Transport in China
An Evaluation of World Bank Assistance

January 11, 1999

Sector and Thematic Evaluations Group
Operations Evaluation Department
Abbreviations and Acronyms

ADB  Asian Development Bank
BOT  Build Operate Transfer
CCTA China Communications and Transportation Association
CIECC China International Engineering Consulting Corporation
CTKM Converted Ton Kilometers
DECO Diversified economy companies
ERR Economic Rate of Return
GDP  Gross Domestic Product
GEF  Global Environment Facility
ICR  Implementation Completion Report
IDA  International Development Association
MOC  Ministry of Communications
MOF  Ministry of Finance
MOR  Ministry of Railways
MPO  Metropolitan Planning Organization
NHS  National Highway System
NTHS National Trunk Highway System
PCD  Provincial Communications Department
PID  Policy and Institutional Development
QAG  Quality Assurance Group
RIS  Railway Investment System
RMF  Road Maintenance Fee
SAR  Staff Appraisal Report
SMTP Shanghai Metropolitan Transport Project
SDPC State Development and Planning Commission (formerly SPC)
SPC  State Planning Commission (now SDPC)
TMIS Transport Management Information System
VPF  Vehicle Purchase Fee
MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT

SUBJECT: The Transport Sector In China: An Evaluation Of World Bank Assistance

Attached is the Operations Evaluation Department (OED) report *Transport in China: An Evaluation of World Bank Assistance*.

The report evaluates the performance of World Bank lending and non-lending activities in China’s transport sector. It covers most important modes of transport: roads and highways, railways, urban transport and ports. The Bank contributed through its lending and advice on a broad range of technical, managerial and policy issues.

Currently the institutional rules and organizational structures are in the forefront of the lending program. These include organization, management, and financing of roads; separation of railway operations and regulatory functions; privatization; and pricing, competition, deregulation and decentralization in the sector. The complexity of this restructuring will make the Bank’s future projects much harder to define, approve and review, and measuring results will be more difficult than in the past.

The Bank-supported projects show evidence that process management and technology adoption have been on a steep learning curve. Program formulation, project selection and management; technical standards and quality assurance procedures; experimentation with and adoption of new technologies; and consideration of environmental, resettlement and traffic safety issues are all tackled with legitimate programs.

Whether planned or not, the most important impact of the Bank’s support has been on institutional development and financing. It is too soon to judge their full results, positive and negative, but progress—uneven across the modes—has been made. First, autonomy and competition are being introduced in ports; port management has extensive rights and responsibilities, and there is limited freedom for pricing. Second, decentralized and sound road management is replacing the construction orientation of the Provincial Communications Departments (PCD), and innovative (although expensive) highway financing strategies are being introduced; new organizational and institutional developments to counteract possible or likely undesirable side-effects of the new financing strategies are slowly taking place in PCDs. Third, founded on thorough studies and technological development, the complex task of railway restructuring has begun. Fourth, the product mix for ports, rail, and roads, has been comprehensive and pertinent, and has maintained a keen borrower interest. Finally, China’s
urban transport and regional development issues have begun to be addressed—a challenge of enormous proportions. Across the modes the future agenda is on the correct course, although it has yet to be integrated and urban transport awaits development of the right “product.”

The report discusses extensively areas where the Bank could effectively focus its future activities in the sector and where caution and careful forethought is advised to maintain sustainability of new institutional arrangements or financing practices.

Implicit in the report is an assessment of Bank and borrower performance. Depending on the project it has ranged from satisfactory to highly satisfactory. Although there have been setbacks and resistance to change on both sides, the program’s experience is very positive. The accomplishments to date are due to both the motivated and determined borrower and to skillful project management by the professionals in the Bank and in China.

Attachment
# Table of Contents

**Executive Summary**  
1

1. **Introduction**  
   The Political Economy of Reform in China  
   Methodology  
   Structure of the Report  
5

2. **Highways and Roads**  
   Sector Objectives  
   Physical Results  
   Policy and Institutional Development Results  
   Highway Administration, Private Financing of Highways  
   Borrower Views  
   Current Agenda and Recommendations  
8

3. **Urban Transport**  
   Objectives  
   Accomplishments  
   Current Agenda  
   Recommendations  
12

4. **Railways**  
   Objectives  
   Accomplishments  
   Borrower Views  
   Financing Railway Construction to Expand Capacity  
   Technical Improvements with System-wide Application  
   Studies Dealing with Costing and Tariffs  
   Redefining the Government-Railway Relationship, Housing Reform, and Labor Productivity  
   Current Agenda and Recommendations  
15

5. **Ports**  
   Objectives  
   Accomplishments  
   Current Agenda and Recommendations  
19

6. **Cross-Cutting Issues and Themes**  
   Institutional Framework  
   User and Shipper Views  
   Cross-Cutting Policy Adjustment Issues  
21

7. **Program Relevance, Efficiency, Efficacy, and Bank and Borrower Performance**  
27
Annex A: China's investment in the transport sector and World Bank loans disbursed 31
Annex B: Evaluation Detail: Highways and Roads 33
Annex C: Evaluation Detail: Urban Transport 53
Annex D: Evaluation Detail: Railways 59
Annex E: Evaluation Detail: Ports 77

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Preface

The World Bank's Operation Evaluation Department (OED) evaluated the relevance, efficacy, and efficiency of its transport sector program in China from 1984 to 1997, a period when China was fundamentally changing its transport sector. The evaluation focused on accomplishments, learning and issues of current importance to provide intelligence for the Bank's work in China today and tomorrow. The review shows that the projects' economic rates of return normally exceed appraisal estimates and the efficacy of the program is on a par with contemporary and historical experiences in developed countries. Although there have been setbacks and resistance to change in both sides, the program's experience is very positive. The accomplishments are due to both the motivated borrower and skillful project management by the professionals in the Bank and in China.

The evaluation covers the modes of transport: roads and highways, railways, urban transport and ports, but not waterways where Bank work is just beginning. China's experience in utilization of new technology, institutional development, and corporatization of transport infrastructure are particularly relevant. The Bank contributed through its lending and advice on a broad range of issues: pavement management systems and engineering technical specifications; allocation of resources between maintenance and construction; investment prioritization; use of telecommunications; port management and port autonomy; innovative financing arrangements; and environment protection and resettlement procedures.

Currently the institutional rules and organizational structures are in the forefront of Bank's lending. These include organization, management, and financing (of roads) of Provincial Communications Departments; separation of railway operations and regulatory functions; privatization; competition, deregulation and decentralization; and other aspects of modern transport organizations. The complexity of restructuring China's transport sector organizations and institutions will make the Bank's future projects much harder to define, approve and review, and measuring results will be more difficult than in the past. To underscore the transport program as the unit of analysis and evaluation, it is suggested that the Bank and the borrower begin to track each transport mode's performance using sector wide performance indicators.

The study is based on Bank reports, project files, interviews of bank staff and two special studies by China International Engineering Consulting Corporation (CIECC). The evaluation team made one mission to China in May 1997 and interviewed Chinese officials and sector representatives and Bank staff in China. Their cooperation and valuable assistance are gratefully acknowledged.
Executive Summary

1. Since 1978 when it began its “open-door” policy, China has made extensive investments and institutional reforms to align its transport system with the demands of a market economy. The Bank’s share of investment in China’s transport sector historically has been small, averaging about 5 percent in the period 1980–95. That share of investment has been declining since its peak of 14 percent in 1994. This decline is likely to continue even if Bank lending remains at the current volume. Therefore, the Bank’s most significant future contribution will not come from financing transport projects but from efforts to help China address broad sectoral issues of institutional development, organization and management, and financing. Linked to these broad themes are the issues of environmental protection, poverty alleviation, and regional equity, all of which have a strong relationship to transport.

2. The objective of this evaluation study, then, is to evaluate the Bank’s assistance program—lending and nonlending—to China’s transport sector. Doing so was expected to produce useful lessons about the effects of the Bank’s program on policy and institutional frameworks and on the evolution of sector organizations. The study reviewed projects since the beginning of the Bank’s involvement in China’s transport sector, but emphasized recent experiences and current issues.

3. The study’s broad focus on an entire economic sector reflects OED’s emphasis on program-wide review of Bank activities and its shift toward making the country and sector the units of analysis. The “counterfactual” for the Bank involvement in China’s transport sector is indeterminate because the Bank’s lending program is such a small percentage of overall investment in the sector. The Bank’s influence is instead viewed dynamically by examining the initial conditions in the sector, the problems solved through Bank assistance, the objectives within reach, and the Bank’s effectiveness in helping the client achieve agreed-upon objectives.

4. The evaluation covers the major transport modes and facilities—roads, railways, ports, and urban transport where the Bank has had some involvement. The coverage of each mode is proportionate to the level of Bank involvement. Therefore, in highways and railways, where there are strong ongoing programs, the discussion is deep and thorough. In urban transport, where there are only three ongoing projects and no completed projects, the discussion is forward-looking. In ports, where the Bank is no longer lending for standalone projects, the discussion is retrospective. The report considers modal issues in detail and makes recommendations for future activities in each mode. It also examines cross-cutting issues and assesses the relevance, efficacy, and efficiency of the transport sector program.

Highways and Roads

5. The Bank has built a strong program of investment in China’s highway sector that has historically addressed road construction and construction management issues. Today, traffic safety and maintenance are also of increasing concern. China has acknowledged the importance of these issues by developing programs in construction quality, construction supervision, road maintenance and traffic safety. These programs are being carried out in traffic institutes and are being practiced by Provincial Communications Departments (PCDs). These new concerns, together with the establishment of toll road corporations and signs of growing suburban sprawl, suggest that the construction and maintenance agenda that served China so well a decade ago needs to be expanded.
6. The Bank could help China to adjust by shifting its lending orientation to areas where the institution has a comparative advantage: management, financing, regional planning, and the organization of highway administrations. Other key issues that have not received sufficient Bank attention include institutional change to retain the benefits of decentralization; the question of restructuring the PCDs to enable them to address the complex issues they face; resource allocation between functional road classes, road programs, and geographic areas; and lessons learned from the West regarding urban sprawl and the need for regional planning concepts in the urban segments of the highways. The future may also see increased focus on poverty reduction. The logic for this would be that China has more options for financing highways in growth areas. Bank participation in less-developed areas therefore might be a key factor. Low-volume rural and village roads, for example, have largely escaped Bank attention. Although these not bankable under current institutional structures, they deserve a higher priority than they have so far received.

Urban Transport

7. The rate of urbanization and motorization in China make the country’s urban transport challenges enormous; infrastructure and services, and the relevant institutions, are stretched beyond their limits and outdated. China's urban transport problems will not be solved through isolated projects that focus on “low-cost” traffic management schemes. The Bank needs to develop an urban transport “product” suitable to Chinese cities. This product, coordinated through a metropolitan-wide organization, should approach the urban transport problems strategically and needs to encompass expanded road infrastructure network; citywide traffic system management; private sector participation in the financing and operation of urban transport infrastructure and services; and rationalized informal and nonmotorized services.

Railways

8. Bank-supported expansion of railway capacity in China has been very successful and beneficial to the client. The railway capacity expansion must continue, especially for improving intermodal facilities, processes, and the competitive environment. But the emphasis has decidedly changed to institutional development. The railway sector in China is evolving rapidly. This study was done in mid-1997 and has been updated to reflect current progress. The major issues, institutional in nature, identified in the report and the recommendations are and will remain relevant over the next several years. They represent a major challenge for the Ministry of Railways and the Bank. Due to the complexity of the Ministry of Railways restructuring, the Bank’s future projects in the railway sector in China will be much harder to define, approve, and review, and measuring results will become more difficult.

Ports

9. The Bank has played an important role in China’s port improvement. Equally important has been the role of a motivated borrower. The results of Bank-supported investment projects and institutional development have been beneficial and the impacts positive, especially in helping solve the problem of congestion, which would have threatened expansion of China’s foreign trade. With new management styles, operating systems, and equipment, and through effective Bank supervision, China’s ports have learned how to do business and substantially improve port performance in an environmentally sound way. The Bank should explore ways for continued
cooperation with China in port-related transport and management such as privatization, logistics, intermodal transport, inland waterways, and environment.

Cross-Cutting Issues

10. *Forward With One Spirit: A Strategy for the Transport Sector* (1997) outlines a possible institutional structure for the sector and describes policy proposals in five areas cutting across all modes: competition, investment, finance, environment and society, and institutions. These cross-cutting issues are addressed in the modal chapters and annexes of this report. The present study provides additional cross-cutting perspectives on institutional framework, user views, and selected cross-cutting themes that are emerging in the Bank’s transport sector program in China.

11. Together with financing, the most central cross-cutting issue in China is the transport sector’s institutional framework. The Bank’s strategy paper calls for the establishment of a Ministry of Transport and Communication by merging the Ministry of Communication and Ministry of Railways. The establishment of the MOTC, a desirable long-term goal, is a complex undertaking not only because of China’s size, the importance of the Ministry of Railways, and the unsettled state of urban transport but also because China’s complex political economy requires sequencing of decisions to preserve the rights of the provinces and the functions of the participating ministries during the transition. If the benefits from decentralized governance and autonomy of the provinces are threatened, resistance may develop. To prepare ground for the MOTC, *Forward with One Spirit* suggests that restructuring of MOR precede it. This study adds that urban transport must also be brought into the fold for MOTC be successful and functional.

12. Several technical issues also cut across all the modes in the Bank’s projects. Foremost among these are planning and programming of multiyear transport programs, environment and resettlement, intermodal coordination, and the introduction of new technologies. In all these areas the Bank’s lending program has had a markedly positive effect.

13. Users and shippers represent the marketplace. The study team interviewed members of the China Communications and Transportation Association and selected transport bureau representatives and shippers. Surveys done by others were used to corroborate the views. The interviewees generally wanted a more competitive environment: freer pricing and access to markets, improved vehicles and productivity, expanded physical capacity and provision of terminals, foreign capital, modern technology, and management expertise. The interviewees acknowledged that the Bank-supported projects have been worthwhile, led to improved services, and that the “market” is being recognized.

Program Relevance, Bank and Borrower Performance

14. The Bank’s transport sector program in China is sound. It has addressed and is addressing the relevant issues effectively, and the projects have been implemented efficiently. This accomplishment is due both to the motivated borrower and to skillful project management both in the Bank and in the client country.
1. **Introduction**

1.1 Since 1983 the World Bank has approved $6.7 billion in loans and credits—a quarter of its total lending to China—for 37 transport projects. As of fiscal year 1998, 17 projects have been completed and 20 are being implemented. Another 13 projects are scheduled to go to the Board within the next five years.

1.2 The largest portion of the Bank's lending has gone to highways (50 percent), followed by railways (33 percent), and ports and waterways (14 percent). Urban transport, for which the Bank started lending in 1991, accounts for 3 percent of the lending. Between 1980 and 1995, China invested nearly $55 billion on its transport network. Of this, the Bank disbursed nearly $3 billion, or 5 percent of China's total transport investment (Figure 1.1).

![Figure 1.1. Bank share of total transport investments in China (1984–95)](image)

Source: World Bank data, Annex A

1.3 This evaluation examines the development of roads, railways, ports, and urban transport in China. It describes how China has managed one of its largest endeavors and traces the evolution of its partnership with the Bank. The objective of the study is to evaluate the Bank's assistance program—lending and nonlending—to China's transport sector, particularly the effects the Bank has had on policy and institutional frameworks and on the evolution of sector organizations.

**The Political Economy of Reform in China**

1.4 Economic reform in China has had three stages: liberalization of the economy, integration with the world market, and administrative decentralization for regional development. The reform process began in the late 1970s, when farmers were first allowed to determine the composition and price of their produce. In the 1980s, China liberalized the manufacturing and service sectors.
The country's reform approach has maintained the existing planned economy while allowing development of a parallel market economy that will increase in importance over time. The participation of the private and cooperative sectors in the economic system has increased dramatically since the reforms started; the share of production from state-owned enterprises declined from 78 percent in 1978 to 34 percent in 1994. The process of reforming these enterprises is continuing.  

1.5 In 1980, the central government established Special Economic Zones in four southern coastal cities (Shantou, Shenzhen, Xiamen, and Zhuhai). The zones were given autonomy in approving foreign-funded enterprises and discretion over the collection of many taxes. The tremendous growth of the zones spurred other regions to demand and receive special privileges as well. Numerous cities and regions now have such privileges.  

1.6 The results of opening up the Chinese economy have been remarkable. A few statistics indicate the magnitude of the changes. The ratio of exports to GDP increased from 4 percent in 1978 to 23 percent in 1994. Export volume grew an average of 13 percent a year from 1980 through 1995, and imports grew at an annual average of 17 percent. Net foreign direct investment grew from $407 million in 1980 to $35 billion in 1995.  

1.7 Since the reforms began, China has begun a major devolution of decisionmaking authority from the central government to provincial and local governments. Provincial or local governments now plan and manage many economic activities. This has incited intense competition for resources and markets among provinces and jurisdictions. At the same time, it has enabled those provinces and jurisdictions to learn from one another. China has also begun regional development initiatives to redress economic disparities between provinces.  

1.8 China has historically underinvested in its transportation sector and in the institutional underpinnings of the sector. This has resulted in one of sparsest transport networks in the world for the geographic area and population it serves. Since 1978, China has addressed this shortcoming by making extensive infrastructure investments and putting in place substantial institutional reforms to align its transportation system with the demands of a market economy.  

Methodology  

1.9 The study used a participatory observation method consisting of five tools. The first was interviews with local officials involved in project preparation, appraisal, and implementation. The agencies they represented were selected in consultation with the Region, the borrower, and the  

1. At its September 12, 1997, Party Congress China said it plans to retain full ownership of 3,000 of its 370,000 state-owned enterprises. The rest will be left to merge, sell equity to employees, list on the stock market, or go bankrupt (Oxford Analytica, September 17, 1997).  

2. From 1980 to 1990 the economy grew at an annual average rate of 10 percent. From 1990 to 1995, the annual growth rate averaged nearly 13 percent. The growth of manufacturing has been even more remarkable: 11 percent a year from 1980 to 1990 and 17 percent a year from 1990 to 1995. The growth rate of agriculture declined from 6 percent from 1980 to 1990 to 4.3 percent per year from 1990 to 1995, reflecting the transformation of the Chinese economy from an agricultural to a non-agricultural base. The proportion of people engaged in agriculture declined from 71 percent in 1978 to 54 percent in 1994. China's rapid economic growth has brought with it a marked improvement in various human development indicators. Life expectancy, literacy, per capita income, incidence of poverty, and female participation in the labor force have all improved.  

local consultant. The individuals were selected by the agency. These interviews were complemented by site visits. The second tool consisted of surveys and interviews conducted by local consultants. The subjects of the surveys and interviews were selected by the consultants. The third tool was a series of Bank-sponsored seminars attended by officials of the Chinese central government and provincial governments. The fourth tool was interviews of Bank staff involved in operations and sector work and reviews of reports on the Bank's lending program in China. The fifth tool was interviews of important stakeholders in China's transport sector and review of reports prepared by them. The team observed the Bank's transport program in China from the perspective of the Chinese as well as the Bank and of domestic and international stakeholders. These collected observations were cross-compared to verify the information received. Finally, a Chinese consulting company conducted two case studies, one on low-volume rural roads, the other on the viability of emerging toll road companies. These studies had two objectives: to foster and develop evaluation capacity in China and to learn about these two important issues from the Chinese perspective.

1.10 The observation method was chosen because of its directness, low cost, capacity for timeliness and immediate feedback, robustness against errors, and safeguards against suggestion and uncertainty of interpretation. The team discussed possible sources of error and devised interview strategies, including multiplicity of sources, to prevent them.

Structure of the Report

1.11 Chapters 2 through 5 summarize the detailed findings of the study for each transportation mode: highways and roads, urban transport, railways, and ports. Annexes B through E contain detailed analysis for each mode. The modal chapters are followed by a discussion of cross-cutting issues in Chapter 6. Finally, Chapter 7 comments on the overall relevance, efficacy, and efficiency of the Bank's transport sector program in China.

