Recent Trends on Road Administration and Performance Measurement in Japan

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1. Current state of Road Investments
2. Examples of Major Undertakings
3. Efforts to Performance Measurement
Current state of Road Investment
Japan's Full-fledged Attempts to Renovate Roads Began in the Wake of WWII.

• Full-fledged efforts for road planning and development did not begin until 1955.
• In the wake of the war, even national highways remained unpaved.

Changes in development and extension of railroads and expressways

Sources:
Expressways: A Handbook of Expressways 2002

Traffic congestion and chaos (Intersection at Sankocho, Shinjuku)
(Source: October 1960 issue of Shin-Toshi (New Metropolis))
1) The special funding source for road works
2) The toll road system
3) 5-year Road Improvement Programs

- From 1952 to 1953, the Road Law, the Law on Special Measures for Road Development and Improvement, and the Law on Temporary Measures Concerning Funding Sources, etc. for Road Development and Improvement Expenditures (which later became known as the Road Construction Emergency Measures Law) were enacted. ⇒ In FY1954, the first five-year program for road development and improvement began, and the designation of tax revenues reserved for road development and improvement was made.

- Japan Highway Public Corporation was formed in 1956, followed by the enactment of the National Development Longitudinal Expressway Construction Law and the National Expressway Law in 1957. Upon deliberation by the Council for the National Development Longitudinal Expressway Construction Law, the Japan Highway Public Corporation was mandated to carry out and launch projects. ⇒ In 1963, Meishin Expressway (71 kilometers between Amagasaki and Ritto) opened.

- Construction of expressways was needed to cope with rapid motorization.
- Efficient land transport was a bottleneck impeding the economic recovery.

Three core systems that accelerated road development and improvement:
- Parallel to rapid economic growth, waves of motorization spread through the nation quickly.
- To lessen the ‘quantitative insufficiency’ has been a priority task for road administration.

**Rapid Economic Growth and Motorization**

Change in GDP and volume of domestic transport

Evolution of Expressway network


Source: Prepared based on documents of the Promotion Committee for Privatization of the Four Highway-related Public Corporations
Current State of Expressway Network

- About 60% of the planned Expressway have been completed.
- Future issues include utilization of the portion already in service and more efficient development of truly needed highways.

- The Plan succeeds to 5-year Road Improvement Program since 2003.
- Corresponding to the plan, it has been endorsed by the cabinet, that investment volume for road should not exceed ¥38 trillion yen (national budget) for planning period.
- In FY2005, ¥9.3 trillion is annually invested for roads in Japan.

Work volume relating to road development for the five-year period beginning FY2003

<table>
<thead>
<tr>
<th>Investment for road (public-sector only)</th>
<th>Twelfth 5-Year Plan</th>
<th>Multiples against Planned</th>
<th>Multiples against Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work volume for the 5-year period beginning FY2003</td>
<td>Planned</td>
<td>Actual</td>
<td>Percentage achieved</td>
</tr>
<tr>
<td></td>
<td>(¥ trillion)</td>
<td>(¥ trillion)</td>
<td>(%)</td>
</tr>
<tr>
<td>Investment for road (public-sector only)</td>
<td>380,000</td>
<td>462,000</td>
<td>451,602</td>
</tr>
</tbody>
</table>

Note: An additional ¥19.0 trillion yen is expected for projects independently carried out by local municipalities.

FY2005 Road Investment by Source of Funds and by Project Type (00 Millions of Yen)

