People’s Republic of China | Transport

The Yunnan Baolang Expressway Company’s staff capacities in In 2003, the PRC, with assistance from the Asian Development Remoteness and an underdeveloped road network hampered safety challenges while protecting the natural environment. The project has not only contributed to increased incomes in Yunnan, it also demonstrated how an expressway—when harmonized with the terrain and culture of the project site—can improve connectivity, employ advanced safety measures, and protect the environment. The Yunnan Baolang Expressway Company’s staff capacities in expressway design, construction, and operation were rigorously enhanced through training and knowledge application. These skills remain in use today as the staff were absorbed by the Yunnan Highway Development and Investment Company, which is responsible for ensuring high standards of road construction in Yunnan.

Background

Yunnan is easily the most culturally and biologically diverse province in the People’s Republic of China (PRC). It has snow-capped mountains, clear lakes and rivers, tropical environments teeming with diverse wildlife, and breathtaking heritage spots. It is also home to 25 of the 56 recognized ethnic groups in the country. Unfortunately, Yunnan is also among the PRC’s least developed provinces. Majority of Yunnan’s 45 million people, who mainly rely on agriculture for livelihood, are poor. In 2004, per capita gross domestic product (GDP) was only ¥6,703—about 64% of the PRC’s total average.¹

Yunnan’s remoteness and lack of good road connectivity contributed to this poverty. Not only did these factors severely hamper people’s mobility and access to basic services; they also limited investment and expansion of nonfarm opportunities.

To address this problem, the PRC and the Asian Development Bank (ADB) launched the Western Yunnan Roads Development Project in 2003, which aimed to connect the rural, mountainous areas of Western Yunnan to the PRC’s regional centers, as well as to the Greater Mekong Subregion. The Yunnan Baolong Expressway Company (YBEC), a subsidiary of the Yunnan Highway Development & Investment Company (YHDIC), served as implementing agency.

Approach

Building a Last-Mile Connection. The project linked the Baoshan Prefecture to Longling County in Western Yunnan through a 77-kilometer (km) four-lane expressway atop mountain ranges while upgrading 294 km of local roads to improve access to poor and ethnic minority areas. By building the expressway in a remote site along with local roads that feed into it, local businesses as well as cross-border trade and traffic between Myanmar and Yunnan were stimulated. It also provided the 11 poorest townships in Western Yunnan with all-weather access to markets and social facilities. This last-mile connectivity expanded the benefits of the expressway to more people.

Innovative Highway Design. This project was by no means a simple highway construction. The project employed innovative expressway design and implementation because severe geological challenges threatened road construction and safety. The expressway burrowed through several mountains and crossed over valleys, rivers, and tributaries. It flowed through sharp curves and steep inclines on a surface of rocky mountains with a very fractured, highly variable surface, and erosion-prone slopes. It had inclines averaging 20 to 45 degrees,² which make for continuous climbs or descents in many areas of the road. The expressway strategically placed tunnels and bridges to adjust to the site’s treacherous terrain, which has 31 faults, 48 landslide-prone areas, and 8 karst subsidence areas.³ At the end of construction, the expressway had 237 bridges, 203 passageways, four separated channels, and nine double-arch tunnels.

Environment Protection Measures. The expressway covers a soil erosion prevention area. It also runs through Gaoligong Mountain, part of the Gaoligong Mountain National Nature Reserve—a

3 Refers to the collapse, sinking, or caving in of a karst landscape, a land form resulting from the dissolution of soluble rocks such as limestone, dolomite, and gypsum.
United Nations Educational, Scientific and Cultural Organization World Heritage Site, and a World Wildlife Fund protected area. Thus, the project integrated environmental protection measures into its design and construction. It ensured that digging and cutting activities were in sync with soil erosion protection activities. The main works were complemented by slope protection, quickly followed by replanting and landscaping activities to keep the soil firmly in place. In some instances, preliminary protection activities such as setting up of drainage ditches, trenches, and arresting walls came before construction activities. The project also built corridors to facilitate migration of animals. In addition, it integrated the scenery into the design. To promote local culture, tourism, and businesses, the expressway’s route was dotted with rest areas where motorists can stop to rest, dine, and enjoy the view.

