of managing the system.

The performance and lease agreements, which require bus operators to comply with quality measures and indicators, were successful. In Harbin, private operators completed 85 of the agreed measures in these agreements. In Mudanjiang, they completed 82 percent of the measures. In this way, both cities slightly exceeded the target of 80 percent.

As mentioned under objective 2 below, bus speeds also increased, which lead to reduced travel time, a key dimension of public transport quality. Other quality improvements through the project include enhanced travel information through real time bus arrival information at bus stops and phone apps, heated waiting facilities, and interchange facilities. The travel time for bus passengers decreased by 21.4 percent and 17.9 percent in Harbin and Mudanjiang (ICR, annex 4). The ICR does not explain how bus travel times were assessed.

The satisfaction of bus passenger increased. In Harbin, this satisfaction increased from 42.00 percent in 2015 to 82.80 percent by project end on the intervened corridors. This substantially exceeds the target of 70.00 percent. If this target is adjusted to account for an increase equivalent to the increase between the original baseline and target, i.e. to 84.00 percent, the achievement is 1.20 percentage points below the target. It is also worthwhile pointing out that there has been a steady increase in the user satisfaction in the three surveys carried out between April 2020 and May 2021 (77.20 percent, 79.90 percent, and 82.80 percent). In Mudanjiang, the satisfaction with public transport services on the intervened corridors increased from 75.00 percent in 2013 to 91.40 percent by project end, also following an upward trend (in 2018 the satisfaction was 85.20 percent). The target was 85.00 percent.

In Harbin, the beneficiary satisfaction survey showed that bus passengers were satisfied regarding transfer convenience, bus stop facilities and information provision, indoor bus waiting facilities, cleanness of the vehicles, safety and comfort while waiting at bus stops or riding on buses. In Mudanjiang, it showed that passengers were satisfied with a wide range of aspects, including safety, crowding, comfortableness, fares, and speed, as well as their overall satisfaction with the bus journey. The project had the potential to influence most of these quality dimensions. However, the ICR does not present any information to show that the increase in passengers satisfaction can be attributed to this project's interventions only. The ICR does not provide any information on whether or not other interventions or changes in policies, etc. might have influenced the results. In addition, although reduced overall travel time or speed of travel are among the key project benefits, the ICR does not list them as quality dimension with which passenger in Harbin were satisfied. The project could have surveyed passenger satisfaction in a control corridor to check for attribution.

The annual bus ridership along the targeted corridors, however, did not increase as expected. In Harbin, bus ridership increased by 18.64 million by June 2021, significantly short of the target of 35.00 million a year. For Mudanjiang, ridership went down by 0.22 million by June 2021, also significantly short of the target of an increase of 4.4 million a year. The ICR, para 66, attributes this mainly to COVID in both cities. For Harbin, the ICR also attributes it to (i) a decrease in the population, which steadily declined since 2014 to reach 96.40 percent of the 2014 population in 2018; (ii) the construction of the Harbin subway or metro, which according to what the Bank task team mentioned to the IEG team was decided only after project effectiveness; and (iii) an increase in shared-bicycle use.

COVID definitively had a substantial negative impact on passenger demand in both cities, and this is corroborated by Ministry of Transport data on national central cities (36 large and medium-sized cities in the country), which shows that the volume of traffic has decreased in China from 33.99 billion trips in 2019 to 20 billion trips in 2020 (ICR, para 66). Nevertheless, the data ascribing the low ridership in these cities to COVID is weak, partially illogical, and lacks an explanatory narrative. The additional data provided by the Bank task team to IEG shows that, in Mudanjiang, ridership increased by 0.8 million a year by June 2020 compared to the baseline of 0 and it decreased by minus 0.2 million by December 2020 and by minus 0.22 million by June 2021 against the same 0 baseline. In Harbin, ridership increased by 19.8 million by December 2020 and by 18.64 million by June 2021 compared to the baseline of 0. Considering that China was most strongly hit by COVID in 2020, especially in the beginning of the year, it is strange that ridership in Mudanjiang in June 2020 was higher than in June 2021. This also seem to contradict with the data on bus company profits for Mudanjiang, which decreased by about 52 percent in 2020 but only by 30 percent in 2021 compared with 2019.

