

論点 Points of Discussion

①上村氏及び渡邊氏からSingh氏への質問

Questions to Mr. Singh from Mr. UEMURA and Mr. WATANABE

②Singh氏から上村氏及び渡邊氏への質問

Questions from Mr. Singh to Mr. UEMURA and Mr. WATANABE

③インドの鉄道と地域の持続可能な経済発展・都市計画の関係

Relationship between railway and the sustainable economic development of region and urban planning in India

④インドの鉄道とTODにおける日本からの投資その他の参画の意義・可能性

Meaning and possibility of participation including investment from Japan in India's railway and TOD

インド首都圏における地域高速鉄道システムについて

On RRTS in National Capital Region in India:

①地域高速鉄道システムの構想

Conceptualization of RRTS

②最初の回廊:デリー-メールートとマルチモーダル計画

First Corridor: Delhi-Meerut & Multi-Modal Planning

③最初の先駆的イニシアティブ

First of its kind initiatives

④公共交通指向型開発(TOD)

Transit Oriented Development

⑤バリューキャプチャー(価値獲得)ファイナンスを可能に

Enabling Value Capture Financing (VCF)

⑥完成した回廊を眺めて

Few Glimpses of the Completed Corridor

① 地域高速鉄道システム(RRTS)の構想

Conceptualization of RRTS

- 不十分な地域モビリティが経済成長を制約

Inadequate regional mobility-constraining economic growth

- RRTSによる準高速接続によりデリー中心部への移住、交通混雑、大気汚染を削減する計画

Semi high-speed connectivity by RRTS was planned to reduce migration, traffic congestion and air pollution in Delhi

- 首都圏交通機能計画がRRTS 8路線(回廊)を位置づけ、うち3回廊をPhase Iにおいて優先

Eight RRTS corridors identified in Functional Plan of Transport for NCR, out of which three corridors prioritised in Phase- I

- 首都圏巨大地域(半径:従来30km→100km)をRRTSにより1時間で結ぶ
NCR Mega region covered by RRTS in 1hr (R:100km)
←30km by existing modes (R:30km)

② 最初の回廊:デリー-メールートとマルチモーダル計画

First Corridor: Delhi-Meerut & Multi-Modal Planning

- デリー-メールート回廊(約82km、営業速度:時速160km) コロナ禍にも拘わらず、認可された期間と費用の範囲で竣工

Delhi-Meerut Corridor (ca. 82km, operational speed:160kmph) was completed within sanctioned timelines and cost, despite COVID-19

- Sarai Kale Khan駅等でのマルチモーダル統合とラストマイル接続強化
Multi modal integration at Sarai Kale Khan Station etc. and enhancing last mile connectivity

- RRTSインフラ上でのメトロ運行:ネットワーク統合と乗客利便性の点で先駆的;乗客競合なしで、資源の有効活用

Metro services in Meerut value engineering on RRTS Infrastructure leading to first of its kind NW integration and passenger convenience ;better utilization of resources & no competition for ridership

- メールート市中心部からのバスターミナルの移転による中心部の混雑緩和
Relocation of bus terminal from center of Meerut city will help decongest the city centre

③ 最初の先駆的イニシアティブ

First of its kind initiatives

- プレミアムラウンジを含めた2段階の運賃自動収集改札機能(非接触)/QRコード基本のチケットティングと全国共通モビリティカード(非接触)

Dual Automatic Fare Collection (AFC) gate functionality for premium lounge/QR-code and contactless National Common Mobility Card

- 自動列車運転装置及びホームドアと一体のLTE利用ETCSレベル2(信号システム)の世界初導入/インドの事業者によるバラスト無プレキャストスラブ軌道/インドで完全設計・製造の車両/回廊間の相互運用性/BIM/デジタル式プロジェクト&資産管理/RRTSインフラ上へのメトロの統合/ADB円借款とプロジェクト資金調達からの資本分離

Globally first time ETCS level 2 over LTE integrated with ATO and Platform Screen Door/Ballast-less precast slab-track through Indian contractors/Rolling stock 100% designed & manufactured in India/Interoperability across corridors/BIM/Digital project & asset management/Integration of metro in RRTS infra/ADB loan in JPY and separation of capital structure from project financing

③ 最初の先駆的イニシアティブ(続き)

