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The World Bank

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Report No: ICR00005548

IMPLEMENTATION COMPLETION AND RESULTS REPORT

Loan Number 8347-CN

ON A LOAN

IN THE AMOUNT OF US$ 300 MILLION

TO THE

People's Republic of China

FOR THE

HaJia Railway Project

December 31, 2021

Transport Global Practice
East Asia And Pacific Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective December 31, 2020)

Currency Unit =	RMB
RMB 1.00 =	US$0.15
US$1.00 =	RMB 6.53

FISCAL YEAR
January 1 - December 31

Regional Vice President:	Manuela Ferro
Country Director:	Martin Raiser
Regional Director:	Ranjit J. Lamech
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Task Team Leader(s):	Hua Tan
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[1] Richard G. Bullock provided substantial inputs to the ICR.

ABBREVIATIONS AND ACRONYMS

China Railways	CR
Country Partnership Framework	CPF
Country Partnership Strategy	CPS
China Railway Corporation	CRC
Development Objectives	DO
Economic Internal Rate of Return	EIRR
Environmental Assessment	EA
Financial Management	FM
Hajia Railway Company	HRC
Interim Unaudited Financial Report	IUFR
Implementation Progress	IP
Mid- and Long-term Railway Development Plan	MLTRDP
Monitoring and Evaluation	M&E
Project Development Objective	PDO
Resettlement Action Plan	RAP
Resettlement Policy Framework	RPF
Social Assessment	SA
Sustainable Mobility for All	SuM4All

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DATA SHEET

BASIC INFORMATION

Product Information

Project ID	Project Name
P117341	HaJia Railway
Country	**Financing Instrument**
China	Investment Project Financing
Original EA Category	**Revised EA Category**
Full Assessment (A)	Full Assessment (A)

Organizations

Borrower	Implementing Agency
People's Republic of China	China Railway Corporation

Project Development Objective (PDO)

Original PDO

The objective of the Project is to improve accessibility and mobility by responding to existing and anticipated transport demand along the Harbin-Jiamusi corridor through the provision of additional railway capacity and reduction of transport time for passengers and freight.

FINANCING

	Original Amount (US$)	Revised Amount (US$)	Actual Disbursed (US$)
World Bank Financing			
IBRD-83470	300,000,000	281,650,870	281,650,870
Total	**300,000,000**	**281,650,870**	**281,650,870**
Non-World Bank Financing			
Borrower/Recipient	5,266,000,000	5,147,385,000	5,147,385,000
Total	**5,266,000,000**	**5,147,385,000**	**5,147,385,000**
Total Project Cost	**5,566,000,000**	**5,429,035,870**	**5,429,035,870**

KEY DATES

Approval	Effectiveness	MTR Review	Original Closing	Actual Closing
28-Mar-2014	15-Aug-2014	10-May-2017	31-Dec-2020	31-Dec-2020

RESTRUCTURING AND/OR ADDITIONAL FINANCING

Date(s)	Amount Disbursed (US$M)	Key Revisions

KEY RATINGS

Outcome	Bank Performance	M&E Quality
Satisfactory	Satisfactory	Modest

RATINGS OF PROJECT PERFORMANCE IN ISRs

No.	Date ISR Archived	DO Rating	IP Rating	Actual Disbursements (US$M)
01	16-Jun-2014	Satisfactory	Satisfactory	0
02	09-Dec-2014	Satisfactory	Satisfactory	0

03	23-Jun-2015	Satisfactory	Satisfactory	0
04	10-Dec-2015	Satisfactory	Satisfactory	16.40
05	08-Jun-2016	Satisfactory	Satisfactory	16.40
06	15-Dec-2016	Satisfactory	Moderately Satisfactory	16.85
07	08-Jun-2017	Satisfactory	Moderately Satisfactory	53.54
08	26-Dec-2017	Satisfactory	Moderately Satisfactory	168.17
09	28-Jun-2018	Satisfactory	Moderately Satisfactory	204.38
10	01-Jan-2019	Satisfactory	Moderately Satisfactory	221.29
11	26-Jun-2019	Satisfactory	Moderately Satisfactory	265.54
12	25-Jan-2020	Satisfactory	Moderately Satisfactory	290.50

SECTORS AND THEMES

Sectors

Major Sector/Sector	(%)
Transportation	**100**
Railways	100

Themes

Major Theme/ Theme (Level 2)/ Theme (Level 3)	(%)
Private Sector Development	**17**
Jobs	17
Job Creation	17
Urban and Rural Development	**84**
Urban Development	17
Urban Infrastructure and Service Delivery	17
Rural Development	67
Rural Infrastructure and service delivery	67

ADM STAFF		
Role	**At Approval**	**At ICR**
Regional Vice President:	Axel van Trotsenburg	Manuela V. Ferro
Country Director:	Klaus Rohland	Martin Raiser
Director:	John A. Roome	Ranjit J. Lamech
Practice Manager:	Abhas Kumar Jha	Benedictus Eijbergen
Task Team Leader(s):	Gerald Paul Ollivier	Hua Tan, Bernard Aritua
ICR Contributing Author:		Hua Tan

I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

A. CONTEXT AT APPRAISAL

Context

1. By 2010, China had experienced substantial economic growth over several decades with sustained annual GDP growth over 10 percent. Despite these achievements, China faced growing economic, environmental, and social imbalances. While coastal regions had expanded rapidly, provinces in central, western, and northeast China had lagged. This was the case for the relatively remote areas, such as the city of Jiamusi in Heilongjiang Province. While the province was ranked 17th out of 31 provinces in terms of gross regional product (GRP) per capita, the GRP of Jiamusi (the 4th largest city in Heilongjiang) was about 75 percent of the provincial average in 2011.

2. To reduce the growing imbalances, boost employment and relieve poverty, China's 12th Five Year Plan (FYP) (2011-2015) focused on accelerating the process of industrialization and urbanization in lagging regions by supporting their integration to the rest of the economy. As a result, total investments in interurban transport increased from RMB4.4 trillion in the 10th FYP (2001-2005) to an estimated RMB 11 trillion in the 12th FYP (2011-2015), which aimed to connect 90 percent of towns and cities with more than 200,000 people to national highways and continue the rail network expansion particularly in the poorer western, central and northeast regions.

3. Within transport, annual investment increased 70 percent from about US$138 billion during the 10th FYP (2000-2005) to US$240 billion during the 11th FYP (2006-2010). Total investment in the rail sector also increased considerably from 17 percent of total transport sector investment during 2000-2005 to 20-35 percent during 2011-2015. The higher investment in the rail sector was in recognition of its importance in passenger and freight transport, higher energy efficiency, and lower carbon emissions compared to road and air transport.

4. China’s railway network is a vital element of the country’s transport system. In 2012, traffic on the relatively small China Railways (CR) network of just over 98,000 route-km carried the highest volume of passenger and freight of any railway in the world. Between 2000 and 2012, rail traffic grew rapidly, with both passenger and freight traffic growing by over 6.5 percent per annum. At the time, the railway sector in China faced three key challenges, namely, improving the capacity and quality of infrastructure and services in a railway network that was already the busiest in the world, adapting the industry to be more commercially responsive to the market economy, and securing diversified sources of financing for future investment.

5. To address these challenges, China implemented a series of institutional, commercial, and financing reforms starting in 2013. The former Ministry of Railway was replaced by a three-pronged governance structure. The policy and administration functions were moved to the Ministry of Transport; the regulation functions were moved to the newly established Railways Administration; and commercial operations were transferred to China Railway Corporation (CRC), a State Owned Enterprises.

6. Additionally, to serve the increasing traffic and support sustained economic growth, in 2008 the State Council updated the Mid- and Long-term Railway Development Plan (MLTRDP, originally approved in 2004), which described railway development up through 2020. The Plan would increase the public rail network from 75,000 km before the

plan to 120,000 km by 2020, including 16,000 route-km of high-speed passenger railway routes. The MLTRDP includes the expansion of a rapid passenger network including building dedicated passenger high-speed rail lines, upgrading the existing network, upgrading high-capacity coal transport corridors as well as expanding the network to more remote regions to spread the benefits of economic development.

7. The Harbin to Jiamusi (Hajia) Railway Project (the Project) was one of the high-speed passenger railway projects in the plan. The existing line between Harbin and Jiamusi was built in 1940 to facilitate coal extraction, with little attention given to passenger service standards. Average rail passenger travel time was over seven hours between the two cities. The existing line had for many years been a serious constraint for Jiamusi to access Harbin, capital of Heilongjiang Province and a regional economic hub. While a highway connected Harbin and Jiamusi, road traffic in northeast China is regularly disrupted in winter months by heavy snow and ice[2] as well as thick fog for up to 70 days a year. At the time, poor accessibility hindered Jiamusi's economic development as evidenced by its GRP per capita at 25 and 50 percent lower than the provincial average and that of Harbin, respectively.

8. At the time, the Bank's involvement in the Project, and more broadly in the railway sector, contributed to both pillars of China's rail sector strategy, namely increasing infrastructure capacity and improving service quality. China's rail sector strategy was supported by the World Bank's Country Partnership Strategy (CPS) 2006-2010, which focused on poverty reduction, equality, social inclusion, and proper management of environmental challenges, and CPS 2012-2015, which focused on green growth and inclusive development.

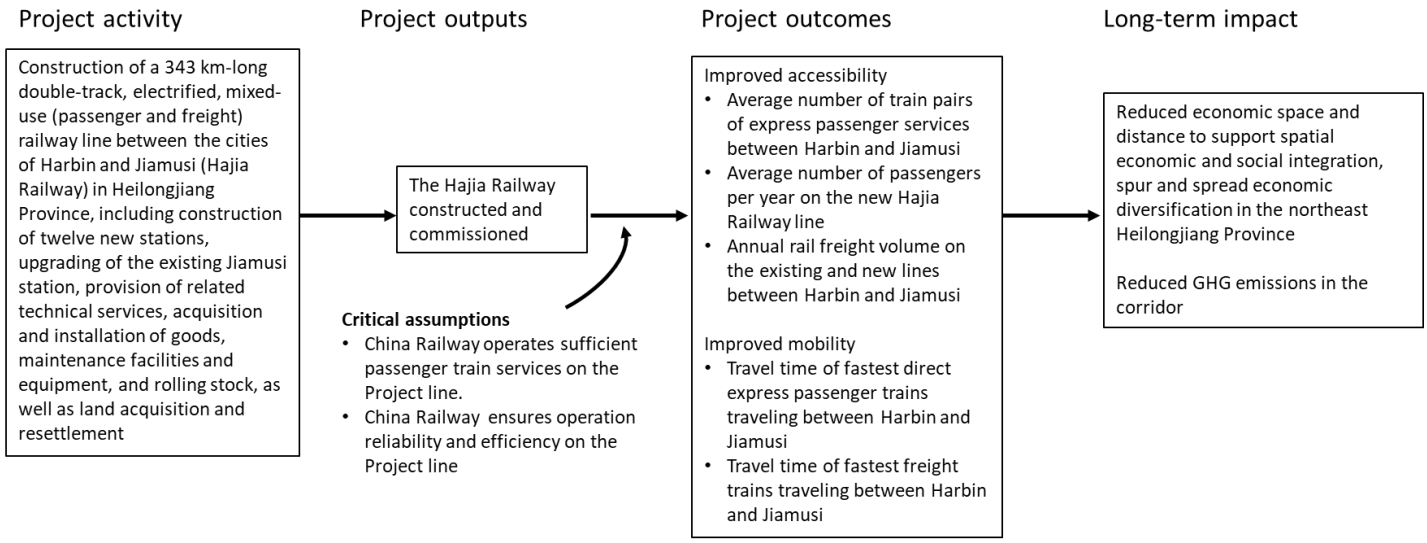
9. The Bank's value-added came from the more than 30 years of partnership between China and the Bank in the railway sector, which included continuous support to the physical development of the railway system and a wide range of demand-driven analytical and advisory activities that contributed to China railway's transformation. The Project was part of a much wider World Bank program of railway projects in China that supported the construction of 2,660 km of high-speed passenger rail lines over six projects from 2008 to 2020. The Project was the 6th and last of the World Bank financed high-speed railway and 17th railway loan. Overall, the Bank had lent US$4.2 billion in support of China's railway development. The Bank's engagement in the project ensured continued and informed high-level engagement on railway and transport policies between the Bank, CR, and Government of China. At the project level, the partnership provided CR with timely access to technical advice on the application of appropriate safeguard policies, economic evaluations, and procurement, which could be applied across its broader MLTRDP.

[2] The cold season lasts from late November to late February with an average daily high temperature below 22F. Source: https://weatherspark.com/y/143006/Average-Weather-in-Jiamusi-China-Year-Round

Theory of Change (Results Chain)

10. The Project reflected the theory of change presented in Figure 1.

Figure 1. Results Chain



Project Development Objectives (PDOs)

11. The PDO, as stated in the Loan Agreement and Project Appraisal Document at approval, was to improve accessibility and mobility by responding to existing and anticipated transport demand along the Harbin-Jiamusi corridor through the provision of additional railway capacity and reduction of transport time for passengers and freight.