Technologically Advanced Safety Features. The project made use of multiple safety protection measures at critical high-risk locations. First, it sought the active engagement of road administration police and automotive mechanical technicians to help identify areas with potential safety problems. Their inputs supplemented the project’s three-dimensional driving simulation system to test driving perception and to further determine the safety black spots. The project also made sure that traffic signs and guardrails were sufficient. Reinforced road signage were provided at tunnel entrances, in the tunnels, at sharp curves, and at the exits. Red road marks were applied at sharp curves and fog signs were provided in foggy areas. To address the expressway’s steep descents, 11 access ramps were strategically positioned along its sides. A solar-powered traffic monitoring system, which included an emergency communication system, was also provided along the project expressway.

RESULTS

Road to Progress. The Baoshan–Longling Expressway was officially opened in September 2008. It connects with the Dali–Baoshan Expressway and has three interchange entries. It reduced travel time between Baoshan to Longling from 4–5 hours to roughly an hour and a half. This has likewise drastically shortened the journey to various ports. This significantly lowered transport and vehicle operation costs and provided poor communities with better access to townships, markets, and public services; and better opportunities for off-farm employment (footnote 4).

In addition, upgrading of the local feeder roads improved poor villagers’ access to markets, social facilities, and services. All villagers in the project area can now reach the nearest market and middle school within 30 minutes and the nearest clinic in 10 minutes. The upgrades also stimulated bus operations. By 2008, 316 passenger bus lines were in operation, including 212 rural bus lines, which represents a 60% increase over 2004 numbers. These bus services covered 100% of the townships and 73% of the villages.

Businesses also benefitted from the expressway. Freight traffic increased to 197,400 tons in 2008 from 28,200 tons in 2004, and the number of passengers rose to 11 million from 8 million in 2004.

Reduced Road Crashes. Before the expressway was completed, 34 crashes were recorded in the Traffic Police Office of the Public Security Bureau of Baoshan in 2006, and 23 in 2007. These were further reduced to 16 in 2008 and 15 in 2009. The number of casualties due to road crashes also gradually decreased each year—from 90 (2006) to 54 (2007) to 32 (2008) to 22 (2009).

Increased Incomes. The expressway has helped perk up business and employment in the project site. From 2004 to 2008, the gross domestic product growth averaged 19% per year in the project area, and roughly 18% per year in the Baoshan Prefecture. In 2008, Baoshan’s total income more than doubled its 2004 level. Total retail sales jumped by 86% from 2004. From 2004 to 2008, investment in fixed assets increased by 262% in Baoshan, 181% in Longyang, and 179% in Longling, in Western Yunnan (footnote 4). Between 2004 and 2008, rural poverty in the project area also declined markedly—by roughly 9% in Baoshan, 8% in Longyang, and 16% in Longling. Meanwhile, per capita net incomes rose by 14%, 12%, and 12%, respectively.

Further, the project empowered staff of YBEC to build their capacity in expressway design, construction, and operation, including road safety and geohazard treatment, through training and knowledge application. Once the project was completed, YBEC was dissolved and the staff were absorbed by the mother company, YHDIC. They now practice what they learned from the project as they discharge YHDIC’s mandate of supervising, constructing, and managing all high standard roads in Yunnan Province (Class I, Class II, and Expressway).

The project clearly showed that by integrating innovation and environmental protection in connectivity efforts, the benefits one may gain can go beyond expectations. The project increased access, ensured road safety, and preserved nature while increasing the poor’s income—showcasing a comprehensive and sustainable approach to improving connectivity.

Related Links


KNOWLEDGE CONTRIBUTOR

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