First of its kind initiatives (continued)

- 運営とメンテナンスの12年間契約/15年間メンテナンスと連動した車両供給/システムインテグレーターと金融機関の別の契約による運賃自動収集システム

12-year O&M contract/rolling stock supply bundled with 15-year maintenance/AFC system with unbundled two contracts :system integrator and financial institution

- 女性の活躍(運行とメンテナンス職員の35%以上)

More than 35% of O&M staff are women

- 公共交通機関初のグリーンエネルギー導入(太陽光発電、再生可能エネルギー、回生ブレーキ、回生エレベーター)

First initiative by a transit agency (solar capacity, regenerative braking, regeneration in lifts, etc.)

- プロジェクトの計画的進行のための技術活用(モバイルアプリ)

Leveraging technology for on-time delivery (mobile apps)

- 国際銀行からの借入/JICAとの議論

Loan from multilateral banks/discussion with JICA

④ 公共交通指向型開発(TOD)

Transit Oriented Development

- 都市計画の枠組み(州政府が中心)

Framework for urban planning : mainly state governments

- 首都圏交通公社(NCTRC)の役割: 州政府への提案、ガジアバートとメールルートにおけるTODに根差したゾーン開発計画(影響ゾーンと特別開発地域)の作成に開発当局と参画、TODとバリューキャプチャー(価値獲得)ファイナンス(VCF)の経験に基づく知見を整理

Role of NCTRC: proposal to state gov., engaged with the Development Authorities in preparation of TOD based Zonal Development Plans including Influence Zone and Special Development Areas in Ghaziabad and Meerut, developing a Knowledge Product on its experiences on TOD & VCF.

- メールルートの新しい街づくり計画で、TODゾーンでの長期的産業再開発とインフラの更新が提案される。

In New Meerut Township planning, long term industrial redevelopment and upgradation of infra within TOD Zones will be proposed.

⑤ バリューキャプチャー(価値獲得)ファイナンスを可能に Enabling Value Capture Financing (VCF)

- NCTRC参加の委員会、先行事例を参考にした研究を得て、NCTRCがVCF手段を提案し、州政府が4措置を承認。VCF手段からの収入は、RRTSプロジェクトの財政維持とTOD開発並びにインフラの創出等に充てられる。

Through committee involving NCTRC, study referring to precedence, NCTRC proposed VCF instruments.
Government of UP State approved four instruments.
Revenues from VCF instruments would be utilized towards both financial sustainability of RRTS Project as well as TOD based development and Infra creation etc.

⑥ 完成した回廊を眺めて

Few Glimpses of the Completed Corridor

- 「豊かで強靱なアジア太平洋日本基金」(JFPR)による地域社会強化活動とADBのリーダーシップ

Community empowerment activities with Japan Fund for Prosperous and Resilient Asia and the Pacific,
ADB's Leadership

参考紹介 Reference Introduction

インドにおけるメトロ・プロジェクトの概観 Overview of Metro Projects in India

斎藤光範

国際協力機構(JICA) インフラ技術業務部部長 前インド事務所長

SAITO Mitsunori

Director General, Infrastructure Engineering Department
/Former Chief Representative, India Office,
Japan International Cooperation Agency (JICA)

JICA's cooperation for India's urban transport

- Delhi Metro -

- ◆ JICA assisted construction of Delhi metro since 1997 (total loan amount :1.078 trillion Yen)
- ◆ First opened in 2002, the network expanded to 12 lines with total length of 395 km (cf.304km in Tokyo)



◆ Project impact

- ① **Reduction of traffic congestion**, ridership: 8.19 million/day (Aug. 2025)
- ② **GHG reduction** : 620 thousand tons/day, First railway CDM project in the world
- ③ Transfer of Japan's construction culture (**safety and "NOKI"**)
- ④ Contribution to **women's empowerment**
- ⑤ Speedy and flexible implementation by an **autonomous project entity**



⇒ **"Delhi Metro Model"** for construction & management of urban mass transit system



Spread out of Delhi Metro Model

JICA is transferring Delhi Metro's success model to other big cities in India



Delhi

- ✓ Total length: 395 km
- ✓ **Ridership: 7-8 million/day**
- ✓ Completion : 2026 (Phase 4)
- ✓ Phase 4 ongoing

