



I. Project Data

Project ID	Project Name	
P123729	CN-Shangrao Sanqingshan Airport Project	
Country	Practice Area(Lead)	
China	Transport	
L/C/TF Number(s)	Closing Date (Original)	Total Project Cost (USD)
IBRD-82560	31-Dec-2018	49,393,873.41
Bank Approval Date	Closing Date (Actual)	
13-May-2013	31-Dec-2018	
	IBRD/IDA (USD)	Grants (USD)
Original Commitment	50,000,000.00	0.00
Revised Commitment	49,393,873.41	0.00
Actual	49,393,873.41	0.00

Prepared by	Reviewed by	ICR Review Coordinator	Group
Kavita Mathur	Peter Nigel Freeman	Victoria Alexeeva	IEGSD (Unit 4)

2. Project Objectives and Components

a. Objectives



The Project Development Objective (PDO) was to improve airline connectivity in northeastern Jiangxi Province and to demonstrate the environmental sustainability of the development and operation of the Shangrao Sanqingshan Airport (Loan Agreement page 5, and PAD para 12).

The PDO was not revised during the life of the project.

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

No

c. Will a split evaluation be undertaken?

No

d. Components

The project had two components:

Component 1. Airport Infrastructure Development (estimated cost at appraisal (includes contingencies): US\$100.7 million; actual cost at project closing: US\$121.5 million). This component included the construction and installation of the following: (i) airfield – construction of runway, taxiway, etc; (ii) terminal building; (iii) air traffic control; (iv) freight facility; (v) supporting infrastructure facility (fuel storage farm, water supply, power supply, fire stations, heating, storm/water management, parking, fence, etc); (vi) implementation of the Environmental Management Plan (EMP) and the Resettlement Action Plan (financed fully by government own funds); (vii) auxiliary facility (office building, staff quarters, etc); and (viii) storm water reuse system and ground aircraft auxiliary power unit.

Component 2. Institutional Development and Capacity Building (estimated cost at appraisal: US\$2.0 million; actual cost at project closing: US\$1.5 million). This component included provision of consultancy and technical advisory services, studies and training:

- Project Management Consultant to provide advisory services to support the Project Management Office (PMO) and Shangrao Sanqingshan Airport Company Limited (SSAC) on project coordination and monitoring;
- Management Consultant services to (i) develop Airport Operation Model for SSAC, (ii) prepare and implement Human Resource Development plan, operational and financial manual (in accordance with China's company's law), (iii) assist SSAC to comply with Civil Aviation Administration of China (CAAC) regulations and international practices, and (iv) assist SSAC to develop a marketing plan to attract airlines and assist in service agreement negotiations with airlines;
- Technical assistance to support the PMO to (i) document the lessons learned in developing Green Airport concept, (ii) share their experience widely with other potential cities considering building green airport in China through



wider dissemination and holding workshops and road shows in selected cities, and (iii) other civil aviation related studies; and

- Training and study tours covering several aspects of airport construction and operations.

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

Project Cost. The actual project cost at project closing was US\$125.5 million, higher than the appraisal estimate of US\$105.1 million. The project team explained that the cost overrun was due to the change in terminal building and site preparation (see Efficiency section 5 for details). The actual and appraisal cost includes (i) interest during construction US\$2.28 million, and (ii) front-end-fees US\$0.125 million.

Financing. The Bank financed a total of US\$49.4 million through an IBRD loan, which is 98.8% of the original loan amount of US\$50.0 million. The loan was fully disbursed.

Co-financing. There was no co-financing.

Borrower Contribution. At appraisal, the Borrower was expected to contribute US\$55.1 million. The actual Borrower contribution was US\$76.1 million to finance the cost overrun.

Dates. The project was approved on May 13, 2013, became effective on July 16, 2013 and closed on December 31, 2018 as scheduled.

3. Relevance of Objectives

Rationale

Country Context: Air transport plays an important role in China in promoting economic and social development and reducing regional disparities. Despite the large airport infrastructure development, the provision of efficient airport service has lagged behind, in part because (i) air transport resources and function between airports in some regions were not optimized, and (ii) air transport was not integrated with local urban planning and surface transport planning. Issues such as poor connectivity with regional airports, poor operational efficiency, and low utilization of feeder airports were restraining China from building a mature and efficient air transportation network (PAD para 6). The 2008 China's National Civil Airport Development Plan envisioned 244 civil airports by the end of 2020 to enable all provincial capitals, major cities, and major tourism destinations to be connected by a functional hub, trunk, and feeder airport network.

