

Opening Remarks

JTTRI Chairman Mr. SHUKURI welcomed the participants with the following opening remarks:

To overcome the challenges facing Japan today in the fields of transport and tourism and move forward, it is essential to accurately grasp international circumstances and trends, thoroughly digest and compare and analyze them, and then to formulate the best policies for Japan, and implement them decisively. Therefore, since 2022, our institute has launched the 'JTTRI Global Seminar' to deepen our understanding by inviting overseas experts and stakeholders to deliver lectures and participate in discussions on significant international developments and policy trends related to transport and tourism. Today marks the fifth implementation in this series. In May 2024, the fourth session featured Er Chua, Deputy Chief Executive of the Land Transport Authority, Singapore, under the theme "Mobility Transformation in Singapore –with a Focus on Rail Policy".

Today's session focuses on India's rail based urban transport. It examines an exceptionally ambitious project: establishing eight railway corridors connecting Delhi's central core with its extensive suburbs—spanning over 100km radius at semi high-speed. This aims to reduce population migration into the center of the capital Delhi, traffic congestion and air pollution, and remove constraints on India's anticipated further economic growth. We have invited Mr. V.K. Singh, the founder Managing Director of the National Capital Region Transport Corporation, who actively incorporated Transit-Oriented Development (TOD) principles while initiating the project, construction and putting into operation of the first corridor, to deliver the keynote address. Through his keynote, panel discussion, and Q&A session, we aim to deepen understanding of the latest railway development and TOD in India. We also hope to explore potential avenues for future railway development and TOD policies, as well as possibilities for collaboration and cooperation between Japan and India in the railway sector. This is why we have organised today's seminar.

Seminar Proceedings

■Guest Greetings

Mr. TERADA Yoshimichi, Vice-Minister for Transport, Tourism and International Affairs, Ministry of Land, Infrastructure, Transport and Tourism

India and Japan have maintained friendly relations over a long period. They have become extremely important partners across a wide range of fields, including economics, diplomacy, security, and cultural exchange.



Cooperation in the field of transport infrastructure, including railways, is one of the key pillars of this relationship. At this moment, as the international community faces a historic transitional period, deepening the already excellent relationship between India and Japan holds immense significance and value.

Today's theme - Railway Development and TOD in Megacities - transcends the boundaries of individual policies and administrative approaches such as railway policy and urban development. It has the potential to transform the behaviour, working practices, learning methods, and lifestyles of local people, influencing entire regional communities and, indeed, national character and culture.

Thanks to the efforts of Mr. V.K. Singh and all concerned, India's transport infrastructure and urban development have seen remarkable progress. I am confident that further leaps forward are possible through town and local development that leverages public transport.

In doing so, I would urge you to make the most of Japan's experience and expertise. Today, we are joined by Mr. UEMURA from Hankyu Railway, Mr. WATANABE from Tsukuba Express, and Mr. SAITO, former Chief Representative of JICA's India Office. I look forward to a lively discussion during the panel session.

Today presents a highly valuable opportunity for a frank exchange of views on initiatives and policies in both India and Japan. I expect it will yield diverse insights for future policy considerations.

■Keynote Address

“Development of Regional Rapid Transit System and Transit-Oriented Development in India's Mega-City”

**Mr. Vinay Kumar Singh, Former Managing Director, National Capital Region Transport Corporation
Managing Director, Thrive Future Habitats Ltd.**

Today, I will outline a project implemented across an area of approximately 55,000 square kilometres centred on Delhi, India's National Capital Region. India's urban population continues to grow, projected to reach 600 million by 2031 and 850 million by 2051, accompanied by rapid urbanization. However, the current infrastructure is unable to cope with such a rapid population increase in urban areas.

This necessitates addressing the growth in urban populations and their associated needs. Furthermore, urgent measures must be taken to tackle problems such as air



pollution, congestion, and urban sprawl.