Ahmedabad

- ✓ Total length: 39 km
- ✓ Completion : 2024

Patna, Bihar

- ✓ Length : 33km
- ✓ Completion : 2029年
- ✓ JICA's 1st cooperation for a tier-2 city

Mumbai Line 3

- ✓ Length :34 km (**all underground, 1st in India**)
- ✓ Completion :2025
- ✓ Line 11 planned with JICA funding

Kolkata East-West Line

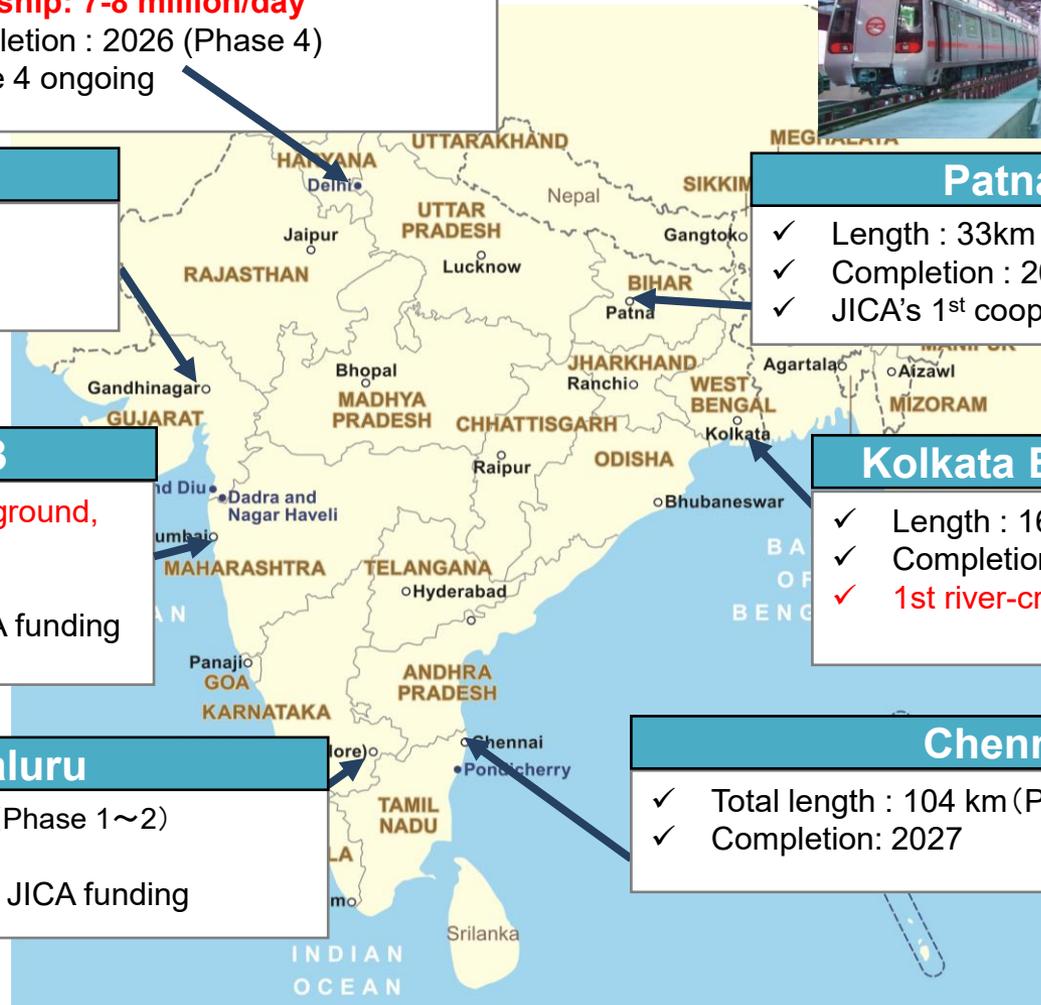
- ✓ Length : 16 km
- ✓ Completion :2025
- ✓ **1st river-crossing tunnel in India**

Bengaluru

- ✓ Total length :122 km (Phase 1~2)
- ✓ Completion : 2027
- ✓ Phase 3 planned with JICA funding