Key Expected Outcomes and Outcome Indicators

12. At appraisal, the achievement of the PDOs was to be measured by five indicators:

Improved accessibility

a. Average number of passengers per year on the new Hajia Railway line
b. Average number of train pairs of express passenger services between Harbin and Jiamusi per day
c. Annual rail freight volume on the existing and new lines between Harbin and Jiamusi

Improved mobility

a. Travel time of fastest direct express passenger trains traveling between Harbin and Jiamusi
b. Travel time of fastest freight trains traveling between Harbin and Jiamusi

Components

13. At appraisal, the project consisted one component: Construction of a 343-km double-track, electrified, mixed-use (passenger and freight) railway line between the northern cities of Harbin and Jiamusi (Hajia Line) in Heilongjiang Province in northeast China. This component included construction of 12 new stations, upgrade of the existing Jiamusi Station, acquisition and installation of goods, maintenance facilities and equipment, and rolling stock, plus land acquisition and resettlement. The Bank loan would finance the procurement of goods associated with the construction of the line and its track, electrification, signaling, and communication systems as well as operation and maintenance equipment and possibly technical assistance, if any. The scope of such technical assistance was not specified at the time of appraisal.

B. SIGNIFICANT CHANGES DURING IMPLEMENTATION (IF APPLICABLE)

Revised PDOs and Outcome Targets

14. The PDO and outcome targets were not revised during implementation.

Revised PDO Indicators

15. The PDO indicators were not revised during implementation.

Revised Components

16. The component was not revised during implementation.

Other Changes

17. No other changes were made during implementation.

Rationale for Changes and Their Implication on the Original Theory of Change

18. No changes to PDO, outcome targets, PDO indicators, and components were made during implementation.

II. OUTCOME

A. RELEVANCE OF PDOs

Assessment of Relevance of PDOs and Rating

19. The railway sector is vital to China's economic and social development and its ability to extend the benefits of development to people living in the remote regions of the country. China is a vast country, where people and goods move long distances. Railways provide one of the most economic means of transporting over such long distances.

Railways are also more energy efficient, environmentally friendly and require less land than highways of comparable capacity.

20. At the time of loan closing in December 2020, the PDO remained highly relevant to the World Bank Group's China Country Partnership Framework (CPF) for FY2020-2025 (Report No. 117875-CN). The PDO is aligned with Engagement Area Two of the CPF "promoting greener development", in particular Objective 2.5 "promoting low-carbon transport and cities", by providing a faster, more economical, and greener mode of passenger travel between cities. In addition, the PDO supports indirectly Engagement Area Three of the CPF "sharing the benefits of growth" by shortening the economic distances between the northern city of Jiamusi and the provincial capital Harbin for better mobility and access to more economic opportunities. Further, the PDO is aligned with the World Bank's corporate priority of financing low carbon and climate-resilient development.

21. The PDO remained highly relevant to China's rail sector strategy. The Project is aligned with China's 13th Five-Year Plan (2015-2020) in the areas of promoting low carbon transport and developing intercity railways to connect cities. Additionally, the Project is aligned with China's new rail sector strategy in the areas of building national high-speed rail corridors supplemented by regional high-speed rail corridors, developing intercity rail network and multimodal transport hubs, and increasing mode share of rail passenger transport. Further, the PDO is aligned with China's commitment for carbon neutrality by 2060 as announced at the UN General Assembly in 2020.

22. The project is also in line with the global strategy pursued by the World Bank in the transport sector, such as Sustainable Mobility for All (SuM4All). The PDO is aligned with Sum4All's four pillars: Universal Access, Efficiency, Safety, and Green. The commercial operation of Hajia Railway has significantly improved mobility and accessibility for people in Jiamusi and its hinterland plus the counties along the railway alignment to Harbin at an affordable price; the travel time has been significantly reduced; and the high-speed rail service has provided a greener and safer transport choice than bus and private cars.

23. In addition, as the last of six World Bank financed high-speed railway projects approved from 2008 to 2014, the project continued the World Bank's support of railway system development and program level analytical activities through the implementation of all six projects (Annex 7 lists railway policy briefs and notes prepared under the program approach). For example, the governance and structure of the railway industry paper and the China rail financial futures model contributed to the dialog that led to corporatization of China Railways, the attracting capital for railway development paper contributed to the dialog leading to the latest reorganization, and the China's High Speed Rail Development review shares the lessons of China's experience with other countries. The Bank's engagement at the program level over six high-speed railway projects ensured the Bank's continued participation in and assistance to important dialogues on China's railway sector policy and institution reforms and successful implementation of these reforms, which tended to take a long time.

24. Based on the above analysis, the relevance of the PDO is rated High.

B. ACHIEVEMENT OF PDOs (EFFICACY)

Assessment of Achievement of Each Objective/Outcome

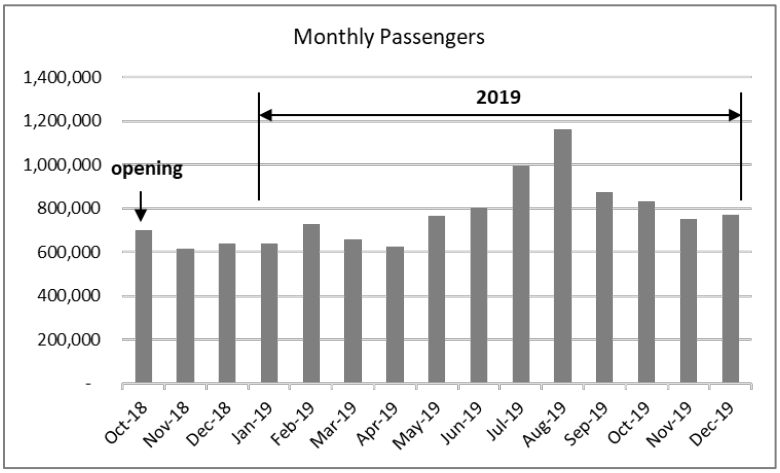
25. The project commenced operation on September 30, 2018, four months ahead of schedule. The project's PDOs were substantially achieved in 2019, which is the first full year of operation. However, the global COVID-19 pandemic severely disrupted businesses and travel in China in 2020. As such, Hajia Railway's 2020 operation statistics were not available. For this reason, the efficacy analysis is based on the 2019 data, which cover a full year of operation.

Objective one: improve accessibility

26. Objective one—the provision of additional railway capacity and improved accessibility—is measured by three indicators, namely, number of passengers (ridership) on the new line, number of passenger train pairs (service level) on the new line, and rail freight volume (throughput) on both existing and new lines. Although passenger ridership, service level, and freight throughput are not direct indicators of accessibility, they measure the increased number of people traveling and goods carried between the cities and towns on the new Hajia Railway line, thus the improved accessibility.

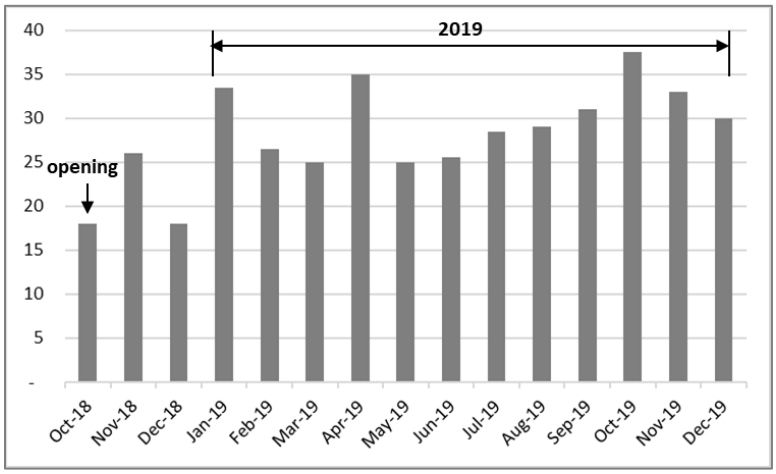
27. **Indicator 1: ridership.** In 2019, Hajia Railway's first full year of operation, the annual passenger volume was 9.6 million, exceeding the target 9 million annual ridership. The project improved access of several counties and villages, which were not served by rail previously, to the regional economic hubs such as Harbin and Jiamusi. For several intermediate stations, which are located away from the county urban areas because of initial plans and local governments' requests, roads were upgraded to improve access and station squares were developed to provide bus transfers and parking facilities. Figure 2 illustrates the progressive increase of passenger volumes from October 2018 (opening) to December 2019.

Figure 2. Monthly Passenger Volume



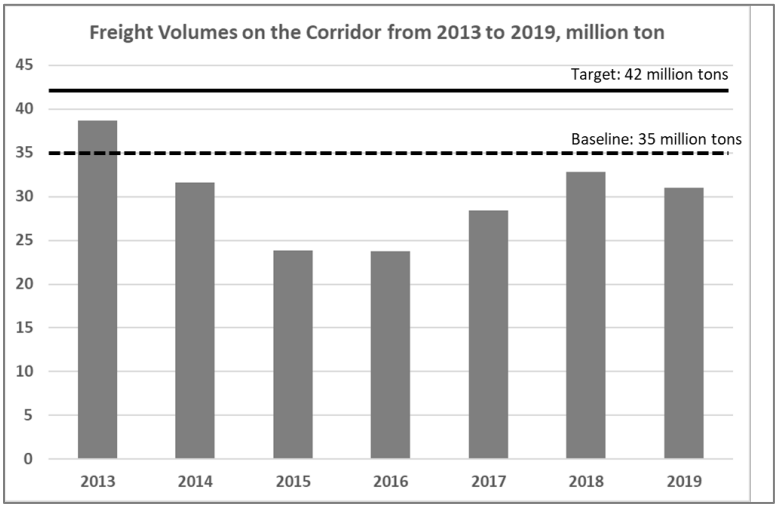
28. **Indicator 2: service levels.** In 2019, the average daily train pairs of express passenger services between Harbin and Jiamusi were 30, exceeding the target value of 25. During the year, October was the busiest month with 38 daily train pairs serving large volumes of tourists visiting the region for the spectacular fall colors, while March and May were the slowest months with 25 daily train pairs. Figure 3 illustrates the average daily train pairs from October 2018 (opening) to December 2019.

Figure 3. Average Daily Train Pairs



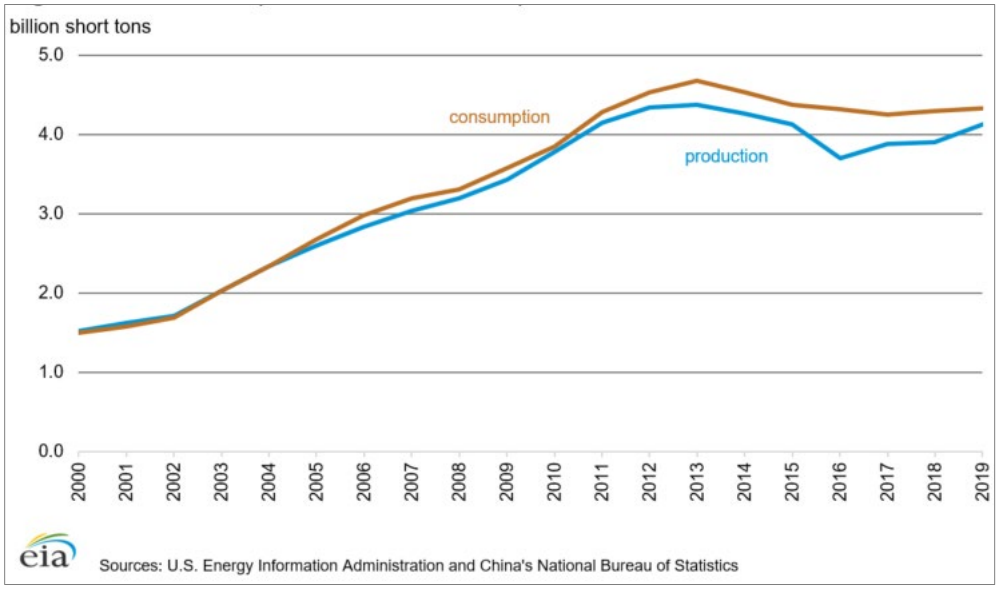
29. **Indicator 3: freight throughput.** In 2019, the annual rail freight volume on the existing and new lines between Harbin and Jiamusi was 31 million tons, below the targeted 42 million tons and further below the baseline 35 million tons. Figure 4 illustrates rail freight volumes on the corridor from 2013 to 2019. The lower than expected freight volume is because the volume of coal, a major commodity produced north of Jiamusi and transported on the existing line, had declined since 2013 due to national policies instituted to tightly control environmental degradation causing reduction in coal use for power and heat generation. Figure 5 illustrates China's total coal production and consumption from 2000 to 2019[3]. Coal production declined through 2016 but has risen since. The output growth was from the largest coal-producing mines in the north central and northwestern regions because outdated coal mines in the eastern and southern regions were closed during this period thus contributed to the decline of coal volume on this corridor.

Figure 4. Freight Volumes



[3] Source: https://www.eia.gov/international/analysis/country/CHN

Figure 5. China's Coal Production and Consumption from 2000 to 2019



30. In addition, the anticipated increase of farm and consumer goods transported on the railway lines had not materialized due to the overall slumping regional economy in Northeast China. Thus, there had been no new freight demand for the capacity created by the Hajia Railway and no freight was carried on the new line as was envisaged during project preparation. As such, this indicator of annual rail freight volume did not meet the target value because of policy changes and economic conditions unrelated to the operation.

31. Further, at appraisal, it was envisaged that the project as a dedicated passenger line would free up capacity on the existing shared-use railway lines, which had been congested mostly due to increasing coal traffic from its production base north of Jiamusi to Harbin and the northern and eastern regions. However, as the coal traffic declined due to the new government policies to discourage coal consumption for environmental and climate reasons, this freed up capacity is instead being used by increased conventional passenger services. According to China's High-Speed Railway Development published in 2019, contrary to original expectations, HSR services have not yet led to a reduction in overall conventional passenger train traffic; rather, they have created an accelerated growth in total passenger rail traffic, which the previous network, close to full capacity, was unable to achieve. This indicates the economic value of the additional capacity created by the project.

