Current Situation of Smart Transport Component and a Strategic Overview Within The Scope of The Turkey's Smart City Maturity Assessment Model

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Smart City Maturity Assessment Model

Smart City Maturity Assessment Model

Smart city is a complex concept,

⬇

it is necessary to give a structure for the concept.

⬇

Smart city maturity assessment models are used to meet this need.

UNECE-ITU
- Smart and Sustainable City Indicators

Morgenstadt
- Morgenstadt Smart City Framework Model

European Union (EU)
- European Mid-Sized Cities Smart City Ranking Model

European Commission
- Cultural and Creative City Monitoring Model

ISO
- 37120-Sustainable Development of Communities-Indicators For City Services and Quality of Life, Smart Transportation, Smart Mobility and Logistics Management [5]

❑ Smart city maturity assessment models enable cities to feed each other and evaluate them together by comparing the smart city maturity of the cities in a systematic and structured way with a common understanding.

❑ Vertical assessment dimensions consisting of smart city components are used in models.

❑ As transportation services are the most used and needed service among city services, digitization in transportation services has become more important than other city services.
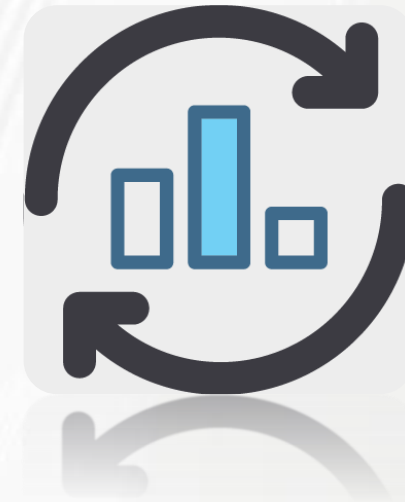
Models

- ❑ have different structures with different concepts representing different understandings serving for different purposes.

- ❑ are evaluated as insufficient in terms associating all smart city components under the smart city roof with each other.

- ❑ do not meet the need to take into account the conditions and opportunities specific to Turkey.

Turkey Specific Smart City Maturity Assessment Model

❑ In Turkey within the scope of the 2020-2023 National Smart Cities Strategy and Action Plan [Project, Smart City Maturity Assessment Model] has been developed by TÜBİTAK BİLGEM Software Technologies Research Institute, which forms a common language and systematic structure guaranteeing simultaneous smart city maturity development.

❑ With the Model, the Smart City maturity level is determined by assessing smart city capabilities of a city and solutions are proposed for improvement of the maturity level.

❑ The Smart City Maturity Assessment Model has been developed in the structure of

- displaying the current state of the city related to smart city transformation through status indicators, assessment of readiness in activity areas in division of competence-component-capability, and maturity level of efficiency dimensions, and

- display of the impact of smart city studies on the city through impact indicators.

Smart Transportation in the Model

❑ The Smart Transportation component is among the smart city components defined in the Model.

- The existence of Smart Transportation applications in the cities, which are included in the breakdown of capabilities defined within the scope of the Smart Transportation component in the model,

- the state of intelligence creation based on the data and expertise obtained with these applications, and

- the use of this intelligence in order to predict the improvement of the services provided by the use of these applications are evaluated.

❑ By determining the indicators used in measuring the current situation regarding smart transportation and the impact created by the smart city studies, the maturity level of the smart transportation component and its impact are evaluated.

Smart Transportation

Smart Transportation

Smart transportation component; developed for purposes such as reducing travel times, increasing traffic safety, optimum use of existing road capacities, increasing mobility, contributing to the national economy by providing energy efficiency and reducing the damage to the environment, is defined as sustainable integration of ICT-supported integrated systems, which include trams, buses, trains, subways, cars, bicycles and pedestrians using one or more modes of transportation, multi-directional data exchange between user-vehicle-infrastructure-center and monitoring, measurement, analysis and control, safe practices [6].Among these components, the smart transportation component; developed for purposes such as reducing travel times, increasing traffic safety, optimum use of existing road capacities, increasing mobility, contributing to the national economy by providing energy efficiency and reducing the damage to the environment, is defined as sustainable integration of ICT-supported integrated systems, which include trams, buses, trains, subways, cars, bicycles and pedestrians using one or more modes of transportation, multi-directional data exchange between user-vehicle-infrastructure-center and monitoring, measurement, analysis and control, safe practices [6].