Number in parentheses indicates percentage (%).
### Sources Earmarked for Roads

<table>
<thead>
<tr>
<th>Tax</th>
<th>Earmarked percentage</th>
<th>Tax rate</th>
<th>Tax revenue (FY2005)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>National</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gasoline tax</td>
<td>100%</td>
<td>(Provisional tax rate) ¥48.6 per litter (Basic tax rate) ¥24.3 per liter</td>
<td>¥2,913.8 billion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2x basic rate)</td>
<td>(¥2,962.9 billion)</td>
</tr>
<tr>
<td>Gas Oil Delivery Tax</td>
<td>100%</td>
<td>(Provisional tax rate) ¥32.1 per liter (Basic tax rate) ¥15.0 per liter</td>
<td>¥1,055.6 billion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.1x basic rate)</td>
<td></td>
</tr>
<tr>
<td>Automobile Acquisition Tax</td>
<td>100%</td>
<td>(Provisional tax rate) 5% of purchase price for private motor vehicles</td>
<td>¥465.5 billion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Basic tax rate) 3% of purchase price</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.7x basic rate)</td>
<td></td>
</tr>
<tr>
<td>Liquefied Petroleum Gas Tax</td>
<td>1/2 of tax revenue</td>
<td>(Basic tax rate) ¥17.5 per kilogram</td>
<td>¥15.0 billion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(¥15.3 billion)</td>
</tr>
<tr>
<td><strong>Local</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local Road Transfer Tax</td>
<td>100% of Local Road Tax revenue</td>
<td>(Provisional tax rate) ¥5.2 per liter (Basic tax rate) ¥4.4 per liter</td>
<td>¥307.2 billion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.2x basic rate)</td>
<td></td>
</tr>
<tr>
<td>Motor Vehicle Tonnage Transfer Tax</td>
<td>1/3 of Motor Vehicle Tonnage Tax revenue</td>
<td>Please see Motor Vehicle Tonnage Tax</td>
<td>¥376.7 billion</td>
</tr>
<tr>
<td>Liquefied Petroleum Gas Transfer Tax</td>
<td>1/2 of Liquefied Petroleum Gas Tax</td>
<td>Please see Liquefied Petroleum Gas Tax</td>
<td>¥14.7 billion</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>¥5,733.6 billion</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(¥5,783.0 billion)</td>
</tr>
</tbody>
</table>
Examples of Major Undertakings
Anti-seismic Reinforcement of Bridges

- Anti-seismic reinforcement of bridges (elevated highways) is under progress based on the three-year program (FY2005—FY2007) for the anti-seismic reinforcement of bridges for emergency transportation routes and others.

Damage caused by the Great Hanshin Earthquake

- Concrete filling method for steel piers
- Steel plate jacket method for RC piers

Diagram: An example of construction technology for anti-seismic reinforcement (for piers)

Reinforced pier unaffected by a major earthquake (Technology of circumferentially reinforced piers by steel plate)
Acceleration of Measures for Grade Crossings

- Quick remedial measures should be administered at 1,300 locations in five years.
- Drastic measures will be administered at 1,400 locations, and the speed of implementation will be doubled.

Crossings require urgent improvement (2,100 locations)

- Crossings without Sidewalks (700)
- 'Never-open Rail Crossing' Crossings with significantly frequent interception (600)
- Crossings with big traffic volume (500)
- Crossings with many pedestrians (300)

Widening of Sidewalks
Prompt Measures (1,300)
Completed in 5 years

Grade Separation

Drastic Measures (1,400)
Grade Crossings Elimination at a doubled pace
Preservation of global environment

- The target for CO₂ emission reduction through the road policies shall be established to ensure the Kyoto Protocol target will be met.
- Urgent measures will be administered by 2012 at about 1,800 points noted for severe congestion.

1. Reexamination of the relationships between people and vehicles

   Creation of opportunities, through efforts to establish communication with local residents, to allow each individual to reflect on his or her car utilization pattern, which may lead to reduced use.

   Improved convenience offered by public transportation to encourage a shift from driving to public transportation.

   Promotion of eco-driving such as anti-idling and improved fuel mileage.

   Cargo transportation designed to minimize environmental burden to be encouraged by working together with shippers and distributors.

2. Smooth running traffic free of congestion

   Measures to relieve congestion to be introduced by primarily focusing on the ring roads in urban areas that benefit most from CO₂ emission control.

   Promotion of measures designed to reduce congestion at points of severe congestion, where CO₂ emissions are concentrated, and to remove railroad crossings, which serve as bottlenecks.

   Development of bypass routes, etc. and parallel measures to narrow the width of old routes and surrounding community roads to be carried out all in a single package.

   Redirecting motor traffic from ordinary roads to expressways where CO₂ emissions are low.

   Reduction in road construction work, as this is a major cause of traffic congestion.

3. CO₂ reduction through better utilization of road space and ingenious approaches

   Greening of road areas to maximize CO₂ absorption.

   Active introduction of water-retentive pavement to achieve higher uchimizu (water spraying for cooling down) effects.

   Active utilization of new energies such as solar energy and windmill power generation for road lighting.

4. More efficient operation of motor vehicle traffic

   Feasibility of road pricing and entry restrictions to certain roads to be studied to relieve congestion in urban areas

   Enhanced delivery of information on road traffic conditions through utilization of ITS (Intelligent Transportation Systems).

   Elimination of street parking violations, a major cause of congestion.