Objective two: improve mobility

32. Objective two is measured by two indicators, namely, travel time of fastest direct express passenger trains between Harbin and Jiamusi and travel time of fastest freight trains between Harbin and Jiamusi.

33. **Indicator 4: travel time of passenger trains.** In 2019, the fastest travel time for passenger trains between Harbin and Jiamusi is 118 minutes, meeting the target travel time of 118 minutes, and is significantly shorter than that of conventional rail, which is around 6 hours. The time saving is attributed to reduced rail distance between Harbin and Jiamusi, which is shortened by 164 km from the existing 507 km to 343 km, and the new line's faster operating speed. This significant improvement of travel time brings residents and businesses in Jiamusi and cities to the north within

2-hour of the provincial capital Harbin and the many resources and opportunities it offers. Conversely, the improved mobility brings Harbin residents to visit the many outdoor recreational areas in the north and Harbin enterprises to explore business opportunities in the north where cost of doing business is lower and access to resources is convenient.

34. **Indicator 5: travel time of freight trains.** In 2019, the fastest travel time of fastest freight trains between Harbin and Jiamusi is 600 minutes, substantially below the target value of 390 minutes. This is because freight cargos are carried on the existing corridor, which has sufficient capacity as described in paragraph 29.

Justification of Overall Efficacy Rating

35. Based on the above analysis, the Project's objectives of improved accessibility and mobility have been substantially achieved. Although the freight related indicators did not meet the target values, this is attributed to policy changes and economic conditions unrelated to the Hajia Railway line, thus does not discount the project's efficacy. The Project provides a much shorter connection between the cities and towns to the north of Harbin, the provincial capital, and in doing so boosts travel and improves regional connections and forms a key link in a direct route from the cities and towns in the less developed Northeastern China to the national high-speed rail network for improved regional connectivity and economic development opportunities.

36. Based on the above analysis, assessment of the PDOs is rated substantial.

C. EFFICIENCY

Assessment of Efficiency and Rating

37. **Economic Analysis.** The ex-post economic analysis indicates that the infrastructure investment was economically viable even with the lower than expected ridership in 2020 due to the COVID-19 pandemic. The ex-post Economic Internal Rate of Return (EIRR) is 9.4 percent. Although the estimated EIRR at appraisal was 19 percent, it included benefits to freight traffic and substantial wider economic benefits. No freight benefits are included in the re-evaluation. In addition, as the project has only just opened, it is too early to identify any wider economic benefits – the evaluation at appraisal assumed these would take ten years to have their full impact. If these two components are removed from the appraisal evaluation, the EIRR at appraisal would have been 9.9 percent, slightly above the 9.4 percent ex-post EIRR. More details are provided in Annex 3.

38. **Design Efficiency.** The project alignment runs along the south bank of Songhua River generally parallel to an existing expressway and was the preferred option among the four alternatives considered because it was the most direct route, would connect populated areas, had received the approval of local authorities, would avoid most designated environmentally sensitive areas, and would not cross the wide Songhua river, thereby avoiding the cost of a major bridge. This alignment had modest resettlement requirements per kilometer constructed. Since the alignment also avoided the mountains in the north and areas of poor geology, the construction work was able to proceed rapidly, resulting in operation commencement four months earlier than planned. For the sections of alignment near cities and

towns, as well as the locations of the new stations, these were determined in consultation with the urban planning and development officials of the relevant cities and counties.

39. In addition, the project's engineering design adopted international practices for electrification, communication, signaling and information systems and electric multiple unit (EMU) trains with regenerative brakes. The seasonal frost problems that would impact tracks were solved by limiting the minimum height of the embankment, improving roadbed filling, setting a water resistant layer, adapting the sub-grade design and effective drainage of surface and underground water. Further, energy conservation measures were adopted to minimize the project carbon footprint, and special attention was paid to incorporate safety systems in the overall design.

40. **Implementation Efficiency.** The implementation efficiency of the project is substantial. Operation commencement was four months ahead of schedule despite significant challenges associated with construction and operation in an extremely cold climate, where winter temperature reaches -40°F / -40°C, and heavy snow and ice are common. In such climate, construction stops during the winter months between November 15 and March 15. To ensure schedule, Hajia Railway Company (HRC) made substantial efforts to complete as much work as possible before winter, for example, welding which requires ambient temperature between 18 and 19°C, was carried out during summer nights, when the construction crew lodged at job sites and worked in shifts so that as much as possible progresses could be made within a very limited time window.

41. In addition, HRC was innovative in implementing solutions to address the unique technical problems associated with trains traveling at high speeds in an extremely cold climate, for which few experiences and solutions existed in China and abroad[4]. These challenges include uneven foundations and tracks caused by frost heave[5] typical in cold climates and is exacerbated by fast moving trains exerting extra pressure on subgrades and tracks, reduced performance of the catenary power supply system during winter due to heavy coating of snow and ice, recurrent damages to trackside equipment such as transponders due to repeated hits by flying snow and ice particles brought up by fast moving trains, and rapid forming and thickening of ice on the bottom and sides of the train bodies as the trains travel through snow.

42. To manage frost heave and ensure safe operation, engineers implemented strict control of the type, proportion, and particle size of foundation ballast, and used anti-frost heave filler in the subgrade layers. Hundreds of frost heave monitoring devices were installed along the Hajia Railway to monitor changes in the foundations and tracks in real time. To safeguard performance of catenary power supply system during winter, engineers developed solutions to reduce catenary icing and improve contact of the catenary system under icing condition. Additionally, to ensure train performance, 19 modifications were made to the high-speed electric multiple-unit trains, such as rail guard, train body skirt, and heating cables[6]. These innovative technical solutions ensure construction quality and operation safety.

[4] Source: https://heilongjiang.dbw.cn/system/2018/10/28/058095376.shtml
[F] Frost heave is the most critical technical challenge hindering railway construction in extremely cold climate. In winter, soil freezes like ice, and as temperature decreases, its volume expands and pushes up railway foundations and tracks. In summer, when temperature rises and ice in the frozen soil melts, its volume shrinks, causing the foundations and tracks to sink. Repeated freezing and melting cause the railway foundation and tracks to become uneven. When trains run on such uneven foundations and tracks, trains will sway, creating safety risks.
[6] Source: http://travel.people.com.cn/n1/2018/1015/c41570-30342673.html

43. **Overall Efficiency**. Based on the above analysis, the overall efficiency of the Project is rated substantial because of substantial cost effectiveness, design efficiency, and implementation efficiency.

D. JUSTIFICATION OF OVERALL OUTCOME RATING

44. Given the Project's high relevance, substantial efficacy and efficiency, the overall outcome is rated satisfactory.

E. OTHER OUTCOMES AND IMPACTS

Gender

45. Gender considerations were incorporated into the project design. In each station, there is a designated area with children's play station, feeding room (Figure 6), and separate toilets for women passengers with childcare and feeding needs. Such area is clearly marked, easy to access, and well lighted. Additionally, each station is designed and built to facilitate safe and efficient passenger flow with open waiting area, properly placed highly visible information desks, security stations, and good lighting to ensure the comfort, safety and convenience of each traveler, especially female travelers.

Figure 6. Child Care Rooms for Women

Institutional Strengthening

46. By financing six high-speed railway projects from 2008 to 2014, the Bank has engaged in policy dialogues in high-speed railway development and has supported institutional strengthening by preparing a series of railway policy notes and a recent retrospective study on China's HSR development. Bank's engagement in China's high-speed railway

sector has contributed to sector reforms, including corporatization of China Railways, accessing financing options, optimization of testing and commissioning, and leveraging the wider economic impact of high-speed railways.

Poverty Reduction and Shared Prosperity

47. The Project has contributed to the economic development of the region. During construction, the contractors hired local labors and sourced local materials. For villagers who preferred to remain in farming, local economic opportunities were limited. To these villagers, construction of the project offered manual and skilled job opportunities that supplemented seasonal farming incomes. Villagers were hired to work at construction sites with jobs ranging from manual labor that earned an average RMB130-150 per day (US$20-23/day), such as loading/unloading and sorting materials, to skilled jobs that earned an average RMB200 per day (US$31/day), such as bricklayer. Additionally, women in the villages could earn about RMB2,000 (US$308) per month by cleaning and cooking at the construction camps.

48. The new Hajia Railway (serving northeast of Harbin) connects to the existing Harbin-Qiqihar (serving west of Harbin) and Harbin-Mudanjiang (serving southeast of Harbin) high-speed railways, thus creating a 2-hour intercity high-speed railway network centered in Harbin, the provincial capital. With fast train services to Harbin and other cities, local governments along the Hajia Railway leveraged the new fast connection to promote local business opportunities, including tourism. Connecting transport services to the new train station were implemented to ensure system wide accessibility and improved mobility of a large population.

III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

A. KEY FACTORS DURING PREPARATION

49. **The project design reflected lessons learned from previous railway projects.** During the national economic stimulus program of 2009-2010, the speed of construction of railway projects raised concerns over safety, quality, and the ability to finance the related debt. On this project, CRC established a construction and implementation schedule that was considered reasonable. The timeframe and cost of this project were consistent with the experience accumulated under the MLRNP program.

50. **The project alignment was chosen based on a diligent multicriteria evaluation process.** Four alternative alignments were evaluated based upon impact on resettlement, environment, geological conditions, take of agricultural land, economic benefits, engineering, and cost. The selected alignment runs along the south bank of the Songhua River and is the most direct, connects populated areas, meets the approval of local authorities, avoids all but one designated environmentally sensitive area and does not cross the wide Songhua River. Because the alignment avoided the mountains in the north and areas of poor geology, construction schedule and costs were optimized. The design institute responsible for the feasibility study had consulted urban planning development officials of the cities and counties in selecting sites for the proposed three new railway stations.

51. **The project design ensured quality, safety, and energy conservation.** The project design reflected the difficult climatic conditions of the area, which is in a frigid zone with a depth of frozen soil of about 2 meters and heavy snow in winter. Frost prevention and ease of snow removal from the roadbed were important design parameters. Measures taken include limiting the minimum height of the embankment, improving roadbed filling, setting a water resistant layer, and effective drainage of surface and underground water. About 10 km of the railway line was identified and treated for significant snow impact. Additionally, the project design included safety systems to monitor weather conditions, train speed, track conditions, seismic activities, and fire. These design elements ensured quality and safety of construction and operation.

52. Further, energy conservation was incorporated into the project design. Measures taken included an alignment designed to be as straight as possible, large curve radii, an auto transformer power supply system, compact design of stations, placement of power distribution substations close to load centers, an efficient water supply and heating system using insulated water pipes, the use of natural light in building construction, efficient window insulation, use of large-scale integrated circuits for communication equipment, and the use of high efficiency energy saving products for the signaling system. These measures ensured maxim energy efficiency of the project.

53. **The project design was readily implementable.** The Project was part of the national railway development program with tight deadlines. Therefore, the project adopted straightforward design, reflecting the latest policy development—such as the separation of high-speed passenger trains from freight, with strong client ownership and solid cooperation among the respective project participants including the Ministry of Railways, Regional Railway Administration, and provincial and regional authorities. At appraisal, the Project was at an advanced stage of readiness, while at the same time exhibiting flexibility in implementation.

54. **The project adopted a simple project component**. Earlier experience in the Bank's large railway portfolio indicated that the inclusion of too many components or components with limited client commitment would

negatively impact implementation because the client and the Bank have limited resources for effective supervision and implementation. Therefore, the Project was designed as a single component consisting of the construction of the Hajia Railway with the flexibility of incorporating required technical assistance during implementation. Policy dialogue with China Railway was carried out throughout the Bank's engagement in the six high-speed rail projects and was beyond a single project delivery to ensure flexibility and consistency in developing national policies.

55. **The environmental and social aspects were diligently considered during feasibility study, and social and environmental assessment**. The Ministry of Railways prepared an Environmental Assessment, a Social Assessment, an Environmental Management Plan, a Resettlement Action Plan, and a Resettlement Policy Framework based on extensive field survey and several rounds of public consultation in accordance with the Bank's safeguard policies.

56. **The results framework had minor shortcomings**. At appraisal, the results framework was fully developed: all five PDO-level indicators were finalized with baseline data, and the targets were realistic and appropriate reflecting knowledge of previous passenger railway projects in China. However, as described in paragraph 20, PDO indicators, namely, number of train pairs and number of passengers, are direct indicators of increased capacity but indirect indicator of PDO improved accessibility. This is considered a shortcoming in the M&E design.

B. KEY FACTORS DURING IMPLEMENTATION

57. **Performance of Hajia Railway Company (HRC) during implementation was satisfactory.** The Project involved the construction of several complex elements in a harsh climate that limited the construction period to eight months in a year and a large volume of land acquisition and resettlement in many local jurisdictions. HRC managed the project with high administrative efficiency and strong management capacity. When the World Bank loan became effective in August 2014, all eight counterpart financed civil works contracts had been awarded, and preparation for procurement of the World Bank loan financed equipment contracts had been well underway. During implementation, HRC worked closely with the relevant authorities at provincial and local levels to manage the challenges of large-scale. As a result, local counterpart funding had been adequate and well managed, thus avoiding unnecessary delay and ensuring timely completion of land acquisition and resettlement.