Alignment with Strategy: The project's objectives are strongly aligned with both Strategic Theme 1: Supporting greener growth, and Strategic Theme 2: Promoting more inclusive development, of the World Bank's Country Partnership



Strategy (CPS) for China 2013–2016 (this is the latest CPS). The PDO "*improve airline connectivity in northeastern Jiangxi Province*" was highly relevant to Outcome 2.4: Improving transport connectivity for more balanced regional development as improving airline connectivity would shorten economic distances between cities and reduce rural-urban and regional disparities (CPS para 63). The PDO "*to demonstrate the environmental sustainability of the development and operation of the airport*" was aligned with CPS Strategic Theme 1, Supporting Greener Growth, under which the Bank aimed at expanding its focus on environmental sustainability across China's portfolio (CPS para 48).

The PDOs are highly relevant to the Government of China's 13th Five Year Plan (2016-2020) which aims to further improve the capacity of air transport and expand the network for more inclusive development. To promote environmental sustainability and investments in 'greening' growth, the State Council issued a "*Three-year Action Plan to Win Blue Sky Protection War*" in June 2018. The action plan identified the civil aviation industry as a key area to reduce the country's carbon footprint (ICR para 17). The *Jiangxi General Airport Layout Plan*, issued in July 2017, aims to build more than 50 airports by 2030, covering all cities, major industry zones, and main tourism areas, to further improve air connectivity in the region and stimulate economic development (ICR para 18).

Sector Context: China is expected to have a total of 260 airports by 2020 and 320 by 2025. Taking this into account, China committed to carbon reduction in the Paris Climate Agreement of 2015. This is the only Bank-financed airport in China and was a high profile project, as it was conceived as a demonstration project to show how a green airport should be designed. This experience would then be rolled out nation-wide for the development of future feeder airport projects in China. This project did not suffer from lack of resources because of the importance attached to it. The Borrower added capital funds in the form of a grant to expand the size of the terminal after it was realized that there would be a greater than expected shift from rail to air. The Borrower also provided a substantial operating cost subsidy during the initial year of operation to cover non-operating income.

Rating

High

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

To improve airline connectivity in northeastern Jiangxi Province.

Rationale

Theory of Change.



The theory of change of this objective was that the construction of Sanqingshan airport infrastructure including (i) construction of runway, taxiway, etc, (ii) terminal building, (iii) air traffic control building and tower, (iv) freight facility, and (v) supporting infrastructure (fuel storage farm, water supply, power supply, fire stations, heating, storm/water management, parking, fence, etc), was expected to improve the operation of Sanqingshan Airport and attract commercial airlines and reduce travel time between Shangrao and other major cities, thereby improving airline connectivity in northeastern Jiangxi Province.

Outputs

The construction of the airport was completed on December 29, 2016, one year earlier than planned (ICR para 38). This included:

- Construction of 4c level airfield, runway, taxiway, etc;
- Terminal building and apron;
- Air traffic control building & tower;
- Freight Facility;
- Supporting Infrastructure facility;
- Auxiliary Facility (office building, staff quarters, etc); and
- Storm water reuse system and ground aircraft auxiliary power unit.

Intermediate outcomes

The airport became operational on May 28, 2017.

- At project close (December 2018), five commercial airlines were connecting Shangrao to eight destinations: Beijing, Shenzhen, Qingdao, Huizhou, Chengdu, Zhoushan, Kunming and Harbin.
- The number of airplanes taking-off/landing increased from 1634 (May 28 to December 31, 2017) to 4512 in 2018. During the same period, number of passengers (in/out) increased from 146,700 to 375,000, and cargo shipped increased from 5.4 tons to 121 tons.
- Average passenger occupancy (% to the total number of seats) was 78% in 2018.
- In April 2019, four additional routes were opened from Shangrao to: (i) Sanya, a tourism city in Hainan Province, travel time was reduced from 12 hours to 2.5 hours; (ii) Jinan, capital city of Shandong Province, travel time was reduced from



6 hours to 1.75 hours; (iii) Guiyang, the capital city of Guizhou province, travel time was reduced from 7 hours to 2.25 hours; and (iv) Ningbo, a major city in Zhejiang province, travel time was reduced from 3.5 hours to 1.3 hours.