* CO₂ emissions for 2004 through 2005 were estimates based on the emission trends established from 1999 through 2003.
* The target called for in the Kyoto Protocol

Incremental CO₂ emissions as a result of an increase in traveling distances of motor vehicles from 2005 through 2010.

Explanatory notes:
- Reduction through better fuel mileage of individual vehicles
- Measures to reduce CO₂ emissions by means of public conveyance and the development of ring roads.
- Measures to reduce CO₂ emissions by means of ITS utilization and reduced road work
- Other measures (Introduction of biomass fuel, more efficient transport)

Another possible reduction measures include decrease in road width, entry restrictions, etc.
Development of Ring Roads in Urban Areas

- Progress is being made in the construction of ring roads in Tokyo and other areas.
- Ring roads are expected to greatly contribute to congestion relief and bring other benefits equals to ¥4 trillion /yr. for the metropolitan area.

### Ring roads in the Tokyo metropolitan area

**Current** (as of April 2004)
- State of construction: About 90% of radial roads and 20% of ring roads have been completed.
- State of congestion: Major points of congestion inside the Metropolitan Inter-City Expressway amount to about 600 locations.
- Losses caused by congestion:
  - Nationwide: About ¥12 trillion annually
  - Tokyo Metropolitan Area: About ¥2.8 trillion annually
  - Tokyo Prefecture: About ¥1.2 trillion annually

**Short-term objectives** (To be achieved in 10 years)
- Construction to be completed: 90% of radial roads and 40% of ring roads
- Effects:
  - Congestion of the major points within the Metropolitan Inter-City Expressway will be relieved by 60%.
  - Reduced traveling time and reduced fuel consumption will bring about ¥2 trillion in savings annually.
  - Compensation for land requisition paid to landowners who in turn use it for real estate purchases and construction will bring about ¥2 trillion in effects.

**Completed network**
- Construction to be completed: 100% of radial roads and 100% of ring roads
- Effects:
  - Congestion of the major points within the Metropolitan Inter-City Expressway will be mostly eliminated.
  - Reduced traveling time and reduced fuel consumption will bring about ¥4 trillion in savings annually.
  - Compensation for land requisition paid to landowners who in turn use it for real estate purchases and construction will bring about ¥6 trillion in effects.
‘Tsukaeru Highway’- Towards More Accessible and Functional Network

Building a network
- Building of a network that allows access to expressways in about 1 hour from anywhere in Japan

Utilizing the network
- All roads ranging from community roads to expressways should be equipped to offer their intended functions.
  - Society in harmony with the environment
  - Resurrection of community roads
  - Prosperous society allowing easy and dependable long-distance mobility

Elimination of missing links
- Newly opened segment for service on March 30, 2003
  - About 9 km

Development of additional interchanges

Diverse and flexible pricing measures

Pilot program for toll pricing measures conducted in the segment of Niigata City and its vicinities of the Nihonkai-Tohoku (Nittodo) Expressway.

- Reduction in losses caused by congestion
  - ¥896 million/12 hours (daytime on weekdays)

- CO₂ reduction
  - 1.4%/12 hours (daytime on weekdays)

Change in traffic volume after all segments of the Takamatsu Expressway went into service

Pilot program for a smart interchange (ETC-only interchange) connected to service and parking areas

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A New Society that Results from “Tsukaeru Highway”

Society in harmony with the environment

- CO₂ reduction through less congestion
- Environmental improvement for roadside areas

Prosperous society allowing easy and dependable long-distance mobility

Resurrection of community roads

- Growth of high-standard arterial road networks and changes in required traveling time.
- Development of community roads that pedestrians can walk on with peace of mind
Chain Effects of Ring Roads - A significant decline in traffic accidents on community roads

- The community roads along the Chuo Ring Road Oji Section (in service since Dec. 2002) saw a 30% decrease in the number of accidents compared to the period before the opening of the Line.
- The development of ring roads prompts a traffic shift from congested arterial roads to the ring road and, subsequently, a shift from community roads to arterial roads, which are no longer as crowded as before (chain effects).