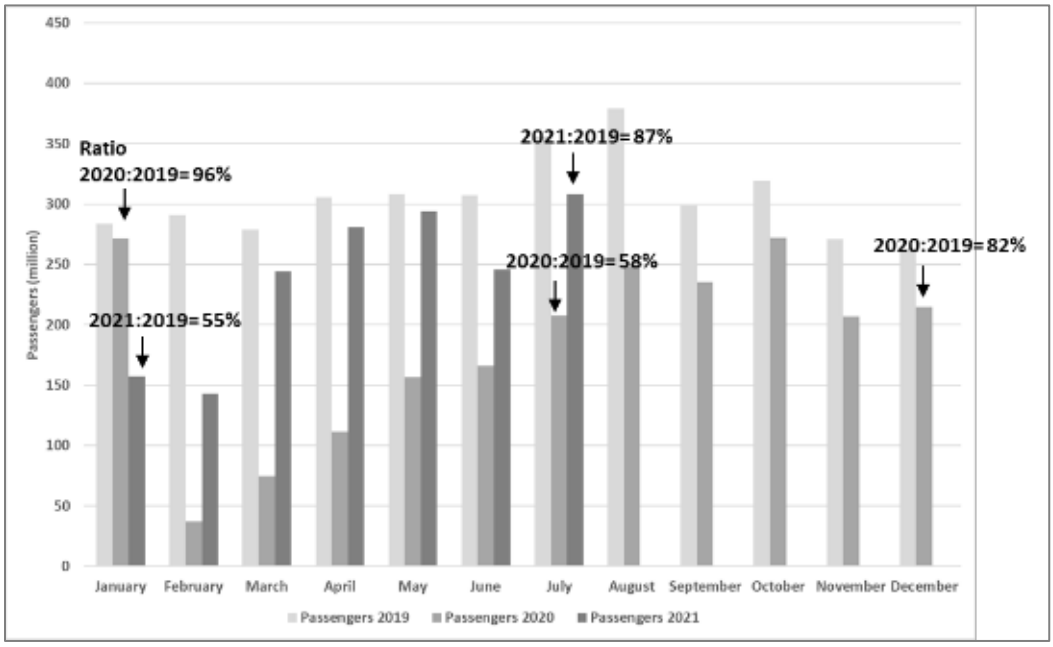
58. **Ratings of the Project's Development Objectives (DO) and Implementation Progress (IP) were consistently Satisfactory or Moderately Satisfactory.** Rating of the Project's DO was consistently Satisfactory because of good overall project management and steady construction progress. Rating of the Project's IP was mostly Satisfactory, except for a 3.5-year period from 2016 to 2020 when rating was Moderately Satisfactory because of persistent issues associated with unqualified staff assigned to the project by the independent resettlement monitoring consultant, the resulting poor quality and incomplete resettlement monitoring and reporting, and the increasing risks of missing opportunities to identify and manage potential resettlement risks.

59. **Despite the project's scale and complexity and construction in an extremely cold climate, the project achieved operation commencement four months ahead of schedule.** HRC made substantial efforts to complete as much work as possible before winter and adopted innovative solutions to address the unique technical problems associated with building and operating high-speed trains in an extremely cold climate, for

which few experiences and solutions existed in China and abroad. These innovative technical solutions ensure construction quality and operation safety.

60. The COVID-19 pandemic has severely disrupted travel and railway services. Since the COVID-19 outbreak in China in January 2020, travel on all modes of travel has been at a lower level compared to that of 2019, including passenger travel on the national railways as illustrated in figure 7. It is expected that passenger travel will continue the rebound and will reach the pre-pandemic level when vaccines become widely available, and the potential spread of COVID-19 is well under control.

Figure 7. National Railway Passenger Volumes



IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME

A. QUALITY OF MONITORING AND EVALUATION (M&E)

M&E Design

61. The Project's Results Framework is designed with a clear theory of change linking project activities with expected development outcomes. The framework includes five PDO indicators measuring outcomes and two intermediate indicators measuring construction progress. The framework was based on MOR's existing data monitoring and reporting systems, which had been comprehensive and effective for monitoring and evaluating the progress of World Bank financed railway projects. The minor shortcoming of the M&E design is that the M&E framework chose indirect indicators to measure PDO: improved accessibility (refer to paragraph 26).

M&E Implementation

62. The Project Implementation Unit, Hajia Railway Company (HRC), collected and reported M&E data in the semi-annual progress reports. M&E data were analyzed to measure the progress of implementation against the plan and the likelihood of achieving PDOs. During implementation, analysis of the M&E data flagged problems of slow implementation for the Bank team and HRC to take timely actions to identify problems and address the root issues.

63. However, quality of resettlement monitoring and reporting had been poor. For example, the independent resettlement monitor did not collect data at the village level and did not conduct analysis of resettlement activities during project implementation as required despite many trainings, considerable hands-on support provided by the World Bank task team, and repeated written reminders. At project closing, HRC had to hire an additional third party monitor to carry out extensive resettlement due diligence.

64. The issue of an incompetent resettlement monitor may be attributed to a lack of competition in the selection process. At the beginning of project implementation, selection of an independent resettlement monitor could not be completed until more than a year after construction commencement because of lack of competition during the domestic tender process that forced HRC to restart the tender three times to find a suitable company in line with domestic tender requirements. However, the competitively selected independent monitor lacked necessary resource and capability to support such a large complex railway project. The persistent problems of resettlement monitoring and reporting had a negative impact on an otherwise successful project.

65. Additionally, there were difficulties in collecting 2020 and 2021 ridership and operation data. This is partially attributed to the disruptions to railway operations caused by the COVID-19 pandemic, which also made onboard surveys – an established practice and a critical component of evidence based ex-post evaluation of the first four World Bank financed high-speed rail projects – impossible.

M&E Utilization

66. The Bank team and HRC used the M&E data to closely monitor project progress against targets, flag delay in project implementation, and take actions to address arising problems. However, as described in paragraphs 61 and 62, resettlement monitoring and evaluation had been unsatisfactory and collecting and utilizing 2020 and 2021 M&E data became very difficult during the ongoing COVID-19 pandemic.

Justification of Overall Rating of Quality of M&E

67. The overall M&E quality is rated Modest because of the following factors: (i) there was shortcoming in the PDO indicator design; (ii) quality of resettlement monitoring and reporting throughout implementation was poor; and (iii) there were great difficulties in collecting ridership and operation data and conducting onboard surveys at project closing partially due to the disruptions to railway operations caused by the COVID-19 pandemic.

B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

Environmental Safeguard

68. The Project is classified as category A due to its large-scale civil works and expected complex environmental and social impacts. An Environmental Impact Assessment (EIA) and a stand-alone Environmental Management Plan (EMP) were prepared following the World Bank's safeguard policies.

69. During implementation, Hajia Railway Company (HRC) paid close attention to environmental protection and mainstreamed it into routine management tasks. HRC established an Environmental Protection Leading Group, including the responsible leaders of each construction management department as members. The Project Management Department was responsible for direct management of environmental protection during construction with dedicated staff assigned. Similarly, each contractor also established its environmental protection leading group, and assigned dedicated environmental management staff at various levels of company, construction section and construction team. in addition, an independent external environmental monitor was engaged throughout project implementation.

70. During construction, the EMP was well executed. The Bank task team observed good environmental management practices at construction sites. This was further confirmed by findings of the semi-annual environmental monitoring reports prepared by the external environmental monitor.

71. At construction completion, an environmental acceptance monitoring report was prepared as required by China's domestic procedures. The acceptance report concluded that environmental protection and pollution control measures were implemented in full compliance of the EIA and EMP requirements. For example, all temporarily disturbed land have been restored or reclaimed, and handed over to the local communities and landowners; noise barriers have been installed as per design requirements; sanitary and environmental facilities have been installed at all stations; slope protection has been well implemented for all embankment and tunnel portals; the railway line has been adequately fenced to ensure safety; and appropriate embankment underpasses for community connectivity have been in place. Overall, the project's environmental safeguard compliance is satisfactory.

Figure 8. Good Environmental Protection Practices: Slope Protection

Figure 9. Good Environmental Protection Practices: Site Restoration (Before and After Photos)

Social Safeguard

72. The Project triggered the Social Safeguard Policy OP 4.12 Involuntary Resettlement. During project preparation, a resettlement action plan (RAP), a resettlement policy framework (RPF), and a social assessment (SA) were prepared based on wide consultations with project stakeholders such as local authorities, local communities, and the affected population. In 2016, due to the adjustment of railway tracks in downtown Harbin from Jingyang Street to Nanzhi Road to accommodate a new railway line, additional urban buildings were to be demolished. As such, a supplementary resettlement action plan (SRAP) was prepared and endorsed by the Bank in January 2017.

73. China Railway Corporation (CRC) was responsible for the overall project implementation, including monitoring, reporting to the Bank, and overall compliance with safeguards. Under CRC's oversight, the Project Implementation Unit, Hajia Railway Company (HRC), assigned designated staff to manage land acquisition and resettlement. Additionally, in each project county / district, a resettlement implementation office was set up and staffed with representatives from responsible local agencies to take full responsibility for the implementation of resettlement. In addition, an external monitor was engaged by HRC and conducted semi-annual monitoring and reporting during project implementation.

74. The project's land acquisition and resettlement involved 10 counties / districts including 35 townships and 112 villages, in two municipalities, namely Harbin and Jiamusi in Helongjiang Province. A total of 28,387 persons were affected because of land acquisition, an increase of 14,045 persons from what was included in the RAP. The project affected persons (PAPs) included 21,682 persons (7,621 households (HHs)) in rural areas and 6,705 persons (2,405 HHs) in urban areas. About 23,752 mu (1,583 ha) land was permanently acquired and 11,848 mu (790 ha) of land were temporarily occupied during construction and restored after construction completion.

75. For the Jingyang Street to Nanzhi Road section in Harbin, which was included in the SRAP, land acquisition resulted in the demolition of 396,969 square meters of houses and relocation of 2,891 PAPs (987 HHs). Eighteen enterprises were affected. In this section, 824 PAPs (277 HHs) were located in the 30-meter

environment protection buffer zone along the railway track, where possible adverse noise impacts to the communities was identified in the EIA.

76. Compensation was based on detailed inventory survey and compensation agreements were signed between the local county / district land resources administration and affected villages. Compensation funds were paid to the affected villages through the respective townships and sub-districts. For affected houses, compensation agreements were signed between the local resettlement offices and each affected household based on appraisal of the affected properties, and compensation funds were paid directly to the households. For the affected enterprises and relevant facilities, compensation agreements were signed directly between the local county or city railway support offices and affected parties based on property appraisal and negotiation. At project closing, RMB 5,954 million (US$933 million) compensation payment had been completed.

77. In addition to cash compensation, different schemes for income restoration had been offered, including land adjustment or compensation using the collective reserved lands, provision of job opportunities to the affected labors during the project construction and operation stages, and provision of social security program to land lost famers. Based on the income restoration survey at project closing, affected persons's livelihood had been fully restored.

78. The project had a GRM, through which the PAPs raised issues with the local resettlement offices and the Bank. The project GRM received complaints from affected persons and the concerns included mainly construction related amenity impacts and general impacts on well-being, resettlement compensation, and replacement measures. These complaints were properly addressed by the local governments and HRC. However, at project closing, one resettlement complaint case remains open. Status of the case is attached in Annex 7. The World Bank will continue to supervise the pending complaint case and follow-up actions until the case is fully addressed. HRC agreed to retain the external monitoring company to monitor and prepare external monitoring reports on resettlement.

79. During implementation, regular Bank supervisions were carried out, except in 2020 when the COVID-19 pandemic made travel impossible. Additionally, an independent external resettlement monitoring and evaluation team was engaged. Based on review of monitoring reports, discussions with HRC staff and local government officials, and interviews with affected people, it is concluded that land acquisition and resettlement was implemented moderately satisfactorily in compliance with domestic regulations and the Bank endorsed RAP.

Financial Management (FM)

80. During implementation, the project's FM system met the Bank's requirements as stipulated in OP/BP 10.02. The project maintained adequate FM arrangements throughout the project. The FM system provided, with reasonable assurance, accurate and timely information confirming that the Bank loan proceeds were used for the intended purposes. The interim unaudited financial reports (IUFRs) were duly submitted, but often with delay. The annual financial reports were audited, and "unqualified" opinions were issued. The project's overall FM performance had been satisfactory. However, there was one incident that the external FM auditor, namely Audit Service Center of China National Audit Office for Foreign Loan and Assistance Projects, disclosed a mis-procurement issue in the FY2018 annual audit report. Based on the Bank's own due diligence, a mis-procurement was declared, and IBRD loan of USD7.5 million was refunded to the Bank and cancelled in line

with relevant policies.

Procurement

81. The World Bank loan financed procurement of bridge bearings, sleepers, fasteners, turnouts, telecommunication equipment, signaling equipment, information system equipment, power equipment, catenary equipment, traction equipment, sound barriers, and maintenance equipment. The procurement method applied was international competitive bidding. Procurement was carried out by the Department of Materials Management of China National Railway Group Company Limited, formerly known as China Railway Corporation, with the assistance of a procurement agent. Procurement activities were carried out in accordance with the procedures as agreed in the loan agreement. However, there was one case of mis-procurement, which was for the supply and installation of centralized traffic control system (Contract No. SE06 with a contract price of RMB50.8 million or USD7.5 million equivalent). In this case, the supplier had been selected before the invitation for bids was issued, and some equipment had been supplied and installed by the supplier before contract award.