4. Reports on these studies are available from OED on request.

2. Highways and Roads

2.1 China's rapid economic growth has increased and realigned transport demand. Meeting that demand by expanding the highway system and modernizing the institutional framework for highway administration became an urgent priority for the central government in the early 1980s. The Bank’s involvement with China's highways and roads began in April 1983 with the identification of the First Highway Project. After that project, the importance of the highway lending program expanded rapidly; 18 projects have been approved through fiscal year 1998, totaling $3.3 billion in loans and credits. Six of these projects have been completed and evaluated; the rest are ongoing.

Sector Objectives

2.2 The physical objectives of the Bank’s lending program for this transport mode are expanding road capacity, improving interprovincial transport, and increasing transport efficiency and relieving congestion. Since 1996 the objectives have also encompassed traffic safety and poverty reduction. The institutional development objectives of the program are to facilitate technology transfer and to improve road transport, road financing, and road planning and management. Policy initiatives have focused on road maintenance and construction and quality assurance; environmental and resettlement requirements; poverty relief; improved pricing through tolled expressways; and developing institutional capacity in provincial and local transport departments. Bank-sponsored studies helped to define the content and objectives of the Bank’s lending program and to adjust the regulatory framework to strengthen and serve a market-oriented economy.

2.3 All Bank highway projects are achieving their development objectives. OED ratings indicate that all six completed projects had satisfactory outcomes and are likely to sustain their benefits. The economic rates of return (ERR) for the evaluated projects range from 16 percent to 39 percent. Supervision ratings and the “projects at risk” report of the Quality Assurance Group (QAG) indicate that all ongoing projects are progressing satisfactorily (see Table B1).

Physical Results

2.4 Development of high-grade roads. Since the Bank began its lending, China has rapidly expanded its highway network by building new high-grade roads and upgrading existing roads. The Bank-supported high-class roads are serving as standards for further highway development.

2.5 National integration and developing inland provinces. Bank lending is supporting the government’s policy to develop a unified national economy and remove interprovincial trade barriers. The most important element of this policy is the National Trunk Highway System (NTHS). Several Bank-supported projects finance portions of the NTHS. The Bank is also financing six highway projects in four inland provinces; three of these have targeted programs to alleviate rural poverty. This portion of the program is currently being reviewed by the China International Engineering Consulting Corporation.

2.6 Road safety. Ten of the Bank’s highway projects have road safety improvement components. Expressways will also help reduce traffic accidents because both access-control and separation of fast- and slow-moving traffic reduce traffic accidents. Since China began to focus attention on road safety, road fatalities and injuries have declined (see Table B2), but traffic safety remains a serious concern and requires a long term commitment.
Policy and Institutional Development Results

2.7 Technical assistance and training supported by the Bank's highway loans have helped improve China's institutional capacities in most aspects of road management. An especially important contribution has been increased awareness of the need to balance resources between new construction and maintenance. The highway construction program has helped establish higher quality standards for construction, and competition has contributed to the development of a more competent and competitive domestic construction industry. Bank-supported studies on transport regulation, trucking and intermodal services, and road user charging mechanisms have clarified policy choices and the intermodal priorities of road projects.

Highway Administration, Private Financing of Highways

2.8 In the early 1990s, China turned to foreign private investment to finance development of its high-grade highway network. The creation of private toll road companies with assets securitized on the markets, while it provides essential financial resources to meet the demands of highway development, complicates the administration of the sector. The private companies pose challenges that have little precedent in other countries. This, whether planned or not, is the most important effect of the Bank's support not only on road finance but also on road ownership and the power and organization of the Provincial Communications Departments (PCDs).

2.9 Private investors with ownership interest in the development of key highway segments will increase the complexity of road administration. The challenge is to develop institutions and management styles to ensure that private interests in planning, operation, financing, and treatment of externalities also serve public interests. If these efforts are successful and responsibly carried out, extremely beneficial outcomes could result: highway plans and policies, private sector interests, and urban development issues can be knowledgeably weighed against financial assessment criteria to resolve issues optimally.

Borrower Views

2.10 Meetings with national and provincial highway officials and their participation in Bank-sponsored seminars provided opportunities to observe and discuss the borrowers' views and solicit ideas on how the Bank could improve its effort. Officials at every level considered the Bank's participation in highway and road development important. In addition to the benefits from the highways built, training and technical assistance were cited as areas where Bank involvement has made a positive difference. The Bank has also lent credibility to efforts to attract foreign capital. A general observation is that as the highway sector continues to evolve, some Bank policies and procedures may become less relevant to China. While the justification for most of these procedures is clear, they are creating some frustration. Following are some of the specific borrower views that may require attention (see Annex B for detailed discussion).

- Expediting Bank loan approval and project reviews.
- The current (evaluated) low-bid criterion creates problems for contractor selection and may prevent procuring the best maintenance equipment available.

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6 These views are opinions expressed by those who were interviewed. They do not necessarily reflect "official" views or the views of the World Bank.
• The need for assistance in design review and construction supervision is decreasing.

• Construction schedules are often unrealistic and can be made worse by poor project management.

• Payment procedures for small contracts are too complicated.

• Bank regulations regarding resettlement and environmental protection are burdensome and may be unnecessary, according to those interviewed, because China has effective and practical means of accomplishing the same ends.

Current Agenda and Recommendations

2.11 The highway program in China has made impressive progress. Bank support for economic development, congestion relief, poverty reduction, and technical assistance should continue, but the project focus of the portfolio will diminish its influence. The challenge now is to help China ensure long-term network-wide benefits from Bank support. The challenge lies in five areas: institutional restructuring and the role of the Ministry of Communications (MOC); organization and management of the highway system; highway finance; technical assistance and training; and competition and private sector development.

2.12 Institutional restructuring. In the current institutional structure the central government has an influential role and the relationship between the central government and the provincial and local governments is vertical. While this structure has sufficed in the past, the issues that need to be addressed in the road sector today require integration across modes and functional areas at each level of government. This calls for coordination of highway system planning with other transport modes and increased consideration of land use and environmental protection. It also suggests a need to accelerate organizational development and increase accountability of the PCDs to reflect the greater decisionmaking and financing autonomy of the provincial governments.

2.13 Organization and management. China has a road classification system for defining jurisdictional and financial responsibilities, and planning and project development. Other than for the NTHS, however, it is not clear that a consistent set of criteria have been used in classifying roads, nor does the classification system drive resource allocation. Road classification, including the "unclassified" and privately financed roads, needs to be revisited and provincial highway planning procedures need to be publicized and strengthened.

2.14 Highway finance. Numerous Bank reports and memoranda, as well as material provided by Chinese officials, suggests that China’s future highway needs will not be met by existing revenue sources. The recent trend of creating expressway companies and refinancing toll facilities through stock offerings is an innovative approach to reducing the gap between traditional highway financing sources and highway development needs. But toll revenues and private capital will be able to finance only a small segment of the highway system. The Bank has an opportunity to help China develop a financing approach that supports institutional change and highway system development, operation, and maintenance at the national, provincial, and local levels. In developing such a strategy, possibly built around the fuel tariff and domestic credit markets, the Bank effort must involve senior Bank officials working with senior officials in the Ministry of
Communications (MOC), State Development and Planning Commission (SDPC),\textsuperscript{7} and Ministry of Finance (MOF), as well as key provincial officials. Another key variable in the strategy is decentralization. The fuel tariff is a good way to generate funds, but its allocation should rest with the provinces to retain the benefits of decentralization. A small portion of the fund could be assigned for MOC to help implement the NTHS. This minimizes political imperatives in the allocation and best reflects the needs and objectives of the provinces. National goals, such as building low-volume roads in remote areas, are important but are best financed through national and provincial revenues.

2.15 \textit{Technical assistance and training.} Technical assistance and training need to focus on the areas where the Bank and China mutually agree that further assistance is a priority. It should not be constrained by the scope of individual projects. Chinese agency staff should be directly involved, preferably in a lead capacity, in the conduct of technical assistance activities. This would increase understanding of and support for the technical assistance efforts and offer valuable training opportunities. Many of those interviewed for this study also recommended that all Bank project and nonlending reports, including the Implementation Completion Report, be translated into Chinese. This would make the material accessible to a much broader audience and would support the overall training effort.

2.16 \textit{Competition and private sector development.} The efficient use of highways will depend on the continued development of competition and market reforms in the transport sector, particularly in the freight industry, but also in the construction and consulting industries. Movement toward an improved regulatory framework will need to proceed at an acceptable pace. It would be useful for the Bank to work with provincial and national officials to develop implementable regulation and pricing strategies for all modes of transport.

\textsuperscript{7} SDPC was formerly the State Planning Commission, SPC.
3. Urban Transport

3.1 The First Shanghai Metropolitan Transport Project (SMTP I) in 1991 and its 1993 follow-on, SMTP II, started the Bank's lending to urban transport in China. Since then, in 1995, the Bank cosponsored a symposium in Beijing on China's urban transport development strategy. Four projects are currently under preparation to go to the Board before fiscal year 2000. The Bank's late entrance into urban transport lending and the lack of policy dialogue in the sector is perplexing. Given the rapid growth of China's urban centers and the critical urban transport issues that have emerged since economic reforms began, the Bank could have moved more quickly. 8

Objectives

3.2 The Bank has two objectives in China's urban transport sector. First, it seeks to enhance urban economic productivity by improving the operational and economic efficiency of the urban transport system. Second, it aims to strengthen public sector management by improving the planning and management of urban transport.

Accomplishments

3.3 Although China has yet to complete an urban transport project some lessons can be drawn from the two ongoing projects. A 28-kilometer section of Shanghai's inner-ring road has been completed, maintenance equipment has been acquired, and plans are under way to build a bus depot. Bus company management and traffic management have been studied, but little action has been taken on the recommendations made by the studies.

Current Agenda

3.4 The number of cities in China tripled between 1981 and 1994; 36 cities have populations over 1 million; and the vehicle fleet has grown 15 percent a year since 1984. China's urban road infrastructure and urban transport services have not kept pace with urban growth and the relevant institutions are stretched beyond their limits and are outmoded for the new urban reality. The situation is a threat to economic growth.

3.5 A fragmented institutional structure (see Annex C) hinders the achievement of the ongoing projects' planning and management objectives. The Ministry of Construction is in charge of national long- and medium-term policies for urban transport and land use planning. The Ministry of Communications is responsible for the development and planning of highways outside city boundaries. The two ministries have no formal coordination mechanisms. To compound the difficulties, traffic control and traffic safety, including the traffic control facilities, are the responsibility of the Ministry of Public Security and its subordinate municipal organizations. Finally, the Ministry of Railways plans and provides commuter rail services in large cities. Economic reforms have devolved many responsibilities for urban transport to local governments, essentially leaving the central government without instruments to ensure that its urban transport policies are carried out.

Recommendations

3.6 China’s urban transport problems must be approached strategically and with a sectoral view and link urban transport development to other urban systems and the interurban highway system. One approach to addressing this would be to develop a metropolitan-wide organization where issues, strategies, and policies can be discussed and where decisions on the planning, financing, and regulating the (metropolitan-wide) urban transport system can be made. The Bank needs to develop an urban transport “product” suitable to Chinese cities. Urban transport development in China needs to encompass the development of the following:

- an expanded road infrastructure network and comprehensive traffic system management;
- a market-based public transport system, including informal and nonmotorized services; and
- a metropolitan-wide organization for coordinating transport planning and programming, and implementing regulations and urban transport policies in a competitive environment.

3.7 Road network capacity. Urban road construction and maintenance need to keep pace with the growing transport demand. Construction must be complemented with comprehensive and continuously updated traffic management. Adherence to and enforcement of traffic rules need to be assessed before a traffic management system is developed and implemented.

3.8 Functional (and administrative) classification of the road and street network. Street classification needs to rationalize the allocation of street space between competing residential and commercial needs, including street vendors, and to assist in financing and resource allocation. Because urban arteries carry nationally important traffic, the higher functional classes of the urban network should be part of the national highway network. Financing the higher classes of roads from the same sources as the interurban national roads should be considered.

3.9 Integration of public transport and terminals with nonmotorized transport. Public transport will continue to be important in China’s motorization process. It will augment the slow-moving, nonmotorized vehicles and could slow private automobile usage, thus reducing congestion and pollution. An urban transport strategy for China needs to pay special attention to the accommodation of bicycles and pedestrians and should enable their continued high rate of usage.

3.10 Private participation in urban public transport. Informal transport providers can be integrated into the public transport system to increase private sector participation in China’s urban public transport services. Several options exist. For example: setting up small, easy-to-manage private bus companies or organizing single bus owners as “bus route associations” (which may later grow in size). The shortage of buses and the limited managerial capacity to operate bus transport services also pose a problem. The Bank could consider developing a loan guarantee mechanism for these small private companies to acquire buses and help train managers. The development and enforcement of rules governing passenger pick up and discharge at terminals and curbs may reduce interloping and curbside conflicts between providers.

3.11 Coordination of transport planning. An efficient and adequate urban transport system requires a strategic institutional framework within which to plan, finance, and regulate the system. The Bank should consider working with the SDPC and a handful of provinces to identify ways in which China can develop a metropolitan-wide organization to coordinate urban transport...
system planning, including financing and mechanisms for decisionmaking and horizontal coordination. The Bank can help identify the issues that need to be addressed and some appropriate institutional models—such as the Metropolitan Planning Organization in the United States. PCDs must be directly involved in these metropolitan-wide planning coordination organizations. Their understanding of and involvement in addressing the integration of land-use and environmental considerations in highway system development is crucial. This is a particularly important on the edges of urban areas where pressure for continued outward land development is strong.

3.12 Private sector participation in consulting and in urban roads. New ideas are important for urban transport in China. For this the private sector and competition are key. A market for consulting companies can be created by mechanisms tied to road system financing and private sector provision of urban public transport. The private sector is already active in financing and operating several expressways in China. With an appropriate policy and regulatory framework, it could participate in urban roads as well.
4. Railways

4.1 The national railway has often been called the "backbone of China." Since economic reforms began to boost China's economy, demand for railway transport has increased: rail freight traffic and passenger traffic have both more than doubled. The trend in freight traffic has been a steady but diminishing increase. The trend in passenger traffic has fluctuated and has recently been on the decline, decreasing by 14 percent between 1994 and 1996 (see Table D2).

4.2 Since 1983, the Bank has approved seven national railway projects and one local railway project, totaling nearly $2.2 billion in loans and credits, about 14 percent of the country's total railway investments (see Annex B). Four of the projects are complete and four are ongoing.

Objectives

4.3 The objectives of the Bank's rail transport assistance in China have evolved through two phases. The first phase, comprising the first five national railway projects approved between 1984 and 1992, primarily supported capacity expansion in high-priority corridors and introduced new technology for improving operating efficiency. The second phase, which started with Railways VI (approved in 1993), supported capacity expansion plus studies and technical assistance for institutional restructuring, policy initiatives, and system-wide modernization. The implementation of the second phase started with the Railways VII and will accelerate under the proposed Railway VIII.

Accomplishments

4.4 With Bank support, China has expanded the capacity of its railway system. Since 1984, the total track route length has increased from 52,000 km to almost 55,000 km and the network has been upgraded to handle increased demand. The electrified track has increased by over 200 percent and double-track routes have increased by 73 percent. World Bank financing has also contributed to modernizing rolling stock.

4.5 All Bank projects for the construction of new railway lines and system modernization are achieving their objectives. The four completed projects had high ERRs and were likely to sustain their benefits. Technical assistance has enhanced the ministry's understanding of new technologies as a means of increasing capacity and efficiency. Training in the use of modern locomotive and signaling equipment has contributed to marked improvement in the operating efficiency of the railway system.

4.6 Despite major capacity expansion and changes in market structure, the railways are still unable to meet the demands of a liberalized and decentralized economy. Many bottlenecks remain in the economically active coastal areas, and access to the railway system in the inner provinces is sparse. Capacity expansion alone will not address these problems. Accelerating the institutional restructuring and policy development, which simultaneously increases system capacity and intermodal transport facilities and improves customer service, will be required to help China's railways compete with other modes of transport.
**Borrower Views**

*Financing Railway Construction to Expand Capacity*

4.7 All the interviewees at MOR positively assessed the Bank-supported capacity expansion projects and cited a very good relationship with the Bank. Ministry officials believe that the Bank has made a major contribution to prioritizing and financing nearly 7,000 km of new construction and the upgrade of several existing lines using the Railway Investment System it helped put in place. Bank lending has also helped improve signaling, construction technology, and equipment. All construction projects are well managed but are affected by problems related to resettlement, land acquisition, and increased land costs.

*Technical Improvements with System-wide Application*

4.8 After some delay due to computer acquisition, the Transport Management Information System (TMIS) is being advanced to full testing in Fuzhou, where several TMIS subsystems are already operational. The MOR plans to expand the full TMIS system to the entire Shanghai administration by the end of 1998. In rail operations, Bank-managed expert groups assisted two MOR research teams, one dealing with the Beijing-Shanghai High-Speed Railway Project, the other with development work for the introduction of 25-metric-ton axle loads. Both groups reported positive results from their studies. Currently, there is a plan for beginning production of 25-metric-ton axle gondolas and an operation plan specifying the lines on which these gondolas would be used. Many of those interviewed said that the Bank’s introduction of cost-benefit analysis would significantly affect all future investment decisions made in the MOR.

*Studies Dealing with Costing and Tariffs*

4.9 The freedom to adjust tariffs is vital to reform, not only as a means of increasing revenue but also as a means of influencing demand, responding to competitive forces, and funding appropriate capacity requirements. The current practice of including an across-the-board surcharge in every tariff as a means of funding the railway construction fund, and the possibility that this surcharge could increase to provide the additional funding required for the recently announced acceleration of railway construction, could limit the MOR’s ability to function effectively in the market economy and effectively compete with the other modes. Over-reliance in the tariff structure on a fixed component severely limits the railway to adjusting its tariffs based on costs and market demand. As China’s market economy evolves, the railway’s ability to respond will be limited.

4.10 Tariff reform is supported by the costing system. Ministry officials recognize that a market orientation makes such reform a top priority, but a proposal the ministry has submitted for overall tariff reform has not yet been approved. Despite the delay, the ministry has introduced some tariff adjustments and price increases. Its New Line–New Tariff and Quality Train Service with premium fares are examples of differentiated tariffs that respond to the market economy. Clearly, however, the MOR and the Bank will have to do more work to realize railway tariff reform fully.

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9. These views are opinions expressed by those who were interviewed. They do not necessarily reflect “official” views or the views of the World Bank.
Redefining the Government-Railway Relationship, Housing Reform, and Labor Productivity

4.11 An action plan that has been developed for railway reform contains 10 major recommendations that are in various stages of implementation. A directorate has been established to manage the reform projects. The MOR, with assistance from the Bank’s team of experts, helped define the issues for reform. Notably, however, the specifics of separating the regulatory (government) and operations functions of MOR were avoided and have yet to be effectively addressed.

Current Agenda and Recommendations

4.12 Cooperation between the Bank and MOR to date has included studies and tentative steps toward institutional restructuring. The current agenda in China can be divided into three interdependent cycles: (i) building railway transport capacity; (ii) transition from transport capacity to institutional development; and (iii) institutional restructuring.

4.13 **Building railway capacity.** Expansion of railway capacity has been very successful and should continue, especially for intermodal facilities. The Bank’s process and the counterparts in China have been the right ones for transport capacity expansion. Since Railway VI, the emphasis has changed to broad institutional development and to improving the competitive environment.

4.14 **Transition from building transport capacity to institutional development.** The transition phase is succeeding, but more slowly than anticipated. The program of studies and piloting experiments has had less impact than the Bank expected. The belief among counterpart agencies that study completion concludes their commitment suggests that while the counterparts and the process for transport capacity expansion have been appropriate, such is not the case for restructuring the railway. A new channel of contacts and a new process is necessary.