**Number of accidents involving deaths or injuries along the Oji Section**

<table>
<thead>
<tr>
<th></th>
<th>FY2001 (Before Service Launch)</th>
<th>FY 2003 (After Service Launch)</th>
<th>Percentage Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arterial Roads</td>
<td>2,866</td>
<td>2,815</td>
<td>-2%</td>
</tr>
<tr>
<td>Roads connecting to arterial roads</td>
<td>1,999</td>
<td>1,839</td>
<td>-8%</td>
</tr>
<tr>
<td>Community roads (in residential areas, etc.)</td>
<td>761</td>
<td>512</td>
<td>-33%</td>
</tr>
</tbody>
</table>

Chuo Ring Road Oji Section  Length: 7.1 km  Went into service on December 25, 2002

Sources: Statistics of Metropolitan Police Department
Enhanced Service through the Evolution of ITS:
- Toward the Creation of Roads with Significant Added Values

- With the spread of VICS* and ETC**, ITS has become a practical tool to cope with traffic problems.
- A single onboard device allows access to diverse services in 2007.
- Enhanced services through assistance for safe driving

* Vehicle Information and Communication System
** Electronic Toll Collection System

Diverse array of services

New VICS services
- Information delivery and Internet connectivity at service areas and parking areas, which serve as “roadside stations”
- Smooth passing of parking gates

Service launch is scheduled for 2007

Assistance for safe driving

* 75% of accidents are attributable to human error

Breakdown of causes
- Management and maneuvering errors 47%
- Delayed discovery 47%
- Others (reckless driving, alcohol, etc.) 8%

Detection by sensors of congestion and slow-moving or stopped vehicles

Conditions beyond the curve ahead are displayed on the screen of a car navigation system.

Pilot program is in progress in the Sangubashi Curve Segment (downtown-bound) of the Metropolitan Expressway No. 4 Shinjuku Line

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Efficient and Eco-friendly Logistic Measures

• More roads will be accessible to international-standard container trucks. (Removal of bottlenecks impeding the development of “Super Hub Ports” in about 5 years)
• Priority is placed on the construction and improvement of routes leading to major airports and ports.

1) Change in accessibility to major airports and ports from expressways as measured by the percentage of airports and ports accessible from expressways in 10 minutes or less

2) State of accessibility to major airports and ports from expressways (an international comparison)
Road Map with Ease-of-Drive Markings: Indication of Service Levels

- Roads on the map are shown by the level of service and not by the type of roads.
- It is designed to offer more convenience assistance for travelers, leading to road evaluations and improvements.

Ordinary road map

Ordinarily, a national road is expressed as a single red line.

Road map with ease-of-drive markings

The varied levels of service available on the same road are clearly marked.

Service level indicators

The varying levels of service are indicated by different colors and symbols on the map.
Privatization of the 4 Road-related Public Corporations

- Ensure Repaying Interest-bearing Debts of ¥40Trillion ($350Billion) in 45 years.
- Expedite Construction of Necessary Roads with minimum cost while Respecting Companies’ Own Decisions
- Provide Various and Flexible toll charge-setting and Services applying Know-how of Private Companies

[Outline of privatization]

[Action scheme for the execution of expressway business by the Companies and the Agency]

- Transfer to the Companies and to the Agency was completed in October 2005.
- Consultation between the Companies and the government will be carried out before April 2006 to set forth future plans to develop the network.
Efforts to Performance Measurement
The Undertakings of Road Administration Management

**FY2003 (Start)**
- The numerical target is set up every year, such as reducing national traffic congestion time 3% in one year, and the "result-oriented" administration management which evaluates the achievement level subsequently started to be promoted.

**FY2004 (Performance)**
- The first “Achievement Report” was drawn up and the achievement level of the target declared one year ago was checked. The evaluation and the knowledge which were acquired by the “Achievement Report” were reflected to the following policies and following projects.

**FY2005 (Fixing)**
- Released the “Achievement Report” and the “Performance Plans” in June.
- Hereafter, a road administration management will be familiarized to local areas, thus it will be certainly practiced.

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Figure: Flow of Road Administration Management
## Linking Outcome and Budget

Reforming the items in a budget of countermeasures for traffic accidents to link intended outcome and budget directly

