İZMIR
METROPOLITAN
MUNICIPALITY

2030

İZMIR SUSTAINABLE URBAN LOGISTICS PLAN

- EXECUTIVE SUMMERY-

IZMIR
METROPOLITAN
MUNICIPALITY

LOPI
IZMIR SUSTAINABLE URBAN LOGISTICS PLAN
- EXECUTIVE SUMMARY -

IZMIR METROPOLITAN MUNICIPALITY

IZMIR SUSTAINABLE URBAN LOGISTICS PLAN (LOPI, 2030)

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1st. Print: April 2020, Izmir

Print-Skin:

Onka Printing, Digital Printing and Printing Services
Zubeyde Hanım Neighborhood Vegetable Gardens Street
No: 80 Scythians 06070 ALTINDAG / ANKARA
Phone: 0 850 346 26 86 - Fax: 0 (312) 341 64 08

ISBN: 978-975-18-0291-0

This book is part of the “Izmir sustainable urban logistics plan preparation work” tendered by Izmir Metropolitan Municipality, Transportation Planning Branch, contractor company TUMAS Türk Mühendislik ve Müşavirlik A.P. The Izmir Sustainable Urban Logistics Plan is presented by the business program as Executive Summary.

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LIVABLE AND SUSTAINABLE CITY IZMIR...

Livable and Sustainable City for Izmir;

“Lots of noise, lots of breath,” we said on the way to the mission... However, it is very important that very loud results are understood and meaningful. What is even more important is that the breath we will take is clean today and tomorrow, of course...

In this context, we have stated that we need long-term strategies to combat the climate crisis and we have stated that we will carry out planning activities in line with our goal of creating a sustainable life based on renewable energy. Because, regardless of the subject, we know that the first condition for achieving the purpose and the desired result is though “proper planning”.

With this real move, we organized “Izmir sustainable urban logistics planning” activities to identify the logistics needs of Izmir, to predict the future from today and to plan our preparations in harmony with Izmir, and all elements of the environment. In this context, the X-ray of the freight and passenger transport in Izmir was taken. It was determined where the traffic load increased, for what reasons, and during what periods. These studies, observations, statistical data obtained from the relevant institutions and organizations are revealed; surveys were conducted with logistics sector representatives, dozens of commercial firms, manufacturers in urban and rural areas, driver tradespeople, and citizens. Future population, labor force, trade potential, and vehicle growth projections were also prepared.

In the light of all these, the Izmir Sustainable Urban Logistics Plan (LOPI) was prepared, in which the problems, plans, and project proposals for the solution, has emerged. This was the first logistical plan made by a city administration in Turkey.

From now on, our goal will be to minimize the negative social and environmental impacts of urban logistics activities and to implement the solution-oriented plans and projects as soon as possible. For this reason, we will quickly start to create action plans for implementation. New roads will be opened, new cold storage facilities, logistics centers and new parking areas will be established in the places that LOPI envisioned. There will be many different applications, large and small.

In the table that will appear when the parts are joined, we will see that freight and passenger transport is provided healthily and smoothly, traffic congestion, noise, high exhaust emissions and other negative environmental factors are reduced to a minimum. However, of course, by reducing the costs in all these areas to the minimum level, the national wealth will be greatly contributed. Izmir will be one of the world’s cities that takes development as a basic principle by taking the environment and human health into the center and making sustainable urban logistics practices the best while walking with health into the future.

To rule the present in the light of reason and science, by consensus, we will bring our tomorrow to our children. In this way, I would like to thank all the stakeholders and the people of Izmir for their participation and interest in the preparation of LOPI.

We will plan the city of happy people together by continuing to work hand in hand for livable and sustainable Izmir.

M. TUNÇ SOYER

Mayor of Izmir

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ABBREVIATIONS

EU.....European Union
ITS.....Intelligent Transportation Systems
ICT.....Information and Communication Technologies
MLSP.....Municipal Logistics Support Project
BPR .....The U.S. Bureau of Public Roads
dB .....Decibel
LEZ .....Low Emission Zones
SAA.....State Airports Authority
EUC .....Equivalent Unit Cars
AFZ .....Aegean Free Zone
SADA .....South Aegean Development Agency
SWOT.....Strong, Weak, Opportunities and Threats
IMM .....Izmir Metropolitan Municipality
ISS .....Izmir Suburban System
IFZ .....Izmir Free Zone
IDA .....Izmir Development Agency
İCC .....İzmir Cahmber of Commerce
ITC.....Izmir Transportation Center
NUSA .....Non-Residental Urban Study Area
GDH.....General Directorate of Highways
RDZPS .....Rural Development Zones Producer Surveys
ULC .....Urban Logistics Center
Km .....Kilometer
Km^2 .....Square Kilometer
KOIZ .....Kemalpasa Organized Industrial Zone
LOPİ.....Izmir Sustainable Urban Logistics Plan
M .....Meter
M^2 .....Square Meter
MRF.....Mechanical Recovery Facilities
OIZ .....Organized Industrial Zone
CV .....Commercial Vehicle
PESTEL .....Political, Economical, Social, Technological, Environmental and Legal
SULP .....Sustainable Urban Logistics Plan
TAM .....Traffic Appraisal Manual
TEU .....Twenty-foot Equivalent Unit
TS .....Turkish Standards
TSI .....Turkish Statistical Institute
UHT .....Ultra-High Temperature
TCC.....Transportation Coordination Center
ITMP .....Izmir Transportation main Plan
RD.....Roadside Surveys
FTM .....Freight Travel Model

INTRODUCTION

1. INTRODUCTION

Izmir Sustainable Urban Logistics Plan (LOPI) is part of the preparation process by Izmir province to determine the current status of the city's socioeconomic status, the structure of freight transport, land use, existing transportation infrastructure, and freight mobility. The reort further analyses hazardous material transportation practices examined by heavy vehicle parking applications. In the context of the current situation analysis, highway freight traffic counts were carried out to make a more detailed analysis of freight mobility, and the usage conditions of the existing truck parking areas were examined. Various enterprise surveys were conducted trough a way of manufacturing survey questionnaires and service questionnaires. The surveys included manufacturing companies in the city, roadside surveys for drivers of vehicles carrying loads, and Rural Development Zones manufacturer surveys for enterprises operating in the countryside. In order to analyze the solid load movement, which is one of the most crucial elements of freight mobility in the city, Solid Waste information was collected and compiled in the city. In addition to these analyses and surveys, in-depth interviews were also conducted with representatives living in the city who have profound knowledge about the sectors operating in different institutions and organizations. In the next phase, freight modeling studies were carried out in order to simulate urban freight mobility in a computer environment. The current status results obtained from the freight model were compared with the counts of road freight traffic carried out in the city and the accuracy and validity of the model were tested. The freight model, whose calibration and validation have been confirmed, were then used to create future state models in line with the target year projections. Incompetence analysis for future freight mobility was carried out and the city's outstanding problems and bottlenecks were identified. The study area is divided into three main study areas (see Figure 1).

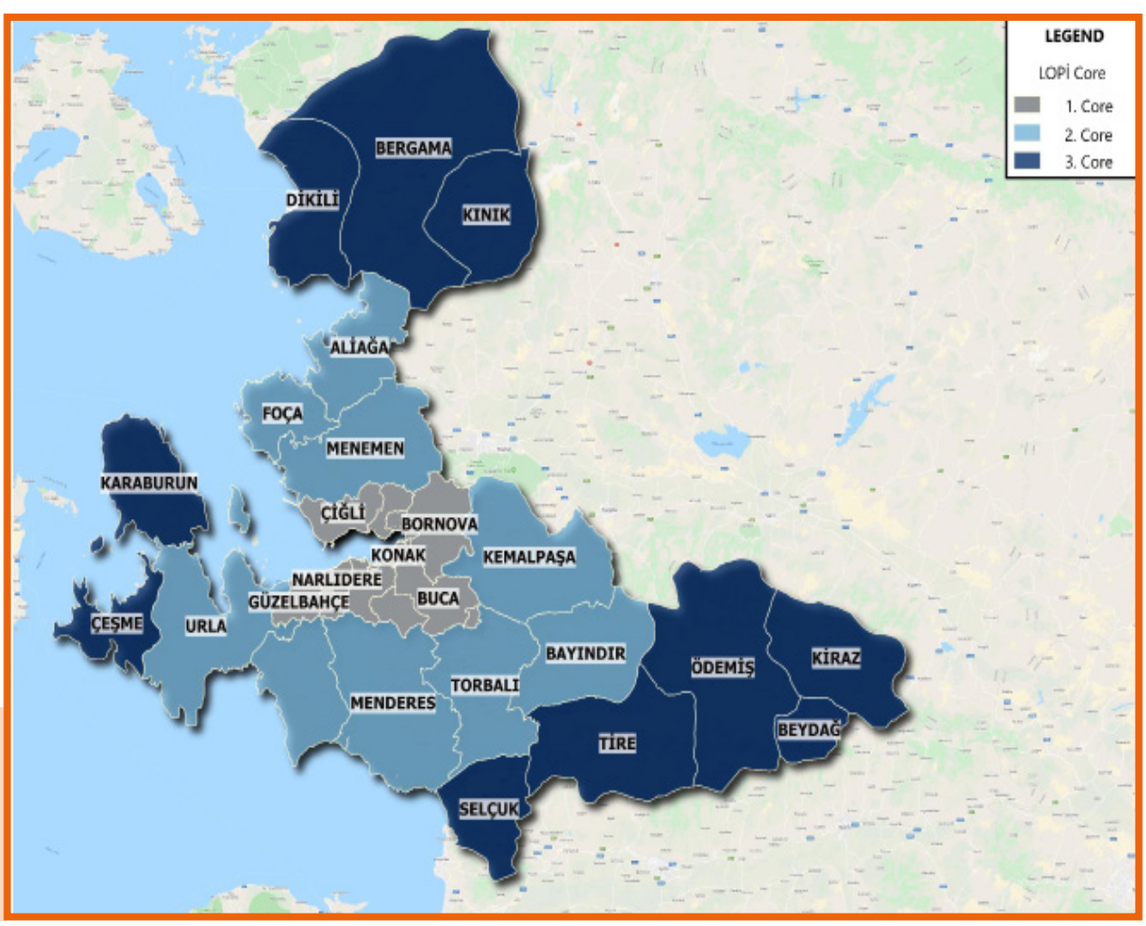

Figure 1: Study area

CURRENT STATUS EVALUATION

2. CURRENT STATUS EVALUATION

2.1. Available Data

As in developing countries throughout the world, increases in socio-economic data are observed in our country, especially in population. With rapid growth, negative effects are observed from time to time in social, economic and environmental systems. At this point, the need for planning arises and sustainability becomes a focus as an attention-grabbing and essential concept during the strategy and objectives setting - stages in the planning processes. Izmir Sustainable Urban Logistics Plan (LOPI) is also a sustainability-based planning process.

In the context of the current situation analysis, existing data was collected, including updating existing data and collecting new data necessary for the planning process. By examining previously published studies with the obtained information from the relevant institutions, the current situation and future planning by detailed analysis of the collected data that is collected for detailed analysis reveals new information required for the compilation of the report.

Within the scope of the current situation analysis, the structure of human logistics activities in Izmir has been revealed, and a planning base has been established with the new data collected. On the side are details of the studies carried out within the scope of the current situation analysis.

- Socio-economic Structure
- Land use structure for freight transportation
- Existing transportation infrastructure and freight movements
- Load vehicles parking applications
- Hazardous material load movements

Population

The population of Izmir province is 4,279,677, according to the results of the 2017 address-based Population Registration System. The population consists of 2,133,548 of whom are males and 2,146,129 of whom are females. As a percentage, 49.85% are men, and 50.15% are women. While 311 people fell to km^2 in 2007 in Izmir, which has an area of 12,007 km^2, in 2017, this figure increased by 14.46% to 356 people per km^2. The change in the population of Izmir province between 2007 and 2017 is given as gender-based (see also Table 1).

Table 1. Population of Izmir by years

Year	Population of Izmır	Male Population	Female Population
2017	4.279.677	2.133.548	2.146.129
2016	4.223.545	2.104.632	2.118.913
2015	4.168.415	2.078.224	2.090.191
2014	4.113.072	2.050.424	2.062.648
2013	4.061.074	2.027.334	2.033.740
2012	4.005.459	1.999.246	2.006.213
2011	3.965.232	1.979.088	1.986.144
2010	3.948.848	1.985.368	1.963.480
2009	3.868.308	1.933.681	1.934.627
2008	3.795.978	1.897.792	1.898.186
2007	3.739.353	1.872.579	1.866.774

Izmir province has 30 districts with the last administrative structure. The distribution of the urban population based on districts is given (see Table 2). The largest districts of Izmir are Buca, Karabaglar, and Bornova. These three districts constitute 33% of Izmir's population. The smallest districts are Guzelbahce with 0.73%, Foca, Kınık with 0.66%, Beydag with 0.29%, and Karaburun with 0.23%. These five districts constitute 2.64% of the overall population of the province. (TSI, 2017)

Table 2. District population of Izmir (2017)

Distinct	Population	Male Population	Female Population	Percentages
Buca	492.252	246.187	246.065	%11,50
Karabaglar	480.790	237.131	243.659	%11,51
Bornova	442.839	219.827	223.012	%11,52
Konak	363.181	177.539	185.642	%11,53
Karsıyaka	342.062	160.855	181.207	%11,54
Bayraklı	314.402	156.316	158.086	%11,55
Cigli	190.607	95.151	95.456	%11,56
Torbalı	172.359	87.069	85.290	%11,57
Menemen	170.090	86.857	83.233	%11,58
Gaziemir	136.273	69.462	66.811	%11,59
Odemis	132.241	65.714	66.527	%11,60
Kemalpasa	105.506	53.575	51.931	%11,61
Bergama	102.961	51.766	51.195	%11,62
Aliaga	94.070	52.138	41.932	%11,63
Menderes	89.777	45.306	44.471	%11,64
Tire	83.829	41.282	42.547	%11,65
Balcova	78.442	38.421	40.021	%11,66
Narlıdere	66.269	33.786	32.483	%11,67
Urla	64.895	32.818	32.077	%11,68
Kiraz	43.859	22.161	21.698	%1,02
Dikili	41.697	20.882	20.815	%0,97
Cesme	41.278	21.024	20.254	%0,96
Seferihisar	40.785	21.186	19.599	%0,95
Bayındır	40.258	19.977	20.281	%0,94
Selcuk	35.991	17.992	17.999	%0,84
Guzelbahce	31.429	15.371	16.058	%0,73
Foca	31.061	18.233	12.828	%0,73
Kınık	28.271	14.246	14.025	%0,66
Beydag	12.391	6.193	6.198	%0,29
Karaburun	9.812	5.083	4.729	%0,23

Map-based distributions of districts are presented depending on their population size (See Figure 2).