4.15 **Institutional restructuring.** All parties have agreed on the broad framework of restructuring—separation of government regulation from railway operations, autonomy of railway operations, and spinning off peripheral activities. This objective can be pursued in several ways. It is important that the solutions are Chinese and made in China. The Bank’s role is to act as a facilitator in the change process, a catalyst to explore and analyze alternatives, and a supportive partner to propel the change forward. Given this broad role, the Bank should focus on several imperatives if it is to achieve results from the cooperatively formulated agenda. *It is of utmost significance, and to the credit of the Bank’s program, that it has had the foresight to sponsor studies and conduct workshops on which the railway restructuring can be soundly based.* The following would enhance the World Bank’s role in the restructuring process.

* A clear mandate for the MOR. Institutional and technological modernization of the railways, and the restructuring process, are affected by the MOR mandate. Is

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10. The reform recommendations and accomplishments to date include (a) set up units to test the Modern Enterprise Systems (five established); (b) spin off railway staff to the newly created diversified economy companies (400,000 employees have been spun off to the DECOs); (c) reform the railway pension system (the railway pension and insurance management center was implemented in January 1996); (d) reform housing (new housing fund management was approved in 1997); (e) restructure the pricing system for locomotives, passenger cars, and freight cars (completed in 1997); (f) establish "lines of business" companies (a container center and a special commodity center have been established); (g) introduce "Labor Contract System" to improve labor productivity and reallocate labor between administrations (400,000 people have been spun off from the DECOs); (h) establish the human resource center to manage the flow of personnel and to enhance the quality of employees through job education and evaluation (10 evaluation centers have been established with the aim of training 8,000 employees a year); (i) the issue of "public service obligations" has not progressed.
MOR an instrument of the State Council, or will it be given the freedom to manage the railways to serve the transport of goods and passengers in a market economy?

- **A channel for communication: the senior managerial level.** The restructuring focus that now characterizes the World Bank’s lending priorities will require sustained access to and interaction with senior MOR management.\(^\text{11}\)

- **A process to institutionalize change.** A process is needed to move issues from research to application, from a project process to a system-wide process, and from MOR headquarters to administrations and sub-administrations.

- **Speed of restructuring.** It took two decades to restructure the U.S., Canadian, and Japanese railways. A rapid transformation in China is neither achievable nor desirable given the complex environment in which its railways function. However, competitive pressures will force the MOR to speed up the restructuring program.

- **Additional training.** Training on how to run a business, not just on how to operate an efficient railway, is vital for change. Especially important is a management training program that embeds in Chinese institutions the enterprise approach to managing railways. To achieve this the Bank should consider allocating significant funds for policy and institutional development and technological modernization with appropriate counterpart funding.

4.16 Restructuring institutions and policies will require changing institutional culture. This will take time, patience, and hard work. Momentous new approaches, like decentralizing railways in a large country, will need trained management and employees. In China, these new approaches can fortunately rest on extensive and thoughtful studies. Recent correspondence and discussion with senior MOR officials suggest that they understand the need for reform and that the ministry’s senior management will be driving this agenda. This is an opportunity for the Bank to start collaborating at the senior level to advance the well-conceived current agenda. But the Chinese authorities must arrive at the solutions themselves. The World Bank can support, train, suggest, and facilitate, but the Chinese must decide, commit, organize, and implement.

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\(^{11}\) The need for a new communications channel has already been recognized: “None of the recommended strategic objectives or recommended strategic policies can be addressed through new or ongoing...projects...because the dialogue between the Bank and the government usually takes place at a level where commitment to policy initiatives cannot be made.” (In Forward with one Spirit: A Strategy for the Transport Sector, May 1997). It also is noteworthy that the Chinese delegation to the Vienna Railways Roundtable was led by Vice Minister Sun of the railways.
5. Ports

5.1 In the early 1980s, Chinese ports were congested and had low productivity. Inefficient port management made the situation worse. With the identification of the Three Ports Project in 1983, the Bank embarked on a series of nine port projects totaling $925.4 million in loans and credits. Since then, the value of China’s exports and imports has grown over 400 percent; the handling capacity in China’s 16 major ports has more than tripled. Sixty-five percent of that increase came from efficiency and productivity increases, particularly the multipurpose and container berths that considerably expanded port capacity.

Objectives

5.2 The physical components consisted of constructing new berths, expanding their handling capacities, and building specialized terminal facilities, especially for containers. Port cargo flow was improved by modernizing terminal facilities in an environmentally sound way. The objectives of the Inland Waterways project are to expand capacity by widening and deepening channels to improve navigation and to construct dams with shiplocks when required.

5.3 Institutional development objectives sought to facilitate technology transfer, improve port planning and management, improve efficiency of ports through pricing and environmental control, and introduce modern operational and financial management. The most important specific objectives were as follows:

- **Strengthen planning and management** by introducing organizational and financial reforms in ports in line with a decentralized market economy. These included decisionmaking autonomy, competition between ports and terminal operators, and improved operation capabilities and pollution control through technical assistance and training.

- **Transfer of technology and training** to increase the productivity of China’s ports with better services, trained personnel in the container and coal terminals, and a computerized management information system for container operations.

- **Intermodal services** for highway, railway, and waterway transport to improve cargo distribution and connections between waterway and land transport services.

- **Studies** such as the containerization study for the port hinterlands; intermodal cargo distribution studies in Huangpu and Dalian port projects; a master plan for port development on the east coast; and a study of strategic issues in ports and shipping.

- **Environmental management**: under a GEF/IDA project the capacity of the port authorities and related regional agencies has been increased.

Accomplishments

5.4 All Bank-supported port projects have been successful and achieved their development objectives. The new berths and specialized terminal facilities, especially for containers, expanded the ports’ handling capacities. Modernized terminal facilities helped improve cargo flow, and China’s ports now have sufficient capacity.
On the institutional side, the development objectives aimed at improved port planning and management, technology transfer, competitive pricing, port autonomy, and environmental control through the introduction of modern methods of operational and financial management. The government and port management have responded and introduced significant institutional, managerial, and financial reforms in the port sector. These have included decentralization, better pricing and reduced regulation, and adoption of modern technologies and pollution control at ports.

Current Agenda and Recommendations

The Bank no longer lends for the ports, and the private sector has taken over responsibility for port expansion and improved port efficiency. Several joint ventures in port operations are already under way and more are likely.

The Bank played an important role in port improvement. Equally important was the role of a motivated borrower. The results of Bank-supported investment projects and institutional development impacts have been positive, especially in helping the government solve the problem of congestion, which threatened the expansion of China’s foreign trade. With new equipment and operating systems, the ports have learned how to do business through effective Bank supervision.

Sustained support for a motivated and skilled borrower in institutional development has improved port planning and management, port operation and maintenance, and environmental quality monitoring systems. Further cooperation is warranted on several issues:

- **Competition in pricing and among terminal operators.** A process should be agreed to delegate port tariff setting completely to port management. A freer entry to the port market is warranted to improve competition and port operations

- **Intermodal transportation.** Improved intermodal rail facilities are needed in the inland provinces and for inland waterways as this low-cost mode’s share is predicted to grow.

Given the apparent success in port lending, the Bank should explore ways for continued cooperation with China on privatization, logistics, intermodal transport, inland waterways, and environmental concerns in port-related transport and management.
6. Cross-Cutting Issues and Themes

6.1 The Bank addresses admirably China's transport sector issues both modally and intermodally in its 1997 strategy paper *Forward With One Spirit: A Strategy for the Transport Sector*. That report outlines desirable transport strategies and a possible institutional structure and describes policy proposals in five areas cutting across all modes: competition, investment, finance, environment and society, and institutions. The policy agenda in *Forward with One Spirit* is challenging because it embraces numerous complex issues.

6.2 The present study endorses the broad policy recommendations made in *Forward with One Spirit*. This chapter discusses institutions, user views, and selected cross-cutting themes not included in *Forward in One Spirit* that are emerging in the Bank's transport sector program in China.

Institutional Framework

6.3 The central cross-cutting issue in China's transport sector is its institutional framework, especially intermodalism. The Bank's strategy paper calls for the establishment of a central government Ministry of Transport and Communication (MTOC) by merging the Ministry of Communication with the Ministry of Railways and centralizing some functions that now reside in numerous government agencies and PCDs. The key responsibilities of the proposed MOTC would be competition policy, pricing and regulatory policy, sector planning and coordination, and facilitating multimodal transport, as well as the management of a proposed Transport Investment Fund.

6.4 The establishment of the MOTC, a desirable long-term goal, is a complex undertaking not only because of the size and importance of the MOR and the unsettled state of urban transport but also because of China's political economy and the complicated sequencing that is necessary to preserve the rights of the provinces and the functions of the participating ministries during the transition. The following issues merit reflection and resolution:

- China's economic success is in part explained by a move toward decentralized governance. Policy and institutional recommendations need to be cognizant of this. The proposed MOTC and the Transport Investment Fund (and the national fuel tariff) need to be aligned to retain the benefits of decentralized governance and provincial autonomy.

- A central government ministry with powers over policy and resource allocation may create provincial resistance because it will frustrate efforts at further decentralization. China today has one of the world's most dynamic economies. This is partly because independent-minded provinces are largely responsible for managing their economies, while the central government concentrates on matters of national importance such as monetary policy and defense and on ensuring the integrity of the common market.

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13. Qian and Weingast (1996, p.164), for example, report that provincial governments have "a wide range of authority, including, determining prices, setting up new firms and making investment with "self-raised funds." They further point to the diminishing role of the State Planning Commission from approving essentially all fixed investments before to now approving only "quotas and some key projects."
• The existing institutional framework vests substantial powers in PCDs. It has worked adequately—although intermodal transport issues have received minimal attention—because policies a PCD develops reflect the preferences and resources of that province and encourage provincial commitment. If policies are developed centrally without adequate consultation, there is a risk that they will become directives that provinces have little incentive to implement.

• As indicated in *Forward with One Spirit*, the MOR must be restructured before the MOTC is created. All parties have agreed that the broad framework of the "new MOR" consists of separating government regulation from railway operations, autonomy for railway operations, and spinning off peripheral activities—all complex tasks (discussed in Annex D).

• Another matter that needs to be sorted out before or concurrent with creating the proposed MOTC concerns urban transport, currently the responsibility of the Ministry of Construction. Urban transport urgently needs a local organizing framework in which the PCD plays an important role. It is desirable that urban transport be brought into the general transport policy context because that is where China's future transport problems are likely to be most acute (discussed in Annex C).

• The issue of limits to organization size must not be neglected. China is the most populous country in the world. There is nothing intrinsically wrong with having multiple agencies looking after transport development of such a vast country. Restructuring should not create diseconomies of scale in planning and managing the country's transport development. What it should do is improve communication and coordination between managers and professionals serving different modes of transport.

• The proposed MOTC and Transport Investment Fund are desirable long-term goals (if the Chinese want them), but better transport policies do not automatically follow when all the modes are in the same ministry. The coordination necessary does not require concentration of functions, and could also be achieved under a decentralized system, as market economies have shown. Among the key issues are the following: Will modal administrations be established within the MOTC? How will the MOTC allocate the Transport Investment Fund? What kinds of projects will the MOTC give priority? Under what principles will the monies be divided between regions, modes, and functional classes? What will be the role of the PCDs? What will be done with urban transport? Large-scale changes of the sort anticipated tend not to succeed.


15. It is a reasonable hypothesis that such an effect precipitated postponement of the fuel tariff. Provincial prerogatives and dilution of central power are also served by the current lack of transparency in organizing and the "chopping up" of the toll road companies.
unless implemented incrementally. Such an approach should be taken in China. After all, that is the Chinese way of implementing reforms “by feeling the stones to cross the river.”

- Finally, Forward with One Spirit points out the importance of intermodalism in transport planning. Intermodalism has two main drivers: the market and interagency coordination. Both require earnest attention. The former concerns are elaborated in annexes B through E, the latter, a problem typical of China’s bureaucracies, must be considered in restructuring and addressed in management training to ameliorate the confining effects of “line-block” organization.

User and Shipper Views

6.5 Users and shippers represent the marketplace. But a representative view from the users and the shippers is hard to obtain in China because it is difficult to contact a sample, let alone a representative sample, of users. Interviews were conducted for this study with China Communications and Transportation Association (CCTA), which is developing into a lobbying organization for shippers and service providers, and with selected transport bureau representatives and shippers. Surveys done by others were used to corroborate the views expressed in the interviews.

The interviewees generally desired a more competitive environment: freer pricing and access to markets; improved vehicles and productivity; provision of terminals and depots for passengers and freight; and foreign capital, modern technology, and management expertise. Those interviewed also recognized that the Bank-supported projects have been worthwhile, gone well, and that the “market” is being recognized. The following are the key points from the interviews.

6.6 Limited, untimely, or inappropriate capacity. The main issue for service providers continues to be the limited capacity of China’s road and rail systems—urban, interurban, and rural—despite the recent surge in capacity expansion. For now, port capacity is adequate. There is a shortage of appropriate trucks and wagons, especially for containers, and of intermodal facilities. The lack of timely capacity is also caused by operating procedures that prioritize services on noncommercial grounds. In some places, local governments levy en route surcharges on truckers to raise money to build more capacity and possibly for other purposes as well. Capacity constraints are also delaying shipments to certain areas or in certain directions. The supply of vehicles and wagons and the flexibility of ordering wagons have increased, but the equipment is old and oriented toward bulk service in a market that desires differentiated service.

6.7 Service time and on-time performance have improved. Capacity expansion, both interurban and urban, has improved service times and the possibility of on-time performance in trucking, rail, and ports (but for a price). Documentation procedures have been simplified and the quality of the transactions has improved. Loading facilities are better and damage losses are decreasing. Nonetheless, much remains to be done: the low level of computerization impedes cargo tracking and is one reason for delay-causing prebooking of wagons and containers.

16. See Douglass North Institutions, Institutional Change and Economic Performance, (1990) Cambridge University Press. In the transport sector, for example, no county has successfully created a functionally organized Ministry of Transport, but all have modally organized sub-administrations. Some states in the United States are experimenting with functionally organized state Departments of Transportation. In China, some PCDs are functionally organized.

provincial inspection and clearance procedures, and freight damage or theft. All customers reported tariff increases ranging from 30 to 40 percent since the late 1980s. Both consumers and producers are benefiting. Agricultural produce can now reach urban markets and deliver fresh vegetables and other farm products at affordable prices.

6.8 **Need for improved competition and service.** Quality of service was high on the wish list of both shippers and passengers. International clients particularly wanted improvements in management training and in the commercial orientation of service providers. They suggested that low freight tariffs are barriers to investments and encourage poor service, and that there is willingness to pay a much higher tariff for more reliable (container) services. The lack of competition was seen as a severe restraint to customer orientation, especially in intermodal transport, although joint venture companies have emerged recently and offer good, on-time service and high quality for a higher price.

6.9 **Lack of choice.** Lack of choice is a problem not only in trucking but also in freight forwarding and port operators. Too few companies share the transport market in China. The transport industry is characterized as inefficient, poorly organized and with a surplus of labor. Several interviewees expressed a desire for a clearer government legal and regulatory framework, including better licensing and inspection procedures, driver training, traffic regulations, and less government intervention in access to markets (especially for state-owned enterprise products) and in pricing.

6.10 **Railway passenger service has improved.** Passengers are experiencing better ticketing through an increase in the number of locations where they can buy tickets. The passenger cars are of higher quality and trains are faster. Fares have increased, but passenger fares are still significantly below airline travel costs.

**Cross-Cutting Policy Adjustment Issues**

6.11 The rapid change in China’s transport sector has exposed a number of new themes that are not covered by existing operational directives. Among these themes are the shift of focus from infrastructure to institutions and policies; the handling of the social services issues (including public service obligations) of state-owned enterprises; and market entry or exit.

- Transport development in China to date has focused on managing physical projects. This job is now 80 percent done, to express the degree of accomplishment pseudo-quantitatively. Institutional and policy issues are gaining in importance, but it is not clear what exactly should be done about them or how. These issues include such familiar topics as “privatization,” “institutional restructuring,” “deregulation and regulatory framework,” “getting the prices right,” “management with a commercial focus,” “focus on the marketplace,” and so on. Each of these expressions conveys an important idea whose time has come in China. But it is not clear how these objectives could be successfully pursued across the transport sector.

- Employee social services are an important part of all state-owned enterprises, and they should be considered in the reforms undertaken. The difficulty lies in weighing their importance against the commercial objectives of reform. This difficulty spans the “structural reforms” addressing the private and public sector roles in transport, organizing public service obligations (PSOs) to redress inequities, or leaving the

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18. The Bank is currently reviewing its technical assistance and training operations in China’s transport program.
solution of social problems (however defined) to the marketplace. It is by no means evident what the roles the private and public sectors should have in China, nor it is evident what the PSOs should consist of or how they should be paid for, nor is it clear that markets can emerge to deal with social problems.

- Market entry and exit regulations are at the heart of competition. Among those interviewed for this study there is a sense that little has been done on this account. The issue encompasses safety regulations, operator licensing, and the way PSOs are awarded and monitored, including PSO-related investments. For example, if rail infrastructure and operations are separated (rather than designating the regulatory function to the Transport Ministry and privatizing the railways), would new entrants be allowed to operate rail services and possibly bid for the existing rolling stock? In urban transport, what policies will be followed with the emerging “informal” service providers? Would enforcement of PSO or possible concession contracts prevent entry to market? Who would determine whether investments were desirable for fulfilling PSO obligations? These are difficult but important questions that need to be raised and eventually answered—by the Chinese.

Technical Cross-Cutting Issues

6.12 Some technical issues also cut across all transport modes. These include planning and programming, environment and resettlement, and introduction of new technologies.

- The Bank’s analytical approach undoubtedly has had a profound, positive effect on planning and programming in China’s transport sector. The projects have supported the development of road management and railway investment systems whose aim is to help develop long-term, budget-constrained plans that efficiently meet the objectives proposed. In ports, a commercially-oriented management style has been adopted.

- The Bank has well-developed guidelines for both resettlement and environment. These guidelines have stimulated indigenous Chinese work and approaches on both issues and have affected Bank-supported projects. Resettlement has been studied separately, and approaches to mitigating environmental harm are discussed for individual modes in annexes B through E. Substantial progress has been made, especially in ports. Environment as an issue transcends the transport sector. No comprehensive treatment of the problem is attempted here.

- New technology was highly important in most projects. The projects successfully supported components whose main aim was to acquire and internalize applications of new technology in construction and maintenance and operation of transport systems. In no small measure technological advance also was driven by the keen interest of the borrower.

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Nonlending Services

6.13 The final cross-cutting theme concerns the Bank's nonlending services. For the most part the evaluation of nonlending services is integrated in the evaluation of the modal programs in annexes B through E. The review and work by a Chinese evaluator suggest three overall observations.

- The Bank's nonlending services are a necessary learning device for Chinese decisionmakers and sector professionals and for Bank staff. Especially valued are international experiences in institutional development, management and marketing, applications of modern technology and models, and analyses of problems or situations in China.

- A “joint study” model is the favored method for carrying out nonlending studies. The participation of domestic consultants is regarded as indispensable to the relevance and acceptance of a study. Strong domestic participation also develops domestic capacity and strengthens local expertise and is more likely to lead to the adoption of the results, application of those results, and follow-up studies.

- Dissemination of results requires translation into Chinese. If the final report is not translated, its effectiveness is critically and negatively affected. A common Chinese view is that the distribution of the translated (draft) report should be followed by a seminar or workshop in China and that the costs of translation (including Implementation Completion Reports) and workshops should be budgeted into the projects.
7. Program Relevance, Efficiency, Efficacy, and Bank and Borrower Performance

7.1 The Bank’s program of assistance to the transport sector in China is sound. It has addressed, and is addressing, the relevant issues. The projects have been efficiently implemented and have economic rates of return that are high, normally exceeding appraisal estimates. The program’s relationship with the Bank’s poverty reduction objective is indirect, and a direct causal link would be hard to establish statistically. Regarding the efficacy with which the program’s objectives are being achieved, reviews of the project data conducted for this study show efficacy to be on a par with contemporary and historical experiences in developed countries. It is not enough, however, to simply identify success. To continue that success and replicate it, we need to know how it was achieved.