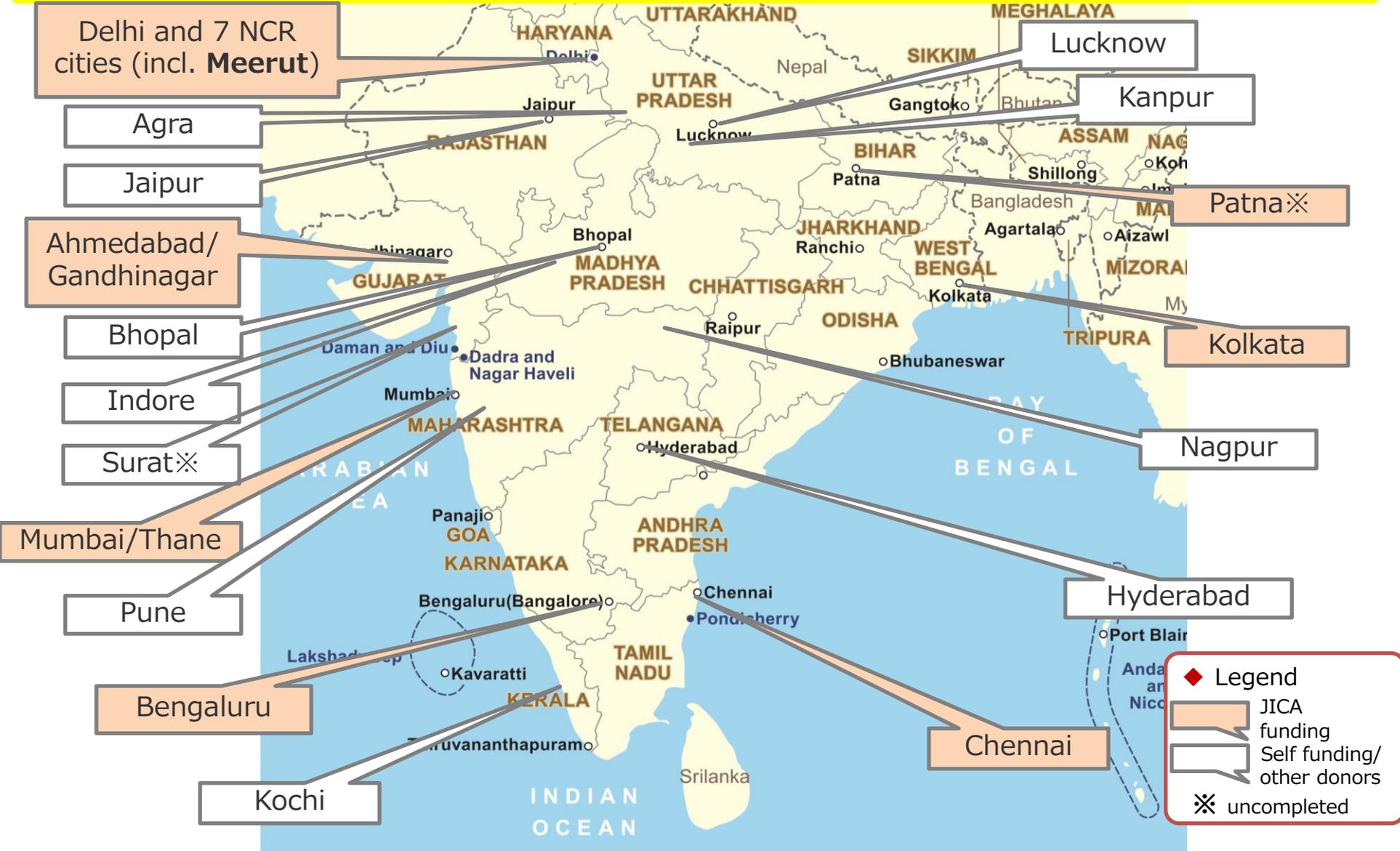
Chennai

- ✓ Total length : 104 km (Phase 1~2)
- ✓ Completion: 2027



Spread out of Delhi Metro Model

Government of India is implementing projects in **18 cities** across India



Legend

- JICA funding
- Self funding/other donors
- ⊗ uncompleted

Panel Discussion 1st round

渡邊氏からSingh氏への質問

Questions to Mr. Singh from Mr. WATANABE

(テーマ1) 鉄道整備運営と沿線開発の手法

(Theme 1) Measures for construction and operation of railways as well as TOD

WQ RRTSにおける鉄道整備と沿線開発の推進体制とNCRTCの役割は？

Which organizations are responsible for the railway development and TOD in RRTS? What is the role of NCTRC?