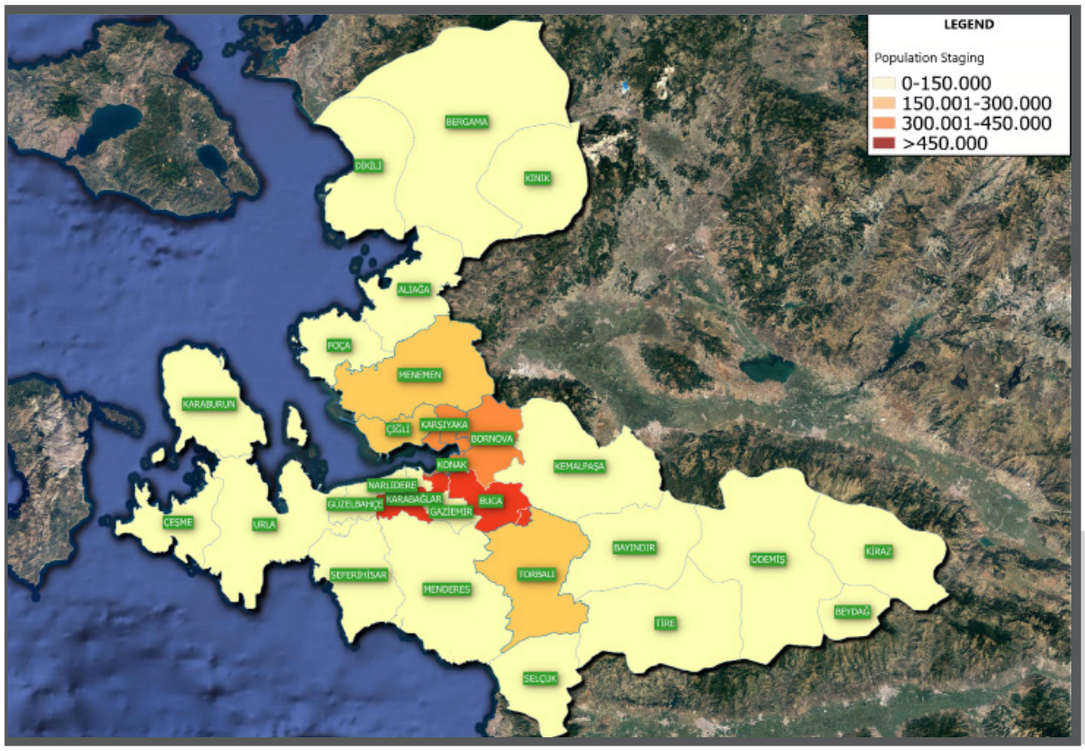

Figure 2: Distribution of Izmir population

2.1.1. Land Use Structure of Freight Transportation

Freight transport interacts with Natural Resources, Land Use structure, and economy in a settlement. Industrial areas also affect the land use status of the cities according to location selection decisions. Factors such as easy access to the city, flat terrain, proximity to water sources facilitate the selection of industrial zones. Also, many situations such as labor, raw materials, energy, presence of universities and other institutions, proximity to marketplace areas, taxes, natural features of the land structure, climate are effective in the selection decisions of industrial areas.

Industrial Zones

Izmir is home to 2 free zones and 13 Organized Industrial Zones. With its Organized Industrial Zones, which are specialized in various sectors and have a large area of approximately 40 million m^2 in total, Izmir provides investment opportunities to investors from all sectors. Organized industrial zones are made suitable for all production sectors through the availability of strong infrastructures and investment areas that makes it a feasible investment environment for manufacturing investors. Infrastructure provided includes roads, water, natural gas, electricity, communication tools, waste treatment, and other services. Thus, the OIZs create their own attractions, each becoming a logistics hub. Information about the province-wide OIZs is given (see Table 3).

Table 3. Industrial Zones of Izmir

Organized Industrial Zones	Distinct	Type	Area (m^2)	Number of Employees	Number of Firm	R&D Center	Enterprises has R&D
İzmir Ataturk	Cigli	Mixed	6.240.000	40.000	588	Available	300
İzmir Kemalpasa	Kemalpasa	Mixed	13.000.000	28.900	504	Available	27
Tire	Tire	Mixed	1.132.562	1.111	58	Not Available	-
Buca	Buca	Mixed	576.700	6.088	74	Not Available	-
Aliaga Kimya İhtisas ve Karma	Aliaga	Mixed/ Specialization	10.000.000	2.432	50	Not Available	-
Odemis	Odemis	Mixed	967.000	-	-	Not Available	-
Bergama	Bergama	Mixed	1.747.491	400	1	Not Available	-
İzmir Pancar	Torbalı	Mixed	1.300.000	821	26	Not Available	27
Kınık	Kınık	Mixed	729.000	104	13	Not Available	-
Menemen Plastik İhtisas	Menemen	Specialization	899.023	1.500	35	Not Available	-
Torbalı	Torbalı	Mixed	665.890	45	3	Not Available	-
Tekeli	Menderes	Mixed	2.500.000	2.714	167	Not Available	-
Bagyurdu	Kemalpasa	Mixed	1.468.000	400-500	4	Not Available	-

The road networks provide access to the city work in integration with the sea roads. In addition, the climatic conditions of the region allow industrial areas to choose a place of establishment. Because the Mediterranean climate, which is too hot in the summers and not too cold in the winters, prevails in the whole of the city. The temperature and rainfall conditions of the region are not enough to disrupt the industrial activities and the industrial areas in the city cause environmental pollution. The locations of organized industrial zones and free zones in Izmir province are given (see Figure 3).

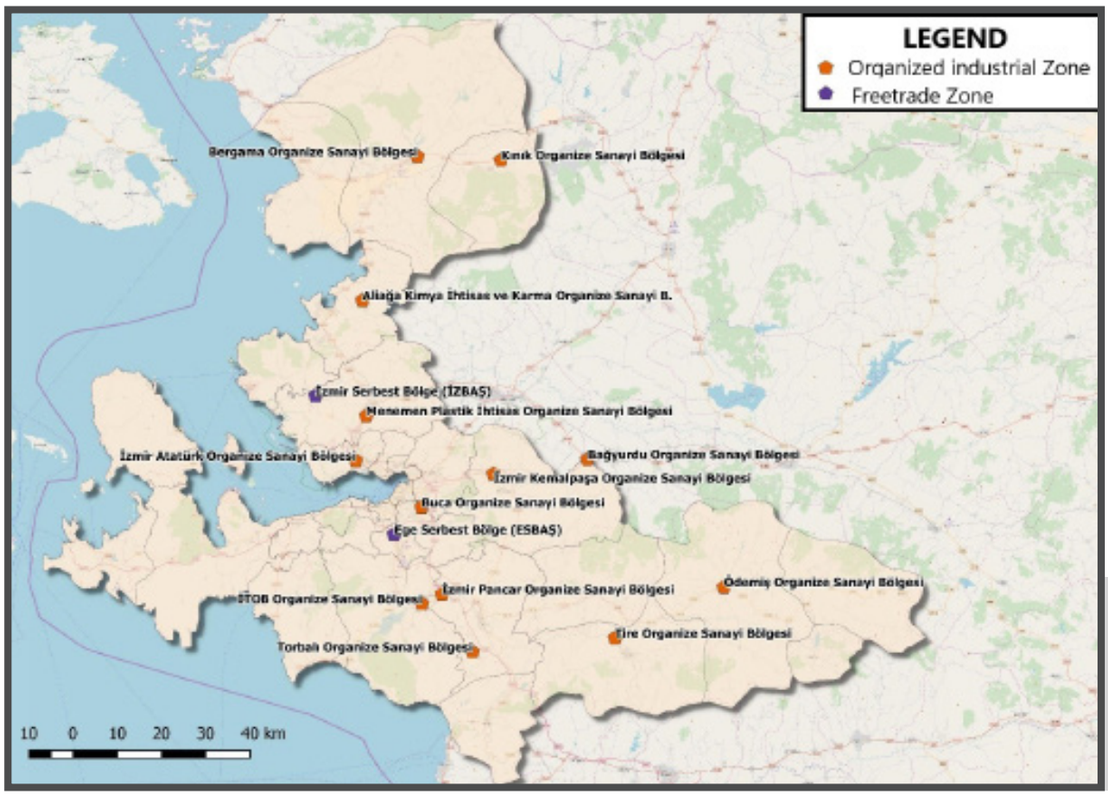

Figure 3: Industrial Zones of Izmir

In general, Izmir is one of the Centers of Turkey with significant logistics opportunities with. 2 free zones and 13 organized industrial zones which are located in the city. In addition, small industrial areas are extending linearly on the city walls in the form of Cınarlı, Bornova, Isıkkent, Pınarbası, Torbalı, Kemalpasa from the back of Alsancak Port. However, this situation is concentrated towards the city center, causing freight truck traffic and the storage areas and container areas that remain within the city cause physical congestion. In this context, important road connections that provide access to Izmir are negatively affected in line with industrial areas.

Ports

Ports are important elements of commercial life and logistical activities in a city. Izmir has a great potential in terms of national and international sea transportation. Alsancak, Aliaga-Nemrut, Dikili, and Cesme Ports are important points in sea transportation. The locations of these ports are given (see Figure 4). Some technical quantities of ports have been given (see Table 4).

Figure 4: Locations of ports in Izmir

Table 4. Informations about ports in Izmir

Port Name	Field Area	Number of Berths	Annual Capacity	
	m^2	Number	TEU	Ton (Handling)
Alsancak	635.000	25	1.000.000	10.000.000
Aliaga-Nemrut	160.000	1	750.000	-
Ege Gubre	485.000	2	There is no tonnage limitation for berthing ships	
IDC	191.000	2	-	4.500.000
TUPRAS	191.000	2	-	-
Petkim	47.401	8	1.500.000	-
Ege Celik	91.000	7	-	7.500.000
Habas Nemrut	180.402	2	-	5.500.000
Batıcim	149.000		-	3.000.000
Dikili	12.500	3	300.000	-
Cesme	51.923	3	-	-
Candarlı			4.000.000	-

The most obvious problem observed with the ports is the lack of railway integrations and inefficient operation caused by operating conditions.

Airports

There are four airports throughout the province including Adnan Menderes, Selcuk-Ephesus, Cigli Military Airport, and Cesme Airport. The logistically important and heavily used area is Adnan Menderes Airport. A satellite image of Adnan Menderes Airport is given. Satellite image of Adnan Menderes Airport (see Figure 5). General information about the airport is given (see Table 5).

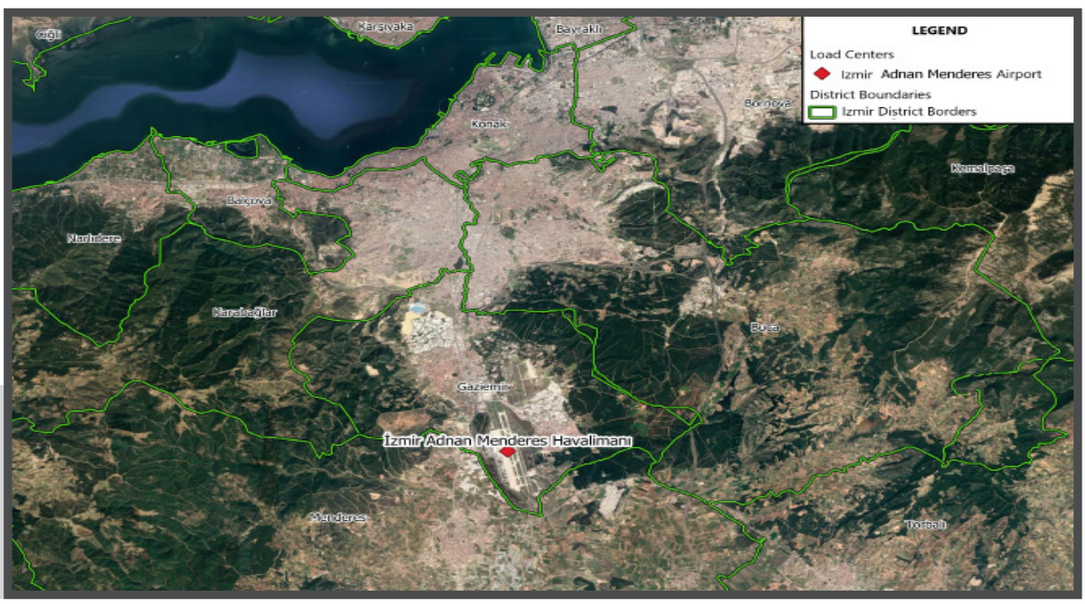

Figure 5: Satellite viewof Adnan Menderes Airport

The airport has a total area of 8,230,945 m^2 and has two passenger terminals with a total capacity of 9 million passengers/Year of 136,199 m^2 including 28.500 m^2 is domestic and 107.699 m^2 international. The airport has two composite runways measuring 3,240x45 meters.

Table 5. General Informations about Adnan Menderes Airport (SAA)

The Located City	Izmir
Service Entry Year	1987
Airport Status	Civil
ICAO Code	LTBJ
IATA	ADB
Traffic Type	Domestic/International
Total Size	310.987 m^2
Coordinates	38°17'21''N, 27°09'18''E
Airport Reference Code	4D+4E

Solid Waste Facilities

Within the scope of logistics activities in Izmir province, information about Solid Waste logistics landfills has been provided (see Table 6). When the ownership status of the 15 active landfills are examined, it is seen that the district municipalities and the Treasury own the majority. 68 tow trucks and 73 semi-trailers are used for waste transfer. The vast majority of these vehicles have an Arvento vehicle monitoring system.