C. BANK PERFORMANCE

Quality at Entry

82. Bank performance at entry is satisfactory. The Bank ensured quality at entry through adequate alignment of the project objectives with the CPS, national and World Bank transport strategies, proper design of components to achieve the PDO, and appropriate setup of implementation arrangements. The project design reflected lessons learned from previous railway projects and benefited from international advisors in railway engineering, management, economic and financial evaluation, and safeguards. Project preparation included extensive consultations with the affected population and project stakeholders. Risks were identified at appraisal, and appropriate risk mitigation measures were incorporated. The overall project risk was carefully assessed and rated moderate at entry. Bank inputs and processes prior to Board approval were appropriate. The Bank provided guidance and support to ensure that technical and environmental specifications and feasibility studies were prepared to meet high-quality standards, and within a short time. The results framework was focused and straightforward, despite a minor shortcoming. The Bank assessed agglomeration effects as part of the economic analysis, which was an innovation, and considered a best practice for the railway sector.

Quality of Supervision

83. Bank performance during implementation is satisfactory. The Bank worked closely with the government and the implementing agencies to ensure that this large railway project was completed to high quality standards and in compliance with Bank policies (including safeguards and fiduciary policies), despite financing only five percent of a US$5.6 billion project. The Bank team provided implementation support with the required expertise. One full-scale implementation support mission was organized every year and included both international and national staff. In addition to the full-scale mission, a social safeguard mission was organized every year to address issues related to land acquisition, resettlement, and social safeguard monitoring. Additional extensive technical

guidance on social safeguards monitoring was also provided to the third party social safeguard monitor when the quality of the monitoring reports was deficient. Implementation Status Reports were prepared on a semiannual basis and the ratings were candid and appropriate. The Task Team was also able to ensure that the project ratings were maintained as either "Satisfactory" or "Moderately Satisfactory" throughout the project.

Justification of Overall Rating of Bank Performance

84. Based on the above analysis of Bank performance at entry and during implementation, the overall rating of Bank performance is Satisfactory.

D. RISK TO DEVELOPMENT OUTCOME

85. Risk to development outcome at project closing is rated substantial based on assessment using the systematic operations risk-rating tool. The substantial rating is attributed to the high social risk rating because of the non-compliance case and complaint related to resettlement in Harbin. Risk ratings of all other categories are either moderate (macroeconomic, institutional capacity, fiduciary, and stakeholders) or low (sector strategy and technical design). In the medium term from 2021 to 2023, the Project will operate at lower than planned service levels and experience lower than expected passenger volumes due to disruptions to travel caused by the COVID-19 pandemic. Based on the project's performance in 2019, and similar train systems that have been operated and maintained at high levels of reliability and safety in China since 2008, it is expected that the service levels and passenger volumes will return to the planned levels when travel returns to normal post the COVID-19 pandemic. At that time, the project is expected to fully achieve the envisaged development outcome.

V. LESSONS AND RECOMMENDATIONS

86. **The World Bank's engagement in the six high-speed railway projects in China enabled it to leverage limited Bank financing to influence the adoption of the Bank's fiduciary and safeguard policies and other best practices in China's high-speed railway program.** All six projects followed the World Bank's policies and procedures in financial management, procurement, environmental and social safeguard. Capacity assessments, trainings, setup of proper management arrangements, and preparation of important financial management manuals, procurement plans, environmental impact assessment, environmental management plans, resettlement action plans, and resettlement policy frameworks were carried out. Implementation of the fiducial and safeguard measures was extensive, consistent, and transparent with the regular auditing and monitoring conducted by third parties.

87. **The government played a key role in putting an eco-system in place to enable the impressive creation, galvanization and implementation of the railway program development.** China Railway Corporation (CRC) took the major responsibility for planning, financing and implementing individual projects, for the creation of delivery mechanisms (such as the joint venture companies with local governments), for collaboration and coordination with local governments, and for administration of China's national railway services. This combined with legal and institutional power, strong technical capacity, access to the operating cash flows of the railways and the ability to

borrow, gave CRC the agility to plan and deliver projects very quickly. Cooperation between national and local authorities made the project a success. This unified control over the project, as well as the overall commitment of the Government and the implementing agencies, enabled the project to be a technical and environmental success.

88. **An effective project management and delivery architecture where accountability is linked to incentives and resources is critical to good project delivery.** On the Hajia Railway Project, two parties, namely, the railway (CRC and HRC) and local government, each with quite different incentive structures and resource windows were responsible for separate but interrelated tasks. The railway was tasked to build the project quickly so had less incentive to take the time to examine planning and engineering options to minimize impacts. The local government was tasked to acquire land and relocate project affected persons (PAPs) on a timely basis to match construction schedule. Scale and complexity of the resettlement tasks is a direct result of project design and engineering. This misalignment of accountabilities creates challenges in project delivery. It is evidenced in the resettlement of PAPs within the 30-meter environmental protection buffer zone described in the next two paragraphs.

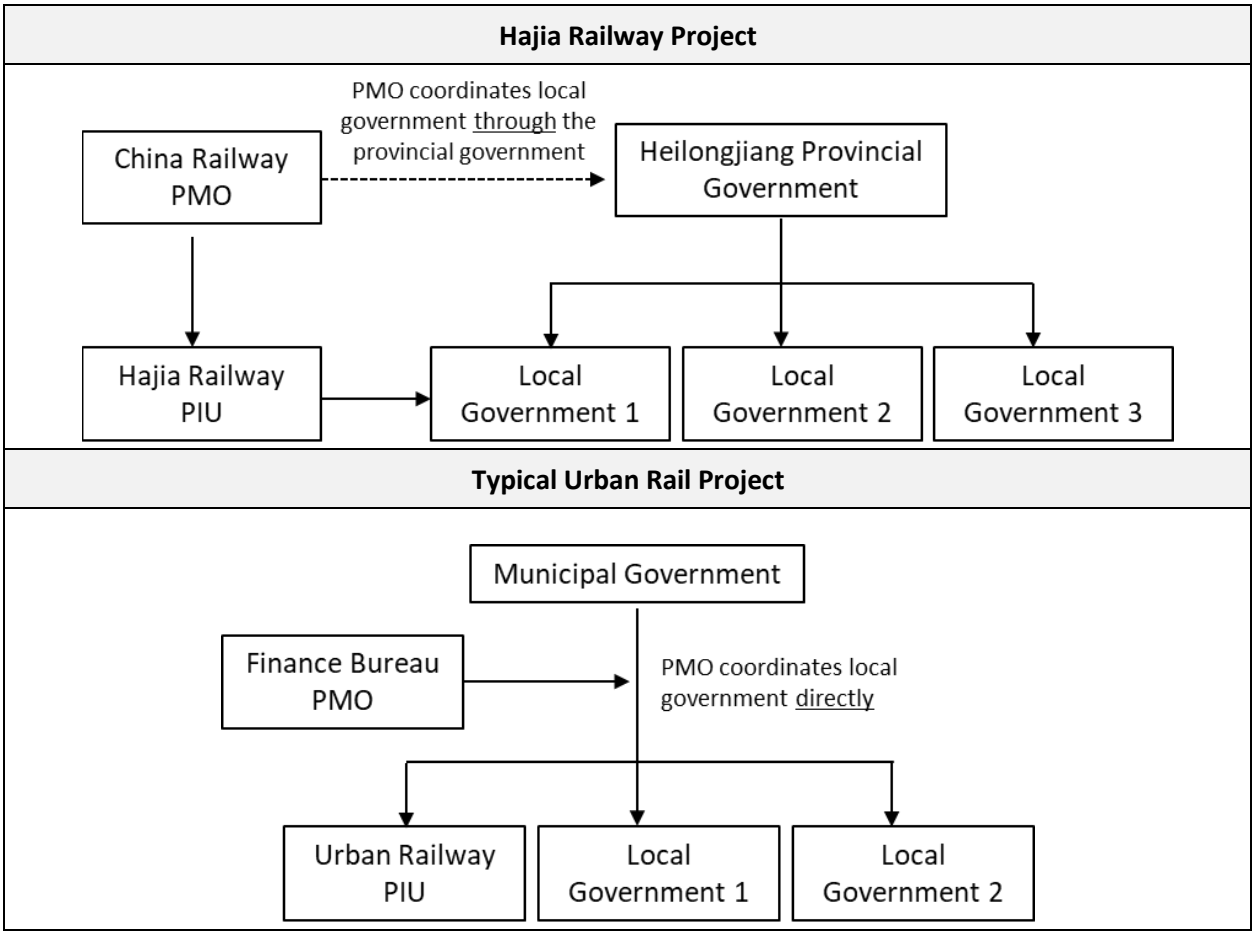
89. The national EIA approval created an environmental protection buffer zone by drawing a 30-meter “red line” based on established practices. The EIA considered resettlement of PAPs within the “red line” a preferable option but not a requirement and recommended adoption of mitigation measures such as noise barrier and noise insulation window to minimize the noise impact. However, on the Hajia Railway Project, the “red line” was drawn in a mechanical and compliance based manner, where potential noise impact was not verified and validated by HRC, primarily because the impacts it created, i.e., land acquisition and resettlement, were the responsibility of the local government. If a more evidence based approach was adopted, such as external wall noise data as a basis for drawing the line rather than a mechanically drawn 30-meter “red line”, it is likely that scale of acquisition would have been much smaller and many problems could have been avoided, such as the people in a same building being treated in a different way including being required to be resettled while the others, including the next unit, was not.

90. This misalignment of accountability is also evidenced in the lack of integrated thinking between the parties. For example, the environmental management agency could have avoided a “one size fits all” red line on the approval and instead set a noise level standard. HRC and contractors could have tested and verified the environmental protection buffer defined by the red line but did not because it was the local government’s responsibility. The local government could have asked the same questions but did not because of the pressure to complete land acquisition and resettlement quickly. A problem-solving approach rather than a mechanical and compliance based approach would have worked better.

91. **Proper institutional setup is key to successful project delivery.** China’s railway projects are often implemented as joint projects between CRC, local railway administration under CRC, and the local government. For the Hajia Rail Project, the PMO is within CRC at the national level, and the PIU is within HRC, of which CRC, Harbin Railway Administration (local branch under CRC), and Heilongjiang Province own 54.6, 28.9 and 16.5 percent shares, respectively. Under this arrangement, all resettlement work is under the administration of the local government. Such arrangement works well when a railway project crosses several provinces, where coordination at the central government is more effective. However, for the Hajia Railway Project, which is within Heilongjiang Province, this arrangement makes it challenging for CRC to coordinate the local government on the resettlement work and synchronize resettlement with construction schedule. This contrasts with many urban rail projects, which do not cross jurisdiction boundaries. For these urban rail projects, the PMO is within the municipal government instead

of the national government, putting the PMO in a better position to coordinate local government agencies to complete work properly and timely. Figure 10 illustrates management architecture of Hajia Railway Project and a typical urban rail project.

Figure 10. Institutional Arrangement



92. **The Bank team's consistent engagement, technical assistance and capacity building in the project's social and environmental safeguard assessment, management plan preparation, and implementation monitoring is good practices of project design, delivery, and risk management.** For the Bank team, focus during project preparation should be on: (i) implementation arrangements, capacity, resources and fund flows; and (ii) capacity building and technical assistance to the clients in thinking through project planning, design and implementation, particularly where responsibilities of tasks seem fragmented. The Bank team's focus during implementation should be on: (i) early agreement and monitoring arrangement with the PMO and PIU; (ii) strong technical and E&S missions early in implementation to set the "tone" for the overall delivery and build effective relationships; and (iii) consistent technical and E&S missions in the last two years of the operation to ensure proper project management and proper risk mitigation measures, such as linking disbursements to project progress, restructuring to improve project performance.

ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS

A. RESULTS INDICATORS

A.1 PDO Indicators

Objective/Outcome: the provision of additional railway capacity and improved accessibility

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Average number of passengers travelling per year along the new HaJia line (both directions) (number in million)	Number	6.00 31-Oct-2013	9.00 31-Dec-2020		9.60 31-Dec-2019

Comments (achievements against targets):
In 2019, the project completed its first full year of operation. Since January 2020, the global COVID-19 pandemic severely disrupted businesses and travel in China. As such, the project's 2020 operation statistics were not available. For this reason, 2019 operation data are used for the PDO indicators.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Average number of train	Number	2.00	25.00		30.00

pairs of express passenger services between Harbin and Jiamusi operated per day.		31-Oct-2013	31-Dec-2020		31-Dec-2019

Comments (achievements against targets):
In 2019, the project completed its first full year of operation. Since January 2020, the global COVID-19 pandemic severely disrupted businesses and travel in China. As such, the project's 2020 operation statistics were not available. For this reason, 2019 operation data are used for the PDO indicators.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Annual rail freight volume on the existing and new lines between Harbin and Jiamusi (number in million)	Number	35.00 31-Oct-2013	42.00 31-Dec-2020		31.00 31-Dec-2019

Comments (achievements against targets):
In 2019, the project completed its first full year of operation. Since January 2020, the global COVID-19 pandemic severely disrupted businesses and travel in China. As such, the project's 2020 operation statistics were not available. For this reason, 2019 operation data are used for the PDO indicators.

The 2019 annual rail freight volume on the existing and new lines between Harbin and Jiamusi was below the target value of 42 million tons and further below the baseline value of 35 million tons. This is because the volume of coal, a major commodity produced north of Jiamusi and transported on the existing line, had declined since 2013 due to national policies instituted to tightly control environmental degradation causing reduction in coal use for power and heat generation. In addition, the anticipated increase of farm and consumer goods transported on the railway lines had not materialized due to the overall slumping regional economy in Northeast China. Thus, there had been no new freight demand for the capacity created by the Hajia Railway and no freight was carried on the new line as was envisaged during project preparation. As such, this indicator of annual rail freight volume did not meet the target value because of policy changes and economic conditions unrelated to the operation.