Outcomes

This objective was fully achieved, **and its efficacy is rated high**. There was substantial reduction in travel time between Shangrao and major destinations. The target for travel time reduction was exceeded, actual reduction was 45% compared to the target of 27%, by end 2018 (the comparator mode of transport was the shortest travel time before the airport's opening, which was: (i) a combination of a flight to the nearby airport from the major cities and ground transport; and (ii) rail transport). There were daily flights from Shangrao to Beijing, Huizhou, Shenzhen, Qingdao, Chengdu, while flights to Kunming and Harbin were thrice a week.

Rating
High

OBJECTIVE 2

Objective

To demonstrate the environmental sustainability of the development and operation of the Shangrao Sanqingshan Airport.

Rationale

Theory of Change.

The theory of change for this objective was that the projects technical assistance in developing Green Airport concept and implementation of the Bank's Environmental Management Plan would support environmentally friendly airport design, construction, and operation. This would result in developing a Green Airport. Upon completion, Shangrao Sanqingshan Airport would be recognized as "Green Airport" through an established recognition process.

Outputs

The PMO prepared the "Shangrao Sanqingshan Green Airport Design Guidelines" and the "Green Airport" concept was incorporated in the design of the airport.

- The Sanqingshan Airport was designed with energy efficient architecture. This included natural ventilation, double glass facades, and large roof overhangs to protect it from the sun.
- The airport layout was also energy efficient. The terminal and runways were designed so as to provide the most direct route to reduce taxiing time, thereby saving fuel.



- A ground aircraft auxiliary power unit was established to reduce fuel use. This system operates as an external power source for the aircraft.
- A storm water reuse system was setup, whereby storm water is treated and collected in a water tank under the airport parking lot. This water is used for washing the airport structure, pavement, watering plants, and for flushing in restrooms.
- The airport is now using energy efficient equipment such as LED lights, Pre-Conditioned Air (PCA) unit to provide heating or cooling to the aircraft, and intermittent functioning modes for elevators, escalators and pedestrian conveyors.
- Ground Source Heat Pump (GSHP) system was installed to convert the energy source for heating and cooling the Airport Terminal from oil-fired boilers with large air handling units to a new geothermal system.

Outcomes

This objective was fully achieved, **and its efficacy is rated high**. The PDO indicator "*Shangrao Airport recognized as "Green Airport" through established recognition process*" was achieved. The airport was awarded **Excellence in Design for Greater Efficiencies** (EDGE) certificate on January 21, 2019. EDGE, an innovation of IFC, is a green building standard and a certification system for designing green within a local climate context (www.edgebuildings.com). According to the 'EDGE' evaluation, the Shangrao Sanqingshan airport achieved 24% energy saving, 42% water saving, 38% building materials embodied energy saving, and 24% operational CO₂ saving.

The project supported substantial reduction in energy consumption of the terminal building. The Technical Assistance Report on the Green Operation of Shangrao Sanqingshan Airport (prepared under the project and the Project Team informed IEG that the report was completed in December 2018) found that the energy consumption per unit area of the terminal building was 40% lower than the maximum national value (ICR para 29). Also, energy consumption at Shangrao airport was 20% lower than two other airports in Jiangxi province namely Yichun Airport and Jingdezhen Airport.

This was a demonstration project, to showcase "Green Airport Design" in China and the project supported local authorities to become familiar with the concept and technologies of "Green Airport". Two workshops were organized on Green Airport design, planning, construction and operation. In total, 150 representatives attended these workshops from CAAC, other airports, and various airport constructions, consulting and engineering companies. Green Airport design guidelines were prepared as well as a technical study reporting the project experience and lessons learnt. Green Airport design guidelines were prepared as well as a technical study reporting the project experience and lessons learnt (ICR para 43 & 73). The Bank team also invited several international aviation experts to join Bank missions or the workshops to introduce global best practices. The concept of green airport was well disseminated, and local institutional capacity was improved with a better understanding of "Green Airport" techniques and its sustainable benefits (ICR para 43).