Table 6. General information about active storage facilities (Izmir Metropolitan Municipality)

Transfer Station Name	Property Owner	District	Capacity (Ton/Day)	Scale	Transfer Type	Business Owner
Gediz Solid Waste Transfer Station	Treasure of the Finance	Buca	1.230	Avaible	Fixed	IMM
Halkapınar Solid Waste Transfer Station	IMM	Konak	912	Avaible	Fixed	IMM
Turkelli Solid Waste Transfer Station	IMM	Menemen	237	Avaible	Fixed	IMM
Urla Solid Waste Transfer Station	Non-Registered Area	Güzelbahce	168	Avaible	Fixed	IMM
Gumuldur Solid Waste Transfer Station	Non-Registered Area	Menderes	113	Avaible	Fixed	IMM
Kısık Solid Waste Transfer Station	Treasure of the Finance	Menderes	120	Avaible	Fixed	IMM
Torbalı Solid Waste Transfer Ramp	Non-Registered Area	Torbalı	196	Not Avaible	Fixed	IMM
Karsıyaka Solid Waste Transfer Ramp	Karsıyaka Municipality	Karsıyaka	261	Avaible	Fixed	IMM
Cesme Solid Waste Transfer Ramp	Non-Registerede Area	Alacatı	66	Not Avaible	Fixed	IMM
Kemalpasa Solid Waste Transfer Ramp	Kemalpasa OIZ	Kemalpasa	124	Not Avaible	Fixed	IMM
Selcuk Solid Waste Transfer Ramp	Selcuk Municipality	Selcuk	61	Not Avaible	Fixed	IMM
Foca Solid Waste Transfer Ramp	Treasure of the Finance	Foca	39	Avaible	Fixed	IMM
Karaburun Solid Waste Transfer Ramp	Treasure of the Finance	Karaburun	13	Not Avaible	Fixed	IMM
Dikili Solid Waste Transfer Ramp	Dikili Municipality	Dikili	57	Not Avaible	Fixed	IMM
Odemis Solid Waste Transfer Ramp	Odemis Municipality	Odemis	140	Avaible	Fixed	IMM

The most apparent problem observed in solid waste logistics can be summarized as filling the capacity of the existing storage area and roads congestion due to single-point storage. However, studies are being carried out by the relevant department in this area.

From a broader perspective, Izmir undertakes all logistics activities. But the lack proper road development is the first glaring negative. Although it does not have an impact on the level of urban logistics, the transit loads that use the city as a transit point and the export potential in the city intersect with the urban traffic at the point of reaching the logistics centers and this creates a negative impact on the traffic.

2.1.2. Current Transportation Infrastructure

Highway System and Freight Movements

The backbone of Izmir's road infrastructure is the highways that start from the city center and connect to Canakkale in the north, Balıkesir in the North East via Manisa, Bursa and Istanbul, Usak in the East, Ankara via Afyon, and Denizli and Mugla in the south via Aydın. Besides these connections, the highway infrastructure of the province has developed considerably, providing connectivity with districts within the province.

The Second Region Highways, which comes under General Directorate, comprises of 1,505 km of highways, including 228 km of highways, 522 km of state roads, 755 km of provincial roads. The most important transit route in the province, Izmir periphery road enters the city, especially in the Bornova crossing, the impact of the traffic in the city is seen as waiting and delay at the intersections. Map of highway and Highway belonging to Izmir province and its environs is given (see Figure 6). Izmir Highway traffic volume map is given (see Figure 7). When the traffic volume map of the regional highways is examined, the heavy Highway Traffic line starting from Balcova continues to Menemen district. Vehicular traffic in this area is over 50,000 vehicles/day.

Figure 6: Highway map of Izmir and its surroundings

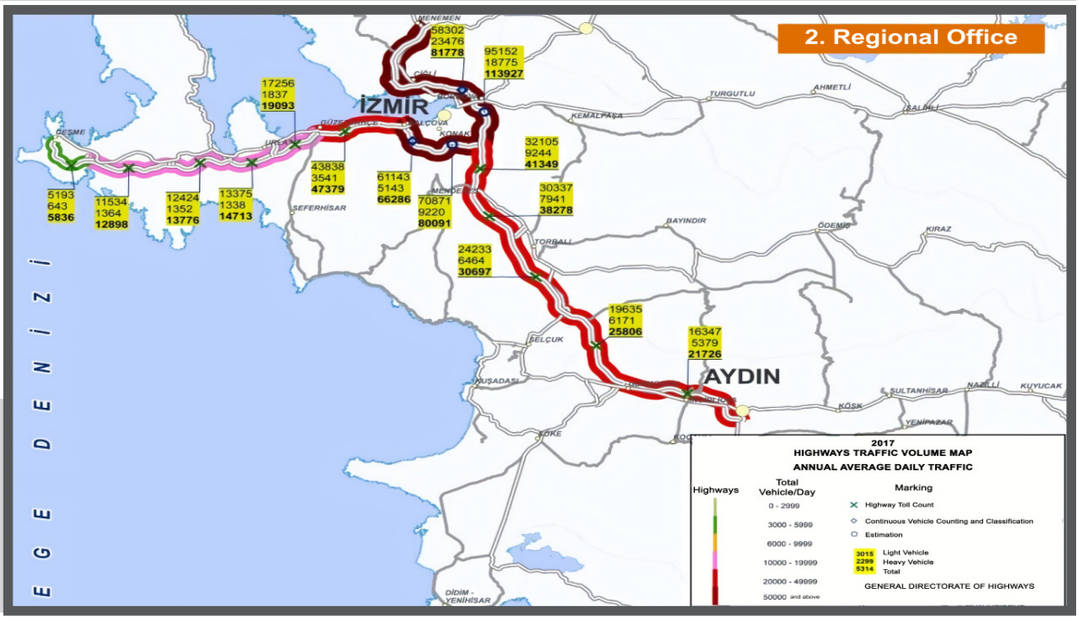

Figure 7: Regional highways traffic volume map (General Directorate of highways)

In Izmir, which has a extensive road network, it is seen that the road network is developing with the projects that are carried out and planned day by day. It is envisaged that road transport, which has an important place in combined transport, will receive the desired efficiency through its integrated operation with other types of transport. Although it is a small volume compared to other types of transport in terms of carrying capacity, it is also possible to provide door-to-door transportation for short-distance transports. By using this advantage correctly, the continuity of effective and sustainable logistics activities will be ensured.

Railway System and Freight Movements

As a result of new railway construction activities that started in 1924 after the proclamation of the Republic, approximately 3,764 km of new railways were built and opened to operation between the period 1923 – 1950. In parallel with the development of road networks and vehicles since 1950, there was no balanced growth in other types of transportation systems, as a result of this, only 945 km of new railways were built during the period 1951-2003. As a result of prioritizing railway investments within the transportation system since 2003, 1,805 km of new railways were constructed during the period 2004 – 2016.

In the Izmir Transportation Main Plan (UPI – 2016), the planned metro and tramway line investments in Izmir province are given in detail (see Table 7). As of the target year 2030, the total of the metrol network in Izmir province is planned to reach 312.1 kilometers. The details of the rail lines planned to be built in Izmir are given (see Table 8).

Table 7. Rail line investments planned in Izmir province (UPI, 2016)

Project Topic	Project Code	Project Name	Construction Stages	Construction Length	Unit
Rail System Lines	B1a	İZBAN North Line	Aliaga – Bergama	54,0	km
	B1b	İZBAN South 1 Line	Aliaga – Bergama	25,7	km
	B2	İZBAN South 2 Line	Odemis – Bayındır – Torbalı	63,2	km
	B3	İZBAN South 3 Line	Tire – Bayındır	11,1	km
	T3a	Cigli Tramway (AOIZ)	Mavisehir – AOSB – K.Celebi Uni.	4,5	km
	T3b	Cigli Tramway (Cigli Center)	Mavisehir – Cigli Merkez – K.Celebi Uni	6,5	km
	T4	Girne Tramway	Bostanlı Pier – Onur Mah.	4,4	km
	M1	Existing LRS Line	Stage 1: Evka3 – Bornova Stage 2: F.Altay – Narlıdere Stage 3: Narlıdere – Guzelbahce	1,16 7,15 13,6	km km km
	M2	Buca Line	Stage 1: Buca Camlıkule – Ucyol Stage 2: Buca Camlıkule – İnkılap Stage 3: Ucyol – Konak – Bayraklı	11,65 2,47 10,7	km km km
	M3	Old Izmir Line	Stadyum – Bozyaka – Karabaglar – Gaziemir – Sarnıc	27,6	km
	M4a M4b	North Line	Stage 1: K.Celebi Uni. – Cigli – Karsıyaka – Bayraklı – Bornova Stage 2: Menemen – K.Celebi Uni.	21,6 14,2	km km
	M5	Halkapınar-Kemalpasa Line	Stage 1: Halkapınar – Otogar – Pınarbası	8,9	km
	M5a	Halkapınar-Kemalpasa OIZ Line	Stage 2: Pınarbası – Kemalpasa OSB	13,3	km
	M5b	Halkapınar-Kemalpasa Center Line	Stage 3: Kemalpasa OSB – Kemalpasa Merkez	10,4	km
2030 TARGET YEAR RAIL SYSTEM NETWORK TOTAL				**312,1**	**km**

Table 8. Railway line investments planned in Izmir province

System	Project	Route	Institution
HSR	Ankara-İzmir High Speed Train Project (Ankara-Afyonkarahisar)	Ankara-Izmir	TCDD
HSR	Ankara-İzmir High Speed Train Project	Ankara-Izmir	TCDD
HSR	Bandırma-Balıkesir-Manisa-Menemen Signalization Project	Bandırma-Menemen	TCDD
Railway	Aliaga-Candarlı Port Railway Connection	Aliaga-Candarlı	TCDD
Railway	Nemrut Bay Railway Connection	Nemrut Bay-Aliaga	TCDD
Railway	Selcuk-Aydın 2. Line Construction	Selcuk-Aydın	TCDD

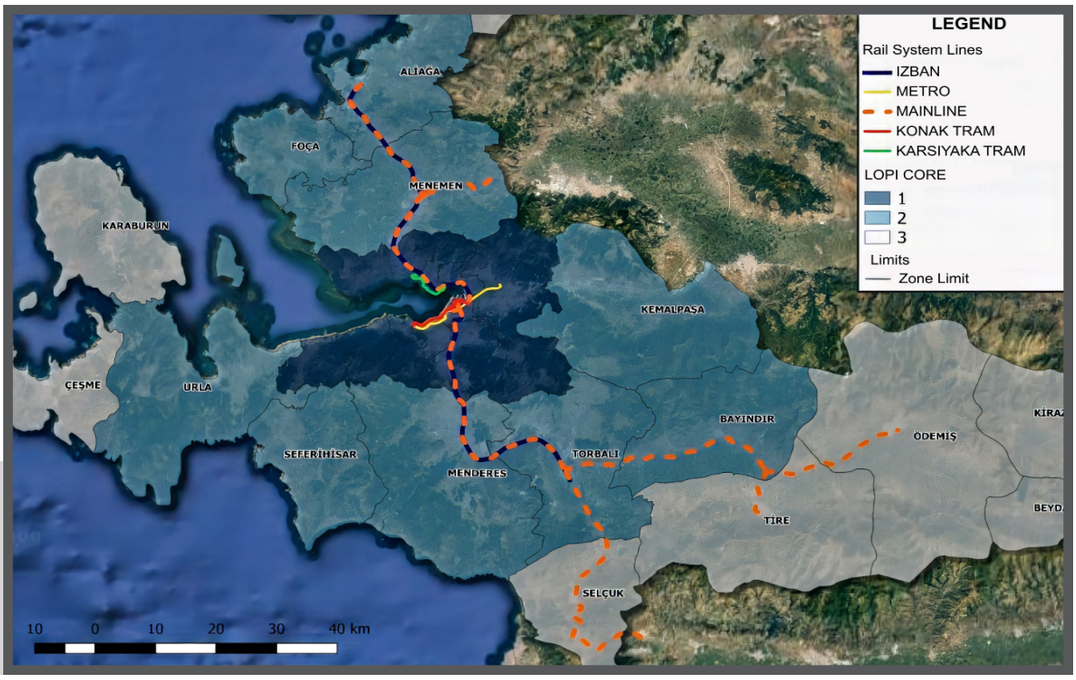

Figure 8: Izmir province rail system lines and LOPI project core boundaries

Planned to be held in demonstration of railway projects on the side given (see Figure 9).

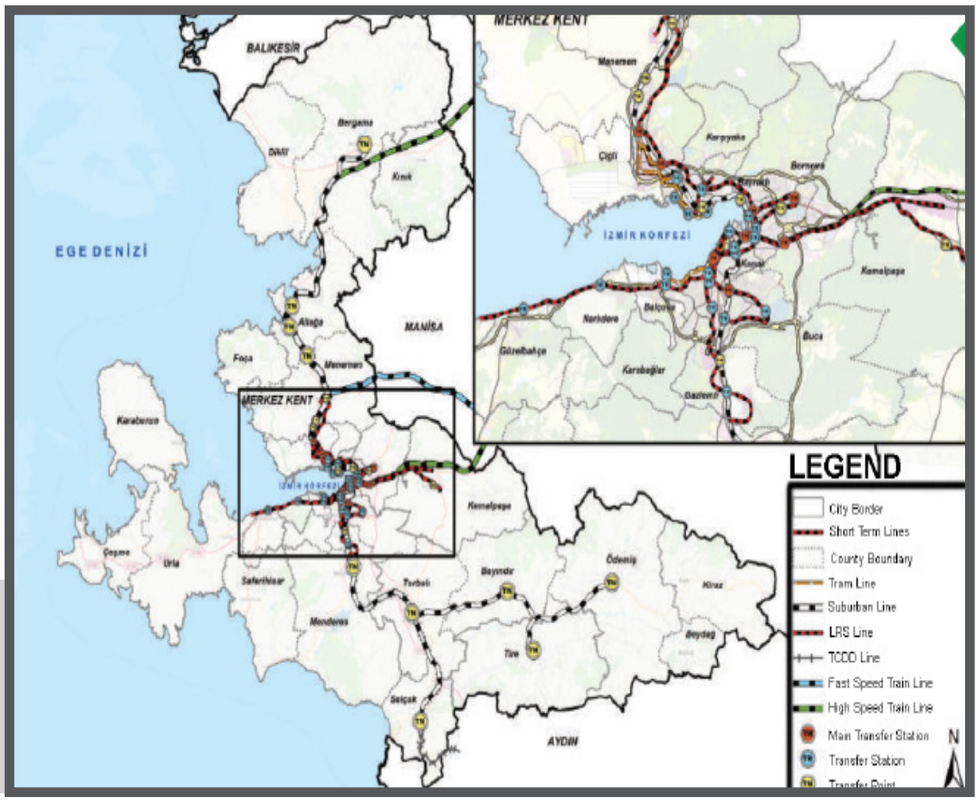

Figure 9: Izmir Province planned railway projects (Transportation Main Plan, 2016)

Maritime Transportation System and Freight Movements

The ports operating within the borders of the province are; Izmir Alsancak port in the center, Aliaga and Nemrut ports in Aliaga district, Cesme Port, and Dikili Port. Petkim container ports and Candarlı North Aegean main port are under construction. Cruise Passenger Transportation is carried out at Alsancak Port of Izmir, Cesme Port, and Dikili Port. Location information of the routes and piers of Izmir city maritime transport is given (see Figure 10). Due to the geographical location of the city, the ports are an effective means of diverting the traffic from the city, as well as the use of the Sea Road on the north-south axis serves as an important means of Transportation. Making round-trip flights from many piers to many piers without interfering with the busy road traffic in the city provides both a more environmental and time-saving situation.