WQ 鉄道施設の運営と維持管理におけるドイツ鉄道（DB）とNCRTCの役割分担は？

What is the division of roles between Deutsche Bahn and NCTRC in the operation and maintenance of railway facilities?

WQ RRTSの運賃外収入におけるNCRTCの注力分野は？

What areas will NCRTC focus on regarding non-fare revenue?

Panel Discussion 1st round

上村氏からSingh氏への質問

Questions to Mr. Singh from Mr. UEMURA

(テーマ1) 鉄道整備運営と沿線開発の手法

(Theme 1) Measures for construction and operation of railways as well as TOD

UQ マイカーから鉄道に転換すると想定する、パークアンドライド駐車場の利用者像は？

What is the image of users of P&R facilities, who use rail instead of private car?

UQ 大結節点 (common station) Sarai Kale Khan駅の歩行者導線の工夫とエリア開発構想は？

At Sarai Kale Kahn Station as common station, what measures are considered to address pedestrian walking conditions and what is planned for integrated area development?

Panel Discussion 1st round

上村氏及び渡邊氏からSingh氏への質問

Questions to Mr. Singh from Mr. UEMURA and Mr. WATANABE

(テーマ2) RRTS回廊が目指す広域都市圏

(Theme 2) The wider metropolitan region envisioned by RRTS

UQ 広域都市圏のイメージ(線全体の都市圏形成、点の駅単位の都市形成か)、人口構造、住宅供給は？

Do you envision corridor-based metropolitan region development along the line or node-based city development?

What population structure and approach to housing supply are assumed?

WQ デリー首都圏の産業振興や経済活性化におけるRRTSの役割・効果、NCRTRCの取組は？

What role is RRTS expected to play in terms of industrial promotion and economic vitalization in the Capital Region?

What measures are NCRTRC considering to achieve this?

Panel Discussion 2nd round

Singh氏から上村氏への質問

Questions from Mr. Singh to Mr. UEMURA

QU 低所得環境における「鉄道・都市・文化」循環阪急モデルのインドへの応用方法は？

What is the measures to apply Hankyu' s "railway-city-culture" circularity model to India with lower per capita income?

QU 初期の阪急駅における指標と、現在との比較は？

What were the density metrics etc. during earlier expansion of Hankyu lines, how do these compare to the present?

Hankyu's TOD (Transit-Oriented Development)



Hankyu's TOD

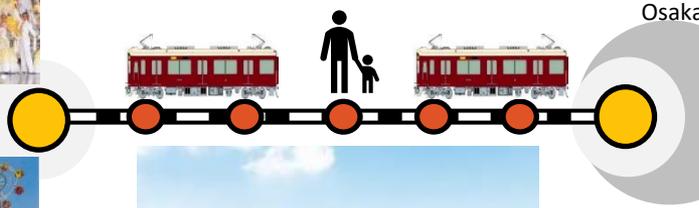


Leisure
(Theater etc.)



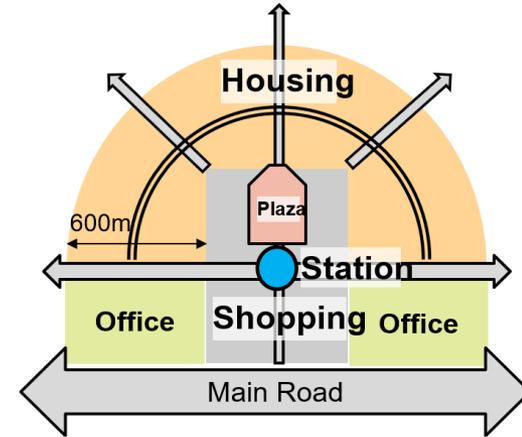
Demand for
Leisure

Demand for
Shopping, Commuting



Department Store
Shopping mall
Office Building

TOD (by P.Calthope)



Panel Discussion 2nd round

Singh氏から渡邊氏への質問

Questions from Mr. Singh to Mr. WATANABE

QW RRTSに対してどのような需要予測手法を推すか？

What demand forecasting methodology would you recommend for RRTS corridors?