The management consultancy to develop the airport operational model and support to SSAC was dropped since it was agreed instead to adopt a PPP approach. An operational concession agreement was signed between SMG and the Jiangxi Airport Group (JAG, which currently operates all seven airports in Jiangxi), to operate the Shangrao airport (ICR para 55).

Rating
High

OVERALL EFFICACY

Rationale

The project fully achieved its objective to improve airline connectivity in northeastern Jiangxi Province and to demonstrate the environmental sustainability of the development and operation of the Shangrao Sanqingshan Airport.

Overall Efficacy Rating

High

5. Efficiency

Economic Efficiency

At appraisal, the Economic Internal Rate of Return (EIRR) was calculated for the airport infrastructure component. The main benefits were to the air passengers since the connectivity to Shangrao would be enhanced. The benefit that were quantified was the value of travel time saving of (a) existing air passengers, (b) existing train passengers who would shift to use Shangrao Sanqingshan Airport, and (c) induced demand, over the assumed project life of 20 years. The costs of the project were the capital investments and operation cost.

The *ex-ante* EIRR was 17.1% and the Net Present Value (NPV) at 12 percent discount rate was 172.5 million RMB. Sensitivity analysis (assuming 20% benefit decrease, 20% cost increase, and both happening) showed that EIRR was higher than the discount rate of 12% for all scenarios.

The *ex-post* EIRR used the appraisal methodology and the EIRR was 17.8%, which is very close to the *ex-ante* EIRR of 17.1% (ICR para 33). The *ex-post* NPV was 448.9 million RMB, higher than the appraisal NPV of 172.5 million RMB. It should be noted that the assumptions made in the ex ante analysis were less complex than used in the more sophisticated analysis at



completion. Compared to the parameters used in the PAD, the benefit per air passenger is higher than was originally expected, while the modal shift from rail to air was also greater than expected.

The Financial Internal Rate of Return was estimated at 8.54% (ICR page 37). Operating subsidies are small in comparison to the forecast budgetary revenue of the local government.

Administrative Efficiency

The ICR reports (para 38) that after loan effectiveness, the PMO was quick in contracting out works, and throughout implementation the disbursement rate was higher than forecast in the PAD. The construction of the airport was completed about one year earlier than anticipated at appraisal. There were no financial or procurement issues.

There was a cost overrun for the airport infrastructure component - actual cost was US\$121.5 million compared to the appraisal estimate of US\$100.7 million. The project team explained that the cost overrun was mainly caused by the change in terminal building design and site preparation. At appraisal, the terminal was designed as a one-story building. However, before implementation, the local authorities decided to build a two-story building to accommodate more passenger volume. Therefore, the cost increased from US\$10.71 million at appraisal to US\$25.60 million at completion. Site preparation fee also increased from US\$13.54 million to US\$23.03 million due to more challenging than expected geographic conditions and to land expansion. The reason for such expansion may have been additional parking but is not elaborated upon in the ICR.

The loan closed without requiring an extension and was fully disbursed.

The overall efficiency is rated **substantial**.

Efficiency Rating

Substantial

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

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	<input type="checkbox"/>	17.10	93.00 <input type="checkbox"/> Not Applicable
ICR Estimate	<input type="checkbox"/>	17.80	95.00 <input type="checkbox"/> Not Applicable

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



6. Outcome

The project objectives were highly relevant to the Bank strategy and government priorities. The relevance of objectives is rated high by IEG, whereas the ICR rated it as substantial. A substantial rating, however, does not reflect the crucial importance of this demonstration project in support of China's strong thrust towards carbon reduction, which is in line with its commitments made at the Paris Climate Agreement. The project fully achieved its objective to improve airline connectivity in northeastern Jiangxi Province and to demonstrate the environmental sustainability of the development and operation of the Shangrao Sanqingshan Airport. Efficacy is rated high. Efficiency is rated substantial. Overall, project outcome is rated highly satisfactory.

a. Outcome Rating

Highly Satisfactory

7. Risk to Development Outcome

Operational Risk. The operational risk is low as Shangrao Municipal Government (SMG) signed an operational concession agreement with the Jiangxi Airport Group (JAG, which currently operates all seven airports in Jiangxi), to operate the Shangrao airport (ICR para 55). The SMG established Shangrao Municipal Civil Aviation Development Bureau (SMCADB) to be responsible for airline marketing and related management works, and assigned the PMO Director as the director of the SMCADB. Most of the PMO staff were also re-assigned to the SMCADB.