<table>
<thead>
<tr>
<th>Budgets based on performance</th>
<th>Amount of 2005 budget (project costs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Indicators</td>
<td>Target for FY2005</td>
</tr>
<tr>
<td>Cost for traffic facilitation measures</td>
<td>722.7 billion yen</td>
</tr>
<tr>
<td>Time loss due to traffic congestion</td>
<td>Approx. 3,620 million people-hr/yr</td>
</tr>
<tr>
<td>Cost for projects to promote cooperation with communities</td>
<td>1,922.8 billion yen</td>
</tr>
<tr>
<td>Ratio of high standard road usage (Targeted traffic that will be newly switched over to expressways)</td>
<td>14%</td>
</tr>
<tr>
<td>Ratio of roads with access to hub airports and ports</td>
<td>66%</td>
</tr>
<tr>
<td>Ratio of main cities in neighboring regions that are connected to each other by an upgraded national road</td>
<td>75%</td>
</tr>
<tr>
<td>Percentage of people who are able to have a safe and pleasant drive into the city (the center of daily living) in under 30 minutes</td>
<td>66%</td>
</tr>
<tr>
<td>Cost for maintenance and repair</td>
<td>238.2 billion yen</td>
</tr>
<tr>
<td>Percentage of cities that have rescue routes covering a wide area in the event of disaster</td>
<td>72%</td>
</tr>
<tr>
<td>Ratio of bridges receiving preventive maintenance</td>
<td>91%</td>
</tr>
<tr>
<td>Cost for projects to improve roadside environment</td>
<td>188.1 billion yen</td>
</tr>
<tr>
<td>Rate of NO₂ environmental goal achievement</td>
<td>81%</td>
</tr>
<tr>
<td>Rate of SPM environmental goal achievement</td>
<td>(Maintained 2004 standards) 100%</td>
</tr>
<tr>
<td>Achievement rate of required limits on night time noise</td>
<td>68%</td>
</tr>
<tr>
<td>Cost for priority measures dealing with traffic accidents</td>
<td>151.9 billion yen</td>
</tr>
<tr>
<td>Road traffic accident causality rate</td>
<td>112 accidents/100 million vehicle-kilometers</td>
</tr>
<tr>
<td>Cost for projects to improve traffic safety facilities</td>
<td>322.2 billion yen</td>
</tr>
<tr>
<td>Percentage of barrier-free main roads in the vicinity of passenger facilities with an average daily user volume of more than 5,000</td>
<td>35%</td>
</tr>
<tr>
<td>Cost for projects to prepare for common utility duct</td>
<td>198.3 billion yen</td>
</tr>
<tr>
<td>Percentage of trunk roads in urban areas without telephone poles</td>
<td>11%</td>
</tr>
</tbody>
</table>
An Example of Measures to Relieve Congestion

Indicator:
Time loss due to traffic congestion

Based on the time loss due to traffic congestion as indicator, medium-term numerical targets are set up and are followed up on each fiscal year.

- Time loss due to traffic congestion (FY2002):
  - 3.81 billion person-hours (nationwide)

FY2007: 10% reduction will be achieved

Actual results for FY2003: 3.76 billion person-hours
Target for FY2004: 3.69 billion person-hours

Display of road sections in the order of congestion intensity (time loss due to congestion) from severest to mildest for clear identification of priority sections

Actions combining hard and soft measures are administered to sections noted for severe congestion.

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Actual results for FY2003: 3.76 billion person-hours
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**Project Management**

- **Survey**
  - 5 years ago
  - Implementation
    - Target announcement project
      - Directions taken and challenges for regions
      - Visualization of how road development and high-standard arterial roads in particular ought to have evolved in the future.
      - Comparative studies on alternative routes versus utilization of existing roads in terms of effects of road development and cost effectiveness.
      - Sorting out business development
      - Selection of priority locations for road development
      - Feasibility
      - High degree of effectiveness (Effects/Remaining project cost)
      - Cooperation extended by local communities
    - Annual targets by fiscal year to be set up to gauge progress
    - Thorough management over project progress and cost control
      - Clear goals to be set up
      - Unified mindset of parties involved
      - Announcement of goals
      - Accountability for posted announcements with respect to work schedule and cost awareness
      - Announcement of project costs required for service launch
      - Systematic execution of work
      - Prompt response to address pending matters and unexpected events
      - Efforts for cost management and cost reductions
    - Creation of a solid structure to ensure the execution of project management (PM)
  - Service launch
道に関する言葉

(ルートンファーツァイ)

・開道発財 道を造って、沿道地域の経済を活性化することにより、地域住民の生活が豊かになる。

(イートンバイトン)

・一通百通 1本の道路を連結することで、ネットワークの連結性がよくなり、たくさんの箇所との連絡が格段に向かされる。

(シャオダオシャオファン ダダオダファン)

・小道小豊大道大豊 小さな道路より、高速道路など主幹線道路ネットワークを作った方が経済発展により役立つ。

(スダオスファン)

・速道速豊 速い道路 (高速道路)を作ることにより、速く豊かになる。

(シアンダオツォファン)

・想豊作道 豊かになりたければまず道路ネットワークの完成が先決である。
Thank you.

Enjoy your stay in Japan.

Ministry of Land, Infrastructure and Transport