QW TX開業後20年間で運賃収入と運賃外収入との比率はどのように変化しましたか？

How has the balance between farebox and non-farebox revenue evolved for TX over the 20 years since opening?

QW マイカーからの転換を促すために輸送サービスの差別化を検討したことはあるか？

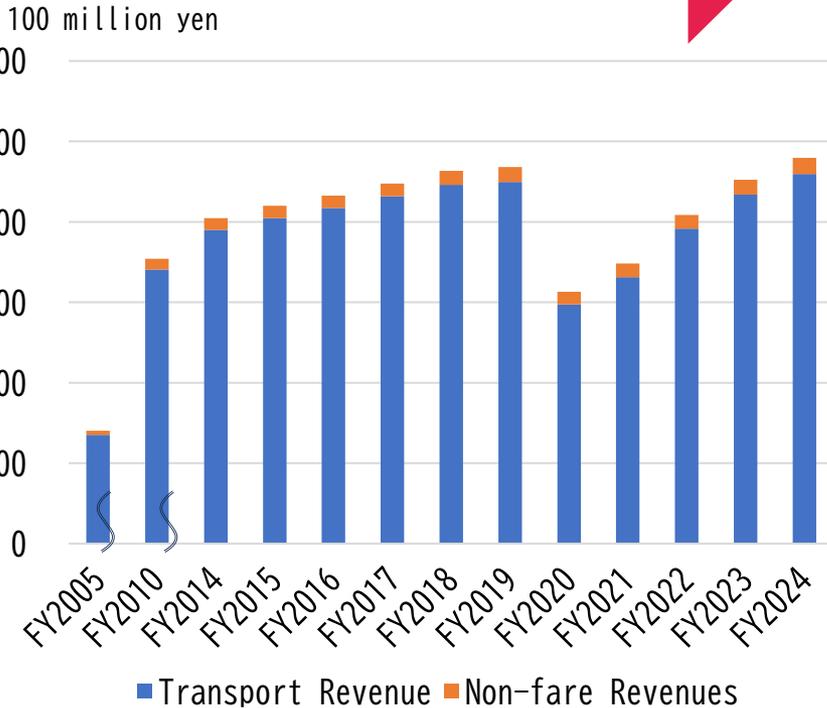
Has there been any consideration of introducing differentiated products, targeted at shifting private car users?

Ratio of Transport Revenue to Non-fare Revenue

Related Projects



Since 2005, Non-fare Revenues have remained at 4-5% of total revenues



<Contents of Non-fare Revenues>

- Real estate rental income
- Shops and restaurants in station buildings income
- Advertising income
- Trademark royalty income
- etc.

Nagareyama-otakanomori



TX GRAND AVENUE

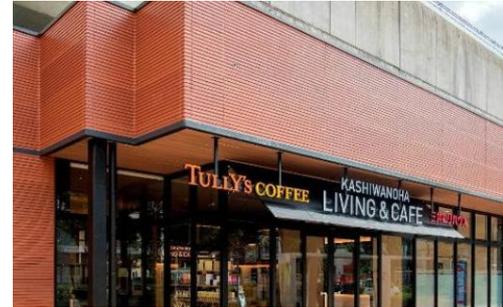
Kashiwanoha-campus



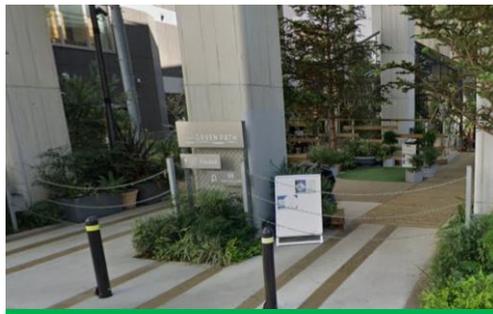
TX AVENUE



Kokage Terrace



TX AVENUE



GREEN PATH



Kakedashi Yokocho

パネルディスカッション ラウンド③

Panel Discussion 3rd round

インドの鉄道と地域の持続可能な経済発展・都市計画の関係

Relationship between railway and the sustainable economic development of region and urban planning in India

パネルディスカッション ラウンド④

Panel Discussion 4th round

インドの鉄道とTODにおける日本からの投資その他の参画の
意義・可能性

Meaning and possibility of participation including investment from Japan in India's railway and TOD