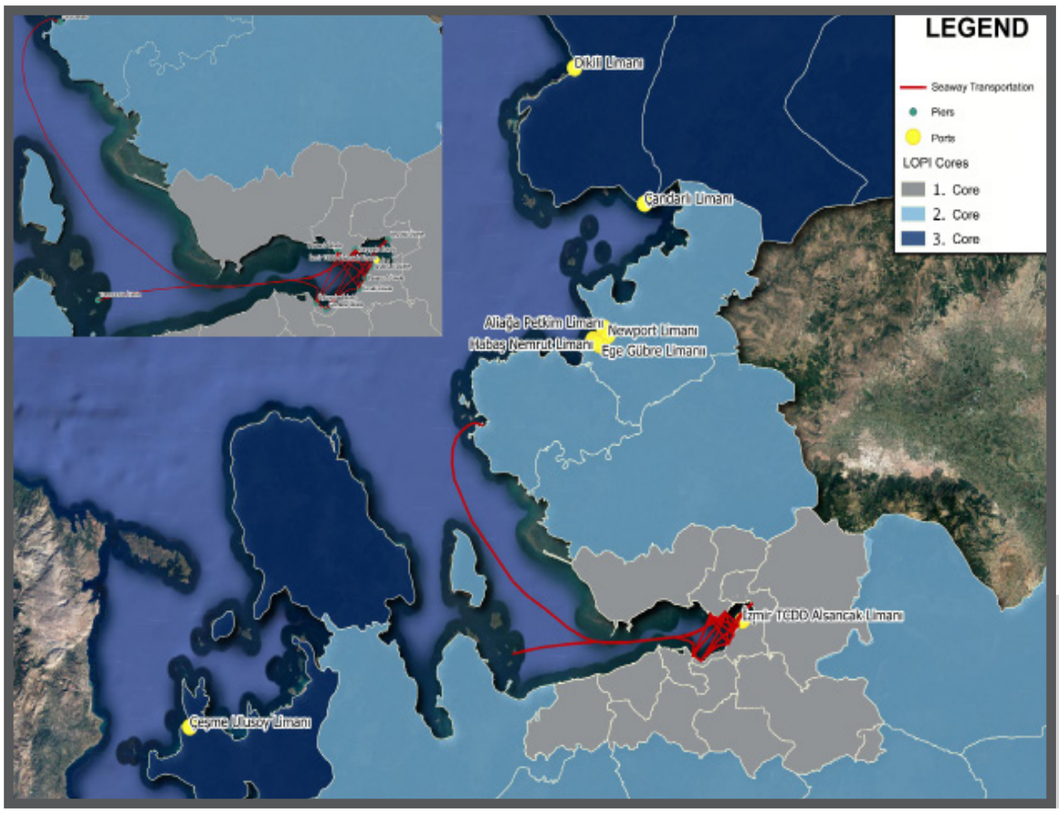

Figure 10: Izmir intracity Seaway passenger transport routes and ports

Airline Transport System and Freight Movements

There are 4 airports throughout the province including Adnan Menderes, Selcuk-Ephesus, Cigli Military Airport, and Cesme Airport. Adnan Menderes Airport is a logistically important and heavily used area. Izmir Adnan Menderes Airport is located in the south direction of Izmir city center, 18 km from the city center. The airport is connected from the city center with the O-31 periphery road and IZBAN's Airport Station. Since 2003, the number of aircraft of airlines has increased by 220%, seat capacity by 254% and cargo capacity by 449%.

2.1.3. Truck Parkings

The most current study on Truck parks in the current situation is the LOPI study. In this context, parking surveys were carried out in 7 trucks and truck parks in Izmir province. The locations of the parking areas and occupancy rates of the truck parks surveyed are given (see Figure 11 and Figure 12).

Figure 11: Locations of trucks parking (Izmir Transportation Main Plan, 2016)

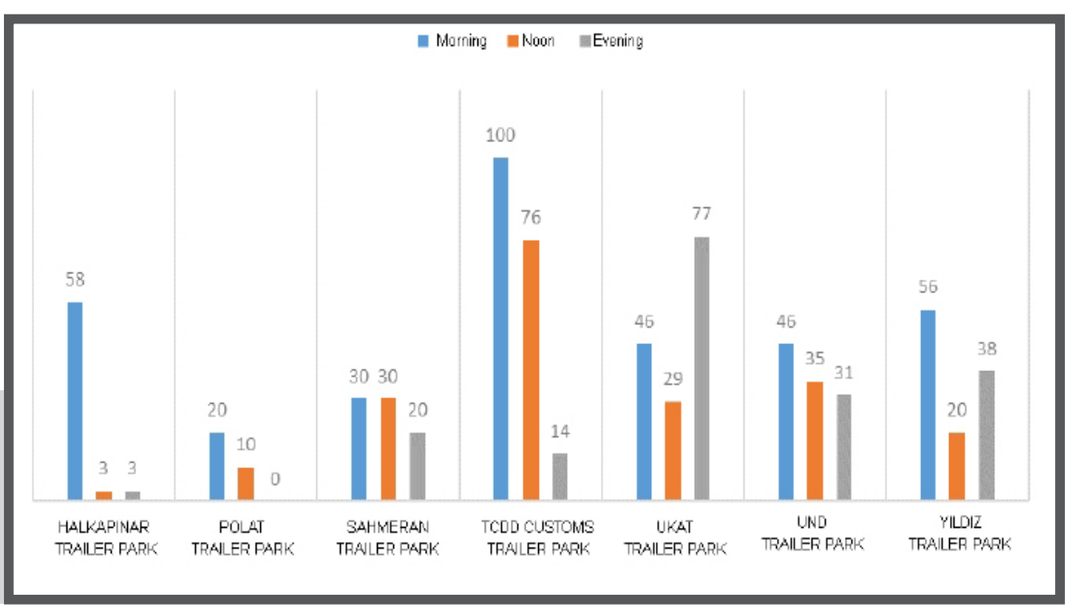

Figure 12: Occupancy rates of Truck parking spaces (Izmir Transportation Main Plan, 2016)

In Bornova District of Izmir province,21 large Truck parks were identified, of which Isıkkent Small Industrial Zone had 14, 1 outside the Industrial Zone, 1 in Cigli – Ataturk Organized Industrial Zone, 2 in Aliaga district, 2 in Konak district, 1 in Bayraklı district. The busiest of these Truck parks are TCDD Gumruklu Truck Park, UKAT Truck Park and Ataturk OIZ Truck Park. The following is a list of Truck parks;

- Aliaga Security Service Support Association Tanker Park
- International Shippers Association (UND) Customs Truck Park
- UKAT Trailer and Truck Park
- Kahramanmaraslı Trailer and Truck Park
- Logistics Manager Alsancak Truck Warehouse Field
- Yıldız Trailer and Truck Park
- Izmir Ataturk Organized Industrial Zone (IAOIZ) Trailer and Truck Park
- Cemiyet Trailer and Truck Park
- Yesildaglı Trailer and Truck Park
- İstanbul Trailer and Truck Park
- Ozbay Trailer and Truck Park
- İmparator Trailer and Truck Park
- GAP Trailer and Truck Park
- Merkez Trailer and Truck Park
- Olimpiyat Trailer and Truck Park
- Beysehir Trailer and Truck Park
- Sancak Trailer and Truck Park
- Polat Trailer and Truck Park
- Isıkkent Trailer and Truck Park
- Halkapınar Trailer and Truck Park

2.1.4. Hazardous Material Transport

The most important criterion expected from the hazardous transport system is whether the "transport system' is "dangerous" or humans and nature a like. The source of this danger is the threat to humans and the environment due to the insufficient and inappropriate transportation methods of the goods carried.

The widespread use of hazardous materials has made it challenging to avoid, thus led to a need for regulation ahead of some basic laws and ethical rules. The European Treaty on the "International Transport of dangerous goods by road"has been adopted in many countries, with the addition of its own country rules. However, the countries have established their own rules and laws. Turkey is one of these countries. The first thing that comes to mind in Turkey in reference to a dangerous substance is fuel oil, as it is the most carried substance.

In the cities, the most intense transportation of hazardous materials is between producers, warehouses, and fuel stations where retail sales take place. Another significant movement of the fuels is carried by pressurized tubes, which are common in domestic and industrial use. Both hazardous materials traffic interacts with dense habitats. Izmir has 465 fuel stations throughout the province. The most number of fuel stations are in the Bornova district with 47 units, and the least fuel stations are in Karaburun district with 3 units. The distribution of fuel stations in various districts of Izmir is given (see Figure 13). 1 in 454 units across the province. The classroom features an informal sanitary facility. The regions where facilities are concentrated are Bornova with 114 units and Aliaga with 74 units. Balcova, Guzelbahce, Karaburun, Narlıdere, Seferihisar, Selcuk, and Urla districts 1. there are no classroom informal sanitary facilities. The distribution of facilities is given map-based (See Figure 14).

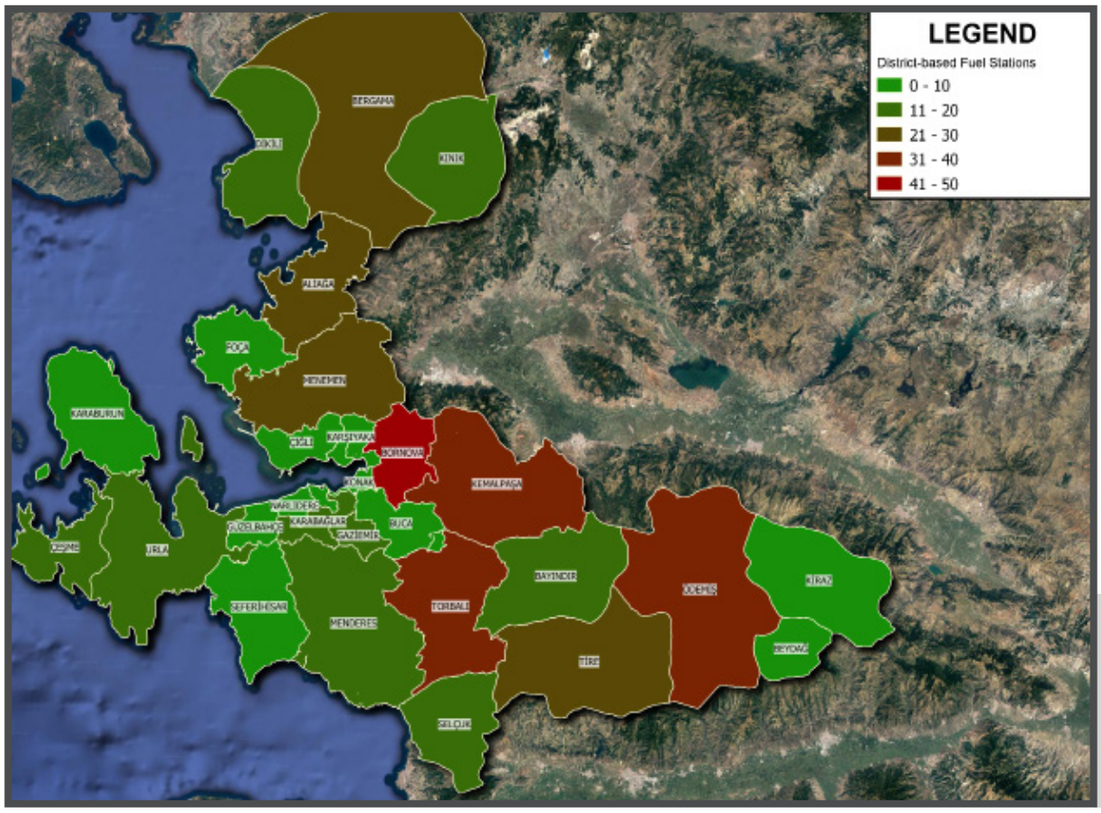

Figure 13: Distribution of fuel stations based in Izmir province-wide District

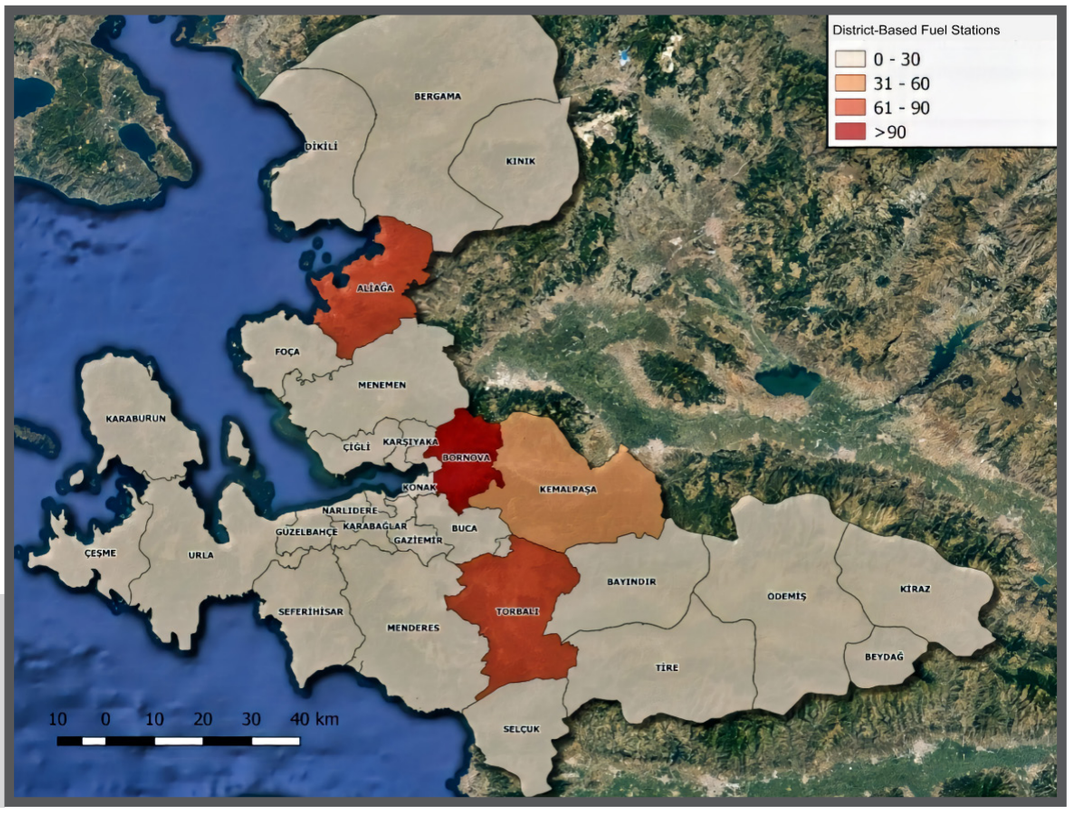

Figure 14: Distribution of informal sanitary facilities by districts throughout Izmir province

2.2. New Data Collection

Data collection is one of the most basic stages of planning. The data collection has been established for various field studies conducted for the collection of new information by checking the quality, quantity, and up-to-date features of the existing data on the general structure of the city, which are primarily in the hands of the institutions. The LOPI has planned and carried out new data collection studies, detailing existing information, modeling, and solution suggestions to support the processes. In addition to the data collected from the institutions in the Izmir Sustainable Urban Logistics Plan Study, information was also collected from logistic enterprises to ensure proper supply of data. The primary purpose of field work is to determine the characteristics of land use (area sizes, number of employees, etc.), freight mobility, such as the distribution of this freight mobility during the day is the collection of information needed to be able to relate information.