For instance, the average travel speed in Bengaluru and Hyderabad is 17-19 km/h, though actual speeds are often lower. An examination of international examples led to the conclusion that rail-based transit should be utilized also in India. While national railways handle long-distance travel, Namo Bharat focuses on regional rail, which bridges the gap between these services and the metro, BRT, and city buses within urban areas. The last mile is covered by taxis, feeder buses, etc. As India lacked this regional rail network, the federal government decided to establish the Regional Rapid Transit System (RRTS), a semi high-speed rail system, centred on Delhi to fill this gap. The envisaged distances are 100-250 km.

The rationale behind this is to create a network of semi high-speed rail corridors acting as counter-magnets to the gravitational pull of the city centre, thereby alleviating excessive economic concentration in Delhi. Eight corridors are planned, collectively termed Namo Bharat. Three corridors are being implemented for the first phase. These three corridors form part of the National Infrastructure Pipeline. The initial 82 km section between Delhi and Meerut being constructed: a 70-kilometre elevated section and a 12 km underground section. The primary objective is to cover the 82 kilometres with travel time under 60 minutes, with the design accommodating development of the surrounding areas. Two further corridors will subsequently be added, connecting within the metropolitan area: access to the new airport in Noida (from Ghaziabad - 72 kilometres) and, Noida (through Faridabad) to Gurugram (approximately 60 kilometres).

The current transport network only achieves speeds of 20-30 km/h; even the Delhi Metro runs at 30-32 km/h, while buses operate below 20 km/h during peak times. Introducing the RRTS will enable seamless travel, connecting areas within a 100 km radius in one hour. As the National Capital Region (NCR) extends approximately 130 km from the centre, this will significantly expand the commuting zone.

While implementation of the three corridors is progressing, the Delhi-Meerut line is unique. It shares a 22 km section with the metro, operating both services on the same infrastructure. The design speed for the rolling stock is 180 km/h, with an operational speed of 160 km/h. Following government approval in March 2019, the pandemic struck within six months. Nevertheless, the initial section was completed in four years, with operations commencing after four and a half years.

The RRTS integrates the urban transport network. It provides diverse connections within high-traffic central sections, linking with the Delhi Metro, airports, ISBTs

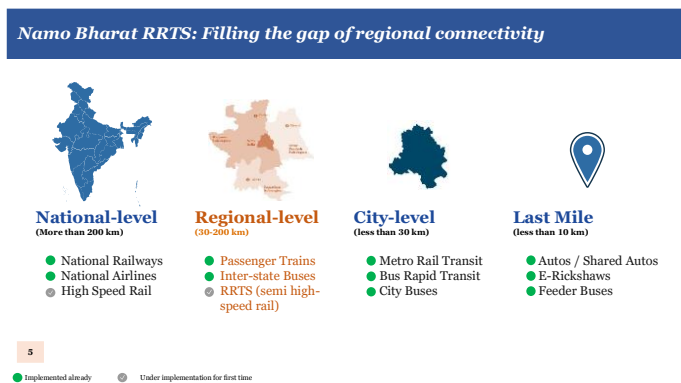
(Inter State Bus Terminus), and national railways etc. This achieves multimodal integration, eliminating previous transfer inconveniences. For example, Sarai Kale Khan Station centralises RRTS, Metro, national railways, and ISBT services. Station locations were carefully planned to reduce walking distances to within 350 metres. Seamless connections were achieved via elevated walkways.

Similarly, at Anand Vihar Station, the RRTS forms the core connecting the long-distance bus terminal, Metro, and national railways, ensuring pedestrian comfort and safety. Technical challenges were overcome to position stations at their optimal locations. Connections to last-mile transport (ride-sharing, two-wheelers) were strengthened to prevent delays in mode shift.

First of its kind initiatives include integrated metro-RRTS operations on RRTS infrastructure. Thirteen stations (nine metro + four RRTS) are shared across a 23km section, reducing project costs by 63,000 million rupees. The metro operates as a feeder service at 5-minute intervals, while RRTS runs at 10-minute intervals.