Capabilities of Smart Transportation

Next Generation Vehicles

These are environmentally friendly vehicles with high fuel performance, low or no air pollutant emission.

Next Generation Transportation

These are models that adopt innovative approaches as well as the combined use of different transportation modes developed as an alternative to conventional transportation methods.

Emergency Management

It is the management of unexpected events that require emergency intervention in transportation.

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Capabilities of Smart Transportation

Accessibility Management

It is the ease of people and commercial activities to reach the desired goods, facilities and activities in the transportation network.

Transportation Infrastructure

It consists of lines such as canals, waterways, airlines, railways and roads, as well as facilities such as terminals, ports, refueling depots, warehouses, bus stations, train stations and airports.
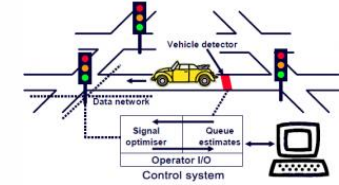
Transportation Governance

It consists of transportation planning, operation and maintenance, improvement and change management, continuity and integrated management.

Capabilities of Smart Transportation

Logistics Management

It is the supply chain management that provides the forward and backward flow of goods, services and related information between the production points and consumption points in line with the needs.

Traffic Management

It is the management of activities aimed at regulating urban traffic and ensuring its safety.

Public Transport Management

Providing quality service for city residents using public transportation and managing vehicles and drivers in a holistic manner.

Capabilities of Smart Transportation

Railway Management

It is the management of the necessary activities for the safe and quality of railway safety and transportation.

Parking Management

These are the activities required for the innovative, effective and efficient use of parking lots.

Payment Management

It is the establishment and management of the necessary infrastructures to make payment safe and easy in transportation.

Applications of Smart Transportation

SMART TRANSPORTATION

Next Generation Vehicles (Alternative Power System Vehicles)
- Electric Transportation Vehicles
- Hybrid Vehicles
- Autonomous Vehicles
- Connected Vehicles
- Parking Assistance
- Maintenance and Repair Assistance

01

Next Generation Transportation Modes
- Car Sharing
- Bike Sharing
- Multimode Public Transport
- Transport Tunnels
- Demand Responsive Transport
- Multimode City Transport Traffic
- Targeted Combination of Different Transport Modes

02

Emergency Management
- Traffic Light Prioritization
- Emergency Vehicle Priority (EVP) Management
- Vehicle Location Detection
- Snow and Ice Fighting
- Preferential Paths

03

Accessibility in Transport
- Talking Pedestrian Button for Disabled
- Personalized Transportation Information
- Pedestrianized Zone
- Barrier-free Accessible Pedestrian Routes
- Barrier-Free Traffic Signaling
- Barrier-Free Public Transport
- Standards for Pedestrian Roads and Sidewalks

04

Logistics Management
- Intelligent Freight Transport
- Special Transport Infrastructure for Cargo Systems
- Logistics Data Portal
- Freight Mobility
- Logistics Infrastructure

05

Traffic Management
- Traffic Intensity Detector Sensor
- Smart Intersection Solution Center
- Real Time and Dynamic Intersection Management System
- Traffic Measurement System
- Variable Message System
- Intelligent Guidance System
- Virtual Twin and Simulation in Transportation
- Traffic Light Analysis
- Traffic Analysis
- Trip Planning
- Traffic Jam Assistant
- Lane Warning System