7.2 The historical findings of OED project audits suggest a four-step process for a favorable program in institutional and capacity development. The Bank’s transport program in China does not invalidate this model. The four steps are:

1. Establish a program framework and agree on a contract for concrete near-term objectives.
2. Formulate a project or projects in which the borrower can use existing skills. Begin training staff in areas covered by the project and management, and consistent with near-term objectives.
3. Conduct studies (the borrower together with the Bank and other partners) on the organization’s core processes and prioritization of activities. Begin to implement the recommendations of those studies.
4. Institutionalize accomplishments and recycle them to undertake more complex activities.

7.3 In China, this process is on its third cycle. The first cycle addressed relatively straightforward technical problems. The second cycle consisted of more complex technical issues—pavement management systems and engineering technical specifications; allocation of resources between maintenance and construction; railway investment prioritization and the use of telecommunications in railways; port management and autonomy; innovative financing arrangements; and environment protection and resettlement procedures. In the third cycle the institutional rules and organizational structures are being worked on more. These include focusing on organization, management, and financing (of roads) of PCDs; separation of railway operations and regulatory functions; privatization; competition, decentralization, deregulation; and other aspects of modern transport organizations.

7.4 This simple model, when used in a participatory way allows problems to be identified and solved through Bank-sponsored project work (“work in common”). The operation of the model is as simple as its structure: near-term objectives and a project are agreed and implementation begins; when a problem is encountered, it is studied and solved by the borrower and the Bank (or its consultant) working together; concurrently, studies are done on perceived problems not requiring immediate decisions; hypothetical problems or issues relevant in other countries are not studied, addressed, or solved. This problem-solving and learning continues throughout the

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The significance of the model is that the ability to absorb know-how is commensurate with the solutions to problems, and that the problems addressed are relevant to the client.

7.5 It is important to make a distinction between the efficiency of the project and its execution and the efficacy of the program-wide process. Self-evaluations in Bank Implementation Completion Reports show that the projects have been efficient. The implemented projects have high economic rates of return. As a rule the higher ERRs have been caused by higher than predicted demand that has offset the (often observed) cost and time overruns. That result shows that the procedure for selecting projects has been good and project execution has been reasonably efficient.

7.6 The efficacy of the overall program has three aspects. The first, which is intertwined with efficiency, is the process of implementing a program (process efficacy), the second is the absorption of new technology (technology efficacy), and the third is institutional restructuring (institutional or policy efficacy). Regarding the process efficacy, implementation of the civil works, the new course has consisted of independent project supervision, cost estimation, and competitive bidding; design standards, numerous technical specifications and quality assurance, and adoption of new technologies also have been substantially new. Learning these new things has been a priority. It follows from the observed successes that focusing on efficiency in project implementation, that is, time and cost overruns and the ERR, are less important than learning. If the principal objectives are learning new ways of production and adopting new technologies, and preparing ground for new institutional practices and organizations, emphasizing efficiency can inhibit success. Once the “correct” way to do these things has been learned through the projects, then learning how to do them most efficiently can become an objective.

7.7 The Bank-supported projects show evidence that process efficacy and technology efficacy have been on a steep learning curve. Program formulation, project selection and management; technical standards and quality assurance procedures; experimentation with and adoption of new technologies; consideration of environmental, resettlement, and safety issues are all successfully tackled with legitimate programs. With the support of the Bank and foreign consultants processes have been improved and clarified and new technology has been put to use.

7.8 It is too soon to judge institutional efficacy, but progress—uneven across the modes—has been made. First, management autonomy and competition are being introduced in ports; port management has extensive rights and responsibilities, and there is limited freedom for pricing. Second, decentralized and sound road management is replacing the construction orientation of the PCDs, and innovative highway financing strategies are being introduced; new organizational and institutional developments are also slowly taking place in PCDs. Third, founded on thorough Bank-sponsored studies and technological development, the complex task of railway restructuring has begun. Fourth, the product mix for ports, rail, and roads, has been comprehensive and pertinent, and has maintained a keen borrower interest. Finally, China’s urban transport and regional development issues have begun to be addressed—a challenge of enormous proportions. Across the modes the future agenda is on the correct course, although it has yet to be integrated and urban transport awaits development of the right “product.”

7.9 The complexity of restructuring China’s transport sector organizations and institutions will make the Bank’s future projects much harder to define, approve, and review, and measuring results will be more difficult than in the past. To underscore the (modal) transport program as the unit of analysis and evaluation, and the importance of institutional efficacy, it is suggested that, without neglecting project evaluation, the Bank and the borrower begin to track each transport mode’s performance using sectoral performance indicators. In this work the client must take the lead, but the Bank can be the professional sounding board and propel the process along.
7.10 Implicit in this report is an assessment of Bank and borrower performance. Depending on the project it has ranged from satisfactory to highly satisfactory. Although there have been setbacks and resistance to change, the program’s experience is very positive. Why was it successful? The accomplishments to date are due both the motivated and determined borrower and to skillful project management by the professionals in the Bank and in China.
China's investment in the transport sector and World Bank loans disbursed

<table>
<thead>
<tr>
<th>Year</th>
<th>Highways and Roads</th>
<th>Railways</th>
<th>Ports and Waterways</th>
<th>Total All Modes</th>
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<tbody>
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<td>US $M</td>
<td>US $M</td>
<td>US $M</td>
</tr>
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<td>170.7</td>
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<th>Ports and Waterways</th>
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<td>-</td>
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<td>5</td>
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<td>958.2</td>
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Sources: China Statistical Yearbook on Investment in Fixed Assets, 1997; Bank Staff Appraisal Reports
Evaluation Detail: Highways and Roads

1. China’s rapid economic growth has increased and realigned transport demand. In the early 1980s, meeting that demand by expanding the highway system and modernizing the institutional framework for highway administration became an urgent priority for the central government. The Bank’s involvement with China’s highways and roads began in April 1983 with the identification of the First Highway Project. After that project, the importance of the highway lending program expanded rapidly; 18 projects have been approved through fiscal year 1998, totaling $3.3 billion in loans and credits. Six of these projects have been completed and evaluated; the rest are ongoing.

Objectives

2. The Bank’s lending program for China’s roads has two major categories of objectives: physical objectives and policy and institutional development (PID) objectives. Figure B1 shows the history: lending for roads has grown gradually and PID lending has tracked the path of that for road capacity expansion, except in 1997, when the share of PID funding dropped sharply.

![Figure B1: Evolution of World Bank lending for China highways](image)

Typical Physical Objectives

3. **Road capacity expansion and road system efficiency.** Capacity expansion consists of building expressways and access roads and developing transport corridors and roads to tourist areas. Efficiency of road transport is being improved further through technology transfer, better
equipment, and better road maintenance.\footnote{Traffic safety and poverty reduction, important objectives since 1996, consist of improved traffic engineering, vehicle inspection and accident data systems and investigation techniques. It also comprises improved highway access through upgrading or building rural roads in poor areas of several provinces (Shaanxi and Henan).} Traffic safety and poverty reduction, important objectives since 1996, consist of improved traffic engineering, vehicle inspection and accident data systems and investigation techniques. It also comprises improved highway access through upgrading or building rural roads in poor areas of several provinces (Shaanxi and Henan).

Typical Institutional Development Objectives

4. **Road planning and management** comprise a wide array of initiatives to develop the institutional capacity of provincial and local transport departments: road data banks and pavement management systems; highway capacity analyses; cost models; technical specifications and contract documents; training in transport planning, investment prioritization, maintenance management, construction supervision, and environmental protection. Technology transfer also has a wide scope: training and study tours abroad to improve road management, trucking regulation, and trucking industry management; equipment for laboratories; and intermodal services. Finally, road-financing studies aim to broaden the financing options for roads and improve cost-recovery.

Typical Policy Initiatives

5. Policy initiatives have focused on road maintenance and construction; compliance with environmental and resettlement requirements; traffic safety; poverty relief; and market-based pricing, such as toll expressways. The most far-reaching policy activity consists of Bank-sponsored studies such as Transport Sector Paper (1984), China—Highway Development and Management: Issues, Options, and Strategies (1994), China—Strategies for Road Freight Development (1995), and most recently, Forward with One Spirit: A Strategy for the Transport Sector (1998). These studies helped define the objectives for the Bank’s lending program and to support China’s efforts in market integration and market-orientation.

Results

Efficiency of Bank-Supported Highway Projects

6. All Bank highway projects are achieving their objectives. OED ratings indicate that the six completed projects had satisfactory outcomes and are likely to sustain their benefits but have had only modest institutional development impacts. The economic rates of return (ERR) for the completed projects range from 16 to 39 percent and are close to those estimated at appraisal. Recent supervision ratings and the Quality Assurance Group’s “projects at risk” report on ongoing projects indicate that all projects have satisfactory implementation progress and are likely to achieve their development objectives without significant risk (Table B1).
Table B1. Supervision ratings and QAG projects at risk

<table>
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<tr>
<th>Project</th>
<th>Supervision Ratings</th>
<th>QAG*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zhejiang Province Transport</td>
<td>HS</td>
<td>Nonrisky</td>
</tr>
<tr>
<td>Guangdong Province Transport</td>
<td>S</td>
<td>Nonrisky</td>
</tr>
<tr>
<td>Henan Province Transport</td>
<td>S</td>
<td>Nonrisky</td>
</tr>
<tr>
<td>Fujian Province Highway</td>
<td>S</td>
<td>Nonrisky</td>
</tr>
<tr>
<td>Hebei/Henan National Highways</td>
<td>S</td>
<td>Nonrisky</td>
</tr>
<tr>
<td>Xinjiang Highway I</td>
<td>S</td>
<td>Nonrisky</td>
</tr>
<tr>
<td>Shanghai-Zhejiang Highway</td>
<td>S</td>
<td>Nonrisky</td>
</tr>
<tr>
<td>2nd Shaanxi Province Highway</td>
<td>S</td>
<td>Nonrisky</td>
</tr>
<tr>
<td>2nd Henan Province Highway</td>
<td>S</td>
<td>Nonrisky</td>
</tr>
<tr>
<td>Xinjiang Highways II</td>
<td>S</td>
<td>Nonrisky</td>
</tr>
<tr>
<td>Hunan/Guang HWY2-NH2</td>
<td>S</td>
<td>Nonrisky</td>
</tr>
</tbody>
</table>

Source: Project Supervision Reports, QAG Report.
*IP=Implementation Progress; DO=Development Objectives; QAG=Quality Assurance Group;
HS=Highly Satisfactory; S=Satisfactory; U=Unsatisfactory

Highway Capacity Expansion and Congestion Relief

7. China's rapidly increasing per capita income has led to dramatic increases in passenger and freight traffic. Between 1984 and 1994, passenger traffic grew 216 percent and freight traffic grew 192 percent. To meet this increase in demand China's highway network has expanded rapidly. In 1986, the length of the highway network was 962,000 kilometers (km), by 1994 it had increased by 16 percent. More important, with the Bank's support, China is upgrading both the quality and the quantity of road capacity. Between 1986 and 1994, 65 percent of the 187,000 km of paved roads built were high-grade roads. Network-wide, the share of first- and second-grade roads increased by 8 percent, while the share of medium- and low-grade roads went down 5 percent. The Bank-supported high-class roads are also serving as standards for further highway development (Figures B2 and B3).

Figure B2. Increase of China's road network length

![Figure B2. Increase of China's road network length](source: Statistical Year Book of China (Various Years)).

Figure B3. Paved roads by technical class

Integrating the National Economy and Developing Inland Provinces

8. The Bank's lending is contributing to the government's policy to integrate the national economy and remove interprovincial trade barriers. The most important element of this
development program is the National Trunk Highway System (NTHS). The nodes of this system were selected based on a variety of demographic and economic criteria and will connect the provincial capitals, all cities with populations of more than one million, and most cities with populations of more than 500,000. The NTHS, planned for completion in 2020, consists of five major north-south corridors and seven east-west corridors with a total length of 35,000 km, 4,000 km of which have been built. The Bank is heavily involved in the building of the NTHS. The Beijing-Zuhai (Jingzhu) Expressway, for example, is being built through four national highway projects (NH1, NH2, NH3, and NH4), the first of which started in 1994. The Jingzhu Expressway, which is more than 2,500 km long, links the north and the south and crosses five provinces (Hebei, Henan, Hubei, Hunan, and Guangdong). In addition, the Bank is supporting interprovincial roads to connect two or more provinces. The access-controlled Beijing-Tianjin-Tanggu Expressway connects three jurisdictions, and, when completed in 2000, the Shanghai-Zhejiang Highway project will provide additional capacity in the Shanghai-Hangzhou corridor.

9. The Bank is financing nine highway projects in five inland provinces (two in Henan, one in Hebei, two in Xinjiang, two in Shaanxi, one in Sichuan, and one in Jiangxi). The construction and upgrading of highways are expected to benefit these less-developed provinces and contribute to China's economic growth. Two projects in Shaanxi and one in Henan have targeted programs to alleviate rural poverty and facilitate the participation of the rural poor in the economic growth of China. A study by China International Engineering Consulting Corporation (CIECC), undertaken as part of the present work, focused on this issue.

Improving Road Safety

10. The Bank's highway lending is improving road safety in China. Many of the approved highway projects have road safety improvement components, with an average of 1 percent of total Bank financing allocated to road safety. In addition, Bank financing is reducing traffic accidents because the higher-class roads are access-controlled and separate fast- and slow-moving traffic, both factors essential to reducing traffic accidents (Table B2). However, traffic safety is a serious concern; it is in its beginning stages in China and merits continuing attention.

<table>
<thead>
<tr>
<th>Year</th>
<th>Population (Millions)</th>
<th>Vehicles ('000)</th>
<th>Fatalities per 10,000 Vehicles</th>
<th>Injuries per 10,000 Vehicles</th>
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<tbody>
<tr>
<td>1989</td>
<td>1127</td>
<td>5113</td>
<td>105.6</td>
<td>311.2</td>
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<td>1991</td>
<td>1158</td>
<td>6061</td>
<td>93.9</td>
<td>266.9</td>
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<tr>
<td>1993</td>
<td>1175</td>
<td>8176</td>
<td>83.1</td>
<td>173.9</td>
</tr>
<tr>
<td>1995</td>
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</tr>
<tr>
<td>1997</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

2. The NTHS is a high-grade motorway system with dual carriageways, normally 2+2 lanes, access control, and tolls.
Institutional Development Impacts

Road Planning and Management

11. Technical assistance and other PID activities supported by the Bank’s highway loans have improved the institutional capacities of the Ministry of Communications (MOC), participating PCDs, and toll road companies in design, engineering, construction, operations and maintenance, environmental mitigation and monitoring, and resettlement. An especially important contribution has been increased awareness of the need to balance resources between new construction and maintenance.

Technology Transfer, Studies, and Policies

12. Tours abroad to study highway design, maintenance and construction, construction supervision by foreign experts, procurement of modern equipment, and modernization of technical specifications and road management practices have been successful and their beneficial effects are acknowledged. In particular, China’s large highway program has driven development of the domestic construction industry, whose capabilities have been improving rapidly. Higher quality standards for construction and competition have created a more competent and competitive construction industry.

13. Bank-supported studies on trucking, intermodal services, road transport regulation, and road users have been useful in clarifying policy choices and the intermodal priorities for road construction and maintenance projects. No clear attribution from studies to adopted policies can be made, however. It is noteworthy, though, that the recently enacted Highway Law that took effect in January 1998 also contained a provision, now indefinitely postponed, for a tariff on gasoline dedicated to road construction and maintenance. This policy decision would have been compatible with one long advocated by the Bank. The details of the gasoline tariff have yet to be worked out. Bank policies on environment and resettlement have also been meticulously followed and implemented on Bank-financed highway projects.

Highway Administration

14. Whether planned or not, the most important impact of the Bank’s support has been on road finance and its consequent effects on road ownership and the organization of the PCDs. For this reason, these issues are worth discussing at length. Before doing so, however, it is necessary to describe the functional and administrative classification of roads. An up-to-date road classification is a vital backdrop to road administration and management to clarify road ownership and to ensure that network development is consistent with the needs of the society and the economy. The Bank’s role in the institutional development of China’s road sector must also be seen in the context of an evolution from centralized to decentralized road administration, which increasingly involves provincial governments and the private sector.

15. China’s roads are currently defined by jurisdictional interest and responsibility, which serves as a proxy for the functional role of these facilities. The jurisdictional categories include national (the National Highway System and the NTHS), provincial, county and town, village, and “special purpose” roads. Subnetworks are further defined by the six design classes, expressways at the high end and “unclassified” roads at the low end. With exceptions, the design classes
categorize the existing characteristics of highways. Two major types of facility categories have been established: (i) motor vehicle–only highways include the expressways and design classes 1 and 2, and (ii) general highways include roads in design classes 3 through 5 and the “unclassified” roads (Table B3).

### Table B3. China’s road network in 1997

<table>
<thead>
<tr>
<th>Administrative Classification</th>
<th>Technical Classification</th>
<th>Length (km)</th>
<th>%</th>
<th>Length (km)</th>
<th>%</th>
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</thead>
<tbody>
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<td>National</td>
<td>Expressway</td>
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<td>&lt;1</td>
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<tr>
<td>Provincial</td>
<td>Class 1</td>
<td>11,800</td>
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<tr>
<td>County</td>
<td>Class 2</td>
<td>97,200</td>
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<td>Village</td>
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<td>216,700</td>
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<td>619,000</td>
<td>52</td>
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<td></td>
<td>Unclassified</td>
<td>237,700</td>
<td>20</td>
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<td>1,186,000</td>
<td>100</td>
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<td>1,186,000</td>
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</table>

Source: CIECC

16. While the above classification is not as formalized as in many other countries, China’s framework for a highway classification system is the basis for defining jurisdictional and financial responsibilities, and for planning and project development approaches. Other than for the NTHS, however, it is not clear that a consistent set of criteria have been used to define system classifications, nor does system classification (versus project-by-project decisions), even for the NTHS, drive resource allocation or take into account the recent privatization of some roads.

17. Until the early 1990s, China’s institutional arrangements for highways were straightforward. The MOC set the policies and guidelines and the PCDs implemented them. Few Class 1 highways were built, and those that were built were financed primarily by the international lending organizations and overseen by the traditional institutional structure in which the State Planning Commission (SPC) and MOC were the principal national agencies. Major policy issues dealing with highway development and land use, intermodal planning and coordination, and highway financing strategies were dealt with at the SPC and State Council levels. The MOC had overall responsibility for highway planning and for allocating vehicle

**Figure B4. Traditional institutional framework**

![Diagram of traditional institutional framework](image)
purchase fee (VPF) revenues for the priority segments of the National Highway System. The SPC departments reviewed national highway plans and project proposals and helped develop financing strategies at both the program and project levels. This institutional arrangement is still in effect for the inland provinces (Figure B4).

18. The fast-developing coastal provinces have evolved a more complicated institutional framework for highways. In the early 1990s, China recognized that highway capacity expansion needs would not be met by the traditional revenue sources then in use. As a result, foreign private investment sources were tapped for much of the development of the high-grade highway network. New organizations—holding companies, operating companies, construction companies, and the like—were created to meet the legal, technical, and marketing requirements of new financing methods involving foreign and domestic private capital. A number of other changes have occurred in the institutional support structure of the sector. The most important have been the increasing importance and power of the provinces and the PCDs that the concurrent decentralization provided, and the development of property rights for private toll road companies. The PCD will still develop the provincial network plan for all roads for approval by the provincial government and be responsible for their planning, design, construction, and management. But the “traditional” organization structure has undergone a near revolutionary change over the past two to three years. The new organization structure is shown in Figure B5.

Figure B5. Institutional structure of highway administration in China, 1997

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3. These figures are adapted from J.P. Morgan Securities Asia Ltd. (1997) Industry Report: China Highway Sector.

19. The Hong Kong Stock Exchange currently lists eight stocks that have substantial assets in Chinese roads. Most of these assets are in Guangdong province. Many of the companies holding these assets are diversified companies with comprehensive portfolios. Many if not most of the companies are ultimately controlled by entities associated with the PCDs in provinces where the assets are located. The toll roads and toll road companies differ in their degree of control by the provincial road authorities, normally the PCD. There are four toll road models:

- **Government-built and -operated toll road ("Shaanxi model").** The PCD, a government agency, is the owner and operator of the toll road. The planning, construction, maintenance, and operation of the project are directly under the management of PCD departments.