The project's impact includes mitigating urban sprawl. To alleviate congestion in Meerut (10-12 km/h), after consultations with the state government, we proposed relocating bus terminal and utilizing the metro, thereby easing congestion on arterial roads.

Corporate and residential development progressed, with intermediate stations becoming nodes. The journey time between Meerut and Delhi fell below one hour, leading to rising land prices (2-3 times higher in Meerut).



Positioning of RRTS in a four-tier transport system: Regional-level connectivity enhancement (Presentation material from Former Managing Director Mr. V.K. Singh)

First of its kind initiatives include: - Automatic fare collection (AFC) functionality ensuring contactless entry and exit including dedicated business class gates/QR code-based ticketing and National Common Mobility Card, - ETCS Level 2 signalling system over LTE backbone - Ballast less precast slab-tracks (similar to Shinkansen tracks) through

Indian contractors – Rolling stock fully designed and manufactured in India – Interoperability across corridors etc. Utilising ADB loan in JPY, capital structure was separated from project funding. O&M was first implemented by German Deutsche Bahn on a 12-year contract.

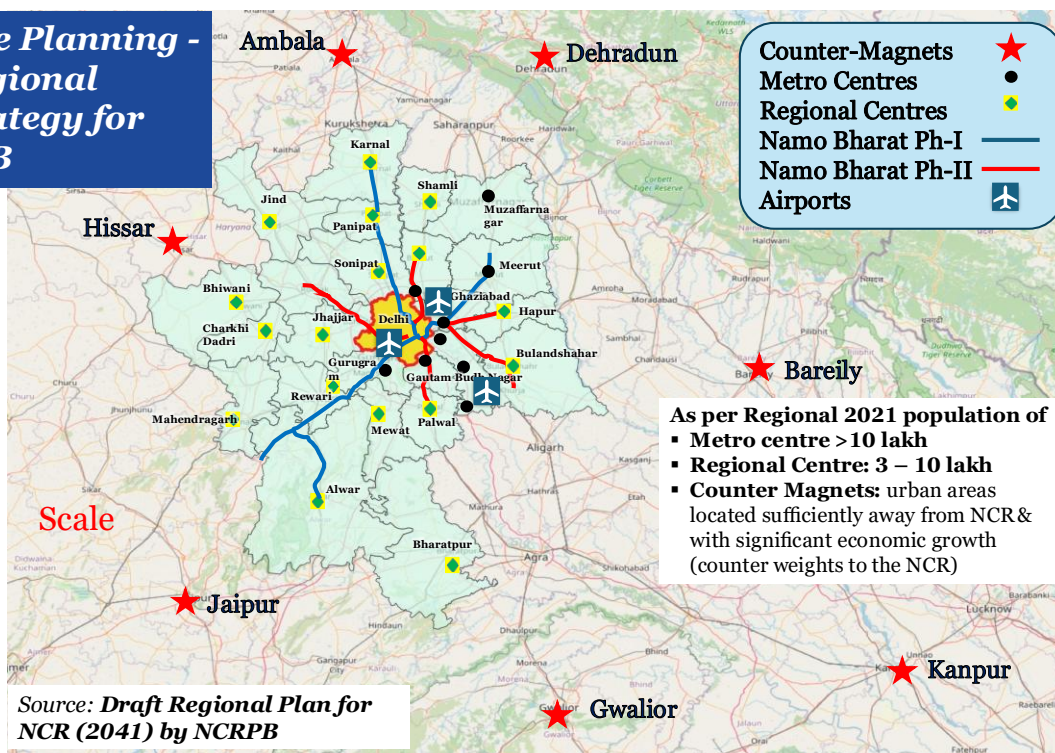
Empowerment is promoted, with women accounting for more than 35% of operation and maintenance staff. It was the first public transport system to introduce green energy. BIM and GIS were used to manage all planning under an ecosystem, speeding up the project and enabling asset management and cost reduction. 40% of funding is domestic (central and state governments), with the remainder from the ADB, New Development Bank, and Asian Infrastructure Investment Bank. Given JICA’s track record of supporting important Indian railway projects such as the Delhi Metro, the Western Dedicated Freight Corridor (DFC), and the Mumbai-Ahmedabad High-Speed Rail, it is possible that Japan’s expertise could be utilized through JICA in future RRTS corridor projects.