Objective/Outcome: improve mobility

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Travel time of fastest direct express passenger trains travelling between Harbin and Jiamusi.	Minutes	368.00 31-Oct-2013	118.00 31-Dec-2020		118.00 31-Dec-2019

Comments (achievements against targets):
In 2019, the project completed its first full year of operation. Since January 2020, the global COVID-19 pandemic severely disrupted businesses and travel in China. As such, the project's 2020 operation statistics were not available. For this reason, 2019 operation data are used for the PDO indicators.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Fastest travel time of freight trains from Harbin to Jiamusi	Minutes	600.00 31-Oct-2013	390.00 31-Dec-2020		600.00 31-Dec-2019

Comments (achievements against targets):
In 2019, the project completed its first full year of operation. Since January 2020, the global COVID-19 pandemic severely disrupted businesses and travel in China. As such, the project's 2020 operation statistics were not available. For this reason, 2019 operation data are used for the PDO indicators.

In 2019, the fastest travel time of fastest freight trains between Harbin and Jiamusi is 600 minutes, substantially below the target value of 390 minutes. This is because freight cargos are carried on the existing corridor, which has sufficient capacity as described in indicator: freight throughput.

A.2 Intermediate Results Indicators

Component: HaJia Rail Line

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Delivery of Bank financed goods.	Percentage	0.00 31-Oct-2013	100.00 31-Dec-2020		100.00 31-Dec-2019

Comments (achievements against targets):
Targets of the intermediate indicators had been achieved by December 2019 as the project completed construction and commenced operation by September 2019.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Completion rate of civil works (in value).	Percentage	0.00 31-Oct-2013	100.00 31-Dec-2020		100.00 31-Dec-2019

Comments (achievements against targets):

Targets of the intermediate indicators had been achieved by December 2019 as the project completed construction and commenced operation by September 2019.

B. KEY OUTPUTS BY COMPONENT

Objective/Outcome 1: Improved accessibility	
Outcome Indicators	1. Average number of passengers per year on the new Hajia Railway line 2. Average number of train pairs of express passenger services between Harbin and Jiamusi per day 3. Annual rail freight volume on the existing and new lines between Harbin and Jiamusi
Intermediate Results Indicators	1. Delivery of Bank financed goods. 2. Completion rate of civil works (in value).
Key Outputs by Component (linked to the achievement of the Objective/Outcome 1)	1. a 343-km double-track, electrified, mixed-use (passenger and freight) railway line between the northern cities of Harbin and Jiamusi (Hajia Line) in Heilongjiang Province in northeast China
Objective/Outcome 2: Improved mobility	
Outcome Indicators	1. Travel time of fastest direct express passenger trains traveling between Harbin and Jiamusi 2. Travel time of fastest freight trains traveling between Harbin and Jiamusi
Intermediate Results Indicators	N/A
Key Outputs by Component (linked to the achievement of the Objective/Outcome 2)	1. a 343-km double-track, electrified, mixed-use (passenger and freight) railway line between the northern cities of Harbin and Jiamusi (Hajia Line) in Heilongjiang Province in northeast China

ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION

A. TASK TEAM MEMBERS

Name	Role
Preparation	
Gerald Paul Ollivier	Task Team Leader(s)
Jianjun Guo	Procurement Specialist(s)
Songling Yao	Social Specialist
Pei Shen Wang	Social Specialist
Ye Song	Social Specialist
Ning Yang	Social Specialist
Supervision/ICR	
Hua Tan, Bernard Aritua	Task Team Leader(s)
Jianjun Guo	Procurement Specialist(s)
Yi Dong	Financial Management Specialist
Hong Chen	Team Member
Gerald Paul Ollivier	Team Member
Lien Thi Bich Nguyen	Team Member
Yan Zhang	Procurement Team
Ruifeng Yuan	Team Member
Ning Yang	Environmental Specialist
Ross James Butler	Social Specialist
Shuang Zhou	Social Specialist
Jin Wang	Team Member

B. STAFF TIME AND COST

Stage of Project Cycle	Staff Time and Cost	
	No. of staff weeks	US$ (including travel and consultant costs)
Preparation		
FY10	10.487	166,671.10
FY11	20.950	201,790.98
FY12	2.415	30,398.32
FY13	5.014	81,041.45
FY14	4.724	38,257.31
FY15	0	0.00
Total	**43.59**	**518,159.16**
Supervision/ICR		
FY09	0	1,619.69
FY10	0	0.00
FY14	.800	15,942.08
FY15	3.356	39,760.19
FY16	4.000	48,129.39
FY17	6.250	67,133.70
FY18	8.105	75,630.80
FY19	12.762	111,412.23
FY20	25.523	151,776.55
Total	**60.80**	**511,404.63**

ANNEX 3. PROJECT COST BY COMPONENT

Components	Amount at Approval (US$M)	Actual at Project Closing (US$M)	Percentage of Approval (US$M)
HaJia Rail Line	5,566	5,429	97.5%
Total	**5,566**	**5,429**	**97.5%**

ANNEX 4. EFFICIENCY ANALYSIS

INTRODUCTION

1. The ex-post economic evaluation of the 343-km Hajia line, opened to traffic between Harbin and Jiamusi in September 2018, faced difficulties as services have been impacted by restrictions to prevent the spread of the COVID-19 pandemic since January 2020. This evaluation is therefore based on 2019 data and such data as was available at the beginning of 2021, after adjustments for these COVID-19 restrictions. The estimated economic return is 9.4%, compared to 15% in the original evaluation, due to the decision (to date) not to use the line for freight traffic, the lower-than-expected regional growth due to the problems of the local coal industry and the exclusion of agglomeration benefits which were individually identified at appraisal but have been excluded in the re-evaluation. Passenger demand is likely to be about 25% below the appraisal forecast, initially because of the COVID pandemic but subsequently because of the lower base to the significant changes to the transport networks since appraisal.

PROJECT SUMMARY

2. At appraisal, the project was planned as a 200 km/hr line between Harbin and Jiamusi which could also carry light axle-load freight (e.g., containers) such as was expected to travel to and from Russia over the new Tongjiang Bridge. However, in common with a number of other 200 km/hr lines which were expected to carry similar freight, no freight services have been operated and it seems unlikely any will do so in the future. As of April 2021, the line carried about 33 pairs of trains per day, mostly 8-car sets, which seem to be well-patronised7. About 15% of the services continue beyond Harbin to Shenyang, Tianjin and Beijing. Travel times from Harbin to Jiamusi currently average 2 hours 17 minutes, with a range of 20 minutes either way depending on the number of intermediate stops.

PASSENGER TRAFFIC

3. At appraisal, IBRD prepared independent passenger forecasts. These are given in Table 1, together with those given in the Chinese feasibility study (FS), which were around three times the IBRD forecasts.

Table 1 Forecast sectional loads at appraisal

Year	FS		IBRD		Actual paths at ICR(1)
	Passengers (million)	Services (pairs/day)	Passengers (million)	Services (pairs/day)	
Harbin – Jiamusi					
2007	14.2				
2020	38.4	168	18.3	52	25
2030	46.4	208	25.5	73	

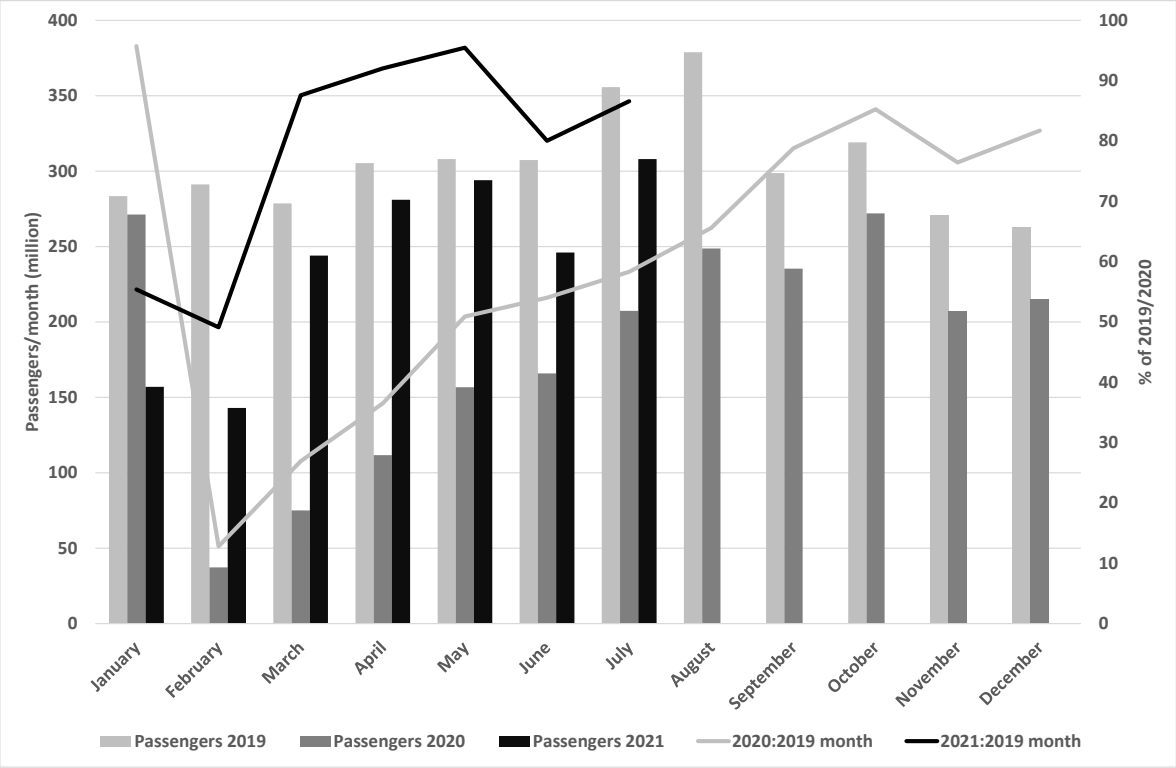
(1) As reported for 2020. Includes all passengers, including those on through services from beyond Harbin and Jiamusi.

[7] Of 33 southbound services scheduled for April 15, 9 were sold out by 14 April.

4. CRC has been unable to provide passenger volumes on the service since the pandemic and it has also been impossible to undertake on-board surveys as was the practice for previous Chinese HSR projects. The current and projected demand has therefore been estimated from available information combined with the pattern for the sector as a whole.

5. Figure 1 shows the monthly passenger demand on CR for 2019, 2020 and 2021. After a very sharp fall in February 2020 demand steadily recovered and by December 2020 had reached close to over 80% of the year before. In the first two months of 2021 there were some partial travel restrictions and volumes were just over 50% of the pre-pandemic levels but in March there was a strong recovery and in April 2021 the volume reached 92% of that in April 2019. Since then, there have been some restrictions due to continuing outbreaks but it seems reasonable to assume that if there are no significant further outbreaks demand will be back to pre-pandemic levels by the end of the year.

Figure 1 CR rail passenger traffic 2019 – 2021



6. Unfortunately, CR has only been able to provide partial passenger totals for 2020 for the line, and the current patronage has thus been estimated from the current train schedule, assuming 70% occupancy.8 The trains appear to be all 8-car sets, with a capacity of 550; this implies an annual usage, after allowing for COVID, of 11.4 million passengers to and from Harbin and beyond. The average trip distance (including travel beyond Harbin) is estimated at 377 km.

[8] As noted above, a sample day showed 9 out of 33 recent departures from Jiamusi were sold out.

7. Experience has shown there is normally a ramp-up period of three years before growth settles to its long-term trend. Analysis of four previous HSR projects showed an average ramp-up of 27.5% in Year 1, 11% in Year 2 and 6% in Year 3, and these have been assumed for the re-evaluation. Thereafter, a growth of 3% p.a. has been assumed, reflecting the difficult economic outlook for the region, particularly for the coal industry, and the stagnating population. Table 2 compares the revised demand forecasts with those estimated at appraisal.

Table 2 Comparison of appraisal forecasts and ICR re-estimates

Year	Passengers (million)	
	Appraisal	ICR re-evaluation
2025	24.0	16.0
2030	27.8	18.5
2035	32.2	21.6
2040	37.3	25.0
2045	43.2	29.0

8. Even allowing for the uncertainties surrounding the base ICR figure, the appraisal passenger forecasts were over-optimistic. One of the principal reasons for this was underestimating the forecast diversion from air services. The appraisal forecast estimated 0.1 million passengers would transfer from air by 2020 and 0.2 million by 2025. This was based on growth on what was then a feeder service from Jiamusi to Harbin.

9. In practice, air passenger throughput at Jiamusi has grown extremely fast and this has created many more direct routes to and from Jiamusi, thus greatly reducing the need to go to Harbin to change planes (or allowing interchanges at other airports which are more reliable). There are no services between Jiamusi and Harbin but currently there are four return flights daily from Jiamusi to Beijing, equivalent to about 500,000 passengers per year and up to eight daily between Jiamusi and other airports, such as Yantai, Qingdao and Dalian, all with onward connections. These are all trips which would have previously travelled by rail, at least as far as Harbin.

10. Another factor is that conventional trips on overnight services on the existing line appear to have increased, rather than being withdrawn as was assumed at appraisal. The reason for this is unclear but, while the fare on the HSR is competitive for trips to Harbin, the fare for longer-distance conventional trips south of Harbin is much cheaper than by HSR9.