Financial Risk. There is a low risk that financial resources for operations and maintenance of the airport will not be adequate. The Project Team clarified that Shangrao Airport is expected to cover its operation cost from operation revenue.

The ICR reports (para 77) that SMG provided an operational subsidy of RMB27 million to SAOC. The Project Team clarified that this RMB 27 million was to subsidize for the operation loss and various preparatory aspects before the airport became operational.

Institutional Risk. The institutional risk is low as the project improved the institutional capacity of the local civil aviation bureau, including improved technical, project management and business development skills, and improved collaboration between various sector stakeholders.

8. Assessment of Bank Performance

a. Quality-at-Entry



The quality at entry was **highly satisfactory**.

- The PDOs were realistic and clearly formulated and were in line with the Bank and country priorities.
- The project design incorporated the best practice in technology i.e. "Green Airport" design. The project was aimed as a green airport demonstration for other feeder airports in China. The task team and the PMO jointly held several "Green Airport" workshops, and prepared the "Shangrao Sanqingshan Green Airport Design Guidelines", which listed requirements for the general plan, deck bridge facilities, and comprehensive rainwater and sewage utilization system.
- The readiness for implementation was strong with full support from all stakeholders. This facilitated the rapid take-off of civil works after the loan was declared effective in July 2013.
- The risks were adequately identified during preparation, including (i) the capacity weakness of the PMO, (ii) inadequate counterpart funding from the national government, and (iii) delays in implementing the Green Airport concept. The risks were mitigated by procuring project management consulting services and securing commitment from Civil Aviation Administration of China (CAAC) and the National Development Reform Commission (NDRC) for funding.
- The project's results framework was based on a clearly defined PDO, and was supported by measurable performance indicators.
- Appropriate safeguards policies were triggered.
- The project supported gender-balanced consultation during the preparation of the resettlement plan. The Project promoted gender-balanced access to infrastructure investments and to training. Among the 104 staff that were hired by SAOC for the operation of the airport, 32 are female (ICR paras 40 and 41).

Quality-at-Entry Rating

Highly Satisfactory

b. Quality of supervision

The quality of supervision was **highly satisfactory**.

- There was continuity in the Bank Team, with only two TTLs during implementation. The TTLs were field based and maintained a strong working relationship with the SMG and PMO. The Bank team provided technical support



on the TOR for the TA study on Green Airport design and provided feedback on the draft report. The Bank Team also invited international experts and arranged two workshops on Green Airport design. The Bank Team also provided training on Bank procurement requirements.

- The ICR reports (para 74) that social and environmental specialists satisfactorily supervised environmental and social safeguards through field visits and ensured timely submission of the external monitor's report on safeguard implementation. Compliance with financial management and procurement was monitored satisfactorily by the Bank specialists from the Beijing office.
- Under Component 2, the project had proposed to hire a management consultant to develop the airport operation model and support SSAC to prepare and implement a Human Resource Development plan, and an Operational and Financial Manual.
- During implementation, the Bank and the Borrower agreed instead to adopt a Public-Private Partnership (PPP) approach, based on similar airport experiences in China. An operational concession agreement was signed between SMG and the Jiangxi Airport Group (JAG, which currently operates all seven airports in Jiangxi), to operate the Shangrao airport (ICR para 55).
- The Bank team also invited several international aviation experts to join Bank missions or the workshops to introduce global best practices. The concept of green airport was well disseminated, and local institutional capacity was improved with a better understanding of "Green Airport" techniques and its sustainable benefits (ICR para 43).
- The project was completed one year ahead of schedule.