New data collection studies;

- Highway freight traffic counts
- Truck parking areas
- Enterprise surveys
- Roadside Surveys
- Rural distinct producer Surveys
- Solid waste transport

2.2.1. Highway Freight Traffic Counts (Curtain, Cord Count)

Within the scope of the LOPI, counts were carried out to determine vehicle and freight crossings between regions at the designated cord – curtain lines and focal points for use in the calibration of the transport model. Curtain – column lines identified primarily in the UPI phase were used in the censuses. This curtain, internal cord, and external cord lines are also taken into account when the census points classification is given as articles. Organized industrial zones, ports, industrial sites, such as freight production, geographic locations of gravity centers, played a role in selecting the locations of these sections. Selected cross section count points and the UPI curtain-column lines are observed for LOPI (see Figure 15).

1. External Cord Section Count Points
2. Curtain Lines Section Count Points
3. LOPI Section Count Points

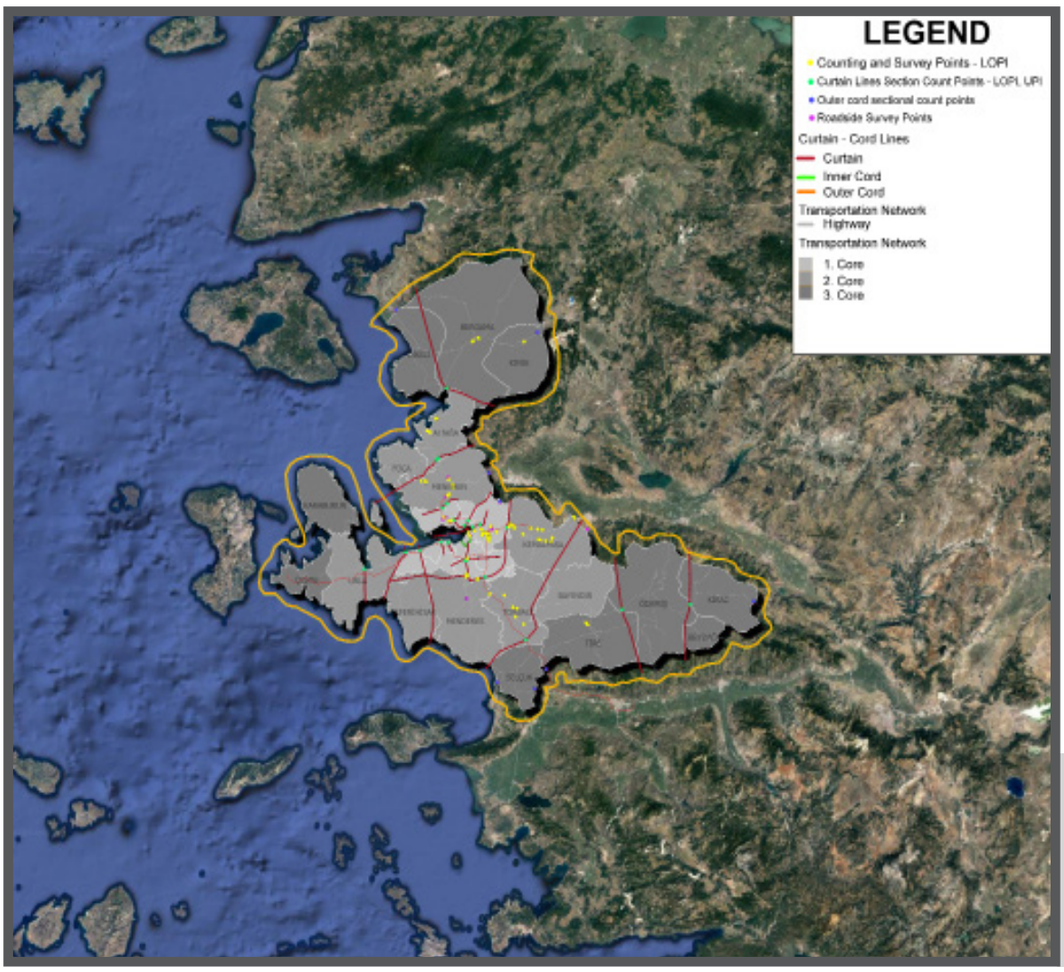

Figure 15: LOPI section count points

According to the census results in sections, the overall average number of vehicles for 24 hours is given (see figure 16).

Figure 16: Overall average number of vehicles

When we look at the general average number of vehicles created as a result of the census conducted in Izmir province, it is seen that the number of daily vehicles on Ankara tarmac Street is less than 25,000 vehicles/day and the number of vehicles on the periphery road increases, especially on LOPI 1 on the freeway. The number of vehicles in and around the core limit has increased to over 75,000 vehicles/day.

Other data obtained as a result of the studies are given below.

- It is observed that the ratio of medium-loaded commercial vehicles to total transportation is between 5% and 10% in the Isıkkent small industrial site.
- It was determined that the ratio was less than 5% at Pınarbası junction of Izmir periphery road, on Izmir periphery road, in Ataturk Organized Industrial Zone and Büyük Cigli Junction this ratio ranged between 5% and 10%.
- It was observed that the ratio of medium-loaded commercial vehicles to total transportation in the Izmir Isıklar TM region varies between 10% and 15%. 4. The ratio of medium-loaded commercial vehicles to total traffic in the vicinity of the Harmandali junction of Izmir periphery road has been determined to increase to over 15% at the industrial site. It has changed between 10% and 15%.
- The truck density in and around Alsancak Port is above 30%. In Liman Street and its continuation between 20% and 30%, Izmir – Aydın motorway, Izmir – Aliaga Road Street and on the roads on Istanbul street, this ratio was found to be between 10% and 20%.
- It is observed that the ratio of trucks to total transportation is between 10% and 20% at Isıkkent Small Industrial site. This ratio was found to be less than 10% at Ataturk Organized Industrial Zone and Büyük Cigli Junction on Izmir Peripheral Road.
- It is observed that the average vehicle speed in and around Alsancak Port is below 50 km/h, the speed in Liman Street and its continuation is above 50 km/h, and the speed in Izmir – Aydin Highway is above 75 km/h.
- It is observed that the speed is over 75 km/ h at the junction and the Aliaga entrance of the Izmir – Canakkale freeway. However, between these points between Sasalı – Harmandali junctions, Buruncuk Junction and Aliaga Center, the speed drops below 50 km/h.
- It is observed that the speed at Isıkkent Small Industrial site is below 25 km/h, and the average speed is above 75 km/h at Pınarbası Junction on Izmir periphery road.

- In Alsancak port, it was observed that the trailer density was over 20% and that this rate did not exceed 5% in the vicinity. In line with the Isıkkent Small industrial site on Liman Street and Izmir periphery road, it was determined that the ratio of S5 vehicle class to total vehicle class did not change and did not exceed 5%. On the other hand, it is observed that this ratio is between 10% and 15% within Isıkkent small industrial site.
- Izmir periphery road, the northsouth axis in general, the proportion of trailers to total vehicle class was observed to vary between 5% and 10%. This rate does not exceed 5% on Kemalpasa Street road, while on Ankara Asfaltı Street, it was found to vary between 5% and 15%.
- Isıkkent small industrial site and the surrounding area, by 1. The core is within the boundaries of Kemalpasa street. Trailer density is below 5%. On Liman Street, this rate is over 15%.
- The average vehicle speed of the trailers in Alsancak port reaches a maximum of 25 km/h and around 75 km/h. It is observed that the speed is over 75 km/h on Izmir – Aydin Highway.
- The average vehicle speed of the trailers was determined to reach a maximum of 75 km/h at Büyük Cigli junction, 50 km/h at sparse Junction, and the Izmir – Canakkale periphery road reached a maximum of 50 km/h at menemen entrance.
- The average speed on Izmir freeway with Harmandali Junction and Ozan Albay Street reached tu 50 km/h, and the average speed on Izmir freeway generally ranged from 50 – 75 km/h. On the other hand, the average speed in and around Isıkkent small industrial site falls below 50 km/h.
- It was determined that the density of heavy cargo vehicles was over 40% in Liman Street, as well as this ratio ranged from 0% to 20% in the entire Izmir province. However, Ankara tarmac and Kemalpasa Street it has been observed that the ratio of heavy freight vehicles to total transportation varies between 20% and 40%.
- It was determined that the ratio of heavy cargo vehicles to total transportation within Isıkkent Small industrial site was between 0% and 20% and that the ratio in the industrial area was between 20% and 40%. The ratio of heavy cargo vehicles to total transportation in the periphery roads of Izmir province with its general lines was observed as 20% at most.
- The average daily traffic value of the sections measured was 30,316 vehicles/day. * The average daily traffic value of the cross-sections measured was 30,316 vehicles/day.
- The average proportion of heavy commercial vehicles in sections was 17.3%.
- The average proportion of light commercial vehicles in sections was 6.9%.
- In the determination of the peak hour on the total number of vehicles, it was determined as the peak hour between 08:00 and 09:00 in the morning, between 14:00 and 15:00 in the afternoon and between 18:00 and 19:00 in the evening.
- When the ratio of the number of peak hour vehicles to the total number of vehicles over the total number of vehicles is determined as 6.85% in the morning, 6.54% in the afternoon and 7.74% in the evening.
- In the peak hour determination studies carried out on the number of heavy commercial vehicles, it was determined as the peak hour between 10:00 and 11:00 in the morning, 14:00 and 15:00 in the afternoon and 17:00 and 18:00 in the evening.
- When the ratio of the number of peak hour vehicles to the total number of heavy commercial vehicles over the number of heavy commercial vehicles is determined as 7.29% in the morning, 6.63% in the afternoon and 7.50% in the evening.

Heavy traffic is observed throughout the province. The proportion of heavy commercial vehicles is more than 2 times the proportion of light commercial vehicles. In line with the data and analyses obtained, valuable information has been obtained for the development phase of calibration studies and project proposals.

2.2.2. Trailer and Truck Parking Area

Under the LOPI, truck and parking surveys were carried out at 21 points including 14 in Isıkkent small Industrial Zone located in Bornova District of Izmir province, 1 outside the Industrial Zone, 1 in Cigli – Ataturk Organized Industrial Zone, 2 in Aliaga district, 2 in Konak district and 1 in Bayraklı district. Besides the above-mentioned heavy vehicle parking areas, afz Truck and Truck Park, Mazıdagı Truck and Truck Park and Alsancak Truck and Truck Park have also been included in the scope of the study. Thus, field work was carried out at a total of 24 points. The location of the heavy vehicle parking areas included in the study is given (see Figure 17). The results of the Part study are given below (see Table 9).

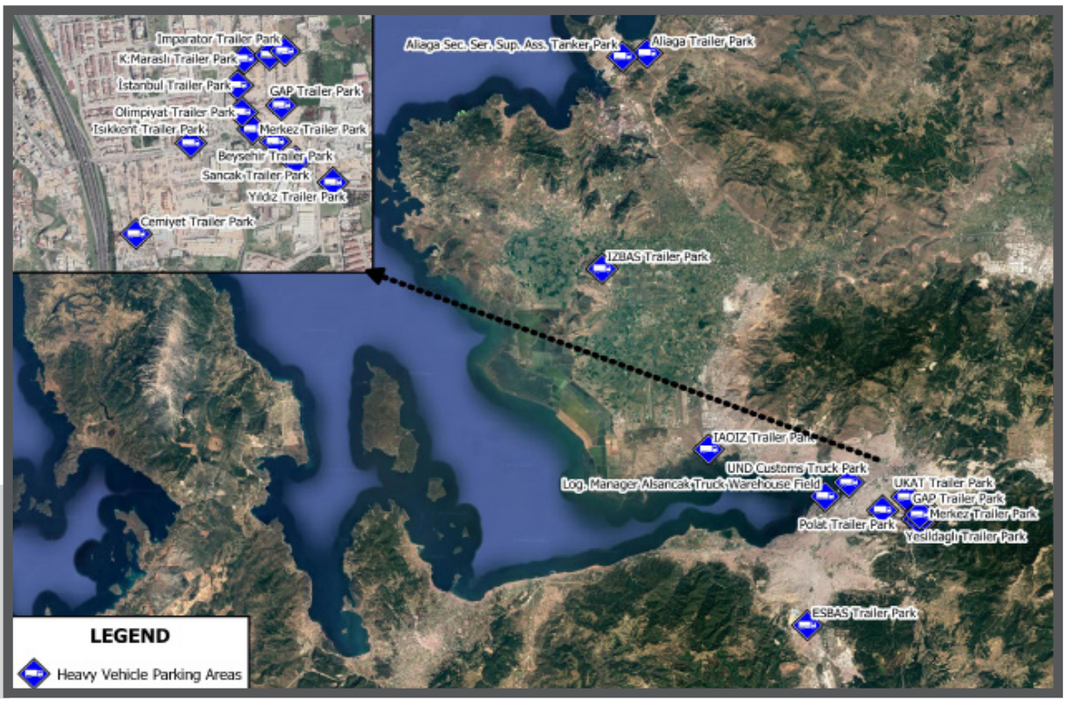

Figure 17: Truck parking areas for Izmir province

Table 9. Truck and truck parks occupancy rates

Trailer and Trcuk Park	Daily Total number of Vehilcles Entered (Veh.)	Daily Total Number of Vehicles Released (Veh.)	Average Number of Vehicles	Capacity (Veh.)	Daily Average Occupancy Rate
Aliaga Trailer and Trcuk Park	209	248	131	200	%65
Aliaga Sec. Supp. Service Ass. Tanker Park	351	193	107	200	%54
UND Trailer and Trcuk Park	51	50	67	110	%61
UKAT Trailer and Trcuk Park	126	99	87	130	%67
Kahramanmaraslı Trailer and Trcuk Park	47	45	68	80	%85
Alsancak Lor Warehouse Area	160	104	46	90	%51
Yıldız Trailer and Trcuk Park	30	32	24	35	%68
IAOIZ Trailer and Trcuk Park	159	124	60	160	%38
Cemiyet Trailer and Trcuk Park	62	50	72	90	%80
Yesildaglı Trailer and Trcuk Park	26	34	60	95	%63
Istanbul Trailer and Trcuk Park	22	19	37	45	%83
Ozbay Trailer and Trcuk Park	4	3	18	35	%50
Imparator Trailer and Trcuk Park	16	20	8	30	%50
ESBAS Trailer and Trcuk Park	345	318	97	120	%81
Mazıdagı Trailer and Trcuk Park	37	32	34	60	%57
Alsancak Trailer and Trcuk Park	11	4	30	16	%52

In general, it was determined that the truck parks throughout the province are clustered in the regions where the industry is concentrated and, that the average capacity utilization rates are low, the reason being poor location selection or operating conditions.