In summary, the project substantially improved the quality of public transport services in the project cities. However, the expected bus ridership increase, which is the ultimate goal of the public transport service quality improvements, was not yet achieved by project end. The ICR mostly ascribes the reduced ridership to COVID and provides weak and illogical evidence about the likelihood that the expected ridership increase will be achieved when the pandemic subsides. Although, a ridership increase after the pandemic subsides is plausible, the data provided does not show any improvement in 2021 compared to 2020. In addition, the rate at which passengers are likely to shift back to buses is unpredictable given that many might have definitively opted for other travel modes. As a result, **the efficacy rating is considered modest.**

*Note: All references to the discussions between the Bank task team and IEG in this ICRR refer to the IEG interview of July 5 and 6, 2022.

Rating
Modest

OBJECTIVE 2
Objective
To upgrade the efficiency of public transport services in selected public transport corridors in the project cities.

Rationale
The theory of change for Objective 2 was that the activities to (i) improve public transport corridors; (ii) construct passenger hubs/terminals, depots/garages, and maintenance, safety education, and driver training facilities; (iii) procure cleaner buses; (iv) install ITS; (v) procure equipment and civil works for traffic management; (vi) procure emergency response and road maintenance equipment and devices; and (vii) prepare urban transport-related studies would have the following outputs: (i) improved public transport corridors; (ii) auxiliary facilities; (iii) cleaner buses and new performance and lease agreements; (iv) intersections with traffic management improvement and equipment; (v) emergency response and road maintenance equipment and devices; and (vi) urban transport-related studies. In terms of outcomes, this was to improve the efficiency of public transport services, including, among others, increased bus speeds, reduced energy consumption, and less road fatalities. In the longer term, together with an increase in public

transport modal share, these results were expected to reduce GHG emissions and air pollution. The main assumptions were that (i) the PMOs had adequate capacity to oversee corridor implementation; (ii) private owned companies agreed to the new performance and lease agreements; (iii) bus priority functioned efficiently; (iv) Harbin had adequate capacity to operate and maintain the emergency rescue and road maintenance equipment; (v) cleaner buses worked adequately in cold weather; and (vi) an improved level of public transport service would enhance the attractiveness of public transport services (ICR, para 9). If these outputs and outcomes are achieved, it is plausible that they will lead to enhanced efficiency of public transport services.

Outputs:

The outputs are the same as the ones for objective 1.

Outcomes:

Note: Also for this objective, for indicators related to the project corridor improvements, a 2015 baseline is used for Harbin. For Mudanjiang, the baselines used is the original one for the five corridors, not taking into account that one corridor was not improved. Results are reported for the four corridors improved.

The physical project interventions, especially the bus priority and traffic management improvements, increased the bus speed in Harbin from the 2015 baseline of 28.00 km/h to 34.10 km/h, slightly exceeding the target of 33.30 km/h (the adjusted target to account for an increase equivalent to the increase between the original baseline and target is 31.86 km/h). In Mudanjiang, the bus speed increased from the 2013 baseline for the original five corridors of 19.00 km/h to 24.20 km/h, in line with the target of 24.00 km/h. The Bank task team explained to IEG that travel times were calculated from bus arrival times data, which seems adequate. The fact that the baseline in Mudanjiang is for 5 corridors and the results are for 4 corridors has no significant impact on data accuracy because the data is in averages.

Newer vehicles and higher and more regular bus speeds led to energy saving. In Harbin, bus energy consumption along the project corridors decreased by 0.31 liters of diesel per vehicle kilometer travelled (VKT), achieving the target of 0.3 liters of diesel per VKT. In Mudanjiang, the bus energy consumption by buses along the project corridors decreased by 0.2 liters of diesel per VKT, exactly achieving the target of 0.2 liters of diesel per VKT. The reduced energy consumption also means less CO2 emission and air pollution. The ICR estimates 5,087 and 2,207 tons of CO2 emission were avoided in Harbin and Mudanjiang in 2021. The project had no indicators to measure reduced CO2 emission and air pollution.