11. Further analysis of the difference is not possible due to the inability to undertake on-board surveys but one possible reason is that the generated trips are lower than the 34% assumed at appraisal. 20% has

[9] The fare for a 'hard sleeper' on the conventional train, taking about 24 hours, is about half that of the cheapest HSR ticket, taking about 8 hours. The fare for a 'hard seat' on the conventional train is under half again.

been assumed for this ICR, except for trips to and from intermediate points within the corridor, for which generation has been taken as 40%.

PROJECT INVESTMENT

12. The project company has provided the capital expenditure by year as given in Table 3. This has been converted to Rmb 2020 using the Fixed Asset Investment cost index.

Table 3 Construction cost

Year	FA price index	Capex (Rmb million)	
		Current	2020
2014	1.11	4274	4736
2015	1.11	9862	10928
2016	1.09	7110	7769
2017	1.05	6183	6482
2018	1.01	800	811
2019	1.00	2220	2220
Total		30450	32946

13. The estimated cost of the project infrastructure at appraisal was $US 4.4 billion ($US2009) (without interest during construction). The final cost of the project, as reported by the project company, was $US 5.61 billion ($US2020), of which IBRD contributed $US 284 million.

PROJECT BENEFITS

14. At appraisal, four main groups of benefits were considered:

- The reduction in travel time and cost for the passenger traffic diverted to the new line. Service frequency has also been greatly improved. In this re-evaluation these costs and benefits have been divided into the change in costs and benefits for the passengers and the change in costs and benefits for the operators.
- Freeing up capacity on the existing network, thereby allowing the potential increase in freight traffic to be carried by rail, avoiding congestion and reducing accidents on the road network
- Reducing the emissions of greenhouse gases (GHG) through the transfer of passengers to rail from other more energy-intensive modes.
- Wider economic, social and environmental benefits associated with the improvement in accessibility for Jiamusi and surrounding towns.

15. No detailed operating cost data has been made available by CR and the evaluation uses parameters and values developed for the 2019 retrospective report on High-speed Rail. The operating costs in that report were expressed in Rmb 2015 and these have been updated to Rmb 2020 using the Fixed Asset construction price index.

Passenger Benefits

16. The methodology used at appraisal considered the potential for diverting passengers from each of the existing modes (conventional rail, air, bus and car). Normally, these proportions are checked during the ICR using on-board surveys but this was not possible. Accordingly, the proportions transferring were estimated based on patterns observed in other projects.

17. At appraisal, the benefits were measured on a mode-by-mode basis as the net improvement due to the project, i.e. after allowing for the HSR between Jiamusi and Harbin. It was not possible to reproduce the precise methodology but it was approximated by deriving the benefits on this basis for those previously travelling by conventional rail. These were estimated at appraisal as a time saving of 2 hours 15 minutes. The HSR service was given a 10% reduction in time costs to reflect the higher level of comfort compared to the conventional train. Table 4 summarizes the benefits for these passengers under the current timetable.

Table 4 Passenger benefits – Harbin – Jiamusi - transfer from conventional rail 2020

	Without project	With project
Average travel time (minutes)	471	122(1)
Average fare (Rmb)	109	150
Services/day	11	24
Headway penalty(2)	45	26
Value of time (Rmb/hour)	24.40	24.40
Generalised cost (minutes)	784	516

(1) Includes 10% discount for comfort
(2) Based on the UK Passenger Demand Forecasting Handbook

18. The value of time used is based on that used in the 2019 retrospective report on HSR as a whole, itself derived from on-board surveys on similar projects, which found an average income in 2015 of Rmb 6000 per month with 45% of passengers travelling for business or work-related reasons. This value of time has been indexed using the increase in real GDP per capita, assumed as 6% p.a. to 2020 and then 4% p.a. for the remainder of the evaluation period.

19. This benefit (equivalent to Rmb 0.78/HSR-km) has been applied to all passengers transferring from the conventional service. Following the rule-of-a-half, 50% of this benefit has been applied to passengers that are generated or transferring from other modes.

Operator costs and benefits

20. These have been estimated on a passenger-km basis using current revenues and operating costs based on those in the 2019 retrospective, updated to 2020 prices (Table 5). The rail cost covers only rollingstock maintenance and capital, train and on-train crew and fuel and energy. Rail infrastructure-related costs are considered separately.

Table 5 Estimated passenger operating costs (Rmb per pax-km)

Mode	Cost

HSR(1)	0.28
Conventional rail	0.23
Bus	0.37
Car	0.82
Air	1.12

(1) 200 km/hr service

21. For passengers previously travelling by conventional rail, these costs were applied to the Jiamusi – Harbin section; 50% of these passengers are assumed to have transferred to HSR at Harbin while the other 50% remained on the conventional services.

22. The new rail infrastructure will also need to be maintained and train control established at an estimated annual cost of Rmb 1.032 million per route-km.

Freight-related benefits

23. As discussed above, the potential freight benefits envisaged at appraisal are very unlikely to ever materialize, given the current policy excluding freight services from 200 km/hr lines, and these have therefore been excluded from the re-evaluation.

External and environmental benefits.

24. The external benefits included at appraisal included the reduction in accident costs and changes in greenhouse gases (GHG). At appraisal these were all valued using standard unit costs adjusted to Chinese conditions, with a value of GHG in 2015 as $30/tonne, increasing to $50/tonne in 2045.

25. The re-evaluation has adopted the same principles but has used the values derived for the 2019 retrospective, updated to 2020 values in line with the increase in real per capita GDP.

26. The accident savings have been revised to recognize that most of the road traffic transferring to rail would have otherwise travelled on expressways, where the accident rates are much lower than for the general road network. The value of life has been assessed as 70 times the average GDP/head, converted at the PPP rate of exchange.

27. The GHG estimates include the impact of the expected change in generation mix in China, as well as improvements in individual modal efficiency. GHG emissions during construction have been excluded.

Wider economic benefits

28. The original evaluation included an allowance for wider economic benefits. However, these typically take several years to become fully mature (at appraisal they were assumed to take ten years to be fully realized) and they have been omitted both from the ICR re-evaluation.

ECONOMIC RATE OF RETURN

29. At appraisal, the project was expected to yield a net present value (NPV) during 30 years of operation of Rmb 33 billion ($US 962 million) (2015 prices discounted at 12% to the first year of operation in 2015) and to achieve an economic rate of return (EIRR) of 19%.

30. The re-evaluation, which excludes the wider economic benefits which were included at appraisal, estimates an NPV of Rmb -7.5 billion ($US -1.1 billion at the average exchange rate of US$1 = Rmb 6.90) in 2020 prices discounted at 12% to 2013 and an EIRR of 9.4%. The bulk of this difference is due to the exclusion of the wider economic benefits. Table 6 compares the distribution of costs and benefits in the appraisal evaluation and ICR re-evaluation, converted to US$ using the 2012 average exchange rate of 6.31. Both evaluations have been expressed in 2012 prices, with the ICR benefits and costs deflated by 11%.

Table 6 Comparison of costs and benefits at appraisal and at ICR ($US million)

(2012 prices discounted to 2013 at 12% p.a.)

	ICR	Appraisal	Difference
Construction	-3282	-3332	50
Passenger user benefits	2062	2401	-339
Passenger operator benefits	83	0	83
Freight benefits		154	-154
Road maintenance and accidents	56	12	44
GHG	-3	3	-6
Agglomeration		6061	-6061
Total	-1085	5299	-6384

31. The ICR discounted construction cost is similar to that at appraisal. Passenger user benefits at ICR are lower, reflecting the higher patronage forecast at appraisal. The difference in passenger operator benefits, which is the net of HSR, conventional rail, air and car costs and savings is negligible; it is largely caused by revised estimates of operating costs of each of these modes.

32. Road-related benefits have increased due to an improved method for estimating them and GHG emission benefits (which are the net across all modes) are similar in the ICR to those at appraisal in spite of revised mode-specific emissions.

33. If freight benefits and agglomeration benefits had not been included in the appraisal evaluation, the IRR would have been 9.9% with an NPV of Rmb -5693 million ($US – 915 million), very close to the ICR estimate.

ANNEX 5. BORROWER, CO-FINANCIER AND OTHER PARTNER/STAKEHOLDER COMMENTS

Implementation Completion Report of Harbin-Jiamusi High-speed Railway Project

(New Harbin-Jiamusi High-speed Railway Project)

I. Basic Information

Hajia Railway Passenger Dedicated Line Co., Ltd. ("the Company"), registered and established in Harbin on April 27, 2011 with a registered capital of RMB 17.36 billion, is jointly held by China Railway Development Fund Co., Ltd. (Party A), Heilongjiang Investment Group Co., Ltd. (Party B) and China Railway Harbin Group Co., Ltd. (Party C), the share of which is 54.6%, 28.9% and 16.5% respectively. The Company is mainly responsible for the construction and management of the newly-built Harbin-Jiamusi Rapid Railway.

According to the project feasibility study report approved by the state, the total investment of the project is RMB 34.714 billion, with 50% as the capital, totaling RMB 17.36 billion, including: Party A subscribes to the capital contribution of RMB 9.48 billion, accounting for 54.6%. Party B subscribes to the capital contribution of RMB 5.02 billion, accounting for 28.9%, and undertakes 10% of the project capital equaling RMB 1.74 billion, and the cost of land requisition and demolition equaling RMB 3.28 billion; the final cost of land acquisition and demolition shall be included into Party B's capital contribution after being audited by the intermediary agency and confirmed by the shareholders of all parties, and the share ratio shall be adjusted accordingly. Party C subscribes to the capital contribution of RMB 2.86 billion, accounting for 16.5%; Heilongjiang Province undertakes the work and cost of the land acquisition and demolition of Harbin-Jiamusi Rapid Railway Construction Project.

II. Project Overview

The new Harbin-Jiamusi Rapid Railway ("Harbin-Jiamusi Railway") is located in Harbin City and Jiamusi City on the south bank of Songhua River in the mid-east of Heilongjiang Province, starting from Harbin Station (not included), passing through Binxi, Binxian, Fangzheng, Demoli, Gaoleng, Dalianhe and Yilan, and reaching Jiamusi Station in Jiamusi City, connecting two cities and three counties. Harbin-Jiamusi Rapid Railway is connected with Harbin-Dalian Passenger Dedicated Line, Harbin-Qiqihar Passenger Dedicated Line and the existing Beijing-Harbin Railway and Harbin-Manzhouli Railway at Harbin Railway Station, and connected with Mudanjiang-Jiamusi Passenger Dedicated Line under construction

and the existing Suihua-jiamusi Railway and Jiamusi-Fu'an Railway at Jiamisi Railway Station. It is the main channel of rapid railway passenger transportation connecting the central and eastern regions of Heilongjiang Province and leading to the eastern border areas. After the completion of Harbin-Jiamusi Rapid Railway, it is of great significance to improve the layout of railway networks, improve the quality of transportation services and promote the coordinated economic and social development of Heilongjiang Province.

The main line of Harbin-Jiamusi Rapid Railway is 342.516 kilometers long, including newly- built 336.869 kilometers and reconstructed 5.647 kilometers. There are 17 stations in the whole line, i.e., Taipingqiao (reconstructed), Binxi North, Binxi East (overtaking), Binzhou, Bin'an (overtaking), Shenglizhen, Rixingtun (overtaking), Shuanglonghu, Fangzheng, Demoli, Gaoleng, Dalianhe, Yilan, Hongkeli, Xinghua (overtaking), Jimusi West and Jimusi (reconstructed).

The main technical standards of the line are as follows: Railway grade: Grade I; Number of main lines: double track; Spacing between main lines: 4.4 m; Designed speed: 200 km/h; Minimum curve radius: 3500 m in general section and 2800 m in individual section; Restricted gradient: 13‰; Traction type: power; Traction tonnage: 5000 tons; Locomotive type: EMU, HXD series; Effective length of arrival departure track: 1080 m; Block system: Automatic block. The main works of the whole line include: Subgrade works in the main lines of 185.273km, accounting for 54% of the total length of the line. Bridge and culvert works in the main lines of 149.963km, including 145 super large, large, medium and small bridges, accounting for 43.5% of the total length of the line. Tunnel works in the main lines of 7.280km, including 5 tunnels, accounting for 2.1% of the total length of the line. Track laying and beam erecting engineering: 685.032km for main tracks, 141.692km for station tracks, 513 sets of turnouts, 2 sets of rail expansion device, and 8920erected T-girder holes.

On July 22, 2010, the National Development and Reform Commission approved the project proposal by issuing the *Reply of the National Development and Reform Commission on the Proposal of New Harbin-Jiamusi Rapid Railway Project* (Fa Gai Ji Chu [2010] No. 1613).

On January 9, 2014, the National Development and Reform Commission approved the project feasibility study report by issuing the *Reply of the National Development and Reform Commission on the Feasibility Study Report of the New Harbin-Jiamusi Rapid Railway Project* (Fa Gai Ji Chu [2014] No. 54).

On April 26, 2014, China Railway Corporation approved the preliminary design by issuing the *Reply*

of China Railway Corporation and Heilongjiang Provincial People's Government on the Preliminary Design of the New Harbin-Jiamusi Rapid Railway (Tie Zong Ban Han [2014] No. 478), with a total approved budget of RMB 36.046 billion.