Quality of Supervision Rating

Highly Satisfactory

Overall Bank Performance Rating

Highly Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

The PDO indicators 1 *Travel time reduction between Shangrao and major destinations* adequately measured the achievement of the objective - to improve airline connectivity in northeastern Jiangxi Province. The methodology for the calculation of PDO indicator 1 was clearly described in the PAD Annex 1. The arrangements for data collection,



compilation, analysis and reporting were laid out in the PAD. The PAD (para 26) mentioned that the PMO would coordinate with relevant agencies in collecting data required for monitoring and evaluation of outcomes.

The PDO indicator 2 "Shangrao Airport recognized as "Green Airport" through established recognition process" was adequate in measuring the objective - to demonstrate the environmental sustainability of the development and operation of the Shangrao Sanqingshan Airport.

The main shortcoming of M&E design was that it did not have any indicator to measure the progress towards achieving the institutional development component.

b. M&E Implementation

The ICR reports (para 61) that the PMO collected real-time data from Shangrao Airport Operation Company (SAOC) records after the airport became operational in May 2017. For intermediate indicators, the Quarterly Progress Report was used as a basis to update the Results Framework. The ICR notes (para 63) that the quality of M&E data was good.

c. M&E Utilization

The ICR reports (para 62) that the M&E data was used to improve project management and implementation, especially during the mid-term review and for the application of the "Green Airport" concept.

M&E Quality Rating

Substantial

10. Other Issues

a. Safeguards

Environmental Safeguards

The project was classified as category A for environmental assessment purposes and **environmental assessment OP/BP 4.01** was triggered. Construction was expected to cause temporary impacts on the surrounding environment, including vegetation loss, soil erosion, noise of machinery and trucks, vibration, dust, and wastewater (PAD para 51). All environmental safeguard documents (i.e. Environmental Assessment (EA), Environmental Management Plan (EMP), and Environmental Management Framework (EMF)) were prepared and were disclosed locally in September 2012 and at the Infoshop in October 2012.

The ICR reports (para 65) that the EMP was implemented satisfactorily.



Social Safeguards

The project triggered **Involuntary Resettlement (OP/BP 4.12)** safeguards policy as construction would require (i) acquisition of 150 hectares of village land (including 26 hectares of cultivated land) which would affect about 2500 people from 500 households; and (ii) demolition of 5760 square meters of existing structures which would affect 76 people from 16 households. The Resettlement Action Plan (RAP) and the Resettlement Policy Framework (RPF) were prepared and disclosed to the local people on September 20, 2012 and the English versions of the documents were sent to the Infoshop on October 30, 2012 (PAD para 44).

The ICR reports (para 67) that actual land acquisition was slightly higher than planned due to detailed measurements during implementation. The project carried out acquisition of 2,913 mu (or 194 hectares) of village land and the demolition of 7,708 square meters of existing structures which affected 21 households. Land acquisition and compensation was carried out in accordance with RAP (ICR para 67).

The Project Team provided a detailed table of land acquisition comparing planned and actual figures as the units were different in PAD and ICR.

The 4.65 km link road to the airport (which was paid for by the Borrower outside the project) was included in the RAP for safeguard purposes. There were no delays in the payment of appropriate compensation. The project also triggered **Physical Cultural resources (OP/BP 4.11)** safeguards policy as field surveys for the airport site found 137 household graves. The ICR reports (para 66) that the relocation of household graves was carried out in accordance with the RAP.

	Quantity		Increase (%)	Reason
	RAP Planned	Actual		
Land Acquisition				
1. Total area (mu)	2241.9	2913	30	1. Local design changes; lighting construction increased land acquisition; land acquisition for less than piecemeal 0.3 acres of the remaining area after land acquisition; inconvenience arable land area blocked by the airport also increased land acquisition; 2. 450 acres of land reserved by military requirements
2. arable land	383.75	506.52	32	
Demolition				
1. Households	16	21	31	Local design changes, lighting construction increased land acquisition;
2. area (square meters)	5760	7708	34	Local design changes, lighting construction increased land acquisition;



3. Population	76	96	26.32	Local design changes, lighting construction increased land acquisition;
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b. Fiduciary Compliance

Financial Management (FM). The ICR reports (para 68) that project's financial management was satisfactory. The Bank's team communicated the Bank's FM requirement to the Finance Bureau and provided timely advice. The Project Management Office (PMO) financial staff was proficient and the Interim Financial Reports (IFRs) and audit reports were submitted in a timely manner. All audit reports were unqualified and internal control issues detected by the audit reports were fully addressed by the PMO.