Road fatalities decreased. In Harbin, the number of transport related fatalities and major injuries along the project corridors decreased from 53 in 2015 to 17 at completion in June 2021, exceeding the target of 21 (the adjusted target to account for an increase equivalent to the increase between the original baseline and target is 20). In Mudanjiang, the number of transport related fatalities and major injuries along the four intervened project corridors decreased from 26 (this is the average for four corridors only) in 2013 to five in 2020 and zero at completion in June 2021, exceeding the target of 20. However, the evidence provided in the ICR has shortcomings. First, data from ISRs provided by the Bank task team to IEG, showed that road fatalities and major injuries decreased already before project completion, so the full attribution of the project end results to the project interventions is questionable. In Harbin, road fatalities and major injuries had already decreased to 32 in April 2018, before the completion of the corridors. In Mudanjiang, the traffic management system, which is expected to significantly contribute to road safety, was not yet operational by project end (see Objective 1 above) but road fatalities and major injuries had declined to 10 in June 2020 and 9 in December 2020.

Second, although the different data points show a downward trend in road fatalities, the baseline and project end achievements are given for one data point only and could be outliers (especially the zero fatalities and major injuries by project end in Mudanjiang). Finally, the ICR does not provide the definition of fatalities and major injuries nor the assessment timeframe, therefore it is not clear if the same definitions were systematically used and if data refers to a full years or less.

Other efficiency improvements, not captured by indicators, include (i) substantial reductions in the vehicle operation costs and passenger travel time costs because of the improved road conditions and traffic management (savings per vehicle-kilometer of RMB0.11 for small passenger vehicles, RMB0.27 for buses, and RMB0.17 for freight vehicles), and (ii) reduced bus maintenance costs (a reduction of least RMB750.00 per bus in Mudanjiang) because of the operation of the bus depot and terminals (ICR, annex 4) .

In summary, there is reasonable evidence to show that the capacity enhancements and physical interventions under the project improved the efficiency of public transport services in the project corridors for the aspects captured by the project indicators even with the shortcomings in the road fatalities data. The significant lower bus ridership in both cities by project end negatively impacted other aspects of public transport service efficiency, such as profitability of bus operation (see Objective 1 above). Considering the reasonable evidence for most public transport service efficiency achievements and the data for Mudanjiang showing that bus operation profitability picked up in 2021 compared to 2020 (see Objective 1 above), on balance, **the efficacy of objective 2 is rated substantial.**

Rating
Substantial

OVERALL EFFICACY

Rationale
There is reasonable evidence to show that the project substantially contributed to improved public transport quality in the intervened corridors. It is plausible that the longer-term outcome of increased bus ridership will be largely achieved once the longer term effects of COVID subside. However, the evidence on such likelihood is weak in the ICR. There is, however, reasonable evidence to show that the project enhanced the efficiency of public transport services in the project corridors for the aspects captured by project indicators. Therefore, overall, the efficacy of this project is rated substantial, albeit with shortcomings.

Overall Efficacy Rating

Substantial

5. Efficiency

Economic Efficiency:

At appraisal, the project carried out a cost-benefit analysis, comparing the "with-project" and "without-project" scenarios, using a 23-year time frame (20 years for operation and 3 years of construction), and applying a 12 percent discount rate. This analysis showed an economic internal rate of return (EIRR) of 19.4 percent and 23.9 percent and a net present value (NPV) of RMB492.22 million and RMB500.70 million for Harbin and Mudanjiang. The sensitivity analyses showed that all scenarios tested achieved an EIRR higher than the discount rate, except for (i) a 20 percent increase in costs and a 20 percent decrease in benefits and (ii) a 10 percent increase in costs and a 20 percent decrease in benefits in Harbin.

At completion, the project repeated the economic analysis using the actual project costs and data from a traffic analysis. This showed EIRRs of 18.9 percent and 16.2 percent and NPVs of RMB763.15 million and RMB319.65 million for Harbin and Mudanjiang. The lower EIRRs are mainly due to the longer implementation periods and less traffic mainly ascribed by the ICR to COVID. The sensitivity analyses showed that the project was economically viable for all tested scenarios.

Cost Effectiveness, Administrative and Operational Efficiency:

This project had a 12-month delay in implementation for the reasons pointed out in Section 2, but the overall implementation period was less than seven years. The total actual project cost was 66 percent of the cost estimated at appraisal because of a reduction in the project scope. It was 94 percent of the cost estimated at the 2019 restructuring.