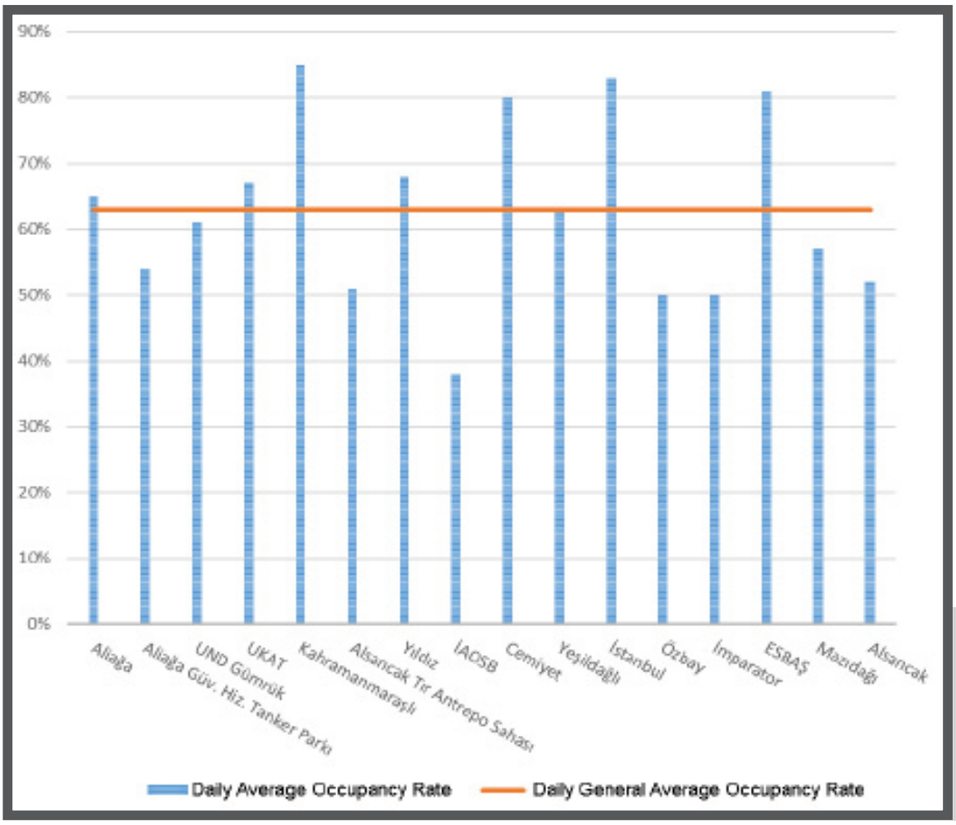

Figure 18: Extract chart of truck and truck parks

2.2.3. Enterprise Surveys

Enterprise surveys were carried out in urban areas 1. and 2. it was made in areas designated as core. The survey applied to the companies within the scope of the LOPI is composed of 3 main headings.

- General informations,
- Freight type and information,
- Freight transport information.

The urban logistics studies carried out in Turkey and abroad were examined, and the enterprises were categorized into 6 groups for the surveys to be carried out within the scope of LOPI (see Table 10).

Table 10. The main branches of activity included in LOPI

No	Enterprises
1	Production sector
2	Logistic/depot sector
3	Service trade
4	Whossale trade
5	Retail trade
6	Others

When the distribution of these main branches of activity in Izmir is examined, the production sector is 20%, the logistics/depot activity is 8%, the service sector is 23%, the wholesale trade is 22%, the retail trade is 26%, and the other sectors cover the rest (see Figure 19).

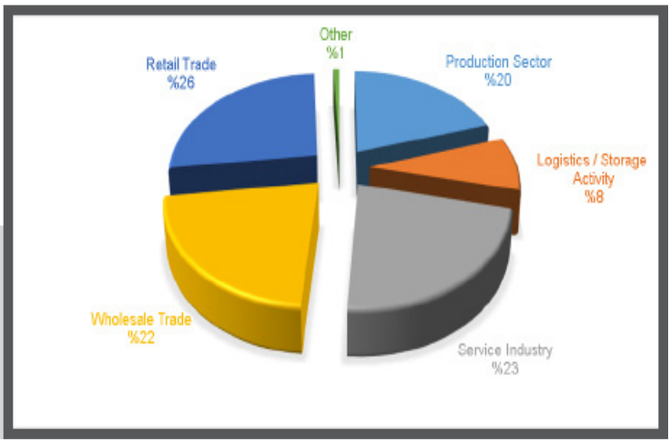

Figure 19: Izmir general main activity of Enterprises distribution

World Bank Enterprise Survey and Indicator Surveys Sampling Methodology, (2009) published by the logistics of the proposed sample size for the study of the relation depending on the main activity area is calculated with the help of County based and counties. The sample size is calculated in consideration of ICC poll numbers that are performed in the database.

The 7.5% accuracy rate, which is considered "compatible" by the World Bank, was also selected here. The equation used in calculating the number of County-based required surveys, generated using this accuracy rate and community size, is given below.

$$n = \left[\frac{1}{N} + \frac{N-1}{N} \frac{1}{PQ} \left(\frac{k}{Z_{1-\frac{a}{2}}} \right)^2 \right]^{-1}$$

Here, n= society size, p= Society ratio, Q= 1-p, k = desired level of sensitivity, $Z_{1-a/2}$ = shows the normal standard coordinates for a desired level of confidence.

The Sample size calculated using the next equation is given (see sample size Table 11). As can be seen from the table, 1,976 Enterprise surveys with 7.5% sensitivity were sufficient, while 6,795 surveys were conducted taking into account the importance of the project.

Table 11. Survey sample size

Districts	Number of Firms (Qualified)	Required Sample Size with 7.5% Accuracy	Total Number of Surveys Performed
Aliaga	1.203	100	112
Balcova	1.049	99	190
Bayındır	293	80	80
Bayraklı	2.347	104	227
Bornova	10.000	108	1.254
Buca	4.132	106	521
Cigli	1.801	103	148
Foca	349	83	83
Gaziemir	1.645	103	444
Guzelbahce	424	87	88
Karabaglar	1.334	101	420
Karsıyaka	5.351	107	426
Kemalpasa	1.389	101	152
Konak	22.012	109	1.582
Menderes	1.216	100	290
Menemen	1.194	100	136
Narlıdere	608	93	136
Seferihisar	533	91	99
Torbalı	1.493	102	251
Urla	1.006	99	156
Total	59.379	1.976	6.795

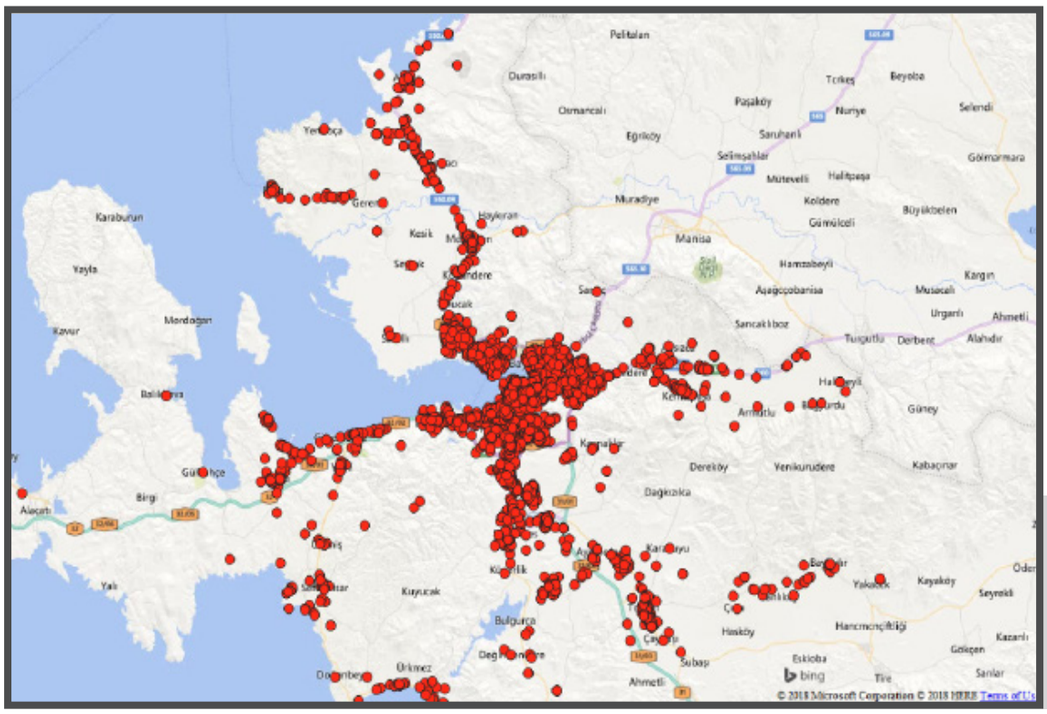

Figure 20: Study area survey numbers

As a result of the surveys carried out within the scope of the LOPI project; Izmir province-wide; truck, about 5 million vehicles, including trucks, tankers, vans, trailers and others, are logged in also, it was determined that a similar number of vehicles had checked out. (see figure 20-Table 12 and Table 13).

Table 12. Total number of vehicles entering and rates

District	Number of Vehicles Logged In (Veh/Year)	Rate
Bornova	993.223	%21
Aliaga	952.108	%20
Konak	885.852	%19
Bayraklı	480.418	%10
Gaziemir	355.118	%7
Buca	180.450	%4
Karsıyaka	178.276	%4
Karabaglar	131.234	%3
Torbalı	117.527	%2
Kemalpasa	99.480	%2
Cigli	82.074	%2
Menderes	72.513	%2
Narlıdere	62.225	%1
Balcova	51.651	%1
Menemen	47.099	%1
Urla	39.357	%1
Guzelbahce	19.010	%0
Seferihisar	18.517	%0
Bayındır	11.488	%0
Foca	6.466	%0
Total	4.784.086	%100

Table 13. Total number of vehicles leaving and rates

District	Number of Vehicles Departing (Veh/Year)	Rate
Aliaga	1.008.699	%22
Bornova	942.891	%21
Konak	781.849	%17
Bayraklı	489.677	%11
Gaziemir	341.618	%7
Karabaglar	158.925	%3
Karsıyaka	139.919	%3
Buca	139.832	%3
Kemalpasa	120.359	%3
Torbalı	115.703	%3
Cigli	81.914	%2
Menderes	77.880	%2
Narlıdere	51.179	%1
Menemen	36.004	%1
Balcova	26.443	%1
Urla	23.219	%1
Seferihisar	15.913	%0
Guzelbahce	14.883	%0
Bayındır	10.488	%0
Foca	4.407	%0
Total	4.581.802	%100

Data were collected for the analysis of inadequacy and for the creation of alternatives in line with the answers received by the enterprise surveys conducted throughout Izmir province.

2.2.4. Roadside Driver Surveys (RDS)

Roadside Driver Surveys (RDS) were conducted in order to characterize the freight traffic at the entrances and exits and to define the movements.

As a method of study, electronic tablets were used to fill survey forms. The survey was conducted on weekdays. When determining survey points, geographical structure of Izmir province, location of Transportation axles, alignment with Section counting points were carried out within the scope of plan preparation. Safety of surveyors during Survey studies, failure of traffic, traceability, collection of information at load shooting and production Points, etc. factors have been taken into account. RDS implementation is considered appropriate points are given (see Figure 21).