- **Toll road operating company.** This type of company is listed on a stock exchange and owns the rights to toll revenues, but not to the assets, for a long period, normally 30 years. The company’s controlling shareholder, ultimately, is the local PCD. A variant of this is the “asset injection” format in which the PCD sells a foreign investor the right to operate a road for a finite period.

- **Toll road company ("Zhejiang model").** This type of company is listed on a stock exchange. The road assets and rights to the toll revenue and the debt service are transferred or leased for a long period, normally 30 years, from a government-owned parent company after completion of the road. Toll road management and operation may be performed by the toll road company itself, or through another stock exchange-listed road operation company, which would have rights to a share of the toll revenues. The parent company or the toll road company have monopoly-like rights over future road development in the area (the latter often have “first right of refusal”). Ultimately, however, the controlling shareholder is the local PCD, which initially built and financed the road.

- **Joint venture with a foreign company ("Guangdong market model").** This type of company, normally located in Hong Kong, may have a controlling stake in the joint venture. In this model the company is responsible for raising the money and for management from planning to implementation and operation of road. It is also required to take responsibility for any (loan) liabilities. The foreign partners contribute money to build the highway and may have preferential access to toll revenues. The Chinese counterpart contributes its share of capital in highways (not necessarily completed), land use rights, or even cash. The companies may enjoy monopoly-like road development rights and tax and other privileges.

20. The build-operate-transfer model has been studied, but proposals for its use have been suspended for further study. A toll road from Guangzhou to Shenzhen is an early BOT-like project built by a Hong Kong developer. This toll road also has close ties to provincial authorities. It has a policy and operations committee consisting of the developer and officials from the Guangdong Provincial Government.

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5. J.P. Morgan *op. cit.*
Impacts and Challenges of China’s High-Class Highway Development

21. The creation of private companies with assets securitized in the financial markets provides essential financial resources to meet the demands of highway development, but it complicates administration of the sector. The companies pose challenges that have little precedent in other countries. As China develops economically and socially, the administration of its highway system must necessarily evolve to adapt to the new challenges and requirements. Simply raising some money to build or pave a few roads might be sufficient in the early stages of road administration (analogous to the early U.S. road-building objective of providing essential lifelines for getting goods to market). However, the responsibilities, obligations, and interests of public road administrations grow increasingly complex as society develops around them and because of them, bringing with them tough policy issues such as economic development, participation, resettlement, traffic congestion, environmental protection, integrated land use and multimodal transport, equity, and others.

22. Under the simpler, traditional institutional framework, the significant peripheral issues raised by the high-class highways would be worked out at the ministry level, based on consideration of those issues from the local level up through the layers of bureaucracy. For example, the MOC spent many years developing and negotiating the NTHS corridors. Using the traditional Chinese hierarchy, the initial priorities were proposed at the local level. The PCDs were then responsible for working out the province’s highway priorities and making recommendations to the MOC. The MOC’s responsibility was to ensure that the final NTHS system was compatible with national priorities under the State Planning Commission’s Eighth Five-Year Plan. With the privatization of highway development companies, new managerial and planning styles are required to ensure the integrity of the planning, prioritization, and construction of the highway network.

23. One impact of creating private toll road companies was the creation of a new, parallel line of authority in highway financing. This new line of authority—in which corporate boards play a key role—can either work with or interfere with the original line of authority. The management of the technical aspects of road construction and operation have developed in line with well-thought-out strategies motivated domestically and assisted by the Bank and foreign engineering consortia. The original lines of authority were well suited to this. The management of the financial aspects of highway system development has not benefited from the same level of attention and effort by the Bank or the financial community. Foreign funding of highways has therefore lacked appropriate concern for financial, legal, multimodal, and land use considerations. There has been a lack of appropriate delivery mechanisms for province-based road loans when policy and institutional concerns remain unaddressed. These ventures seem to have occurred in a vacuum, with foreign investment bankers leading the way. The adopted means of financing projects is an expensive way to build toll roads; it may also have led to expensive ways of operating them. Furthermore, current rules governing financing (using international money) have already affected provincial highway organization, planning, and operation by “chopping” toll roads into small pieces; only provincial approvals are required to do this.

24. Another impact of private toll road companies concerns road operation more directly. To the extent that the private investors’ profit motives are incongruent with the public good,

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6. The Bank-sponsored High Level Policy Seminar for Highway Sector held in May 1997 in Beijing was a step in the right direction.
significant conflicts between the toll road companies and the PCDs—as civil service organizations—may develop in the future. For example, absent a clear policy, it is easy to imagine that tolls might be raised on certain roads to divert traffic to other roads owned by companies whose shareholders are or were in a privileged position within the government. Private citizens serving in official capacities on private toll road boards of directors have an opportunity to misuse previous connections with the PCD. Private motives and public interests may also clash in the design of concession agreements. Without well-defined, well-designed safeguards and without competition to secure public service and efficiency in road operations, investors may seek to maximize profits by cutting maintenance expenditures when the concession nears its end, normally 30 years in China, and when the road infrastructure is approaching the limits of its useful age and would require increased maintenance.

25. A third impact of toll road companies concerns planning and externalities. Private companies already have influence over the adopted network plan. On the positive side, private companies may be better tuned to traveler and investor needs and may therefore propose roads with high benefits. On the negative side, when employees of PCDs are transferred to the private company, and those holding senior positions are given shares of the company, they may favor road priorities that serve the company's business objectives but clash with national, regional, or other important objectives. Another conflict of interest might arise when a large shareholder of a (joint venture) road company purchases inexpensive property where there is no road access and then attempts to influence the planning and construction priorities to obtain a highway to serve the property. This highway may serve the development and the developer well. Still, the financial risk will be borne by the road company, currently closely tied to the government, and the external risks—environmental, social equity, and the like—will be borne by society.

26. The involvement of private investors who have ownership interest in the development of key highway segments will increase the complexity of road administration. This poses challenges that have little precedent in other countries. New regulations and managerial and planning styles may be required to ensure consideration of competing proposals, the integrity of the planning process, and transparency in prioritization and construction of the highway network. The challenge is to evolve institutions and management styles to ensure that private interests in planning, financing, operation, and treatment of externalities also serve public interests. If these efforts are successful and are responsibly carried out, extremely beneficial outcomes could result: highway development plans and policies, private sector interests, urban development issues, and others can be knowledgeably weighed against financial assessment criteria and issues could be optimally resolved. This may not be the case now. The organization, management, and responsibilities of the private toll road companies are not transparent. They may be transparent to those now involved, but to an observer and a potential participant they—and the dependencies between the government and the private toll road companies—are troublesome rather than transparent. An institutional development effort is indicated.

Borrower Views7

27. Meetings with national and provincial highway officials and their participation in Bank-sponsored seminars provided opportunities to observe and discuss the borrowers' views and

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7. These views are opinions expressed by those who were interviewed. They do not necessarily reflect "official" views or the views of the World Bank.
solicit ideas on how the Bank could improve its effort. Officials at every level considered the Bank's participation in highway and road development important. In addition to the benefits from the highways built, training and technical assistance were cited as areas where Bank involvement has made a positive difference. The Bank has also lent credibility to efforts to attract foreign capital. A general observation is that as the highway sector continues to evolve, some Bank policies and procedures may become less relevant to China. While the justification for most of these procedures is clear, they are creating some frustration.

Bank Procedures

28. *Expediting Bank loan approvals and project reviews.* Reducing the time and the number of stages required to execute a loan agreement and approve a design or design changes during construction, while still meeting quality control objectives, is desirable and should reflect increasing domestic capability.

29. *Modifying the low-bid requirement for contractor selection.* The low-bid criterion creates problems with contractor selection and may be a barrier to procuring the best maintenance equipment available from foreign vendors. Concerns about contractor selection are closely linked to the reliability of cost estimates and the prequalification process. The Bank's requirement that the lowest evaluated bid from a prequalified contractor be selected might be of less concern if the cost estimates were realistic and the prequalification process screened out incapable firms. Some borrower representatives suggested a reasoned rejection of bids outside a defined band, say ±15 percent of the owner estimate, is an approach the Chinese favor and may be a way to enforce more realistic cost estimates. The Bank should consider responding to this concern.

30. *Improving construction cost estimates.* The (quota) method of establishing the owner estimate of cost is reasonable and allows for differences in construction environments and unit prices in various locations. Limitations cited by the Bank include the lack of recognition of developments in construction technology and methods, differential inflation for inputs, and infrequent updates. Cost estimates can be improved by requiring more details of the proposed construction method and costs for major work elements, tracking data on owner cost estimates, comparing bid price and actual construction costs, and eliminating obviously questionable estimates as non-responsive. Provincial officials expressed support for the quota system, which—while rigid when not “decentralized”—allows enough flexibility to develop supportable estimates.

31. *Strengthening prequalification of contractors is a shared goal.* The Bank has urged that the prequalification process become more realistic in determining contractor capability and involve more verification of contractor claims. These efforts are unlikely to succeed in the short term. Concurrent developments in the banking and insurance industry to provide performance bonds or guarantees are required, not only for improving the prequalification process but also for determining contractor capability. Overly stringent prequalification requirements only impede development of the domestic construction industry. As the industry develops, increasingly rigorous qualification criteria can be established.

32. *The need for assistance in design review and construction supervision is decreasing.* Many Chinese officials feel that foreign construction supervision no longer adds significant value. The quality of Bank-required foreign supervision has sometimes been poor, and the cost difference between foreign and domestic supervision is significant. There also is an institutional dimension with program-wide consequences not solved by foreign supervision. This must be
addressed if greater reliance on domestic supervision is to succeed: when domestic supervisors raise issues of construction quality, often related to project completion date, and the conflict cannot be resolved at the project level, provincial officials will impose an agreement that may or may not hold the contractor accountable. The Bank could consider an incremental strategy to phase out the need for direct foreign supervision while continuing work to strengthen capability, authority, and accountability of domestic construction supervisors.

33. **Construction schedules are often unrealistic and compounded by poor project management.** Short contract time periods often result from politically influenced deadlines (for example, commitments to achieve targets within a set period). Some contractors’ lack the ability to mobilize sufficient staff and equipment in the early stages of projects and then fall behind schedule. In both cases, construction quality has suffered at the expense of on-time project completion. Provincial officials and facility owners acknowledged this but felt that it had to be addressed by the national government. The issue for the Bank is to support realistic schedules and to continue to work at the national level to encourage an appropriate balance between planned targets and the need for construction quality. One way to address this problem would be to decentralize program scheduling and control subject to program delivery performance measures. Another way would be to develop national or provincial guidelines on project scheduling that reflect delivery capacity, construction season constraints, geological conditions, and other risks and uncertainties.

34. Barriers to foreign competition in the highway construction market are real but entry is possible. The only foreigners in the construction market are equipment and materials suppliers and Bank-required construction supervisors. There are three significant barriers to creating foreign competition. First, there is a surplus of domestic construction firms and price competition is aggressive. Second, there is a conflict between the larger-sized contracts that would be required to attract foreign firms and the capacity of the typical domestic firm requiring a more modest contract scale. Third, the price differential between foreign and domestic labor is significant for both construction and construction supervision work.

35. **Payment procedures for small contracts are too complicated.** According to those interviewed, the Bank’s payment procedures, particularly for small contracts, were too complicated and the review and approval of documents took too long.

36. **Affordability of the resettlement and environmental protection regulations.** Resettlement and environmental protection are important yet problematic issues for both China and the Bank. The ends are the same but the means differ. The Chinese claim that the government has formulated a set of rules and regulations that are effective and practical in China and that China cannot afford the World Bank regulations in all projects and in the whole country.

37. **Implementation Completion Reports can be made useful to project owners.** The ICR is recognized as an important product of each project and an excellent training opportunity if the facility owner develops it with close Bank collaboration. Interviewees suggested that the ICRs include an evaluation of the contractors and of construction supervision. They also recommended that the ICR and all Bank project and nonlending reports be translated into Chinese. This would make the material accessible to a much broader audience and would support the overall training effort.
Technical Assistance and Training

38. The Bank provides valuable assistance and training on a broad range of topics as part of highway loans, particularly to improve China’s highway planning and construction capabilities. In some cases, such as the Bank’s approach to resettlement and environmental protection, technical assistance has resulted in approaches that are more comprehensive and constructive than might have existed without Bank involvement. However, interviewees voiced several concerns.

39. Technical assistance studies that are part of loan agreements are sometimes perceived as a low-priority use of project funds. Separating technical assistance studies from project loan agreements may make it easier to develop broader and more appropriate scopes. For example, a technical assistance study aimed at developing a highway capacity manual for a number of provinces might better focus on the national level. The Bank’s concern about a “grant” approach is the need for payment for technical assistance services. Separating the scoping of technical assistance from the constraints of specific project scopes, while still maintaining a mechanism for repayment, is possible. The scope for a multiyear highway program-level technical assistance effort could be negotiated and then allocated to project loans for payment.

40. The selection and scoping of technical assistance studies should be a collaborative process between the Bank and Chinese officials. Both national and provincial officials were aware of the Bank’s frustration with the pace at which study recommendations have been implemented. However, these officials see the Bank studies generating more reform agendas than they can handle; a better focus and priority setting is desirable and needs to be done outside of specific projects and loan agreements.

Current Agenda

41. Two recent Staff Appraisal Reports (Second Shaanxi Provincial Highway Project and Second National Highway Project) illustrate the breadth of the current agenda in China. The Shaanxi project includes a strong highway construction program; road improvements for poverty alleviation; equipment for construction quality assurance, environmental monitoring, maintenance, and traffic police; a road safety program; and institutional strengthening and training in the areas supported by the loan. The Second National Highway Project includes support for a highway construction program; technical assistance and studies in highway maintenance, safety, and commercialization of expressways; and equipment for maintenance, construction quality assurance, environmental monitoring, and a road management system. In sum, the plan is to continue funding the development of specific highway links and sustain technical assistance, workshops, and seminars in key areas. To complete the spirit of this agenda, additional work is required on the following:

- Refining the Pavement Management System, the road system planning process, and associated methods and data services. Management resource allocation decisions can be clarified and aided by comprehensive road management systems. The model systems under development need to be implemented in all the PCDs and

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8. The High-Level Highway Policy Seminar focused on five issues: transport planning, road maintenance, highway financing, traffic safety, and operation and management of high-grade highways.
used by all managers at various levels during annual and day-to-day road management decisionmaking.

- **Modern data collection and monitoring services and systems.** Upgrading this technology will be necessary to enable the MOC and the PCDs to improve their road management models and decisionmaking practices and cost and financial controls in contracting.

- **PC-based financial planning models.** Models will be required to support the toll road companies so that they can propose (and possibly set) appropriate toll levels and have full responsibility for their financial decisions.

- **Refinement and continued improvement in construction quality assurance and road maintenance practices.**

- **Technical standards and specifications.** China has updated its technical standards and specifications for roads and bridges during the period of Bank involvement; they should be reviewed again. Further work is needed in roadside standards; geometric standards for low-volume ("unclassified") roads in mountainous terrain; and pavement materials, designs and testing procedures. The highway capacity manual should be expanded to apply to all classes of roads and intersections, urban and interurban, in the entire country.

- **Improved programming and supervision of road works.** The PCDs have a well-defined "five-year plan" system. Supervision of road works has improved. Three areas need immediate attention: (a) scheduling of road works to better match the construction season, geological conditions, and contract size; (b) programming of road works in flexible lot sizes to permit new contractors to enter the market for competition and efficiency; and (c) strengthening project management, including independence of local construction supervisors, to maintain quality and construction schedules.

- **Road traffic safety improvement.** Fatality and injury rates (per 10,000 vehicles) are high in China; much higher than in Thailand, Indonesia, and many other Asian countries. Coordinated road traffic safety programs must continue at an accelerated pace and with expanded scope and should include building the support and awareness of high-level officials.

- **Continued implementation of intermodal terminals and facilities.** Increased intermodal capacity will be needed to support growth of the import-export sector and the government's policy of developing import-export industries, especially in inland China.

**Conclusions and Recommendations**

42. The highway development program in China has made impressive progress. Still, the country has one of the sparest highway networks in the world for its population and geographic
The Bank's participation in projects for economic development, congestion relief, and especially for poverty reduction must continue, but the Bank's influence on the sector will progressively diminish if project focus is the priority. The Bank funds to support highway development are also likely to be a small part of the total resources devoted to China's road program as it continues to expand over the next decade.

The Bank's technical assistance has had a positive influence but needs to be refocused to scale-up the impacts of its support. The real opportunity now is to assist China in addressing the policy issues that will ensure network-wide benefits of Bank-supported investments over the long term. This section addresses that question. This is not to suggest that the Bank has not raised these issues before or recognized their importance. Rather, it is a strong recommendation that the Bank's most significant contribution in the future will come not at the project level but from renewed efforts to help China develop approaches to address broader issues related to the sector's institutional arrangements, organization, management, and financing. These concerns are discussed next under the following headings: institutional restructuring and the role of the MOC; organization and management of the highway system; rationalization of highway finance; technical assistance and training; competition and private sector development.

Role of the MOC and Institutional Restructuring

At the national level, the MOC and SPC are the key highway agencies. Major policy issues dealing with the national trunk highway system development, intermodal planning and coordination, and highway financing will continue to be dealt with at the SPC and State Council level. This organizational structure reflects a strong central government role and a vertical relationship between the central government and provincial and local governments in some functional areas. This structure has served its intended purpose well. Currently, however, the issues that need to be addressed in the road sector are becoming more complex and require integration across functional areas at each level of government and are reflected in a greater decision making and financing autonomy of the provincial governments. In addition, when the new highway law instituting a fuel tariff is implemented and the expansion of expressway companies continues, a reexamination of roles for the national, provincial, and local governments in the road sector is appropriate. Specific issues that need to be addressed as follows:

- **Strengthen the coordination of highway system planning with land use and environmental issues.** To the extent it occurs, the SPC and provincial planning commissions deal with integration of highway and land use and environmental planning. The PCDs, the primary agencies in road network development, are not directly involved and perceive their role to be plan implementation and system maintenance. However, the PCDs' understanding of and involvement in integrating land use and environmental considerations in highway development is crucial. This is a particularly critical issue on the edges of urban areas, where pressure for continued outward development is strong. On a project level, some coordination has occurred through Bank-sponsored resettlement and construction-related environmental mitigation efforts. A more systemwide perspective and initiative is suggested.

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- **Improve intermodal coordination.** While PCDs have responsibility for most modes, the SPC or other agencies address a significant number of intermodal transportation issues. Closer coordination among the MOC, MOR, SPC and other national agencies, and more active involvement in intermodal transportation planning by PCDs at the provincial level is desirable. The CCTA may be able to provide some of the coordination required and it should be involved in efforts to address intermodal issues.

- **Develop an institutional framework for multimodal urban transportation.** The need for more integration across modes and for greater consideration of land use and environmental issues is most acute in metropolitan areas. While creating a national, provincial, and local framework for highway finance, system classification and institutional roles is desirable, the lack of such a framework will have its most negative near-term impacts within urbanized areas. The Bank can help identify the issues that need to be addressed to effectively develop and manage an urban highway system (Chapter 3).

- **Accelerate organizational and institutional development of the PCDs.** The above issues, and the growing role of the private sector in planning, building, and operating roads, requires continued organizational development of the PCDs to retain the benefits of decentralization. Such development, which must occur incrementally, must take into account the multiple road owners (functional and administrative road classification), evolving financing and cost-sharing mechanisms, multiple jurisdictions, evolving planning frameworks (including toll roads), intermodalism, and the coordination with land use and environmental policies.