In TOD (Transit-Oriented Development), whilst state governments play a central role, the National Capital Region Transport Corporation (NCRTC) is collaborating with Uttar Pradesh State in the preparation of Zonal Development Plans (in Meerut and Ghaziabad). Influence Zone is defined as a 1.5km radius around stations and 500m either side along the Metro Corridor, with zoning conducted using GIS. Under Value Capture Financing (VCF), four methods have been approved to monetize land value increases. The revenues generated would be utilized towards both the financial sustainability of the RRTS project as well as TOD based development and infrastructure creation and upgradation.

Introducing community empowerment activities by Japan Fund for Prosperous and Resilient Asia and the Pacific (JFPR) grant, while expressing gratitude for ADB’s support.

Economic Zone Planning - Integrated Regional Transport Strategy for NCR by NCRPB

- Counter Magnets can **reduce migration pressure** on Delhi
- **Fast connectivity by RRTS** to Metro/regional centers was planned to **reduce migration, traffic congestion and air pollution** in Delhi



RRTS’s eight-corridor plan in Integrated Regional Transport Strategy for National Capital Region (Presentation material from Former Managing Director Mr. V.K. Singh)

Panel Discussion

[Moderator and Panelist]

Professor Dr.KATO Hironori, Department of Civil Engineering, Graduate School of Engineering, The University of Tokyo

[Panelists]

Mr.Vinay Kumar Singh, Former Managing Director, National Capital Region Transport Corporation (NCTRC)

Managing Director, Thrive Future Habitats Ltd.

Mr.UEMURA Masayoshi, Managing Director, Hankyu Corporation

Mr.SAITO Mitsunori, Director, Infrastructure Engineering Department/ Former Chief Representative, India Office, Japan International Cooperation Agency (JICA)

Mr.WATANABE Ryo, President and CEO, Metropolitan Intercity Railway Company

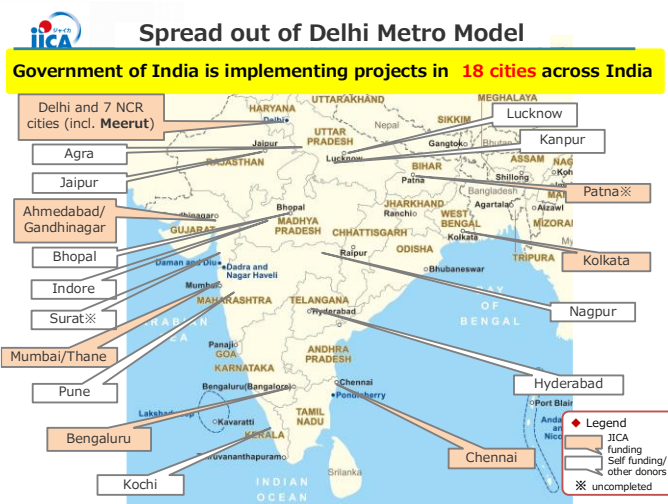
Following a review of the keynote address by Professor Dr.KATO, who served as both moderator and panelist, Director Mr.SAITO presented an overview of metro projects in India.

Reference Presentation by JICA Director General Mr. SAITO

JICA provided support totalling ¥1 trillion for the Delhi Metro starting from 1997. Following partial opening in 2002, the network expanded to 12 lines with a total length of 395 km. It serves 8 million passengers per day, reduces 400,000 car trips, and contributes to various social changes, including women’s empowerment through the transfer of Japan’s construction culture emphasising safety and deadline “NOKI”, alongside a safe and clean capital transport environment.