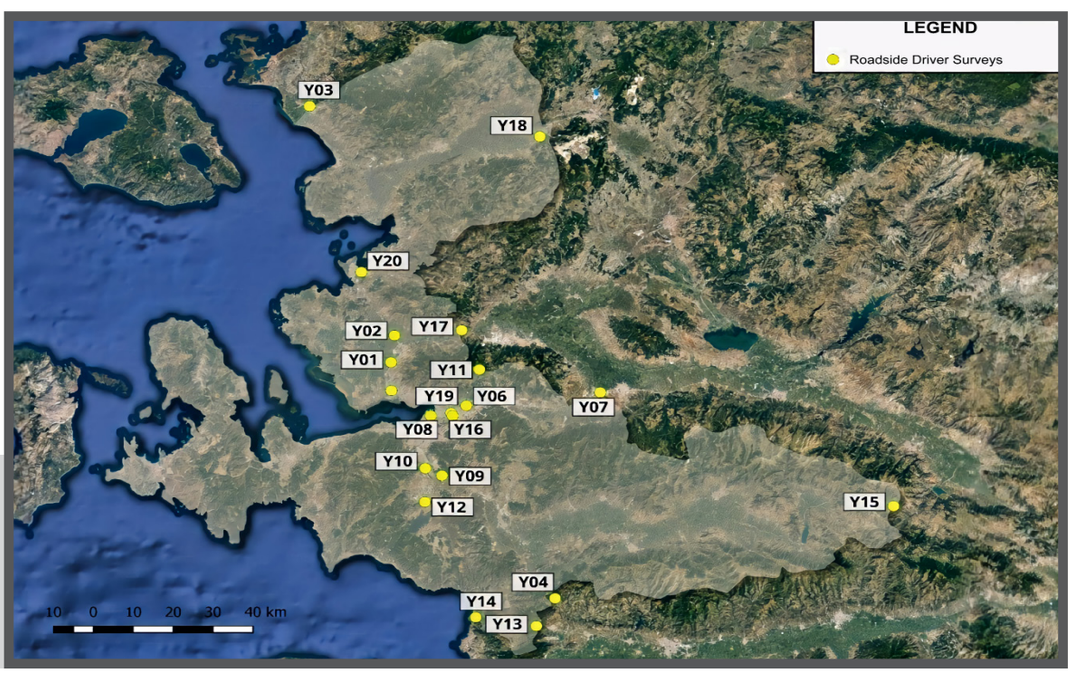

Figure 21: Roadside Driver Survey applied points (Y1-Y20)

There are multiple ways to calculate the theoretical sample size required for RDS. The commonly used and accepted method of determining sample size is to select a sample size of around 3-10% depending on the total number of vehicles. However, this rate may sometimes not give statistically positive results. From this point on, the approach in the Traffic Appraisal Manual (TAM) was used for RDS. The sample size determined by this method is dependent on traffic volume. The variance variable in its exact approximation is given in the following equation.

$$V(Q_a) = \frac{Q*(Q-q)}{q^2(q_1)} * q_a(q - q_a)$$

Study Area : Across Izmir (20 places)

Number of Surveys Applied : Toplam 4.595

Driver Information : Youngest Driver Age 18
Greatest Driver Age 73
Average Driver Age 43

Cross-Section Survey Point: A total of 20 cross-section traffic studies were carried out around the survey points (see Table 14). A total of 4,595 surveys were conducted at 20 selected survey points.

Table 14. Sample sizes determined according to Section count results

Section No	Total Traffic Volume	% Heavy Vehicle Traffic	Total Number of Vehicles of Interest (Q)	% Attributes (P)	Number of Attribute Vehicles	Acceptable Error Rate (%, E)	E: Sensitivity Level	Required Sample Size (Q)	Number of Surveys Performed	Percentage of Sample (%)
16	35.335	26	9.187	65	5.972	10	597	202	251	2,20
18	47.618	24	11.428	65	7.428	10	743	203	225	1,78
89	14.769	21	3.101	65	2.016	10	202	194	178	6,25
84	33.558	24	8.054	65	5.235	10	524	202	298	2,50
14	16.990	23	3.908	65	2.540	10	254	197	356	5,03
54	36.900	34	12.546	65	8.155	10	815	204	231	1,62
90	37.412	20	7.482	65	4.864	10	486	201	198	2,69
51	110.914	12	13.310	65	8.651	10	865	204	244	1,53
59	35.701	21	7.497	65	4.873	10	487	201	229	2,69
56	71.212	20	14.242	65	9.258	10	926	204	251	1,43
87	48.138	18	8.665	65	5.632	10	563	202	232	2,33
58	43.460	17	7.388	65	4.802	10	480	201	143	2,72
85	7.884	21	1.656	65	1.076	10	108	184	247	11,11
86	13.692	14	1.917	65	1.246	10	125	187	191	9,74
91	4.231	19	804	65	523	10	52	165	186	20,49
32	39.757	30	11.927	65	7.753	10	775	203	187	1,70
88	16.562	40	6.625	65	4.306	10	431	201	284	3,03
10	9.898	30	2.969	65	1.930	10	193	193	233	6,51
28	47.088	17	8.005	65	5.203	10	520	202	230	2,52
5	12.073	31	3.743	65	2.433	10	243	196	201	5,24

General evaluation of RD studies;

RD has been analyzed to contribute to the LOPI modelling in terms of both sample size, selected points, and the results obtained. The height of the vacancy rate and the proportion of tankers, especially the type of fuel, came across as important data in the development of action plans in the planning process. In addition, this data will be used to determine vehicle equivalence coefficients during the calibration phase and to convert commercial vehicles into Unit cars.

According to the density of commercial vehicles, the average rate of commercial vehicles was 23% and the rate of heavy commercial vehicles was 17%. The highest point of commercial vehicle ratio is D-250 Manisa-Menemen Road Survey Point (Y17) with 40%, and the lowest point of commercial vehicle ratio is D-300 Altinyol Murselpasa Boulevard survey point (Y8) with 12%.

When the age of the driver was examined, the average age of the driver was 43 years old, the youngest driver was 18 years old, and the oldest driver was 73 years old.

The second part of the survey contains vehicle information. As a result of the analysis, it was determined that 70% of the vehicles had K1 Transport Certificate, trucks, trucks and vans had a share above 90% in the sample, 85% belonged to the year 2000, and above production year, all used diesel fuel and 25% owned trailers.

When the vehicle information was examined, it was determined that alternative fuels were not used at all. While load capacities vary, vehicle ages can be said to be partly high.

When the travel information was examined, it was observed that the vehicles surveyed were in Izmir province at most. Approximately 50% of the 4,595 vehicles surveyed stated that 2,318 of them were moving within the borders of Izmir province.

The total freight traffic surveyed from Izmir was 3,517, and the freight traffic it drew was 3,244 vehicles. Only ten surveys did not provide province-based travel information. The provinces of Manisa, Aydın, and Balıkesir were observed as the busiest destinations for travel from the province of Izmir. These provinces were also busy with incoming traffic.

When the data obtained based on the district is examined, it is observed that 3,516 data were obtained based on the district. The 1,199 trips in the empty column are from Izmir and show the number of vehicles travelling outside Izmir. Out of a total of 3,516 trips, 1,199 trips are subtracted, resulting in 2,317 trips, which corresponds to 2,318 trips in the province-based Matrix. Aliaga and Bornova are the districts that produce the most intense freight traffic. Bornova, Cigli, and Torbalı districts have been identified as the most intense shooting areas.

When the daily traffic values of RD points are examined, the least traffic observed point is D-310 Denizli-Odemis Road survey point (Y15) with a value of 4.231 vehicles/days, and the busiest point is D-300 Altinyol Murselpasa Boulevard survey point (Y8) with a value of 110.914 vehicles/ days. The average traffic value is 34,160 commuters/day.

According to the density of commercial vehicles, the average rate of commercial vehicles was 23%, and the rate of heavy commercial vehicles was 17%. The highest point of commercial vehicle ratio is D-250 Manisa-Menemen Road Survey Point (Y17) with 40%, and the lowest point of commercial vehicle ratio is D-300 Altinyol Murselpasa Boulevard survey point (Y8) with 12%.

As a result, RD has been analyzed to contribute to the Sustainable Urban Logistics Planning process in terms of both sample size and selected points and the results obtained. The height of the vacancy rate and the proportion of tankers, especially the type of fuel, came across as important data in the development of action plans in the planning process. In addition, these data will be used to determine vehicle equivalence coefficients during the calibration phase and to convert commercial vehicles into Unit cars.

2.2.5. Rural Development Regions Producer Surveys (RDRPS)

A total of 603 surveys were conducted and demographic characteristics of rural regional producers such as age, gender, education, occupational status were recorded. Additionally, areas of activity, duration of activity, types of products they grow, the number of employees, and size of production areas were determined. In addition, the characteristics of the journeys carried out, and the use of vehicles, raw material supply patterns, sales channels of the products and the previous year's travel tightness were determined in the information. A sample area of 10 districts and 113 communities were selected as the working area of the rural district surveys.

Districts surveyed and their survey numbers are given (see Table 15). Determining survey points;

- Geographical structure of Izmir province,
- Location of transport axles,
- Safety of pollsters during survey work,
- To be traceable,
- Collection of information at load shooting and production points,
- Carrying out the surveys by spreading them throughout the day, etc. factors taken into account.

Table 15. Rural development regions producer survey applied districts and survey numbers

Code	District Name	Agriculture	Farming	Production	Collection/Storage	More Than Once	Number of Surveys Applied
1	Odemis	96	80	35	11	48	270
2	Kınık	3	10	0	0	1	14
3	Cesme	8	8	0	0	0	16
4	Bergama	19	25	6	4	8	62
5	Selcuk	52	4	3	2	5	66
6	Kiraz	4	8	3	5	18	38
7	Tire	20	23	12	4	28	87
8	Beydag	3	7	3	1	6	20
9	Dikili	4	3	3	1	2	13
10	Karaburun	5	5	1	5	1	17
Total		214	173	66	33	117	**603**

57% of manufacturers supplied products on-site, while 13% preferred to supply them domestically. The share of producers with more than one form of supply is 28%.

57% of the manufacturers surveyed sell their products on-site, while 28% use more than one form of sales.

When we examine which cities constitute the maximum incoming and outgoing vehicles come, it is seen that the majority of them are from within Izmir. After Izmir, the most incoming and outgoing vehicles are from the province of Aydın.

In general, rural producers are concentrated in the middle age group and livestock and agriculture are at the forefront of production at a rate of over 50%. 80% of producers are in high school and six education groups. In raw material supply and product sales, 60% of on-site production and consumption rate was determined. The low share of unions and cooperatives is the most negative situation observed.

Table 16. Distribution of quantities in provinces where products inbound/outbound

Provinces	Incoming	Outgoing	Provinces	Incoming	Outgoing
Adana	29	19	Kayseri	0	1
Afyon	0	2	Kırklareli	0	5
Ankara	10	62	Kocaeli	1	2
Antalya	5	7	Konya	14	9
Aydın	40	66	Kutahya	0	1
Balıkesir	8	26	Manisa	31	47
Bitlis	1	0	Kahramanmaras	0	1
Bursa	0	25	Mardin	1	0
Bolu	2	0	Mugla	3	10
Bursa	11	0	Mus	1	1
Canakkale	0	20	Nevsehir	1	
Denizli	5	20	Sakarya	0	1
Diyarbakır	5	6	Sivas	1	1
Edirne	9	0	Tekirdag	0	3
Eskisehir	5	8	Sanlıurfa	0	1
Gaziantep	3	3	Usak	3	5
Giresun	0	1	Aksaray	3	4
Hatay	1	1	Karaman	0	2
Isparta	0	1	Batman	1	1
Icel	1	1	Yalova	2	1
İstanbul	31	52	Karabuk	0	1
İzmir	950	1.708	Osmaniye	1	0
			The Overall Total	1.179	2.125

2.2.6. Collecting and Compiling New Solid Waste Information

Development of analysis and recommendations for solid waste logistics in the study of the LOPI for determination and coordination of freight transportation within the borders of the Izmir Metropolitan Municipality is also within the scope of the project. In this context, the studies, TSI, Izmir Metropolitan Municipality, district municipalities and related government agencies and professional chambers obtained and solid waste load mobility may affect the update of data.

Table 17. Municipal waste data (municipal waste statistics – TSI 2016)

Explanation	2012	2014	2015
Total number of municipalities	2.950	1.396	1.397
Number of municipalities providing waste service	2.894	1.391	1.390
Proportion of the population served in the total population (%)	83,4	91,2	92,5
Proportion of the population served in the municipal population (%)	99,0	97,7	98,6
The amount of municipal waste collected (Thousand tons)	25.845	28.011	31.584
Average municipal waste per capita (Kg / person-day)	1,12	1,03	1,17

87% of solid waste in Turkey consists of municipal waste. 8% of municipal waste is collected as packaging waste, 5% is recovered as compost or biomethanization, and the remaining 87% is disposed of by storage. Of the waste collected in the municipalities where waste collection and transport services are provided, 61.2% is sent to landfill facilities, 28.8% to municipal landfills, and 9.8% to recovery facilities, while 0.2% is disposed of by burning, burying and dumping in the creek/land.

The amount of waste collected in Izmir in 2016 was 2,026,374 tons per year, and the amount of waste per person per day is 1.32 kg. In the same year, the average amount of daily waste per person in Turkey is 1.12 kg. Waste collected by municipalities in Izmir province is over 5,551 tons per day. According to the survey

results, the average daily waste per person collected in municipalities in 2016 was calculated to be 1.17 kg. In our three major cities, the average daily waste per person collected was 1.30 kg for Istanbul, 1.14 kg for Ankara and 1.32 kg for Izmir (see Table 18).

Table 18. Municipal waste data (municipal waste statistics - TSI, 2016)

Parameter	Unit	Value
Total Population	Person	4.223.545
Total Number of Municipalities	Piece	31
Municipal Population Providing Waste Service	Person	4.207.197
Proportion of Population Provided for Waste Services in Total Population	%	99,6
Amount of Waste Collected	Ton/Year	2.026.374
Average Amount of Waste Collected Per Capita	Kg/Person-Day	1,32

Table 19. Solid Waste information by districts

Municipality	Core	Population	Kg/Day/Person	Kg/Day	Transfer Station
Aliaga	2	94.070	1,26	118.500	Turkelli
Balcova	1	78.442	1,49	116.500	Gediz
Bayındır	2	40.258	1,18	47.500	Torbalı
Bayraklı	1	314.402	1,05	330.500	Halkapınar
Bergama	3	102.961	1,16	119.000	Bergama
Beydag	3	12.391	1,05	13.000	-
Bornova	1	442.839	1,19	527.000	Gediz, Halkapınar
Buca	1	492.252	1,01	497.500	Gediz, Halkapınar, Harmandalı
Cesme	3	41.278	4,22	174.000	Cesme
Cigli	1	190.607	1,32	252.000	Harmandalı
Dikili	3	41.697	2,04	85.000	Dikili
Foca	2	31.061	1,58	49.000	Foca
Gaziemir	1	136.273	1,24	169.500	Gediz, Kınık
Guzelbahce	1	31.429	1,40	44.000	Urla
Karabaglar	1	480.790	1,01	484.000	Gediz
Karaburun	3	9.812	2,29	225.000	Karaburun
Karsıyaka	1	342.062	0,95	325.000	Karsıyaka
Kemalpasa	2	105.506	1,12	118.000	Kemalpasa
Kınık	3	28.271	1,14	45.000	Kınık
Kiraz	3	43.859	1,51	50.000	Kiraz
Konak	1	363.181	2,14	550.000	Halkapınar
Menderes	2	89.777	1,02	192.500	Gediz, Gumuldur, Kısık
Menemen	2	170.090	1,21	173.000	Turkelli
Narlıdere	1	66.269	1	80.000	Gediz, Urla
Odemis	3	132.241	2	140.000	Odemis
Seferihisar	2	40.785	2	78.500	Gumuldur
Selcuk	3	35.991	1	80.000	Selcuk
Tire	3	83.829	1	120.000	-
Torbalı	2	172.359	1	176.500	Torbalı
Urla	2	64.895	2,89	187.500	Urla

The management and disposal of solid waste are primarily based on the principle of producing less waste, evaluating the waste produced, and destroying the final waste. One of the most costly and difficult to manage solid waste management processes is the process of transporting waste to areas where it can be disposed of, recycled, or reused as an economic value. The process of transporting waste is an activity that needs to be well managed, with high economic, social, and environmental benefits and costs. Waste management is not merely the concept that wastes are buried and abandoned as they are in their current state. Moreover, even in this case, the waste should be moved to the place where it will be buried. However, today, reaching the minimum amount of waste to be disposed of in the final stage is one of the objectives of Environmental Management all over the World. This approach, which aims at the final

waste reduction, requires us to commence green solid waste logistics in the framework of disciplinary approaches such as circulareconomy, reverse logistics, green logistics, beyond the transportation of solid waste to the disposal site.