- **Increase accountability and efficiency of the PCDs.** Institutional development to improve accountability should include: (a) separating the “client” and “producer” functions of the PCDs; (b) strengthening the decisionmaking, planning and programming, and project management capabilities at the district levels of the PCDs; (c) establishing annual performance indicators for the PCDs and their districts to follow trends in efficiency of the delivery of road programs to achieve objectives; (d) clarifying the role of the private sector; and (e) devolving more policy development responsibilities to provinces, particularly those dealing with the private financing of roads.10

Organization and Management of the Highway System

45. China has established a framework for a highway classification system that is used for defining jurisdictional responsibilities, planning and project development approaches, and financial responsibility. In this context, several issues need further development.

- **Strengthen the framework used to classify and manage the highway system.** The basic framework for a highway functional classification system has been

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established. But only the NTHS reflects a rigorous and consistent definition of
criteria and evaluation. Provinces have considerable latitude to define key provincial
highways, which may or may not include all the non-NTHS segments of the
National Highway System (NHS) in the province. Design classes reflect physical
features rather than function. A functional classification system, at least at the
national and provincial levels, would provide a stronger basis for long-term system
planning and resource allocation.

- **Classify the “unclassified” roads.** Many rural roads are categorized as
“unclassified.” For road management, especially for maintenance and resource
allocation, it is important that these “unclassified” roads be assigned an owner or
owners who are responsible for their maintenance and structural condition. Again,
the Bank can help identify the issues to manage the “unclassified” roads and
propose institutional models.

- **Accelerate the development and use of pavement and bridge management systems.**
The development of facility databases and management system tools is, at least on a
pilot basis, being applied in some provinces. These tools are not yet used at the
national or provincial levels to evaluate system resource allocation decisions by
functional class or by program (rehabilitation versus maintenance) or by geographic
area of the region. The Bank should work with Chinese officials on “full-scale”
studies to demonstrate the broad capability of such tools to help manage the road
system.

- **Develop a highway system operating and maintenance strategy for major urban
areas that includes both public and privately owned facilities.** In some urban areas,
such as Beijing, Shanghai, and Guangzhou, the organizational and ownership
structure emerging to attract domestic and foreign investment in toll facilities may
impede highway system management. A Bank-sponsored effort to examine
Intelligent Transportation Systems (ITS) technology and operating strategies used in
urban areas of other countries might provide insight into the kind of coordination
that may be desirable among various toll facilities. It may also help refine the
requirements placed on each expressway company and the longer-term system
operating strategy. In addition, clarifying the roles of various levels of government
and specific agencies, particularly the role of PCDs, should be a key part of such a
strategy.

- **Develop and publicize a strategy for provincial highway networks.** Similar to what
the national and provincial governments have done in establishing the NTHS, and to
a lesser extent the NHS, each province should develop and publicize an overall
highway system development and financing plan, including NTHS and NHS
components, but focusing on long-range provincial capacity expansion needs. The
institutional arrangements currently used to generate foreign investment for the
NTHS and NHS may create a significant barrier to the effective management and
operation of the expressway system as a whole. For example, in Guangdong and
some other provinces a fairly complex expressway ownership structure has emerged
that may frustrate the integration required to price, operate, and manage the entire
system. Already provincial officials have noted variations in tolling and traffic
monitoring equipment as a potential barrier to system integration.
Rationalize Highway Finance

46. Numerous World Bank reports and memoranda, as well as material provided by Chinese officials, suggest that China's highway capacity and maintenance needs will not be met by existing revenue sources. As the highway network expands and ages, additional resources will be required to maintain and operate existing facilities. The relatively recent trend of creating expressway companies and refinancing existing toll facilities through stock offerings on both domestic and foreign stock exchanges is an innovative approach to addressing the gap between traditional highway financing sources and highway development needs. However, toll revenues and private capital will provide financing for only a relatively small segment of the highway system. Helping China rationalize its approach to financing highway system development, operation, and maintenance will have significant benefits. A recently approved, fuel tariff to replace the road maintenance fee (RMF) as the primary broad-based source of highway financing is a step in the right direction. This shift to a direct user fee approach can go a long way toward helping to rationalize the highway funding structure. During the period when the procedures for collecting and distributing the tariff revenues are being designed, the Bank has an opportunity to assist China in developing a financing approach that supports institutional change and highway system development, operation, and maintenance at the national, provincial, and local levels. In developing such a strategy built around the new fuel tariff, the following issues need to be addressed:

- **Design road user charges to reflect road use costs** (cost-based pricing). Current road user charges do not reflect the real costs of roads and their use. The prospective fuel tariff should be calculated and implemented for different vehicle types so that it would do that. Well-designed road user charges will generate the revenue needed for the planned road investment, serve as a traffic management tool to alleviate congestion and pollution, especially in urban areas, and help achieve an effective modal distribution of demand.

- **Develop domestic credit markets.** The ability of several provinces and major municipalities to tap into foreign equity markets has been impressive and creative. Foreign credit and private capital, attractive if no other option exists, are expensive compared to domestic credit and additional user charges as a way to finance the highway program. Ultimately, users will pay a premium through higher toll rates under the current project financing approach. Resources that could have been devoted to system expansion, maintenance, and operation will be devoted to servicing foreign debt and investment. China's domestic credit market is not yet viable as an alternative to foreign and domestic private capital markets, or loans from bilateral and international institutions. Remedy this requires reforms of state-owned enterprises and progress may be slow, but the Bank should continue to assist the country in understanding the opportunity costs involved.

- **Improve cost and efficiency of revenue collection.** The leakage problem of the RMF is large (some sources report rates as high as 30 to 60 percent). Steps should be taken to automate the collection and revenue monitoring process and reduce leakage as well as collection and management cost. The new fuel tariff law may reduce the importance of these issues for some revenue sources, but revenue
collection and monitoring procedures for the new tariff will be critical to ensuring that its revenue potential is realized. There also is leakage in toll revenue collection in that some (many?) government and military vehicles that participate in the market economy do not pay.

- **Retain the benefits of decentralization.** When the fuel tariff is national, the central government may want to decide how it will be allocated; this inevitably brings in political variables. The allocation criteria may include rational economic variables, but the central government may also want to achieve ancillary goals at the expense of transport development. Some provinces may find themselves subsidizing transport development in other provinces and less able to decide about their own transport programs. The fuel tariff is a good way to generate funds, but its allocation should rest with the provinces,\(^\text{11}\) or only a small portion of the dedicated fund assigned for the MOC to help implement the NTHS. This will minimize political imperatives in the allocation and better reflect the needs and objectives of the provinces. National goals, such as building low-volume rural roads in remote areas, while important, are best financed through other national revenues.

- **Most important, any Bank effort to encourage highway finance reforms must involve very senior Bank officials working with senior officials in the national government, particularly the SPC and MOF, as well as key provincial officials.**

**Technical Assistance and Training\(^\text{12}\)**

47. In the future, technical assistance may have more impact than project loans by themselves. The scope of technical assistance should not be constrained by the scope of the individual projects. While Bank-sponsored technical assistance has addressed important issues, it has not led to the type of partnership and collaboration in defining a forward-looking technical assistance agenda that may be most useful. Technical assistance is an important means of learning. Chinese agency staff and contractors (including consultants) should be directly involved, preferably in a lead capacity, in the conduct of technical assistance activities. This would increase the understanding and support for the technical assistance efforts and offer valuable training opportunities. Technical assistance and training efforts need to focus on the areas where the Bank and China mutually agree that further assistance is a priority.

- **Refocus technical assistance.** China is well on its way to having a well-developed highway system infrastructure—at least in the most rapidly developing portions of the country. The challenge will increasingly become the management, operation, and maintenance of that infrastructure and its integration into the multimodal transportation system. While continued efforts to support the development of China’s highway design and construction industries may be desirable, it is clear that capabilities in those areas are developing rapidly and the Bank’s comparative

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12. Currently the Bank is undertaking a review of its technical assistance and training operations in China’s transport program.
advantage now is in the institutional, management and finance, regulatory, and system operation arenas. All levels of government must be involved.

- **Refocus training.** Project activities have so far been the major focus of training. Future training agendas, developed in cooperation with the Chinese, should parallel technical assistance and emphasize road administration, management, and finance (particularly the implications of private sector financing in road system planning), and management at the national, provincial, and local levels. Wherever possible, training programs should be developed as modules that can be repeated, and a “train the trainer” element should be included to scale-up the domestic training capacity quickly. The possibility of establishing Technology Transfer centers and programs, patterned after the U.S. and European experience should be investigated. This shift again reflects the growing domestic capability to develop and implement road projects.

*Competition and Private Sector Development*

48. The primary focus of the Bank’s involvement in the highway sector has been providing loans for specific projects and technical assistance focused on developing expertise on highway planning and engineering. However, efficient use of the highway infrastructure will depend on the continued development of competition and market reforms in the transport sector, particularly the freight industry. It is recognized that the transport market reforms being undertaken must occur incrementally and in step with other reforms in China.

- **Improve pricing.** Pricing of transport services and segments of the system is not consistent and may not be encouraging additional competition and efficiency. This is true within the road sector and is probably more dramatic across modes. Movement toward an improved regulatory framework will need to proceed at an acceptable pace, and it would be useful for the Bank to work with appropriate provincial and national officials to develop implementable regulation and pricing strategies for all modes of transport.

- **Develop domestic credit markets.** China’s ability to finance its infrastructure needs, including road system needs, will depend on the development of the domestic credit market as an alternative to bilateral or international agency loans and private capital. The Bank’s continued efforts to assist in reforming state-owned enterprises and improving the banking and legal systems can have a dramatic effect in providing a highly cost-effective mechanism for infrastructure finance.

- **Bring more market reforms to the construction and consulting industry.** Competition will both improve the cost effectiveness of the construction industry and make foreign competition more viable. The same goes for the domestic consulting industry, which is underdeveloped by any standard. Project loans and associated technical assistance and training provide an excellent opportunity for the Bank to work with the Chinese to develop a domestic consulting industry by partnering it, when necessary, with foreign firms.
Evaluation Detail: Urban Transport

1. The First Shanghai Metropolitan Transport Project (SMTP I) in 1991 and its 1993 follow-on, SMTP II, started the Bank’s lending to China’s urban transport sector. The Bank cosponsored a 1995 symposium in Beijing on China’s urban transport development strategy and has four projects under preparation to go to the Board before fiscal year 2000. The Bank’s late entrance into urban transport lending and the lack of policy dialogue in the sector is perplexing. Given the rapid growth of China’s urban centers and the critical urban transport issues that have emerged since economic reforms began, the Bank could have moved more quickly.

Objectives

2. The Bank has two objectives in China’s urban transport sector. First, it seeks to enhance urban economic productivity by improving the operational and economic efficiency of the urban transport system. Second, it aims to strengthen public sector management by improving the planning and management of urban transport.

3. Under SMTP I and II the Bank funded a range of activities in Shanghai. Those activities included construction of sections of inner-ring road, traffic safety and management, investment in public transport, development of priority routes for nonmotorized vehicles, and technical assistance for the metropolitan government.

Results of Bank Lending

4. Although China has yet to complete a Bank-supported urban transport project, some lessons can be drawn from the two ongoing projects. The implementation of the road infrastructure component is satisfactory; a 28-kilometer section of Shanghai’s inner-ring road and associated surface road improvements have been completed. Maintenance equipment has been acquired and plans are under way to build a bus depot. Bus company management and operation have been studied, but no action has been taken on the study’s recommendations.

5. According to the supervision reports, the traffic management components are facing implementation difficulties in Shanghai. Both traffic signals at intersections and intersection channelization are performing unsatisfactorily. Lack of adherence to traffic rules is one source of the problem: pedestrians routinely cross against the signals and nonmotorized vehicles ignore the signals. The two routes that have been established for nonmotorized vehicles are also performing below expectations because of lax lane discipline and uncontrolled parking. The implementation of standard traffic management measures is only one of the many challenges facing urban transport development in Chinese cities.

1. Except for the Proceedings of a Symposium in Beijing (November 8-10, 1995) on Urban Transport Development Strategy (World Bank Discussion Paper, No. 352), economic and sector work in transport refers little to urban transport. It is pertinent to mention here that recently the Bank’s East Asia and Pacific Regional office was organized for urban transport and interurban transport to be located in the same unit.
Current Agenda

6. High urban population density and a high rate of urbanization and motorization make China’s urban transport challenges seem overwhelming. The number of cities in China has increased from 225 in 1981 to 622 in 1994; 36 cities have populations of more than 1 million; since 1984 China’s vehicle fleet has grown 15 percent a year. This rapid urbanization and motorization has been helpful to China’s economic development, but the country’s urban infrastructure and services, and the institutions responsible for them, are stretched beyond their limits and outmoded for the new urban reality. The situation is a threat to economic growth.

Physical Challenges

7. **Road infrastructure.** The urban road infrastructure in China has not kept pace with urban growth. The street networks were designed to accommodate much smaller traffic flow and lack a systematic classification according to function. Road maintenance is frequently deferred for lack of adequate funds and effective organizational capacity.

8. **Traffic management.** Traffic system management and traffic enforcement are limited by institutional arrangements, and road capacity is consequently underutilized. Land use development is not integrated with transport development and this, combined with inadequate infrastructure and ineffective traffic system management, has led to higher than necessary vehicle operating costs, severe air pollution problems, a disproportionately high number of accidents, and severe traffic jams.

9. **Public transport.** Public transport is inconvenienced by traffic congestion and, above all, by an institutional framework that is insufficient for the provision and regulation of ample and efficient service. Since the mid-1980s bus operating speeds have been declining; in many urban centers buses are slower than bicycles. An attempt to provide busways under SMPT I was dropped early in the project because of the large volume of buses to be served.

10. Public transport in China belongs to the social service sector rather than the transport sector. Along with residential water, gas, and heating supply, public transport is considered an urban public utility. This classification mandates that municipalities subsidize the construction and operation of public transport because the central government no longer provides subsidies and grants for public transport. However, the mandate also forestalls meaningful reform to align the sector with the market economy.

11. The inadequate performance of publicly-owned buses has created a market niche for privately operated shared-ride taxis and minibuses. In heavily congested areas, even motorcycles are sometimes used as taxis. These informal arrangements have emerged in response to demand for faster, more comfortable service even if it comes at a higher price. The private operators offer relief from the crowded, slow buses and are a welcome alternative for many passengers. But interloping and conflicts at terminals and bus stops for waiting passengers are common. A recent paper\(^2\) on public transport in China notes that “a large number of non-state owned passenger

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vehicles compete with public transport vehicles on the same bus lines, fighting for passengers at stations designated for public buses.”

Institutional and Policy Challenges

12. Nationally, the Ministry of Construction is in charge of developing long- and medium-term policies and strategies for urban transport development and land use planning; it also drafts reform plans and related laws and regulations. The Ministry of Communications is responsible for developing and planning highways outside city boundaries. The two ministries have no formal coordination mechanisms, which makes planning integration difficult. To compound the difficulties, traffic control (and traffic safety), including the planning, construction, and maintenance of the traffic control facilities, is the responsibility of the Ministry of Public Security and its subordinate municipal organizations. Finally, the Ministry of Railways independently plans, prices, and provides commuter rail services in large cities.

13. Economic reform has devolved many administrative and financial responsibilities for urban transport to local governments, essentially leaving the central government without instruments to ensure that its urban transport policies are carried out. The central government is largely restricted to providing guidelines—which municipalities may or may not follow—and, through the State Development and Planning Commission, approving large-scale investments (such as urban passenger rail systems).

14. On the local level, two institutions are responsible for urban transport: the Construction Commission and the Public Security Bureau. The larger cities typically have three bureaus under the Construction Commission: Urban Planning Bureau, Civil Engineering Bureau, and Public Utility Bureau. The three bureaus are responsible for planning, constructing, and managing urban roads, and for providing public passenger transport. The Construction Commission coordinates the various bureaus. In practice, the functions of the bureaus overlap and coordination among them and with agencies outside its “line-block,” such as the Public Security Bureau, Finance Bureau, Land Management Bureau, and Planning Commission, is deficient. 3

15. Clearly the most pressing challenge in China’s big cities is developing an institutional framework where issues, strategies, and policies can be discussed across the “line-block” system and where decisions on the planning, financing, and regulating of the urban transport system can be made. The organizations currently responsible for urban transport are fragmented; their responsibilities are unclear and they have overlapping functions and lack coordination. No area-wide or regional planning organization is responsible for developing an integrated urban transport system plan for a metropolitan region or for new developments in areas outside the city limits but within the urbanized area.

Conclusion and Recommendations

16. Judging from the preliminary results of the Shanghai projects and from observation, China’s urban transport problems will not be solved through isolated projects that focus on “low-

3. Lack of “horizontal coordination” is a difficult problem in any country. In China even more so because of the hierarchical “line-block” organization structure which duplicates the central organization at local levels and which fractal organization is inherently suited for commands and downward coordination. It will be an important task in organizational development to impart the value of interagency coordination in practice and not only in theory.
cost," location-specific traffic management schemes. No "scale-up" effects can be obtained by tackling a few location-specific problems. The Bank needs to develop an urban transport "product" suitable to Chinese cities. This product, whose main components are enumerated below and elaborated later, should approach the urban transport problems strategically, take a sectoral view, and link urban transport development to the larger issues that affect urban development as a whole and drive transport demand. It needs to encompass the development of:

- an expanded road infrastructure network and comprehensive traffic system management;
- a public transport system based on market principles, including informal and nonmotorized services; and
- a metropolitan-wide organization capable of transport planning and implementing regulations and policies for urban transport in a competitive environment.

17. China's rapid urbanization and economic growth pose unique challenges to developing an urban transport system that is economically feasible, socially beneficial, and environmentally sustainable. Most cities in China must invariably deal with the growing demand for urban transport and associated problems of traffic congestion, safety, air pollution, and land use, especially on the edges of cities. Policy and institutional development need to pay particular attention to private sector development, financing of urban transport, cost recovery, and enhancing the government's capacity to plan and implement urban transport improvements.

Physical Expansion

18. **Road network capacity.** Urban road construction and maintenance need to keep pace with the growing transport demand. Expansion of the road infrastructure should be expedited. Without devaluing the low cost, location-specific traffic management measures, urbanization and transport demand quickly overwhelm the physical capacity of the network as traffic outstrips the technical capacities of the low-cost traffic management measures. However, rational road capacity expansion requires up-to-date traffic management. For this to be cost-effective, adherence to and enforcement of traffic rules need to be assessed before a traffic management system is developed and implemented.

19. **Functional (and administrative) classification of the road and street network.** Land use planning, zoning regulations, and street classification need to rationalize the allocation of street space between competing residential and commercial needs, including street vendors. China's existing functional classification of roads in urban centers is rudimentary; a hierarchical classification of streets by function (for example, arterial, collector, and local) is needed. This will help develop, manage, and maintain the road and street network. Perhaps the most useful contribution of an up-to-date road and street classification is its relationship to financing and resource allocation. Because urban arteries carry considerable traffic that is nationally important, it is vital that the higher functional classes of the urban network also be a part of the national highway network. It also may be worthwhile to consider financing these higher classes of roads from the same sources as the interurban national roads.
Public Transport

20. **Integrated public transportation plans for terminals and nonmotorized transport.** Public transport will continue to be important in China’s motorization process. It will augment the slow-moving, nonmotorized vehicles and, if it is efficient and adequate, could slow private automobile usage, thus reducing congestion and pollution and saving energy resources. Integration of public transportation terminals with nonmotorized vehicles is important.

21. **Private participation in urban public transport.** China’s urban public transport sector needs to be reoriented to increase private sector participation in its provision. Informal transport providers can—and must—be integrated into the public transport system. The development and enforcement of rules governing passenger pick up and discharge at terminals and curbs may reduce interloping and curbside conflicts between providers.

22. **Bicycle transport and pedestrians.** Bicycles and pedestrians are very important modes of transport in China, but they are hindered by inadequate infrastructure and shared road space with motorized transport. This makes the “light traffic” vulnerable to accidents and traffic pollution. An urban transport strategy in China needs to pay special attention not only to accommodating bicycles and pedestrians but also to enabling their continued high rate of usage.