JICA is currently transferring the Delhi Metro Model to seven metropolitan areas across India in collaboration with the Indian government. Including projects outside JICA’s support, the government is currently developing metro projects in 18 cities nationwide.



Spread out of Delhi Metro Model to other cities (Reference Material from Director Mr.SAITO)

Round 1: Theme 1 - Measures for construction and operation of railways as well as TOD

(President Mr.WATANABE) The Tsukuba

Express was developed under a special act integrating residential land development with railway construction, with our company responsible for railway operations.



Questions: ① How is the National Capital Region Transport Corporation (NCTRC) involved in development along the line? ② Operations and maintenance of railway facilities are contracted to Deutsche Bahn (DB). What are the division of roles and challenges? ③ What areas will NCTRC focus on regarding non-fare revenue and related businesses? How does Value Capture Financing (VCF) contribute to railway operation?

(Former Managing Director Mr. V. K. Singh) ① In the Metro and RRTS projects, joint ventures undertake from design through to construction and operation, under the supervision of central and state governments, including NCTRC. Station area development: NCTRC develops its own land, while other land is developed by state government agencies or private companies. NCTRC collaborates with state governments to formulate the overall framework, negotiates and establishes regulations and rules with companies, offering potential efficiency benefits for state governments.

② NCTRC owns the railway assets and has outsourced maintenance and operation to Deutsche Bahn via competitive bidding, paying fees based on KPIs stipulated in the outsourcing contract. ③ Beyond fare revenue, NCTRC generates income from non-fare sources, including dispatching experts and providing policy recommendations for state government TOD initiatives, as well as leasing income from properties purchased along the line for consumer-oriented businesses such as restaurants.

(Managing Director Mr. UEMURA)

① Regarding the development of park-and-ride facilities, what policies are envisaged to incentivize increased rail usage by commuters switching from private cars? ② What are the plans for interchange routes at Sarai Kale Khan station, the major common station? I would like to hear about your approach regarding station development concepts to minimize the psychological burden of movement, such as commercial development in the station yard.



(Former Managing Director Mr. V. K. Singh) ① In the Delhi metropolitan area, traffic congestion means car journeys take a long time, and parking fees are high. The time and financial saving through using the punctual rail service act as an incentive for park-and-ride. Integrated development benefits are expected from future commercial and residential development around the station alongside the car park. ② Sarai Kale Khan Station has been planned with a focus on user experience value, selecting a highly convenient location to serve as a multimodal hub. This includes installing footbridges and lifts, relocating the existing bus terminal closer to the station, and implementing pedestrian-vehicle separation.

◇Round 1: Theme 2 - The wider metropolitan region envisioned by RRTS

(Managing Director Mr. UEMURA) Within the 100km metropolitan area, how do you envision corridor-based region development along the line (wide-area town development) and node-based city development per station(station site development, etc.)? I would like to hear about the corridor strategy.

(Former Managing Director Mr. V. K. Singh) We will promote integrated development of the corridor as a line and central node hubs. For instance, in Meerut City, where medical institutions are concentrated, we envisage enhancing hospitals, pharmaceutical companies, and testing facilities centred around the station. To foster cultural development along the corridor, we will advance sports facilities, entertainment venues, and residential development on NCRTC-owned land over 10-15 years. We will develop the entire corridor, including facilitating suburban relocation of housing leveraging semi high-speed rail, and establishing educational and commercial functions to encourage counter-flow migration, all while carefully assessing supply and demand.

(President Mr. WATANABE) What is the role of the RRTS in the industry and economy of the Delhi metropolitan area?