Procurement. The procurement capacity was enhanced through (a) training provided by the Bank (or institutions acceptable to the Bank) throughout project preparation and implementation, (b) hiring of a procurement agent and project management consulting company by the PMO, and (c) designated procurement officer and contract management staff, who remained throughout project implementation. The ICR reports (para 68) that the procurement was carried out in accordance with Bank procurement policies, procedures and requirements.

c. Unintended impacts (Positive or Negative)

The ICR notes (para 47) that the implementing agency adopted several new technologies during project implementation, which greatly improved the efficiency of project management and airport operation, and lowered project costs. These includes:

- Use of an unmanned aerial vehicle mounted with a camera to monitor construction progress and soil/water conservation during airport construction. This innovative approach complemented normal supervision and allowed the PMO and the supervision engineers to monitor the real-time status of implementation in inaccessible areas of the project site.
- Use of the new technology of red sandstone construction during the rainy season. This was based on local geological conditions, and helped save more than RMB10 million on airfield foundation construction.

d. Other

11. Ratings



Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Satisfactory	Highly Satisfactory	The project objectives were highly relevant to the Bank strategy and government priorities. The relevance of objectives is rated high by IEG, whereas the ICR rated it as substantial. A substantial rating, however, does not reflect the crucial importance of this demonstration project in support of China's strong thrust towards carbon reduction, which is in line with its commitments made at the Paris Climate Agreement. The project fully achieved its objective to improve airline connectivity in northeastern Jiangxi Province and to demonstrate the environmental sustainability of the development and operation of the Shangrao Sanqingshan Airport. Efficacy is rated high. Efficiency is rated substantial. Overall, project outcome is rated highly satisfactory.
Bank Performance	Satisfactory	Highly Satisfactory	No shortcomings were identified in quality at entry and quality of supervision.
Quality of M&E	Substantial	Substantial	
Quality of ICR	---	Substantial	

12. Lessons

Lessons identified in the ICR are summarized and rephrased below:

- **Technical Assistance reports can play an important role in dissemination of the benefits of the Green Airport approach for future airport expansion in China and around the world.** The Technical Assistance reports supported under the Project not only documented the good design, implementation and operational approaches that the airport conducted for carbon reduction, but also provided several



recommendations to improve performance. The M&E system also played a key role in incentivizing the local implementing agencies to obtain the EDGE certification.

- **A public-private partnership operation model can improve the efficacy of the airport operation.** In this project, SMG signed an operation concession agreement with the Jiangxi Airport Group (JAG) to operate the Shangrao airport. This greatly improved the efficacy of operations and management.
- **Use of new technologies can be used to enhance project management and supervision.** New technologies adopted during project implementation, including the use of an unmanned aerial vehicle mounted with camera for supervision, and red sandstone construction during the rainy season, greatly improved project management and operational efficiency, and reduced project costs.
- **Early procurement planning, including the identification of Bank financed activities, as well as advanced contracting can facilitate successful implementation.** The project experience demonstrates that the timely award of the most important airfield works contract, which was procured through International Competitive Bidding using prequalification, was key to successful implementation

13. Assessment Recommended?

Yes

Please Explain

This is a demonstration project, so a field study would be useful in assessing the actual benefits this project brought to the region especially in terms of stimulating development and would also help identify the cost involved.

14. Comments on Quality of ICR

The ICR was candid and internally consistent and provided useful lessons. It is evaluative and provides detailed tables on travel time to major destinations. The economic and financial analysis as detailed in Annex 4 of the ICR is excellent.

However, there are some minor shortcomings. The ICR sets out the theory of change in a graphical way, but does not provide a narrative. The ICR would have also benefited from a more articulate linking of the project's theory of change and how this related to the various project achievements. The discussion on the implementation of the environmental safeguard could have been more detailed. On Involuntary Resettlement safeguards, the units for land acquisition are different, making the comparison difficult.



The ICR reasons for higher actual cost (compared to the appraisal estimate) for the airport component could have been stated more explicitly but were found in the detail of the efficiency analysis.

a. Quality of ICR Rating

Substantial