Institutional Framework and Capacity Development

23. **A metropolitan-wide planning organization.** The urban transport system requires a strategic institutional framework to plan, manage, finance, and regulate it. China’s large cities have institutional vacuums resulting from the rapid urbanization and from multiple organizations/jurisdictions involved in urban transport that do not talk to each other. China needs a metropolitan-wide institution capable of responding to the demands of a decentralized economy and facilitating the development of a multimodal urban transport system, including coordination of land development projects with the requisite infrastructure.\(^4\)

24. The difficulty and time required to establish a functioning metropolitan-wide planning coordination organization should not be underestimated. The Bank should consider working with the State Development and Planning Commission (SDPC) and a handful of provinces to identify ways in which China can develop a metropolitan organization to coordinate urban transport system planning and development, including financing\(^5\) and mechanisms for decisionmaking and horizontal coordination. The SDPC’s representation within the various government ministries, embodied in each ministry’s Planning Department, makes it a logical candidate for such work. The Bank can help identify the issues that need to be addressed to develop and manage an urban highway and transport system. It can also identify useful institutional models, such as the Metropolitan Planning Organization (MPO) in the United States.

25. **Improved transport planning capabilities for all passenger and freight transport, door-to-door.** The need for more integration across modes and for greater consideration of land

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4. The latest urban transport projects include a notion of a metropolitan wide planning organization through the “leading group” that coordinates the project. A more formal organization structure, an institution, is suggested here.

5. For example, if a national (or provincial) fuel tariff is earmarked to building transport facilities, a portion of this fund could be allocated to the regional transport organization to finance urban area transport facilities.
use and environmental issues is most acute in urban areas and in the rapidly developing areas just outside current urban boundaries. It is also within the major urban areas that the establishment of various forms of expressway companies is making current institutional arrangements in the highway sector more complex. While creating a new framework for highway finance, system classification, and institutional roles is desirable at the national, provincial, and local levels, the lack of such a framework is likely to have its most negative affects within urban areas in the near future.

26. PCDs, the primary agencies overseeing the development of the country’s highway system, must be directly involved in the metropolitan-wide planning organizations. Their understanding and involvement in addressing the integration of land use and environmental considerations in highway system development are crucial. This is a particularly critical issue on the edges of urban areas, where pressure for continued outward land development is strong.

27. Private consulting industry for urban transport planning. New ideas are important for China’s urban transport. This is best aided by competition. The metropolitan planning organization and a financing mechanism tied to road system financing, and private sector provision of urban public transport can help create the market for private consulting companies.

28. Policies for greater private sector participation in urban transport services and infrastructure. Public transport services need a better policy and regulatory framework and improved fare structures for cost recovery. The shortage of buses and the limited managerial capacity to operate bus transport services compound the urban transport problem. There are several possible remedies: setting up small, easy-to-manage private bus companies, or organizing single bus owners as “bus route associations” (that may later grow in size). The Bank could then consider developing a loan guarantee mechanism for these small private companies to acquire buses. The private sector could also play a greater role in the financing and operation of urban roads; it already finances and operates several expressways in China. With appropriate policy and regulatory framework, the private sector could participate in urban roads as well.
Evaluation Detail: Railways

1. Since 1983, the Bank has approved seven national railway projects and one local railway project, totaling nearly 2.2 billion in loans and credits. Four of the projects (Railway I–III and the Inner Mongolia Railway project) are complete and four (Railway IV–VII) are ongoing. Another railway project (Railway VIII) is under preparation and is expected to go to the Board in fiscal year 1999. The World Bank’s credits and loans to China’s railway subsector make up approximately 14 percent of the country’s total railway investments.

Objectives

2. The objectives of the Bank’s rail transport assistance in China have evolved through two phases (Figure D1). The first phase, comprising the first five national railway projects approved between 1984 and 1992, primarily supported capacity expansion in high-priority corridors and introduced new technology for improving operating efficiency. The second phase, which started with Railways VI (approved in 1993), supported capacity expansion plus studies and technical assistance for institutional restructuring, policy initiatives, and systemwide modernization. The implementation of the second phase started with Railways VII and will accelerate under the proposed Railway VIII.

![Figure D1. Evolution of Bank lending for China railways](image)

*Figure D1. Evolution of Bank lending for China railways*

Major Objectives of the Projects

3. **Capacity expansion** consisted of double tracking, lengthening and constructing crossings, electrification, constructing new tracks, and installing centralized signalling systems. The Bank also funded projects to improve the technology and productivity of locomotive and rolling stock manufacturing and maintenance. Recent projects (Railways V–VII) have also
included systemwide technological modernization, such as track maintenance and telecommunications.

4. **Institutional development** objectives sought to upgrade the Ministry of Railways’ (MOR’s) telecommunication and information system; strengthen and rationalize staff development; modernize railway welfare functions; and redefine government-railway relationships and, most important, restructure the railway organization and its peripheral enterprises, such as locomotive manufacturing, into a number of profit-oriented, market-based enterprises and diversified economy ventures.

5. **Policy initiatives** are geared toward developing market-based railway tariffs; adopting cost-benefit analyses in planning and programming railway investments; introducing new costing and accounting methods; changing staff compensation and incentives; strengthening financial management; and improving the ministry’s capacity to regulate and manage the railway system.

**China’s Economic Reform and the Railway System**

6. The 54,616 route-kilometers of national railway\(^1\) under the administration, management, and operation of the MOR has often been called the “backbone of China.” Under the planned economy of the past, the railways were a means for executing government economic, military, and social policies. Some of this remains even after two decades of economic reform. Likewise, the ministry does more than provide transport, it is a government policy instrument, a regulator, a social services provider, and manager of a range of manufacturing and non-rail transport services. Restructuring the railway—and the MOR—is constrained by its planned-economy mandate, while the country is rapidly moving to a market-driven economy.

7. As China’s economy has grown, transport demand has increased. As Figure D2 shows, since economic reforms started, rail freight traffic has more than doubled from 570 billion ton-km to 1,300 billion ton-km. Likewise, rail passenger traffic has more than doubled from 138 billion passenger-kms in 1980 to 350 billion passenger-kms in 1996. The trend in freight traffic has been a steady but diminishing increase. The trend in passenger traffic has fluctuated and has recently been on the decline, decreasing by 14 percent between 1994 and 1996.

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1. Provincial and local governments administer an additional 4,400 route kilometers of local railways.
Figure D2. Trends in railway traffic

8. Liberalization and decentralization of the economy have led to realignment of transport demand with the economically appropriate transport modes. For example, due to market and service requirements and the lack of economies of scale (distance), more and more short-distance freight traffic is being handled by the trucking industry, leaving long-distance hauls for the railways. Figure D3 shows that the average distance traveled by rail freight traffic increased by 48 percent between 1980 and 1996 rising from 526 km to 776 km.

Figure D3. Average distance of freight traffic carried by MOR

9. The railway's market share has been declining compared to other modes of transport (Figure D4). In 1981, rail freight traffic made up 72 percent of all freight ton-kms in China, while road transport was just under 10 percent. But by 1995, the rail freight share had declined to nearly 52 percent, while road-based freight transport had increased to 20 percent. The remaining freight was carried by waterways (21 percent) and air cargo (0.1 percent).
Figure D4. Freight traffic by mode (road and rail transport)

10. Similarly, intercity passengers are increasingly carried by buses and by air. In 1981, rail passenger trips accounted for nearly 60 percent of the passenger kilometers, while cars and buses accounted for only 35 percent. By 1995, rail had dropped to 43 percent and road had increased to 49 percent.

Reforms in the Railways

11. Despite major capacity expansion and changes in market structure, China’s railways are still unable to meet the demands of a liberalized and decentralized economy. Many bottlenecks remain in the economically active coastal areas, and access to the railway system in the inner provinces is sparse—especially for containers. These bottlenecks will continue to affect the railways and cannot be solved through capacity expansion alone. Accelerating the institutional restructuring and policy development, which both increases the capacity and improves customer service, will be required for China’s railways to compete with the other modes.

12. Reform of China’s railways has been slow in part because the MOR still operates under its old planned-economy mandate. Recently, however, changes have begun to align the institutional and policy structure of the railways with the rest of the economy. Many state-owned enterprises are now autonomous and have independence for planning and operations. The private sector, too, has grown. But the railways remain fully in the government’s fold, centrally owned, regulated, and operated with numerous peripheral services. With this institutional structure it will be difficult for the railways to remain viable. Restructuring the railways and the MOR is the logical next step. All parties generally agree on the broad framework—separation of government regulation from railway operations; autonomy of the railway operations; and spinning-off of peripheral activities. The agenda of necessary studies and pilot implementations also is clear and agreed because there are several alternative ways to achieve the restructuring objectives. At the
Vienna railways Roundtable,² it was suggested that a law is required to legislate the role of the government and the setting up of a railway enterprise with a clear commercial orientation.³

Results of the Bank Assistance Program

13. A major Bank objective in China’s railway subsector has been to assist and support the MOR’s expansion of railway capacity through credits, loans, and technical assistance. Beginning in 1983 and continuing to the present, a major portion of the Bank’s lending has been allocated to achieving this objective. To achieve investment efficiency, the World Bank helped develop the Railway Investment System (RIS) to prioritize all capacity expansion projects.

14. All Bank projects dealing with the construction of new railway lines and the modernization of infrastructure are achieving their development objectives and are having a positive impact on the railway system. OED’s ratings of completed projects show that the four completed projects had a satisfactory outcome, high ERRs, and were likely to sustain their benefits. Recent supervision ratings indicate that implementation progress has been satisfactory and that the projects are likely to achieve their development objectives.

Track Construction and Modernization

15. With Bank support, the capacity of China’s railway system has been expanded. Since the Bank began its lending in 1984, the total track route length has increased from 52,000 km to 54,616 km (Figure D5). More important, the network has been upgraded to handle increased demand. Between 1984 and 1995, electrified track route-km increased by over 200 percent from a low of 1,700 route-km to nearly 10,000 route-km and double-track routes have increased by 73 percent, rising from 9,700 route-km to nearly 17,000 route-km (Figure D6).

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² This evaluation was available for the Vienna Railways Roundtable, organized by the Austrian Transport Society and the World Bank in October 1997, where China’s railway reform and future steps were discussed.

³ The first step on the long road of railway reform has already been taken. In January 1998, Vice Minister Fu (the recently appointed Minister of Railways) commented on the railways restructuring. The plan calls for separating non-transport enterprises from transport enterprises by the year 2000; the introduction of a joint-stock ownership system for some non-trunk railway lines; and leasing or transfer of some others (thus introducing the short line concept in China).
Figure D5. Route length increase

Figure D6. Rail network upgrade

16. Despite the impressive progress in expanding capacity, China’s railway system continues to have major capacity limitations. Figure D7 shows that in 1995 over 50 percent of the railway tracks were still single and non-electrified. This means that modernization of the rail infrastructure will remain an important objective in the years to come.
Figure D7. Railways of China by track type

<table>
<thead>
<tr>
<th>In 1984</th>
<th>In 1995</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrified</td>
<td>6%</td>
</tr>
<tr>
<td>Double Track</td>
<td>19%</td>
</tr>
<tr>
<td>Single/non-electrified Track</td>
<td>75%</td>
</tr>
</tbody>
</table>

Rolling Stock

17. Bank financing has also contributed significantly to modernizing the China's rolling stock. Since 1984, the locomotive fleet has increased 36 percent, rising from 11,000 to 15,000 locomotives. The number of electric locomotives has increased from 484 in 1984 to 2,500 in 1995; the number of diesel locomotives has increased from 3,100 to 8,300. The use of steam locomotives has declined sharply from 68 percent in 1984 to only 28 percent in 1995. Even that overstates steam's importance because by 1995 it was primarily used for yards and terminals.

Figure D8. Locomotive modernization
Steam's share of ton-km and passenger-km would be much lower (Figure D8).

18. The satisfactory outcome of the capacity expansion program derives from the design of the projects, which sought to achieve the prevailing MOR objectives. The projects also were within the scope of the implementing agencies' organizational capabilities and required little cultural change within the MOR.

**Institutional and Policy Development**

19. According to MOR officials, the Bank’s technical assistance has enabled the ministry to "broaden its horizons" by enhancing the understanding of new technologies as a means of increasing capacity and efficiency. Technical assistance and training in the use of modern locomotive and signaling equipment have contributed to marked improvement in the operating efficiency of the railway system (Figure D9). The use of locomotives has steadily increased. When the first Bank-supported railway project started in 1984, the converted ton-kilometers (CTKM) per locomotive was just over 80 million, but by 1995 that had increased 28 percent to 107 million—among the highest in the world.

**Figure D9. Productivity of locomotives**

20. The modernization of the locomotive fleet has helped improve overall usage of locomotive assets. Likewise, human resource training and reassignment programs, and labor productivity initiatives have begun to improve the quality of human capital within the MOR. New housing policies and programs are increasing the standard of living for railway workers, while at the same time reducing MOR's social costs.

21. Policy reform in the railway subsector has been slow because of the complexity and scope of the problem. Still, progress has been made. A program to shift surplus staff from the core business to entrepreneurial diversified economy companies (DECOs) has been very successful. Some institutional restructuring is beginning in Guangzhou and Fuzhou. In addition, joint ventures and private sector participation in railway expansion and modernization are occurring with Sinoral Intermodal Facilities in Shanghai, Tianjin, and Chengdou. These changes, combined with information technology and capacity modernization, have substantially improved staff productivity. Although productivity has improved since 1984 (Figure D10), until 1990 the
rate of improvement was diminishing. Since then the rate of increase has rebounded, except for a slight decline in the rate of growth between 1994 and 1995.

22. Costing and tariff reforms have faced implementation difficulties. While progress has been made on the understanding of cost structure—including fixed, variable, and point-to-point costing methods—the costing model refinement in the Fuzhou subadministration pilot program had been suspended "because the railway does not have the freedom to adjust price." After many years of discussion with the Bank, Senior Management of the MOR in Beijing is renewing its emphasis on costing and has successfully involved the finance staff from the 14 administrations. They have taken steps to (a) separate passenger from freight costs; (b) obtain a better definition of fixed and variable costs; and (c) develop more customized regional and line-by-line cost data. The MOR has resurrected the Fuzhou model and is training staff from the administrations and MOR in the use of this model.

Figure D10. Productivity of labor

23. In sum, the capacity expansion investments and measures to improve the operational efficiency of the railway have been successful and institutional restructuring and policy initiatives are being worked on.

Views of the Borrower

Financing Railway Construction to Expand Capacity

24. All the interviewees at the MOR positively assessed the capacity expansion projects and cited a very good relationship with the Bank. Ministry officials believe that the World Bank has made a major contribution to prioritizing and financing nearly 7,000 km of new construction and to upgrading several existing lines using the RIS. Bank lending has also helped improve signaling, equipment, and construction technology. Despite the enormous enhancement of line capacity, the speed of expansion has not met the growing demand for rail transport services. All

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4. These views are opinions expressed by those who were interviewed. They do not necessarily reflect "official" views or the views of the World Bank.
construction projects are well managed but are affected by difficulties related to resettlement, land acquisition, and increased land costs.

**Technical Improvements with System-wide Application**

25. After some delay due to computer acquisition, the Transport Management Information System (TMIS) is being advanced to full testing in Fuzhou, where several TMIS subsystems are already operational. In particular, waybilling, an “advance train consist” system, and daily statistical reports are now computerized. MOR plans to expand the full TMIS system to the entire Shanghai administration by the end of 1998. In rail operations, Bank-managed expert groups assisted two MOR research teams, one dealing with the Beijing-Shanghai High-Speed Railway Project, the other with development work for the introduction of 25-metric-ton axle loads. Both groups reported positive results from their studies. Currently, there is a plan to begin the production of 25-metric-ton axle gondolas and an operating plan specifying the lines on which these gondolas would be used. It was further felt that the Bank’s introduction of cost-benefit analysis would significantly affect all future investment decisions made in the MOR.

**Studies Dealing with Costing and Tariffs**

26. The freedom to adjust tariffs is vital to reform, not only as a means of increasing revenue but also as a means of influencing demand, responding to competitive forces, and funding appropriate capacity requirements. The current practice of including a surcharge in every tariff as a means of funding the railways construction fund—and the possibility that this surcharge could increase to provide the additional funding required for the recently announced acceleration of railway construction in China—could limit the MOR’s ability to function effectively in the market economy and to compete with the other modes. Over-reliance in the tariff structure on a fixed component severely restricts the ability of the railway to adjust its tariffs based on costs and market demand. As China’s market economy evolves, therefore, the railway’s ability to respond will be hindered.

27. Tariff reform is supported by the costing system. Ministry officials recognize that a market orientation makes such reform a top priority, but a proposal the ministry has submitted for overall tariff reform has not yet been approved. Despite the delay, the ministry has introduced some tariff adjustments and price increases. Its New Line–New Tariff and Quality Train Service with premium fares are examples of differentiated tariffs that respond to the market economy. Clearly, however, the MOR and the Bank will have to do more work to realize railway tariff reform fully.

**Redefining the Government-Railway Relationship, Housing Reform, and Labor Productivity**

28. An action plan for railway reform contains 10 major recommendations that are in various stages of implementation. A directorate has been established to manage the reform projects. The
ministry, with assistance from the Bank's team of experts, helped define the issues for reform.\(^5\) Notably, however, the specifics of separating the regulatory (government) and operations functions of MOR were avoided and have yet to be effectively addressed.

**Current Agenda**

29. The World Bank Railway VII, Railway VIII, and proposed Railway IX loans all have major capacity expansion components, but they emphasize technological improvements, organizational restructuring, and policy initiatives. The MOR and Bank work to date has included studies and tentative steps toward institutional restructuring. The current agenda seeks to take these initiatives to the next level. Current efforts are aimed at moving from studies to implementation, from project to line organization, and in the process, to transform the MOR from an outmoded planned-economy operation into a railway ready to respond to the needs of a market economy.

30. Some progress has been made on several issues:

- The costing model is being refined into a point-to-point system that will support better tariff understanding and management decisions. Such a costing system will also be the foundation for negotiating government support and funding for public service obligations. The completed model then needs to be implemented in the field and used by all managers when making day-to-day decisions about railway operation. Additional work is also needed to complete the tariff reform initiatives.

- A computer-based financial planning model is being developed to support the transformation of the MOR from a state enterprise into a railway transportation enterprise with full responsibility for its own financial decisions.

- A modern communication system is a prerequisite not only for an appropriate information technology but also for enterprise reform. Upgrading this technology is continuing as part of the TMIS project. Additional capacity will be required to enable the MOR to continue the reform of costing, tariffs, and especially of financing controls. Access to accurate waybill and operating statistics are fundamental to a refined financial control system.

- The continued implementation of railway intermodal terminals' systems and facilities is progressing to support the growth of the import-export sector and the government’s policy of developing inland import-export industries.

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5. The reform recommendations and accomplishments to date include (a) set up units to test the Modern Enterprise Systems (five established); (b) spin off railway staff to the newly created DECOs (400,000 employees have been spun off to the DECOs); (c) reform the railway pension system (the railway pension and insurance management center was implemented in January 1996); (d) reform housing (a new housing fund management was approved in 1997); (e) restructure the pricing system for locomotives, passenger, and freight cars (completed in 1997); (f) establish “lines of business” companies (a container center and a special commodity center have been established); (g) introduce “Labor Contract System” to improve labor productivity and reallocate labor between administrations (400,000 people have been spun off from the DECOs); (h) establish the human resource center to manage flow of personnel and to enhance the quality of employees through job education and evaluation (10 evaluation centers have been established with the aim of training 8,000 employees a year); (i) the issue of “public service obligations” has not progressed.
31. The most important questions on the current agenda are those affecting the restructuring of the railway. These are as follows:

- **The Ministry of Railways.** Currently, the MOR is a government policy instrument, a regulator, a provider of social services, and manager of numerous manufacturing and non-rail transport services. Restructuring the ministry is imperative.

- **Outdated mandate of MOR.** Railway reform is constrained by the legacy of the railway. The railway was (and to a large degree still is) vital to executing government economic, military, and social policies in the planned economy. While the country as a whole is rapidly moving to a market-driven economy, the railway still operates under its old mandate.