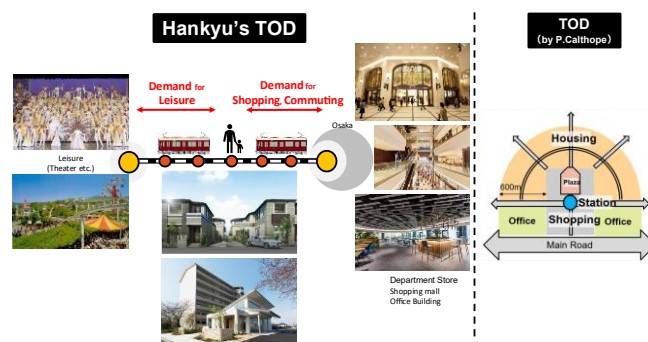
(Former Managing Director Mr. V. K. Singh) Aiming for polycentric development that relocates economic activity from congested Delhi to the suburbs, semi high-speed rail will integrate both the Delhi and Meerut markets, enabling the active movement of engineers, knowledge workers, and others, and targeting the formation of clusters within the metropolitan area.

◇Round 2

(Former Managing Director Mr. V. K. Singh) What is the measures to apply Hankyu's "Railway-City-Culture" circularity model to India with lower per capita income?

(Managing Director Mr. UEMURA) When it opened more than 100 years ago, KOBAYASHI Ichizo aimed for a "service for the masses" where the people could easily ride trains and enjoy the corridor. As shown in the materials, Hankyu's TOD involves dispersing housing, commerce, and sports like high school baseball away from Osaka to suburbs to alleviate congestion, fostering cultural development along the entire line. In India too, we would expect that the public will readily take the railway, enjoy sports and other activities along the line, thereby fostering affection and culture, ensuring continued railway use even after prosperity is achieved.

Hankyu's TOD (Transit-Oriented Development)

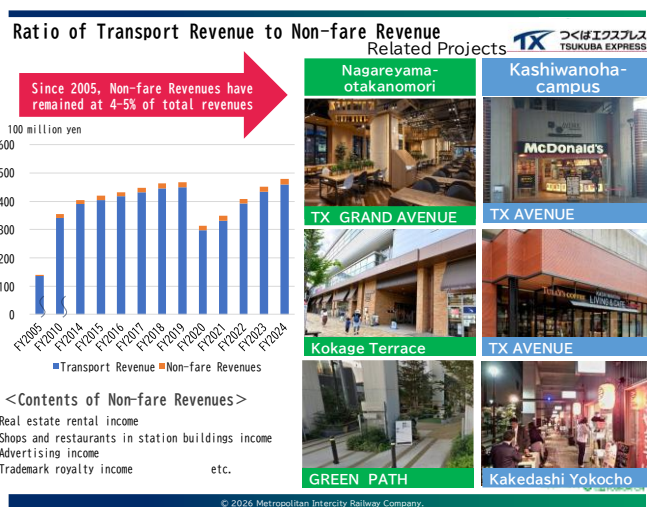


Hankyu's TOD (Explanatory material from Managing Director Mr. UEMURA)

(Former Managing Director Mr. V. K. Singh) ①What methods are used for demand forecasting? ②What is the trend in the ratio of fare revenue to non-fare revenue? ③Have you introduced differentiated services such as green cars and express trains?

(President Mr. WATANABE) ①We use a method established by our company, which incorporates the academically established four-stage estimation method while taking into account actual conditions such as the time lag between population growth along the railway line and the increase in railway

users. ②The ratio of non-fare revenue has remained at 4-5%. Under the division of roles in which local authorities and companies are engaged in development along the railway line, our company's development activities are limited to station premises and areas under elevated tracks, but in line with our long-term vision formulated in 2025, we are promoting collaboration with local authorities and companies aiming for development along the railway line. ③As the priority is to alleviate commuter congestion caused by the increase in residents along the line, we do not operate luxury trains, etc., but we are working to provide stable transport by leveraging the differentiation factor of having few operational disruptions considering the status of a single line.



Ratio of Fare Revenue to Non-Fare Revenue and Related Projects (Explanatory material from President Mr. WATANABE)

◇ Round 3: Relationship between railway and the sustainable economic development of region/urban planning

Round 4: Significance and potential of participation including investment from Japan in India's railways and TOD (Executive Director Mr. UEMURA)

From a long-term perspective, fostering customer loyalty through local culture along the line will generate synergies for non-railway businesses and enable effective internalisation of profits. I suppose that expertise cultivated by private railway companies such as Hankyu will be useful.