III. Project Progress

1. Project Procurement

(1) According to the station works bidding plan for the section from Binxi North to Ping'antun of the new Harbin-Jiamusi Rapid Railway approved by the former China Railway Corporation, and following relevant provisions on bidding for railway engineering construction, the Company organized the bidding for the construction and supervision of Section 2-7 of Harbin-Jiamusi Rapid Railway station works through the bidding platform of Beijing Construction Engineering Trading Center in May 2014, and completed the bidding on June 30, 2014. Winning bidders for civil works: Contract No. 2 to China Railway 22nd Bureau Group Co., Ltd., Contract No. 3 to China Railway No. 5 Engineering Group Co., Ltd., Contract No. 4 to China Railway 11 Bureau Group Co., Ltd., Contract No. 5 to China State Construction Engineering Corporation, and Contract No. 6 to China Railway 19 Bureau Group Co., Ltd., and Contract No. 7 to China Railway First Group Co., Ltd. Winning bidders for construction supervision: Contract No. 2 to Heilongjiang Zhongtie Construction Supervision Co., Ltd., Contract No. 3 to Huatie Engineering Consulting Co., Ltd., Contract No. 4 to Tianjin New Asia-Pacific Engineering Construction Supervision Co., Ltd., Contract No. 5 to Beijing Tieyan Construction Supervision Co., Ltd., and Contract No. 6 to Changsha Central South University Construction Supervision Co., Ltd., and Contract No. 7 to CREEC (Chengdu) Consulting and Supervision Co., Ltd.

(2) From September to October 2014, the construction and supervision biddings for the station works for the section from Ping'antun to Jiamusi (Section 8 of the station works) of the new Harbin-Jiamusi Rapid Railway were organized and completed. Winning bidder for civil works: China Railway 23rd Bureau Group Co., Ltd.; Winning bidder for construction supervision: Beijing Tiecheng Construction Supervision Co., Ltd.

(3) From the end of September to the beginning of November 2014, the construction and supervision biddings for the station works for the section from Harbin Railway Station to Binxi East Station (Section 1 of the station works) of the new Harbin-Jiamusi Rapid Railway were organized and completed. Winning bidder for civil works: Shanghai Civil Engineering Co., Ltd. of CREC; Winning bidder for construction supervision: Heilongjiang Zhongtie Construction Supervision Co., Ltd.

(4) From August to September 2015, the biddings for the construction of "four power" system

integration and related works of the new Harbin-Jiamusi Rapid Railway were organized and completed. Winning bidder: China Railway Electrification Bureau Group Co., Ltd.

(5) From June to July 2016, the biddings for the construction of the housing construction (intermediate station) section of the new Harbin-Jiamusi Rapid Railway were organized and completed. Winning bidder: China Railway No. 5 Engineering Group Co., Ltd.

(6) From November to December 2016, the biddings for the construction of the housing construction (Jiamusi Station) section of the new Harbin-Jiamusi Rapid Railway were organized and completed. Winning bidder: China Railway 23rd Bureau Group Co., Ltd.

(7) From December 2016 to January 2017, the biddings for the construction of customer service systems of the new Harbin-Jiamusi Rapid Railway were organized and completed. Winning bidder: Beijing Jingwei Information Technology Co., Ltd.

2. Main Quantities Completed

By December 2019, the subgrade works of the whole line: 48,369,300 m3 (main lines and connecting lines) was designed, with a total of 48,369,300 m3 completed, accounting for 100% of the design. Bridge engineering: 40,159 pile foundations were designed, with a total of 40,159 piles completed, accounting for 100% of the design; 4,657 pile caps were designed, with a total of 4,657 completed, accounting for 100% of the design; 4,759 piers were designed, with a total of 4,759 piers completed, accounting for 100% of the design; 8,920 holes were designed for beam fabrication, with a total of 8,920 holes completed, accounting for 100% of the design. 8,920 holes were designed for girder erection, with a total of 8,920 holes completed, accounting for 100% of the design. Tunnel engineering: 5 seats of 7,280m were designed, with a total of 5 seats completed, accounting for 100% of the design. Housing construction engineering: 19.2085 m2 were designed, 100% has been completed, and 100% of the “four power” works have been completed.

3. Key and Difficult Works

The key and difficult works are as follows: (1) Harbin Super-large Bridge: 13,235 m long, with many types and large number of continuous beams, highly interfering existing roads and railways and requiring a long construction period; (2) Yilan Mudan River Large Bridge: Adopting (80+128+80) m continuous beams crossing the main riverway of Mudan River, with substructure located in the main riverway, and requiring a long construction period; (3) Jiamusi Super-large Bridge: 7111 m long, with many types and large number of continuous beams, and requiring to cross many urban roads and the existing Suihua-

jiamusi Railway for construction and highly interfering existing roads and railways; (4)Houshishan Tunnel: 3410 m long, passing through three fault fracture zones and having pressing construction period; running through military facilities underground and wind power generation equipment aboveground, which makes construction difficult; Jiamusi Railway Station Transformation: including Suihua-jiamusi Railway re-routing, Tumen-Jiamusi Railway re-routing, EMU line construction, Jiamusi Railway Station and East Jiamusi Railway Station transformation, etc., with complicated construction and transition of stations, long construction period, and many interfaces between various disciplines, which greatly interferes with business line transportation.

4. Construction Process

Harbin-Jiamusi Rapid Railway is jointly constructed by China Railway Corporation and Heilongjiang Province. The Employer is Hajia Railway Passenger Dedicated Line Co. Ltd., the survey and design contractor is China Railway Design Group Co., Ltd. (the former Third Railway Survey and Design Institute Group Co., Ltd.), and the construction drawing auditing unit is Wuhan Tiesiyuan Engineering Consulting Co., Ltd.

The construction of Harbin-Jiamusi Rapid Railway was started in July 2014, and the whole line was completed and put into operation in September 2018. During the construction process, all participating units conscientiously implemented the relevant regulations of the former Ministry of Railway, the former China Railway Corporation and the China State Railway Group Co., Ltd., comprehensively implemented the management objectives of quality, safety, construction period and investment, promoted the project construction in accordance with the laws and regulations, adhered to the high standard design, high quality construction and efficient management in accordance with the standard management requirements, promoted the project construction work and realized the construction objectives.

IV. Investment Completion, Fund Availability and Utilization

1. Investment Completion

By the end of August 2020, the accumulated investment completed reached RMB 31,296,100,000 (including RMB 283,720,000 for Binxi Subway)

2. Funds in Place

By the end of August 2020, a total of RMB 3,100,3799,200 was available, including: RMB 3,000,000,000 from the central budget; RMB 5,980,000,000 for railway construction funds; RMB 20,000,000 from vehicle purchase taxation; RMB 5,000,000,000 from special construction funds; RMB

50,000,000 from railway bonds (capital); RMB 1,242,000,000 from social financing (Railway Development Fund); RMB 8,118,445,900 from Heilongjiang expropriation and demolition funds; RMB 283,720,000 from Binxi local railway authority; RMB 4,530,506,800 from domestic bank loans; RMB 1,931,126,500 from foreign loans; and RMB 3,800,000,000 from railway bonds (debts).

3. Use of Funds

By the end of August 2020, the accumulated expenditure of construction funds was RMB 30,843,268,700, including: Project fund of RMB 21,286,231,600, material fund of RMB 7,256,204,900, and other costs of RMB 2,300,832,200.

V. Utilization of World Bank Loans

Harbin-Jiamusi Rapid Railway Project was financed by the World Bank with the loan amount of USD 300 million, which were mainly used for the procurement of bridge bearings, turnouts, sleepers, buckle accessories, sound barriers and most “four power” materials and equipment, as well as some non-installation equipment. Up to now, a total of 40 contracts have been signed, of which 25 contracts have been amended. After such amendments, the total contract amount is 1,878,470,000, equivalent to USD 283,690,000. The project has been accepted and priced at RMB 1,878,470,000.

VI. Main Situation of Environmental Impact

The main requirements of the EIA report are to protect the main ecological environment sensitive targets, reduce the occupation of cultivated land, reduce the destruction of surface vegetation and prevent soil erosion; the control objectives of waste gas and waste water are to meet the discharge standards; the control objectives of noise and vibration are not exceeding the standards of functional areas; and the control objectives of solid waste are centralized disposal.

By the end of 2017, the ecological environment, acoustic environment, vibration environment, water environment, atmospheric environment, electromagnetic environment, solid wastes and other engineering measures involved in the construction have been implemented in accordance with the requirements of the EIA report. In August 2018, independent acceptance of environmental protection was carried out; in September, the information of environmental impact assessment was logged in National Construction Project Environmental Impact Assessment Information Platform and disclosed to the public.

VII. Land Acquisition and Demolition

Harbin-Jiamusi Rapid Railway from Harbin Station (not included) to Jiamusi Station (included) is about 343 km long and has 19 stations in Binjiang (existing), Taipingqiao (existing), Zhaoantun, Binxi North, Binxi

East, Binzhou, Bin'an, Shenglizhen, Rixingtun, Shuanglonghu, Fangzheng, Demoli, Gaoleng, Dalianhe, Yilan, Hongkeli, Xinghua and Jimusi (existing).

According to the preliminary design, the land acquisition and demolition cost is RMB 6,135,000,000 (excluding for dispatching office).

By June 2020, the accumulated cost of land acquisition and demolition of the whole line of Harbin-Jiamusi Rapid Railway is RMB 6,160,130,000. The accumulated cost of RMB 2,481,360,000 was paid for Harbin City (excluding Binxi Subway). The accumulated cost of RMB 858,710,000 was paid for Bin County (excluding Binxi Subway). The accumulated cost of RMB 428,460,000 was paid for Fangzheng County. The accumulated cost of RMB 485,950,000 was paid for Yilan County. The accumulated cost of RMB 131,010,000 was paid for Heilongjiang Forest Industry. The accumulated cost of RMB 12,560,000 was paid for Shahe Farm. The accumulated cost of RMB 88,060,000 was paid for Jianan Farm. The accumulated cost of RMB 1,425,300,000 was paid for Jiamusi City. The accumulated cost of RMB 248,720,000 was paid for Dispatching Building (Harbin City).

VIII. Operation

Harbin-Jiamusi Rapid Railway was put into operation on on September 30, 2018. At present, 29 pairs of passenger trains are scheduled to be opened and 28 pairs are actually opened (8 direct pairs and 20 internal pairs), with an average daily passenger flow of 28,000 passengers in 2019, and 9,200 passengers from January to the end of September 2020.

IX. Assessment of World Bank Team Performance

The World Bank team is dedicated, professional and cooperative. They can communicate well with us and help us a lot to implement the project.

Heilongjiang Railway Development Group Co., Ltd.

November 5, 2020

ANNEX 6. LIST OF RAILWAY POLICY BRIEFS AND NOTES

The following Railway Reports, Policy Briefs and Notes are published by the Bank on China Railways.

- High-Speed Rail: The Fast Track to Economic Development? 2010, by Paul Amos, Richard Bullock, and Jitendra Sondhi
- Railway price regulation in China: time for a rethink? 2011, By John Scales, Gerald Ollivier and Paul Amos
- Governance and structure of the railway industry: three pillars, 2011, by Paul Amos and Richard Bullock
- China Rail Financial Futures Model, 2012
- Fast and Focused - Building China's Railways, 2012, by John Scales, Jitendra Sondhi and Paul Amos
- High-Speed Rail: the first three years taking the pulse of China's emerging program, 2012, by Richard Bullock, Ying Jin, Andrew Salzberg
- China: The environmental challenger of railway development, 2012, by Ning Yang, Juan D. Quintero and Peishen Wang
- High-Speed Rail, Regional Economics, and Urban Development in China, 2013, by Andrew Salzberg, Richard Bullock, Ying Jin, and Wanli Fang
- High-Speed Railways in China: A Look at Construction Costs, 2014, by Gerald Ollivier, Jitendra Sondhi and Nanyan Zhou
- High-Speed Railways in China: A Look at Traffic, 2014, by Gerald Ollivier, Richard Bullock, Ying Jin and Nanyan Zhou
- Regional Economic Impact Analysis of High Speed Rail in China, June 2014, Report No. ACS9734, the World Bank
- Attracting Capital for Railway Development in China, 2015, by Martha B. Lawrence, Gerald Ollivier
- High-Speed Railways in China: an update on passenger profiles, 2016, by Gerald Ollivier, Nanyan Zhou, Richard Bullock, Ying Jin, Martha B. Lawrence
- China's High-Speed Rail Development, 2019, by Martha Lawrence, Richard Bullock, and Ziming Liu

ANNEX 7. STATUS OF THE RESETTLEMENT COMPLAINT

1. Eleven HHs filed a resettlement grievance in November 2019. The complaint stated that Harbin Daowai District Government and the Demolition Office of Daowai District did not properly perform their responsibilities in evaluating property values of affected households, offering appropriate compensation, and completing the relocation of affected households. The 11 HHs are in the 30-meter environmental protection buffer, where 173 of the 277 project affected HHs have not resettled.

2. In response to the complaint, due diligence of the resettlement process was carried out by a third party independent resettlement monitor, and separately by the Bank team. The due diligence findings are that implementation of SRAP had been consistent with the Bank's Involuntary Resettlement policy OP4.12 and the house compensation or property exchange had been in accordance with the principle of replacement price. The living conditions and environment of the PAPs who were relocated had been improved, and the PAPs are satisfied with the resettlement.

3. Additionally, an independent environmental consultant conducted three rounds of noise monitoring in June, July, and August 2021 following the World Bank's Environmental, Health, and Safety Guidelines. Noise monitoring results indicate that the actual noise level met the applicable domestic and international standards.

4. Harbin Daowai District Government agreed that resettlement consultation and negotiation will remain open until the end of 2021 for the remaining households should they wish to relocate and the escrow account, which is fully funded, will be maintained until December 31, 2021. The local government also committed that all property service, community and building maintenance will be where the affected HHs live.