06

Parking Management
- Smart Parking Management and Payment Solutions
- Online Parking Reservation System
- Parking Lot Management and Guidance System
- Vertical Parking Lots
- Park and Use Public Transport System
- Parking Lot Dynamic Pricing
- Parking Lot Occupancy

07

Railway Management
- Train Control System
- Railway Safety Monitoring System
- Railway Infrastructure
- Intercity and High Speed Transport

08

Public Transport Management
- Smart Stop
- Indoor Mapping in Transport
- Pedestrian Access Incentive Implementation After Public Transport Stops
- Common Electronic Ticket System in Public Transport

09

Payment Management
- City Box Office Management
- Pricing for Special Cases
- Single Card Payment System

10

Transport Governance
- Data Based Transportation Management
- Integrated Traffic Management
- Optimum Route Planning
- Traffic Congestion Based Pricing
- Test Evaluation Center
- Traffic Control Center
- Urban Network Management
- Transport Inventory Database
- Passenger Mobility
- Planning and Implementation
- Operation and Maintenance
- Monitoring Evaluation and Change Management
- Sustainability
- Organization
- Resource Management, Service Management
- Interoperability, Coordination Among Stakeholders

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Current Situation and Strategic View

Smart Transportation: Current Situation

Turkey-specific Model itself became the backbone in analysis of the current situation and establishment of strategic view activities of the National Strategy and Action Plan. The survey conducted electronically in this context by local governments is important in terms of determining the current status of smart transportation in Turkey. 327 local governments (22 Metropolitan, 34 Provinces, 271 Districts) participated in the survey [8]. The structure of the smart transportation component in the smart city maturity assessment model was used in the questionnaire.

As part of the local government survey [8], in the area of smart transportation;

- 7% of cities have "Next Generation Vehicle and Transportation Modes" capability,

- 8,9% of cities have "Smart Traffic Managements" capability,

- 5,5% of cities have "Smart Parking" capability,

- 12,7% of cities have "Accessibility in Transportation" capability,

- 7,5% of cities have "Emergency Management" capability,

- 6,6% of cities have "Infrastructure Management, Public Transport Management, Payment Management, Railway Management, Transportation Governance and Logistic Management" capabilities

have been found that the foregoing considerations exist at different stages of the life cycle.

Smart Transportation: Current Situation Survey Results

8% "Electric vehicles/Buses"

4% "Hybrid vehicles"

9% "Maintenance Repair Assistance"

7% "Parking Assistance"

5% "Traffic Jam Assistance"

4% "Vehicle Sharing"

10% "Bike Sharing"

7% "Multi-Mode Public Transport"

5% "Emergency Change Management" applications

10% "Traffic Light Prioritization"

5% "Vehicle Priority Management"

11% " Talking Pedestrian Buttons for Disabled Persons"

5% "Personalized Transportation Information"

22% "Pedestrianized Zone"

1% "Smart Vehicle Highway Systems"

4% "Lane Warning System"

5% "Lane Management Arrangement"

5% "Car Park Dynamic Pricing"

8% "Car Park Occupancy Determination"

7% "Parking Management and Routing System"

2% "Online Parking Reservation System"

4% "Intensity Density Sensors"

6% ve "Smart Solution Center"

8% "Real-time and Dynamic Junction Management Systems"

8% ve "Light Analyses"

14% of "High Speed Transport"

8% "Commuting to Work and Regional Transportation"

7% "Trip Planning"

5% "Demand Based Transportation"

1% "Traffic Jam Based Pricing"

9% "Traffic Analyses"

4% "City Ticket Office Management"

12% "Determination of Vehicle Routes with GPRS Data"

7% "Smart Routing Center"

13 % "Traffic Monitoring System"

9% "Traffic Measurement System"

9% "Traffic Violation Systems"

8% "Variable Messaging System"

5% "Integrated Traffic Management"

2% "Connected Traffic Cloud"

9% "Urban Traffic Management Systems"

Smart Transportation: Strategic View-Policies

The need to evaluate the use of the next generation efficient and low carbon release vehicles, a next generation transportation models and reduced traffic and increased user comfort has been determined as a policy area. The dissemination of new generation environmentally friendly (with alternative power system) means of transportation will be ensured. In addition to the combined use of different transportation modes developed as an alternative to classical transportation methods, the widespread use of next-generation transportation models addressing innovative approaches will be ensured.