In summary, the implementation delays were not significant, the EIRRs, although lower than the appraisal estimates, were still higher than the 12 percent discount rate, and the revised project cost was lower than anticipated. Therefore, the project's investments were carried out cost efficiently and, **the efficiency of project implementation is rated substantial.**

Note: In the table below, to compare the ex-ante and ex-post EIRRs, the simple average for both cities is used. The ICR did not provide data on the coverage of the economic analysis.

Efficiency Rating

Substantial

a. If available, enter the Economic Rate of Return (ERR) and/or Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	21.70	0 ☐ Not Applicable
ICR Estimate	✓	17.60	0 ☐ Not Applicable

* Refers to percent of total project cost for which ERR/FRR was calculated.

6. Outcome

The project's relevance of objectives and efficiency are rated substantial. The project's efficacy is rated substantial with shortcomings. Consequently, **the project's overall outcome is rated moderately satisfactory.**

a. Outcome Rating

Moderately Satisfactory

7. Risk to Development Outcome

The following pose risks to development outcomes:

- **Bus Ridership.** Bus ridership in both cities has been significantly lower than expected. Therefore, the risk that the expected ridership might not be achieved is significant even if the impact of COVID subsides because the lower ridership is not only due to COVID at least in Harbin and some people might have permanently shifted to motorized transport.
- **Government ownership and commitment**. This risk is low. The ICR, para 125 mentioned that assets constructed and systems put in place will be handed over to the responsible authorities, and even if the Bank has not received detailed financial plans for operating and maintaining these assets and system, the regular budgets of these authorities will be funding the operating and maintenance expenditures.
- **Technical risk.** The project financed several systems and buses. These systems and buses are in full use. Therefore, and because of the government ownership and commitment, the risk that they will get outdated and not be replaced is low.

8. Assessment of Bank Performance

a. Quality-at-Entry

The Bank intervened in areas highly relevant for the project cities. Although the PDO statement was outcome-oriented and clear, it was timid in addressing the real development challenge in the country. The original design of the results framework was adequate to assess the project achievements, but it had room for improvement (for details see section 9).

The task team benefited from experience in supporting many transport projects in China, hence was able to apply its deep understanding of the Chinese context and the local regulations to project design and appraisal.

The task team made sure that the project design included a comprehensive package of measures, such as corridor and auxiliary infrastructure, systems, and capacity building. Although the activities in the two cities were similar, the project design only included limited synergies and opportunities for collaboration.

According to the PAD, paras 27 to 30, the project design integrated the lessons from the previous projects. The Bank task team paid adequate attention to the social, environmental, and fiduciary aspects during preparation. The team put in place adequate institutional arrangements.

The Bank task team rated the overall project risk as moderate and mainly flagged risks related to lack of familiarity with Bank rules and procedures, difficult coordination among the various project implementation entities, and the complexity caused by the multiple project interventions (PAD, section V. and annex 4). The mitigation measures were largely adequate. The team did not envisage the risk of having to change project corridors.

The project implementation entities expressed appreciation with the task team's support in project design and preparation (ICR, annex 5).

The task team supported project design and preparation with moderate shortcomings in PDO design and minor shortcomings in risk identification and results framework design. Therefore, **the project's quality at entry is rated moderately satisfactory.**

Quality-at-Entry Rating
Moderately Satisfactory

b. Quality of supervision

The Bank task team carried out regular project supervision missions and followed up closely on project implementation. Because of the large number of project implementation entities and contracts, in addition to the regular supervision missions, the task team carried out technical visits and workshops to address issues and ensure quality. The implementation support and supervision were continued virtually during COVID-related travel restrictions. The Bank supervision team benefited from the presence of the TTLs and key team members in Beijing, which facilitated the day-to-day implementation support.

In the aide memoires and ISRs, the Bank task team reported on physical project progress, risks during implementation, and remedial actions. However, the teams results reporting had shortcomings, and they did not flag that the borrower's reporting on indicator achievements was inadequate in the early years of project implementation.

The Bank task team identified the need for project restructuring early during project implementation, worked closely with the counterparts to identify replacement corridors, and ensured that the necessary technical documents were ready long before the receipt of the formal restructuring request. This request was delayed several years because of government-internal procedures. Once the request was received, the task team completed the restructuring process within three months.

The Bank task team did not update the project baselines and targets to reflect the change in intervened corridors. They did also not correct other minor shortcomings in M&E design (for details see section 9).