(President Mr. WATANABE) Japan's era of population growth has ended, yet along the Tsukuba Express line, a culture of dual-residence is emerging: housing for younger generations working in central Tokyo, alongside the line's rich natural environment. We anticipate investments in India, leveraging the expertise of both internationally competitive business and negotiation functions connecting suburban research and innovation hubs with central Tokyo companies in minimal time, as well as companies engaged in line-side development.

(Director General Mr. SAITO) In India, rapid urbanisation

and motorization are making it difficult to maintain urban functions. Ensuring sound mobility in the major metropolitan areas that underpin India's economic growth is an urgent priority. JICA also wishes to provide support through metro projects and TOD initiatives to be trialed in Mumbai and elsewhere. We hope to contribute to India's balanced development by utilising the expertise of Japanese companies, including railway-affiliated real estate developers, in both linear and area-based development. The introduction of VCF in RRTS was revolutionary in India. (Former Managing Director Mr. V.K. Singh) We look forward to Japanese participation, leveraging expertise in environmental measures such as tackling air pollution - a pressing issue in India's metropolitan areas - and in monetizing station and station-area development by railway companies. From my own experience, I learned much from the rigorous project management and advanced technology in JICA-supported projects. I look forward to Japan's support in the multilateral operation and regulation of PPPs, as well as in asset management and longevity through consulting businesses.

◇ Question and Answer Session

(In-person participant) I would like to hear more about the Value Capture Finance (VCF) methodology. What kind of value is being captured?

(Former Managing Director Mr. V.K. Singh) VCF is based on the concept of taxing a portion of the benefits derived from government policies and investments, such as infrastructure development. For example, it targets transactions like gains from the transfer of agricultural land near RRTS or profits from condominium development sales, taxing the increase in land value or property valuation. Separately, increase in registration fees are also under consideration.

(Online Participant) I would like to ask about lessons learned from Japan's TOD initiatives and the differences in approaches required for India's TOD projects.

(Former Managing Director Mr. V.K. Singh) In India, within public-private partnerships (PPPs), the government and private enterprises have not yet achieved a genuine partnership. In the railway sector, there is limited experience in outsourcing facility maintenance to the private sector, presenting challenges for smooth operational management between the two parties. However, successful examples are emerging in airports and motorways.

◇ Summary by Moderator Professor Dr. KATO

I was highly impressed to learn that India has been actively advancing a strategic four-tier transport system



encompassing the national, regional, city, and first/last-mile levels.

The case of the RRTS—a state government-led, wide-area rail system—provides valuable insights into the challenge that railway networks often face in transcending administrative boundaries, an issue also observed in many urban subway systems. The Transit-Oriented Development (TOD) approach adopted by the RRTS appears highly compatible with Japan's model, indicating strong potential for mutual learning and the exchange of knowledge and experience between the two countries.

India's initiatives also appear to be relatively advanced in terms of internalizing the benefits of infrastructure development through Value Capture Financing (VCF). On the other hand, with respect to Public-Private Partnerships (PPPs), it was noted that the private sector in India has yet to establish fully mature and genuine partnerships. Japan, by contrast, has accumulated considerable experience in fostering effective collaboration between the public and private sectors, and this represents an area in which its knowledge could be shared with India. We would welcome further discussion on this topic in the future.

Given the vast scale of the Delhi metropolitan area, with a radius of approximately 100 km, careful consideration is needed when assessing whether experiences from the Tokyo metropolitan area—typically spanning a 40-50 km radius—can be directly applied. In Japan, this may be comparable to the concept of a polycentric urban structure, in which satellite cities within the capital region are interconnected by rail. For Delhi's RRTS, while the immediate priority lies in developing eight radial corridors linking the city center with surrounding suburbs, future discussions may also need to consider the introduction of ring lines and east-west corridors. I found the differing scale and scope of India's TOD initiatives particularly instructive.