- **Services and markets of the railways.** The railway is providing three services: freight service, intercity passenger service, and a few urban commuter or regional and local passenger services. The railway's infrastructure and management structures were developed under the planned economy with a focus on efficient, centrally planned allocation of available resources to serve these transport services.

- **Shift to market economy.** The shift to a market economy, the growth of the import-export market, and the rapid development of the airline and highway subsectors are putting competitive pressure on the railway to recognize that it is operating in four different marketplaces and that major changes will be needed for it to compete with very focused business competitors.

  Among those competitors are airlines, trucking, public transport, and containerized shipping. The airlines are focusing on the intercity passenger business. The emerging trucking industry is focusing on the intercity freight business. Urban transport is undergoing major changes in response to the automobile and changes in urban form, which make other forms of public transport more competitive. The growing import-export market is creating an unprecedented demand for container transport business, which is now being handled by trucks that can provide consistent service.

  These emerging competitors do not face the same constraints as the railways. They are benefiting from more modern infrastructure built to meet current demand, and they use current technology. They have fewer social obligations, a single focus, more foreign participation, and much more freedom to manage.

- **Constraints.** The railway is constrained not only by the limitations of its infrastructure (axle weight, train length, grades, and other factors) and its three competing lines of business, it is also constrained by the historical legacy of a vertically integrated state organization that manufactures rolling stock; provides housing; and runs universities, hospitals, hotels, and other social facilities.

- **Declining market share.** The net result of all these factors is that the railway is losing market share in the freight and intercity passenger business. The loss of market share is not necessarily bad for the railway or the national economy. The railway may not be the best economic alternative to provide certain services. A clear mandate and a well-
established set of objectives, together with a well-refined costing system would determine what services the railway should concentrate on.

- **Developing competition.** "Satisfying users' needs for more varied and better quality service" is one of the Bank's overall objectives for China's transport sector. Achieving this will require increased competition within the sector.

- **Restructuring the railway.** Restructuring must begin with a change to the railway law that formally separates the government and the railway enterprise. The enterprise will need to establish with its shareholder(s) a clear contract, a mandate, which will be the context in which railway management can set objectives and ensure that decisions are made with a goal of meeting the agreed objectives. The mandate is prerequisite to restructuring and presumes to observe the following key principles:
  
  (i) have a State Council–approved mandate and communicate it to all employees;
  
  (ii) have the freedom to manage within the agreed mandate;
  
  (iii) focus on serving the marketplace on a commercial and competitive basis;
  
  (iv) focus on the core business with defined financial incentives and penalties;
  
  (v) provide social services on a clearly defined public service obligation basis;
  
  (vi) change the culture of the organization from an operations- and efficiency-driven focus to one of managing the railway on a commercial basis; and
  
  (vii) introduce technology to improve service, improve safety, and to reduce costs.

The size of the MOR, and the need to be in step with other reforms of state enterprises in China, will determine the speed of change that will be possible.

32. The Bank must continue to catalyze and support the MOR on technological improvements, institutional reform, and policy initiatives. Recent correspondence and discussion with senior MOR officials suggest that they understand the need for reform and that the ministry's senior management will be driving this agenda. This is an opportunity for the Bank to start collaborating at the senior level, with the appropriate technical assistance and training support required to advance the well-conceived current agenda. The Chinese authorities must arrive at the solutions themselves. The World Bank can support, train, suggest, and facilitate, but the Chinese must decide, commit, organize, and implement.

**Conclusions and Recommendations**

33. The Bank's railway program in China can be divided into three cycles:

- building railway transport capacity;
- transition from transport capacity to institutional and human resource development;
- institutional restructuring: agenda and process.
These cycles are interdependent, although the first one can more clearly be demarcated from the latter two.

**Building Railway Capacity**

34. Expansion of railway capacity has been very successful and beneficial to the client. This has been demonstrated by the increased capacity (supply), demand, and high ERRs obtained in the completed projects. The Bank's process and the counterparts in China have been the right ones to make decisions about transport capacity expansion and to undertake them. The railway capacity expansion must continue in subsequent loans, especially for improving intermodal facilities, processes, and a competitive environment, but since Railway VI, the emphasis has changed to broad institutional development.

**The Transition Phase**

35. The transition phase started in Railway VI and was to culminate in Railway VII with a fundamental restructuring of China's railways to meet the demands of customers in a market economy. This transition is succeeding, but more slowly than anticipated. In this cycle:

- Railway transport capacity has continued to increase through improvements in railway operations and rolling stock. Advanced foreign technology for electric locomotives, signaling equipment, and information technology has been acquired and is being assimilated.

- The technical assistance components have enabled the MOR to enhance understanding of new technologies as a means to increase capacity and efficiency. A significant study on increasing the allowable axle load to 25 metric tons concluded that transport capacity can be added without the addition of costly new infrastructure. The introduction of information technology, though in its early stages, is ushering in improved customer service.

- Studies conducted as part of the technical assistance and nonlending service have initiated the process of restructuring the railways' institutional framework in three areas: the role of government, the role of the railway, and the separation of the peripheral activities from the railway. Concurrent initiatives continue to reinforce the role of the marketplace and to improve intermodal services to serve that marketplace. Central to all these are the fundamental changes in costing and tariff-setting, whose adoption and implementation are being studied in the ongoing loans.

- A new center has been established to implement the 10-point institutional reform policies primarily aiming at the separation of the peripheral activities from railway operations (see footnote 5).

- Finally, partial institutional restructuring is occurring in Guangzhou and Fuzhou. Joint ventures and private sector participation in the China railway expansion and modernization are taking place with the Sinorail Intermodal Facilities in Shanghai, Tianjin, and Chengdu. There is also evidence, especially in Guangzhou, that competition and market share, service requirements, quality service and on-time
delivery, ease of business conduct, and other factors were beginning to be recognized and that the Guangzhou Railway was beginning to respond with changes to meet the needs of a competitive market economy.

36. The program of studies and piloting experiments has had less impact than the Bank expected. The problems include the following:

- Labor productivity is improving and excess staff have been transferred to the diversified economy companies (DECOs). However, the crucial reforms to deal with the public service obligations and the spinning off of all (or most) peripheral businesses have been deferred.

- The shift from a planned economy to a market economy is surrounded by uncertainty. Despite frequent mention of this issue, no one in the (Chinese) Railway Project teams had a clear understanding of what it meant to the MOR or what changes were necessary for the MOR to adapt to this new reality. Field visits confirmed that most results of the restructuring and policy studies have not yet reached the field.

- These important observations, especially the last, and the fact that the counterpart agencies felt that study completion ended their commitments, suggest that while the counterparts and the process for transport capacity expansion have been appropriate, such does not appear to be the case for restructuring the railway. A new channel of contacts and a new process is necessary.

Institutional Restructuring

37. Restructuring is the logical next step from the transition phase. All parties have agreed on the broad framework—separation of government regulation from railway operations, autonomy of the railway operations, and spinning-off of peripheral activities. The studies needed to support that framework are also clear and mutually agreed. Achieving the restructuring objective, however, can be done following several alternative efforts. This report does not address the specifics of those alternatives, but it is important that the solutions be Chinese and be made in China. The Bank's role is to act as a facilitator in the change process, a catalyst to explore and analyze alternatives, and a supportive partner to propel the change forward. Given this broad role, the Bank should focus on several things if it is to achieve results from the cooperatively formulated agenda. It is of utmost significance, and to the credit of the Bank's program, that it has had the foresight to sponsor studies and conduct workshops on which the railway restructuring can be soundly based. The following would enhance the World Bank's role in the restructuring process:

A clear mandate for the MOR:

- Articulating a clear mandate for the MOR is of central importance. The Bank programs underlying the institutional development of the railways, systemwide technological

modernization, and the restructuring itself are all affected by the ambiguity of the MOR mandate. Is the MOR an instrument of the State Council to preserve and to implement the government’s social, economic, and military objectives, or will it be given the freedom to manage the railway to serve the transport of goods and passengers in an open market economy? If both are true, and there can be important noncommercial objectives, can these obligations be accommodated within the market regime and agreed-upon mandate?

An appropriate channel for communication: the senior managerial level

- The restructuring focus that now characterizes the World Bank’s lending priorities will require access to senior MOR management and more interaction with other senior government officials. The definition of the China railway mandate, including the clarification of its freedom to manage within that mandate will require sustained senior management interaction at the vice ministry level.7

An appropriate process to institutionalize change

- The policy-oriented project components involve research teams from research institutes, universities, Academy of Railway Science, Planning Committee, and other entities. Foreign expertise and technical assistance are provided to these teams. Currently, the adoption of policy changes in the MOR is being driven through this project process. Costing, tariff reform, heavy axle loads, high-speed technology, the RIS, and comprehensive railway reform itself, are all examples of project-based components of the restructuring initiatives.

- Project-based research is the appropriate mechanism to initiate change. However, ownership of the process of policy or institutional change, its development and sustainable adoption, are essential. Currently, organizational response is not adequate to move policy and restructuring initiatives from research activities to day-to-day line activities that are owned and driven by senior line management.

- Clearly a process needs to be set up to move issues from research to line, from project to a systemwide process, and from MOR headquarters to administrations and sub-administrations.

Speed of Restructuring

- The U.S., Canadian, and Japanese railways took nearly two decades to restructure. European railways have only just begun their reforms. China’s railways, with World Bank assistance, have made significant progress on many fronts. Competitive pressures will force the MOR to speed up the restructuring program.

- There are recent indications that the senior vice ministers of the railway are recognizing the need for change. By the same token, complementing the need for China’s railways

7. This need for a new channel has already been recognized: “None of the recommended strategic objectives or recommended strategic policies can be addressed through new or ongoing...projects...because the dialogue between the Bank and the government usually takes place at a level where commitment to policy initiatives cannot be made.” (In Forward with one Spirit: A Strategy for the Transport Sector, May 1997). It also is noteworthy that the Chinese delegation to the Vienna Railways Roundtable was led by Vice Minister Sun of the railways.
to have an appropriate process for institutional change is the need for Bank management and staff to evolve new patterns of interaction—*a new kind of partnership*—that is based not on pressure and conditionalities but on stimulating constructive institutional changes.

**Additional Training**

- Sustainable restructuring, the process of institutionalizing the changes clarified and specified by technical assistance and nonlending work, and as projects are moved beyond the project team and the research centers, beyond MOR headquarters, and beyond the MOR itself, changes in processes and in culture will need to be supported by an increased focus on training involving all levels of the railways.

- Especially important is a well-thought-out training program that embeds in management the restructuring ideas of the costing model, the tariff reforms, the enterprise approach to management, and so forth. Training on how to run a business, not just on how to operate an efficient railway, is vital for implementing change. This management training, although recognized in the human resources development component, will require greater attention from the World Bank.

- Technological modernization is often based on importing western processes without sufficient training support to adapt the imported process to local conditions. This often results in delays and incomplete results. The Bank should consider allocating to the training budget a significant amount of all loan expenditures for policy and institutional development and systemwide technological modernization programs, *with appropriate counterpart funding.*

38. Restructuring institutions and policies will require changing institutional culture. This will take time, patience, and the hard work of many people. Changing an institutional culture requires a clear mandate, a good employee communication program, and significant leadership supported by management training. Momentous new approaches, like introducing competition, point-to-point costing, and attendant tariff reforms, to say nothing of decentralizing a railroad in a large country, will need substantial management and employee training, not only on how to develop accurate costs, but more important, on how to use them. In China, these new approaches can fortunately rest on extensive and thoughtful studies. Training programs to sustain change are crucial to the success of the World Bank’s programs charted by these studies.

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8. Recently, the MOR and the Bank staff cooperated to obtain Policy and Human Resources Development funds for training in evaluation, management, investment planning, and other areas. Terms of reference for this training have been developed by the MOR.
Evaluation Detail: Ports

1. China's growing foreign trade has required increased investment in the transport sector, especially in ports. Imports grew 440 percent and exports grew 445 percent in value between 1983 and 1994 (Figure E1). In the early 1980s, Chinese ports were congested in every aspect: container berths, bulk cargo berths, port equipment, storage yards, and transport infrastructure for distribution. These supply-side limitations were compounded by low productivity and lack of modern port management.

2. To keep the ports from becoming an impediment to the country's development, China and the Bank began cooperation in the port sector in 1980 with the identification of the Three Ports Project, the Bank's first transport project in China. Since then, nine port projects have been approved, totaling 925.4 million in loans and credits. The Shanghai Port Project and the Inland Waterways Project are ongoing, the other seven projects have been completed and evaluated.

Figure E1. China: Growth of import and export value

![Graph showing the growth of import and export value from 1980 to 1994.](image)

Major Objectives of the Port Projects

3. The Bank's port lending strategy has followed a familiar path: physical projects designed to relieve the major shortcomings or supply constraints, coupled with policy and institutional development and studies to guide port policy. In line with the other transport modes, policy and institutional development has accounted for about 3 percent of lending (Figure E2).
Figure E2. Evolution of Bank lending for China ports

Physical Objectives

4. The physical components of the port projects consisted of constructing new berths, expanding their handling capacities, and building specialized terminal facilities, especially for containers. Port cargo flow was improved by modernizing terminal facilities in an environmentally sound way. The objectives of the Inland Waterways project are to expand capacity by widening and deepening channels to improve navigation and to construct dams with shiplocks when required.

Institutional Development Objectives

5. Institutional development objectives sought to improve port planning and management, facilitate technology transfer, improve efficiency of ports through pricing and environmental control, and introduce modern operational and financial management. The most important specific objectives were the following:

- **Strengthen planning and management** by introducing organizational and financial reforms in ports in line with a decentralized market economy. These included decisionmaking autonomy, competition between ports and terminal operators, and improved operation capabilities and pollution control through technical assistance and training.

- **Transfer of technology and training** to increase productivity of China's ports with better services, trained personnel in the container and coal terminals, and a computerized management information system for container operations.

- **Intermodal services** for highway, railway, and waterway transport to improve cargo distribution and connections between waterway and land transport services.
• Studies such as the containerization study for the port hinterlands; intermodal cargo distribution studies in the Huangpu and Dalian port projects; a master plan for port development on the east coast; and a study of strategic issues in ports and shipping.

• Environmental management capacity in the port authorities and related regional agencies has been increased under a GEF/IDA project.

Results and Impacts of the Bank Assistance Program

Physical Objectives

6. All Bank-supported port projects have been successful and achieved their development objectives. The ICRs of all seven completed projects rated project outcome as satisfactory and sustainability as likely (Table E1). The ERRs of the completed projects were positive, ranging from 19.2 percent to 42.5 percent; all ERRs were higher than appraisal estimates.

Table E1. Economic rate of return and ratings of completed projects

<table>
<thead>
<tr>
<th>Project title</th>
<th>Approval Fiscal Year</th>
<th>Closing Fiscal Year</th>
<th>ERR @APPR (%)</th>
<th>ERR @EVAL (%)</th>
<th>Outcome</th>
<th>Sust.</th>
<th>ID Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three Ports Project</td>
<td>1982 1988</td>
<td>29</td>
<td>34</td>
<td>Satisfactory</td>
<td>Likely</td>
<td>Substantial</td>
<td></td>
</tr>
<tr>
<td>Tianjin Port</td>
<td>1986 1994</td>
<td>19</td>
<td>16</td>
<td>Satisfactory</td>
<td>Likely</td>
<td>Substantial</td>
<td></td>
</tr>
<tr>
<td>Dalian Port</td>
<td>1988 1993</td>
<td>19.9</td>
<td>26.7</td>
<td>Satisfactory</td>
<td>Likely</td>
<td>Modest</td>
<td></td>
</tr>
<tr>
<td>Huangpu Port</td>
<td>1987 1994</td>
<td>21.3</td>
<td>32.7</td>
<td>Satisfactory</td>
<td>Likely</td>
<td>Modest</td>
<td></td>
</tr>
<tr>
<td>Xiamen Port</td>
<td>1988 1995</td>
<td>31.3</td>
<td>42.5</td>
<td>Satisfactory</td>
<td>Likely</td>
<td>Substantial</td>
<td></td>
</tr>
<tr>
<td>Ningbo &amp; Shanghai Port</td>
<td>1988 1995</td>
<td>18.2</td>
<td>22.6</td>
<td>Satisfactory</td>
<td>Likely</td>
<td>Substantial</td>
<td></td>
</tr>
</tbody>
</table>

7. China’s port traffic is low. Since the Bank began its lending, the cargo volume handling capacity in China’s 16 major ports has more than tripled, rising from 217.3 million tons to 765.7 million tons (Figure E3). Sixty-five percent of the increased handling capability came from efficiency and productivity increases, particularly the multipurpose and container berths that considerably expanded the capacity of China’s ports.

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1. In 1994, China’s port cargo volume was 765.7 million tons and Japan’s 3,399.08 million tons. However, expressed per GDP (000s), the respective figures were 1.348 and 0.887.
Institutional Development Objectives

8. The government has introduced significant institutional, managerial, and financial reforms in the port sector:

- **Decentralization.** Many port management and financial functions were decentralized from the state (MOC) to the municipality. Port authorities have assumed responsibility for handling operation, budget, construction, and day-to-day management. With these reforms, port authorities have autonomy for port operation and profit-sharing, and have matured to manage port operations independently.

- **Productivity growth.** Productivity has increased and services are provided at competitive costs. To cite just one performance indicator, while a 24-hour notice was earlier required for visiting vessels, now a 12-hour notice is sufficient and 93 percent of the vessel schedules are met.

- **Management.** Planning and management skills have been improved. The Bank has supported management system improvements, technical studies and training, and containerization of cargo; it has also helped develop Chinese expertise in the economic evaluation of investment projects and in upgrading port operations.

- **Joint ventures.** Joint ventures with foreign port operators have been formed in several Chinese ports. This has helped the ports raise funds for investments and improved management and procedures, which in turn has increased port traffic.

- **Environmental studies.** Studies and action plans have improved port environments.

- **Other studies.** Bank-sponsored studies in the port and shipping sectors have promoted the development of inland container terminals and moving sea-borne containers from ocean gateways to inland provinces to make their export businesses more competitive, streamlined the paperwork and customs procedures at ports, and
improved the efficiency of port cargo distribution through better intermodal facilities and (even) privatization of container terminals.

9. In general, the Bank has catalyzed and supported the decentralization of ports; encouraged sectoral reforms, including pricing policy and reduced regulation; helped adopt modern technologies; and pushed for pollution control at ports. Pricing alone among these issues remains a state function. Even in pricing there is now some flexibility because joint venture container terminals have limited freedom in price setting subject to central government approval.

Current Agenda

10. The Bank currently is not supporting standalone port projects—unlike the Asian Development Bank and Overseas Economic Cooperation Fund, Japan—but is, rather, encouraging private sector involvement in port expansion and improving port efficiency. Several joint ventures in port operations are already under way and more are likely.

Conclusions and Recommendations

11. The Bank has played an important role in China’s port improvement. Equally important has been the role of a motivated borrower. The results of Bank-supported investment projects and institutional development have been beneficial and the impacts positive, especially in helping relieve congestion, which would have threatened the expansion of China’s foreign trade. With new management styles, operating systems and equipment, and through effective Bank supervision, China’s ports have learned how to do business and substantially improve port performance in an environmentally sound way.

12. The Bank’s further cooperation is desirable on several issues:

   • **Cost-based pricing based on competition.** A process should be agreed by which port tariff setting is completely delegated to port management.

   • **Competition among terminal operators.** A freer entry to the market is needed to eliminate the present terminal monopolies and to improve port operation and services.

   • **Intermodal transportation.** In Shanghai Port, 20 percent of container cargo is distributed by inland waterways, nearly 80 percent by (short-haul) truck, and only 0.5 percent by railway. This skewed distribution is the result not only of low productive capacity but also of the lack of intermodal container facilities, cargo agents, and container tracking systems in the inland provinces. Better intermodal facilities are also needed for inland waterways, which provide a low-cost transport mode for bulk products. The share of goods transport by inland waterway is predicted to increase from 5 percent to almost 8 percent by year 2010.

13. Given the apparent success in port lending, The Bank should explore ways for continued cooperation with China in port-related transport and management such as privatization, logistics, intermodal transport, inland waterways, and environmental protection.