The entities involved in project implementation appreciated the task team's knowledge, guidance, and support in project implementation (annex 5).

In summary, the Bank task team adequately supported the implementation of this complex project. However, the Bank did not adequately restructure the results framework and did not flag shortcomings in results reporting during early years of project implementation. Consequently, **Bank performance in supervision is rated moderately satisfactory.**

Quality of Supervision Rating
Moderately Satisfactory

Overall Bank Performance Rating
Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design
According to the PAD, paras 35 and 36, the PMOs in the two cities were to be responsible for project monitoring. They were expected to coordinate the relevant agencies in collecting the required data for the indicators and report the results as part of project progress reporting.

The project's PDO and theory of change were clear. The project activities were to logically lead to the expected outputs, intermediate outcomes, final outcomes, and impacts.

The PDO indicators were outcome-oriented and largely sufficient to measure the project achievements. Nevertheless, additional indicators could have improved the monitoring and reporting on public transport quality and efficacy achievements, such as affordability because the main beneficiaries were low-income people, travel time of bus passengers because it is an important public transport quality dimension, reduction of waiting times or efficiency increases during cold weather because the latter was a major project focus, profitability of bus operations because it is an important efficiency dimension, and the reduction of overcrowding mentioned as a problem in the PAD (para 6). In addition, some indicators, such as on user satisfaction and increase in ridership, could have been sex-disaggregated.

The PDO indicators were also not corridor-specific but related to all corridors to be intervened in each city in an aggregate way. The ICR, para 100, points out that even if it was possible to collect data on project achievements by corridor and aggregate them later, the borrower did not collect this data for the indicators of “increased public transport service satisfaction along the targeted corridors”, “increased share of buses arriving on schedule”, and “Increased bus speed”, as these rely on averages on the selected corridors".

The intermediate indicator of "number of intersections upgraded with traffic signals with bus priority function and pedestrian crossings" was ill-defined. The Bank task team explained to IEG that each road of

an intersection intervened was counted as one intersection in line with the definition of the indicator in the PAD. This means that what was planned was achieved, but the number of intersections intervened was only half in both cities.

The indicators "reduced energy consumption by buses along the targeted corridors" and "increased annual bus ridership" had baselines of zero. This is not a good practice because it is not transparent and does not provide insights on the "without project" situation of the counterfactual. The indicator "increased annual bus ridership" was considered as intermediate indicator even though it contributes to measure the final outcome of the project, i.e. making buses a more attractive alternative to driving a private car.

For many indicators, there is a strong link between project activities and results, such as bus priority and enhanced traffic management and increased bus speeds. For others, such as passenger satisfaction and road fatalities, a control corridor would have been ideal to clearly establish the attribution.

For the indicator on "road fatalities and major injuries", the comparisons between the baseline and achievements was based on only two points of time, which could be outliers. Using averages for at least three years for baselines and targets would have been a good practice

b. M&E Implementation

The project management consultants were only hired in Mudanjiang at end of 2016 and in Harbin in September 2017. Consequently, in the first years, the project had limited M&E capacity and did not collect and report results data. Because of COVID, the project's bi-annual reports were delayed, and some of the result indicators were not surveyed during most of the COVID period. Except for these shortcomings, project reporting was adequate.

The project did not adjust the PDO indicator baselines and targets when changing the corridors to be intervened. However, when reporting results, for most baselines in Harbin and one in Mudanjiang directly related to the intervened corridors, the project used an adjusted baseline that reflected the changed corridors. The project also reported the results of the user satisfaction survey for several years.

According to what the Bank task team mentioned to IEG, the project did not pilot GHG emission and air pollution accounting in Harbin as originally envisaged (PAD, para 37).

The ICR did also not provide information on the methodologies used to collect user satisfaction and other data.

c. M&E Utilization

The M&E data when collected was used for progress reporting to the World Bank, project restructuring, and the presentation of the project achievements in the ICR. The ICR does not indicate that M&E data was used beyond this project. As mentioned by the Bank task team to IEG, even the passenger satisfaction surveys on the project corridor were carried out specifically for project reporting.