The need for efficient management of traffic based on data, optimizing the time spent in traffic, facilitating the lives of city residents and providing safe travel has been determined as a policy area. In this context, there is a need to improve the transportation infrastructure and expand the application / application areas within the scope of transport infrastructure, public transport management, railway management, payment management, parking management and governance capabilities.

There is a need to develop transportation infrastructure and extend applications/application areas. Infrastructure that supports smart transportation systems will be deployed.

There is a need to develop transportation infrastructure and extend applications/application areas. Activities intended for transportation governance will be conducted at the national, regional and local level for organization, resource management, planning and implementation, operational maintenance, monitoring evaluation, sustainability, interoperability, service management and coordination among stakeholders.

Smart Transportation:Strategic View-Policies

In smart transportation area, it is needed to provide emergency transportation management and provide transportation without interruption by vehicle priority in case of emergency and disasters. Within the scope of emergency transportation management, the widespread use of information systems that provide traffic light routing and automatic detection of cases will be ensured in order to provide the rapid transportation of priority vehicles in traffic as required.

There is a need for talking pedestrian buttons for disabled people, unobstructed pedestrian paths, unobstructed accessible traffic signalization and the use of personalized transportation information through unobstructed accessible public transportation applications to ensure accessibility in transportation. To ensure accessibility in transit, all segments on the transportation network will be foreseen for smooth and easy use, as well as advance notification of transportation options and widespread use of applications for disabled people.

By building a Smart haulage infrastructure, the development of the logistics data portal and the provision of logistics management are required. Data-driven logistics management will be undertaken, based on needs that embraces the generation supply chains that provide forward and reverse flows of goods, services and related information between production point and consumption points.

There is a need to provide inclusive transport services that improve the quality of life of city residents and ensure safe mobility of drivers, pedestrians and passengers.

Status Indicators

- The number of public transport trips per person per year
- The number of personal cars per person
- Percentage of people who use a travel mode other than a personal vehicle
- The number of vehicles with two wheels per person
- Percentage of cycle paths and lanes per 100000 people
- The number of deaths in transportation per 100000 people
- Real-time traffic information presentation rate
- Measurement status of the amount of renewable energy used in transportation
- Existence of the physical infrastructure provided for the sharing of electric vehicles

Impact Indicators

- The number of cities with increasing Smart Transportation Maturity of the Component
- National Smart Transportation maturity level increasing status
- Increasing status for the length of the high capacity public transportation system per 100000 people
- Increasing status for of the length of the light passenger public transportation system per 100000 people
- Increasing status for commercial air connection (the number of continuous commercial air destinations)
- Increasing status of the amount of renewable energy used in transportation.

Conclusion

❑ The current situation should be determined in a structural, related and systematic way

❑ The strategies, namely the target view, should be expressed over the same structure.

❑ The smart transportation, its capabilities and applications should be determined and the needs definition studies and target view determination studies for the smart transportation component should be shaped through this structure.

The implementation of adopted policies will be ensured by measuring the development

and

impact of the smart city studies carried out in the city with city-based model implementation.

Future Works

❑ New solutions are constantly added to smart transportation solutions, and some of them are not preferred because they do not create the desired value in practice.

❑ It is necessary to reflect these changes to the model continuously,

❑ There is a need to address such a large number of city-based solutions in line with the priorities defined in the city smart city strategy (possibility, condition, need and current smart transportation maturity).

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THANK YOU…

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