Demand-Responsive Transit (DRT)

Demand-Responsive Transit is a public transportation management technology that does not predefine operation zones or schedules but instead reflects real-time user demands such as travel routes and times.

This system enhances transportation accessibility by providing mobility services to residents in areas without regular public transit. It also increases operational efficiency and reduces transit costs by optimizing routes based on user destinations, minimizing travel time, and improving load efficiency.

▲ Users summon a demand-responsive bus via a smartphone app and board the vehicle.

Issues to Tackle

- ☑ Increasing areas underserved by public transit in regional cities due to aging populations, population decline, reduced bus routes, and longer intervals between services.
- ☑ Need for customized transit solutions to ensure mobility for vulnerable groups, such as children and the elderly, and address transportation access issues.

Expected Benefits ☑

- ☑ Reduces waiting and travel times by offering convenient mobility services to residents in areas with insufficient or no public transit options.
- ☑ Lowers carbon emissions by decreasing private vehicle usage.
  * Example: Average private car usage reduced from 2.88 to 1.59 trips per day, cutting 478.7 tons of CO_2 emissions (Dduk, Gyeonggi Province, 2023).

Key Services

· When passengers select their starting and destination points via a smartphone app to request a vehicle, the system generates a real-time route to a nearby stop, assigns a vehicle, and transports them to their destination stop using an optimized route that includes shared rides with similar paths.

· Demand-responsive transit fare payments can be made via registered credit cards, enabling seamless transactions with linked transit cards.

  * Elderly Accessibility: Offers reservation and ride-hailing services via call centers for seniors.

· Drivers use apps to follow optimal routes and guide passengers to designated boarding and alighting points.

· Integrates with existing public transportation systems like transit cards and the Bus Information System (BIS) to enhance convenience.

Use Cases

· Incheon City(2020-2022): Piloted the I-MOD service in Yeongjong, Songdo, and Geomdan districts through the National Smart City Challenge project..

  * Reduced average waiting times by 80%, decreasing average travel time by 41%.

· Sejong City(2021): Conducted regulatory sandbox tests for demand-responsive mobility services ("SHUCLE").

· Starting in 2023, a wide-area DRT was introduced in areas with insufficient public transportation between cities and provinces in the metropolitan area.

Key Components

Configuration

DRT Vehicle

- Dispatch request and route information

- Operation and location information

DRT Platform

Integrated DRT Management
- Vehicle and customer data management
- Dispatch and reservation management

Dispatch and Route Management Algorithm
- Dispatch
- Route Generation

Big Data Analysis
- Usage pattern analysis
- Route and driving analysis

DRT Monitoring
- Vehicle and operation status information
- Statistical data

Citizen

- Vehicle information inquiry
- Reservation and payment

Key Technologies

1. DRT Platform Monitoring System
· Manages real-time operational status, vehicles, routes, and stops for DRT.

POINT Generates optimized routes for demand-responsive transport using AI-based dispatch algorithms.

2. User Application
· Provides functions for summoning, reserving, and paying for demand-responsive transport services.

3. Driver Application
· Offers guidance on optimized routes generated by the DRT platform, assists in vehicle dispatch, and provides passenger status information.

4. Integrated Terminal
· Collects real-time vehicle location, status, and operation information for demand-responsive transport.

5. QR Reader
· Verifies passenger boarding and processes payments using QR codes.

Demand-Responsive Transit Operating Methods

Vehicle Types		Operating Modes	
	Small DRT: Vans suitable for small-group shared transportation		Fully Flexible Routes: Real-time route generation based on demand
	Large DRT: Buses suitable for large-group shared transportation		Fixed Routes: Operation along predefined routes
	Care DRT: Vans specialized for mobility-impaired passengers, including wheelchair users		Hybrid Routes: Partially flexible routes adjusted within predefined zones based on demand

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