M&E Quality Rating
Modest

10. Other Issues

a. Safeguards
The project was classified as category B for environmental assessment purposes. The following safeguards policies were triggered: Environmental Assessment OP/BP4.01, Physical Cultural Resources OP/BP 4.11, and Involuntary Resettlement OP/BP4.12. The project's environmental impacts during operation were to mainly include air pollution, noise, reduced road safety, and sewage from bus hubs and depots (PAD, para 60). Some land acquisitions were also envisaged (PAD, paras 56 and 57).

The project prepared an environment assessment, an environmental management plan (EMP), including a road safety plan, a social assessment, and a resettlement policy framework and plan. The project also provided capacity building and training, and prepared a monitoring plan.

In terms of environmental performance, the PMOs and contractors, in coordination with local authorities, implemented the mitigation measures of the EMP, including the traffic management plan, and submitted the environmental monitoring reports to the Bank on time. The ICR does not specifically mention if the project was in compliance with the Bank policy and procedural requirements, had problems, and how they were resolved. The ICR, para 109, considers the PMOs' environmental safeguards implementation performance as satisfactory. This performance was rated as satisfactory in the last Implementation Status and Results Report (ISR). In previous ISRs, it was rated moderately satisfactory.

As for physical cultural resources, the ICR only mentions that it was triggered to protect three historical buildings, and that the EMP included mitigation measures to mitigate these impacts. The last ISR rated the compliance with this safeguards policy as satisfactory; the previous ones rated it as moderately satisfactory.

With respect to social safeguards, the project reflected the measures identified in the social assessment in the project's feasibility study. The ICR only mentions that the project changes introduced with the 2019 restructuring did not involve any resettlements. It does not mention if the project was in compliance with the Bank's resettlement policy and procedural requirements, if problems happened, and how they were resolved. The last ISR rated the compliance with this safeguards policy as satisfactory; the previous ones rated it as moderately satisfactory. The Bank task team mentioned to IEG that they did not have information on problems and issues; however, the grievance redress mechanism might not have been fully effective because the project registered no complaints.

b. Fiduciary Compliance
In terms of procurement, the project suffered initial procurement delays because of the PMOs' inexperience with Bank procurement procedures. After the hiring of the project management consultants and a procurement agent, the project's procurement performance improved. The project received many complaints and had an Integrity Vice Presidency (INT) investigation. The project satisfactorily solved the complaints. The INT investigation substantiated fraud related to misrepresentations in bid packages by two

firms. The project did not award the contract to these firms. The last three ISRs rated procurement as satisfactory.

As for financial management, the project's financial management system was in compliance with Bank requirements. The project maintained adequate financial management arrangements even if the financial management responsibilities were not centralized under the provincial PMO as planned. The project provided, with reasonable assurance, accurate and timely information on the use of the loan proceeds for the intended purposes. About half of the interim unaudited financial reports were submitted with delays. The annual financial reports were audited and had "unqualified" opinions. Minor issues identified in the last audit report included payment delays for some activities financed with counterpart funds in Mudanjiang. This problem was partially solved by project end. Mudanjiang's difficulties in providing counterpart funds during project implementation were resolved with the dropping of one corridor. The last ISR rated the financial management compliance as satisfactory; the previous ones rated it as moderately satisfactory.

c. Unintended impacts (Positive or Negative)

---

d. Other

---

11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Satisfactory	Moderately Satisfactory	Because of shortcomings in the evidence, especially on trends for ridership increases.
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	
Quality of M&E	Modest	Modest	
Quality of ICR	---	Substantial	

12. Lessons

The following lessons have been derived and summarized from the ICR, with minor additions by IEG after discussions with the Bank task team:

For project implementation agencies without previous World Bank experience, delays in contracting a project management consultant is likely to lead to a slow project implementation start and inadequate initial progress reporting. In this case, the project management consultants for the two PMOs were only contracted after two and three years of implementation. This led to slow project implementation, in particular slow procurement and inadequate results reporting. Once these consultants came on board, project implementation picked

up and all project implementation ratings improved. Therefore, it might be helpful to prepare for the project management consultants hiring already during project preparation to ensure good progress in early years of implementation. It is also important to train the PMOs during project preparation and early implementation to ensure that they can make full use of the training and solve implementation problems in a timely and effective manner.

Not taking advantage of synergies and establish close collaboration in projects involving several cities is a missed opportunity for learning from each other. Although the two cities included similar activities, except for component 4 in Harbin, they had limited direct coordination and exchange of synergies or lessons even if they are located in the same province. Each of the cities implemented the project separately and did not closely collaborate. In addition, Harbin had greater project implementation capacity than Mudanjiang, shown in the superior quality of their progress and ICR reporting. If the two cities had worked more closely together, for instance through joint meetings, sharing of report templates and other tools, and exchanging good practices, especially Mudanjiang might have benefitted. In addition, because the project had a provincial PMO, this entity could have been the catalyst to identify synergies, facilitate capacity building, and enable the sharing of lessons. Therefore, this appears as missed opportunity in this project.

Land acquisition takes time and, if not started early, may delay project implementation. In this project, resettlement started late and took a long time because of lengthy preparation and coordination among city departments. This delayed project implementation. Therefore, the land acquisition process should start early during project implementation to avoid delays and build in flexibility of the implementation timeline.

Effective communication between the borrower and the Bank task team is a key enabler for project success. The Bank task team who initially supported this project lacked structured and regular day-to-day interaction and follow-ups with the borrower. This led to communication difficulties between the parties. According to the ICR, para 123, these difficulties were barrier to progress at the early stage of implementation. The new Bank task team instituted a well-established and structured communication process, which together with effective coordination mechanisms, resulted in a significant project implementation progress since 2018 and was appreciated by the client. Therefore, a well-established and structured communication process from the start of implementation and throughout the project with pre-set regular coordination and progress update meetings is recommendable.

The successful demonstration that new technologies can work under special conditions might lead to their mainstreaming. Under this project, the promotion of new energy vehicles including hybrid and LNG buses in this project on a pilot basis was an important success story. The pilot carried out under the project showed that the operation of hybrid and LNG buses in a uniquely cold weather in the project cities can work without problems. This experience built confidence in the technical viability of hybrid or electric fleets, and in Harbin, led to the purchase of an additional 3,906 buses, showcasing the impact of the project further. According to the Bank task team, Mudanjiang was also pleased with the new technology, but did not have the means to purchase additional vehicles.

In cold climates, heated facilities can play an important role in making public transport more attractive. The project initiated a "warm" concept for public transport. In Harbin, the project introduced the "Three-Warm Program", which includes warm bus stops, warm vehicles, and warm

bus parking. In Mudanjiang, the project introduced the "warm-heart bus wait" program to mobilize shops and restaurants near bus stops to provide in-door waiting space to passengers. Passengers appreciated the heated waiting facilities and vehicles. The warm bus parking contributed to the timely start of engines and hence the reliability of public transport services.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

The ICR is largely in line with the ICR guidelines. It is well-written, candid, and internally consistent. It contains detailed descriptions of the project context, implementation, and achievements, especially in terms of project outputs. However, these details also include non-essential background information, for instance in annex 4, and repetitions, such as the reasons for dropping corridors, that make the ICR unnecessarily long.

The theory of change is logically presented. Even if the efficacy section contains a lot of information on outputs, overall, the ICR is results-oriented. The ICR adequately reports on the achievement of the targets and provides additional information on project impacts. This additional information is not necessarily in the efficacy section. For instance, the data on vehicle operating costs and travel time reductions, which contribute to public transport efficiency and quality, were reported in the economic analysis annex.

The ICR correctly adjusted some baselines of indicators related to the intervened corridors to reflect that they were changed. For instance, in the case of Mudanjiang, the baseline for road fatalities was reduced proportionally to reflect that the project interventions took only place on four instead of five corridors. The ICR could also have adjusted the targets to reflect the initially expected change. The ICR did not report details on data collection, such as the user satisfaction survey and bus speeds and timeliness data collection.

The ICR includes only a partial discussion of attribution. This is done for most outcomes by mentioning the outputs, which were logically linked to specific outcomes. For instance, the ICR explains that the bus priority lanes, ITS, and new buses led to improvements in bus punctuality.

Some of the evidence has shortcomings, especially the data on fatalities and major injuries and on bus ridership.

The lessons are important and based on evidence, but they are more formulated as findings or forward looking recommendations than lessons.

The ICR provides adequate information on the projects fiduciary compliance and performance. It does not specify if environmental and resettlement safeguards related problems occurred. It also does not specifically mention if land acquisitions/resettlement, environmental management, and the protection of cultural heritage were in compliance with Bank requirements.

a. Quality of ICR Rating
Substantial