2.2.7. In-Depth Interviews

Izmir LOPI aims to set out a plan for the implementation of urban logistics activities in a way that minimizes the negative social and environmental impacts and optimizes its benefits. In-depth interviews aim to contribute to this process with expert opinions. In this context, preparations were made for in-depth interviews with 20 stakeholder representatives.

Within the scope of in-depth interviews, approximately 20 hours of interviews were conducted with the leading representatives of 20 different sectors of the city over a period of 1 month. The 6-person interview team traveled about 500 kilometers in this process. This work package, which includes the views of 20 sector representatives as opinion leaders, is of great importance with the studies to be carried out within the framework of the participation model. In order to analyze the current situation in detail studies were carried out within the scope of the LOPI project for the scientific analysis, and the results compared to the expectations.

When the opinions gathered as a result of in-depth interviews are briefly evaluated, it is seen that even to the most important logistics stakeholders of the city, the importance and difference of urban logistics are not adequately understood. It is confused with the logistics activity between the factories, which includes large-scale freight transports. The reason for this situation, especially in organized industrial zones established in ancient times, wholesalers, and Alsancak port in the city center as a result of the city logistics and heavy vehicle freight mobility, can be shown to live together in Izmir. On the other hand, it has been seen that the institutions and organizations that are stakeholders of urban logistics have minimal holistic perspectives and that each sector interprets the common problems with their own perspectives. In addition, some of the proposals brought by the representatives were also seen to be strategically, tactically and operationally at the decision level with multiple phases.

The management, orientation and regulation of urban social services by means of public platforms are among the most important expectations of the sectoral stakeholders. In addition, it is observed that the economic aspects of sustainability are generally taken into account, and the environmental and social aspects are not adequately addressed during the management of urban logistics activities. In this context, the common expectation of the important sector representatives, who have been interviewed in-depth, is to prepare a scientific urban logistics plan for Izmir province that includes short, medium and long-term planning proposals prepared by a participatory process.

Izmir has an important position in terms of economic, social, and cultural structure and logistics activities. With the studies carried out, the characteristics of logistics activities throughout the province were tried to be revealed. Following the current data collection studies, the new data collection studies were completed to obtain the necessary information for modeling and Future Analysis. After modeling studies, incompetence analysis studies were carried out.

DEVELOPMENT OF LOGISTICS DEMAND FORECASTING MODEL

3. CREATION OF A LOGISTICS DEMAND FORECASTING MODEL

3.1. Introduction

In the context of the Izmir sustainable urban logistics plan (LOPI), the stages of freight travel (FTM) forecasting model were realized as freight travel production-attraction, distribution, and assignment.

In order to establish the FTM model, Izmir province was divided into 825 traffic analysis zones (zones). While the zone structure was created, the zone boundary towards the city center was tightened, and the boundary towards the city walls was extended. The FTM model consists of 13,305 nodes, 36,168 ties, 825 zones and 3,266 connections. Free zones, Organized Industrial Zones, small industrial sites, ports, and refining zones are included in the FTM as featured zones within the scope of LOPI. In addition, while creating the model, enterprise surveys, section counts, and in-depth interviews were used in Izmir province. Each phase of the FTM is summarized below.

3.2. Freight Travel Production-Attraction Model

The enterprises performing logistics activities were examined in six main groups and production-attraction analyses were carried out. Distribution of activity areas for production-attraction are;

- Activity 1: commercial companies engaged in the production
- Activity 1a: manufacturing companies in special regions
- Activity 1b: manufacturing companies outside special regions
- Activity 2 logistics / warehouse
- Activity 2a: warehouse, Truck Park, warehouse etc.in core 1 and 2. companies providing services
- Actıvity 2b: other companies providing shipping service
- Activity 3-6: operating services and other companies
- Activity 4-5: retail and wholesaling companies.

Linear constrained regression models were established using employee count and field variables to estimate the FTM models for the 6 sub-activity groups defined. As constraint in the constrained regression model, Sum of calculated predicted values, a total of values used in regression analysis with $(\sum_{i=1}^{n} \hat{y}_i)$ the absolute difference in $(\sum_{i=1}^{n} \hat{y}_i)$ ace is less than 5%. During the creation of regression models, the constant FTM coefficient per enterprise was not used because it was not possible for an Enterprise with no employees and no field of use to make an attraction or production. In this respect, the following formula was used for the production and shooting of FTM to be used within the scope of the project.

$$y = aX_1 + bX_2$$

Where Y is the dependent variable (total number of vehicles produced or taken), X_1 is the number of employees, and X_2 is the closed area (m^2) in activity 1a, activity 1b, activity 3-6 and activity 4-5 group, combined with closed area+open area (m^2) in activity 2a and activity 2b group. Load travel production and shooting models and levels of significance created for previously determined groups are given (see Table 20).

Table 20. Activity-based summary FTM production / attraction models

Activity	Production/Attraction	*F*	*Adjusted R²*	Model
1a	Production	0	0,3714	Y= 2,4619 X_1 + 0,0882 X_2
	Attraction	0	0,4262	Y= 1,4568 X_1 + 0,0758 X_2
1b	Production	0	0,1959	Y= 9,0412 X_1 + 0,0751 X_2
	Attraction	0	0,2257	Y= 7,9065 X_1 + 0,0701 X_2
2a	Production	0	0,2863	Y= 17,1832 X_1 + 0,1033 X_2
	Attraction	0	0,4198	Y= 12,4081 X_1 + 0,0543 X_2
2b	Production	0	0,3553	Y= 49,8701 X_1 + 0,1342 X_2
	Attraction	0	0,3867	Y= 32,1235 X_1 + 0,2448 X_2
3 and 6	Production	0	0,2255	Y= 9,5691 X_1 + 0,0622 X_2
	Attraction	0	0,3408	Y= 18,9788 X_1 + 0,0398 X_2
4 and 5	Production	0	0,2237	Y= 21,2656 X_1 + 0,0491 X_2
	Attraction	0	0,3397	Y= 25,3683 X_1 + 0,0406 X_2

3.3. Freight Travel Dispersion Model

In the freight travel distribution model, the distribution of estimated freight travel quantities between regions with the freight travel production/attraction model is determined and origin – destination (O-D) matrices are formed on the basis of vehicle types. Travel time was used as the resistance parameter of the attraction model and Roadside driver surveys were used to determine these parameters. The gravitation model is given in the equation.

$$T_{ij}^{p} = a_i b_j G_i^p A_j^p f^p(t_{ij})$$

Here; T_{ij}p: i-j vehicle type travel between i-j zones, G_{ip}: vehicle type travel produced from i zone is the amount of vehicle travel traveled to the A_{jp}: j zone, fp (): resistance function for the vehicle type p between i-j zones, , tij: average travel time between i-j zones and a_i, b_j: balancing coefficients used to provide production and attraction constraints.

The equation given below is used as the resistance function f() between the analysis regions.

$$f_{ij} = at_{ij}^{b} \exp(ct_{ij})$$

Where f is the total resistance, a, b, c is the coefficient, and t is the travel time (Ortuzar & Willumsen, 2001).

Calibration was performed using iterative methods taking into account travel time distributions, values from the production-attraction model, and cross-section volumes. These iterative methods were continued until all constraints were met at a certain percentage of errors, and the coefficients of the distribution parameters were calculated. In the travel distribution as a result of these coefficients, the total and analysis region-based production-attraction values were calculated as a calibration parameter and an error parameter. The coefficients of the distribution parameters are given based on the type of vehicle (see Table 21).

Table 21. Gravity model coefficients

Vehicle Type	Coefficients		
	a	b	c
Comercial Vehicle	0.006	-0.375	-0.005
Truck	0.099	0.042	-0.003
Trailer	0.003	1.441	-0.008

The matrices calculated after the stages of freight travel production and travel distribution are assigned to the transport network, and the routes used between the start and endpoints of the travels are determined at this stage. The routes revealed by the travel assignment process are composed according to the costs of the structure they use. Costs can be variables such as travel distance, duration, and cost. In the logistics plan, the costs are treated as travel time, and the same cost function and assignment method are used in the logistics Plan in terms of compliance, as the change of cost function, parameters and coefficients affect the routes in the first degree. The partial assignment method was used for capacity-constrained assignments, and iteration shares were divided to allow vehicles to load their matrices into the network in order.

The function developed by the U.S. Bureau of Public Roads (BPR) was used as the travel cost function:

$$t_{cur} = t_0(1 + a(\frac{q}{q_{\max} c})^b)$$

t_{cur}: congestion travel time(minutes), t_0: free current travel time (minutes), q: assigned travel volume (vehicle-direction/hour), q_{max}: Link capacity (vehicle-direction/hour), ***a, b, c***: Volume/Delay coefficients.

The parameter leading to the determination of user routes is the cost of travel. The travel cost can consist only of travel time, as well as vehicle operating costs under the category of generalized cost, road usage charges, etc. it can also be categorized as the sum of. One of the factors affecting travel times is the presence and behavior of vehicle types in traffic. The types of vehicles in the city, intersection, flat road, bumpy road, undulating road, etc. are divided. Truck and trailer vehicle types will give different directions to travel times, and therefore, route choices in automobile equivalence. During the assignment, Equivalent Unit car values in TS 6407 were used to convert vehicle types into automobile equivalents. In urban roads, roundabouts, and signalized junctions, the average Equivalent Unit car values to reflect the Izmir overall were used for vehicle types, using the average of the values given in the standard separately for vehicle types. Thus, equivalent unit car values were evaluated as 1.25 in Van type, 2.2 in truck type, and 2.7 in trailer type. Assignment studies were carried out after these factors were used.

3.4. Model Validation Test

Increasing socio-economic values by 2018 has been sufficient for automobile, and public transport journeys as both route and non-route journeys in the UPI are calibrated. In the studies carried out under the LOPI, a calibration process was defined based on the link volumes obtained as vehicle-based as a result of the assignment and their relationship with the cross-section count results carried out in the project process. Traffic values observed at cross-section count points and link volumes obtained as a result of the assignment were analyzed using GEH statistics.

GEH statistics are used in traffic engineering, in traffic forecasting and modeling, to compare two traffic volumes. There are two variables in GEH statistics: “Model” and “Count”. The equation of the GEH statistic is given as:

$$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}$$

Where M: Model, C: denotes observation traffic counts.

In the "Design Manual for Roads and Bridges" published by the UK Department of Transport taking into account inter-city road investments, GEH values calculated on links with cross-section counts are generally expected to be between 0 and 5. Section volumes were entered into the software as observation values (C) and only peak time counts were taken into account from the 24-hour counts. The observation traffic values in the section counts were used to measure process uncertainties, and the values taken into account as a result of the measurements were included in the calculations.

For GEH statistics, values greater than 0-2 were found in 189 units, 2-5 in 23 units, 5-10 in 1 number, and 10 in 1 point were calculated from 214 sectional counting stations. Below are the additional values of GEH Statistics calculated for commercial low load vehicles. According to the calculations, 99% of the GEH values of the vehicle numbers observed and calculated on the links are below 10, and the average value is 1.14 (see Figure 22).

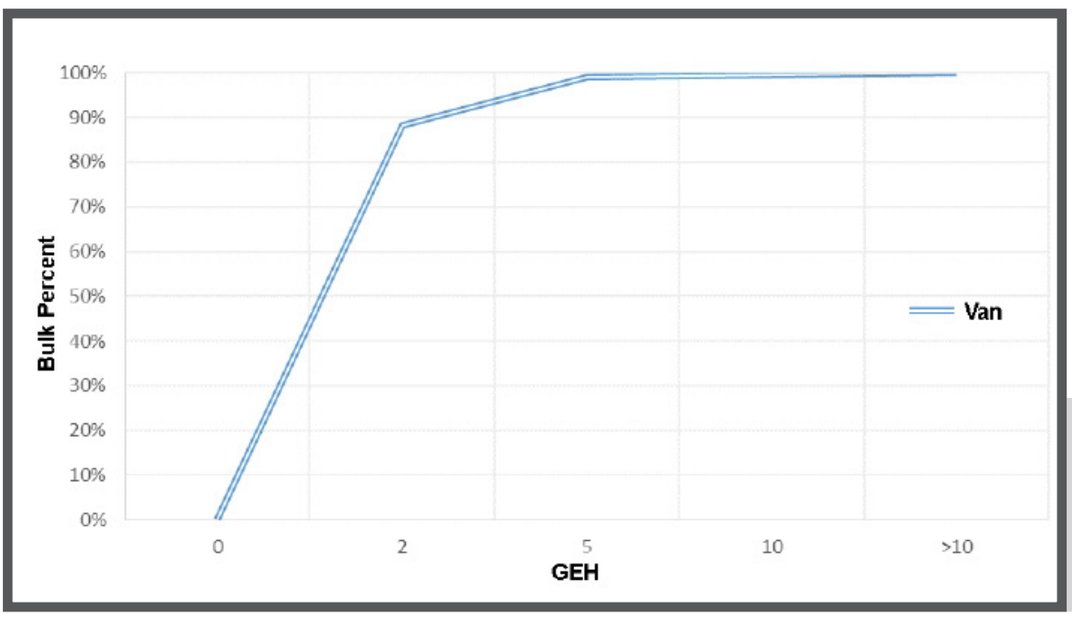

Figure 22: GEH results for commercial vehicles

For GEH statistics, values greater than 10 at 87 points 0-2, 2-5 at 94 points, 5-10 at 28 points and 7 points were calculated from 214 cross-section counting stations in trucks. Below are the additional values of GEH Statistics calculated for trucks. According to the calculations, 85% of the GEH values of the truck numbers observed and calculated on the links are below 5, and the average value is 3 (see Figure 23).

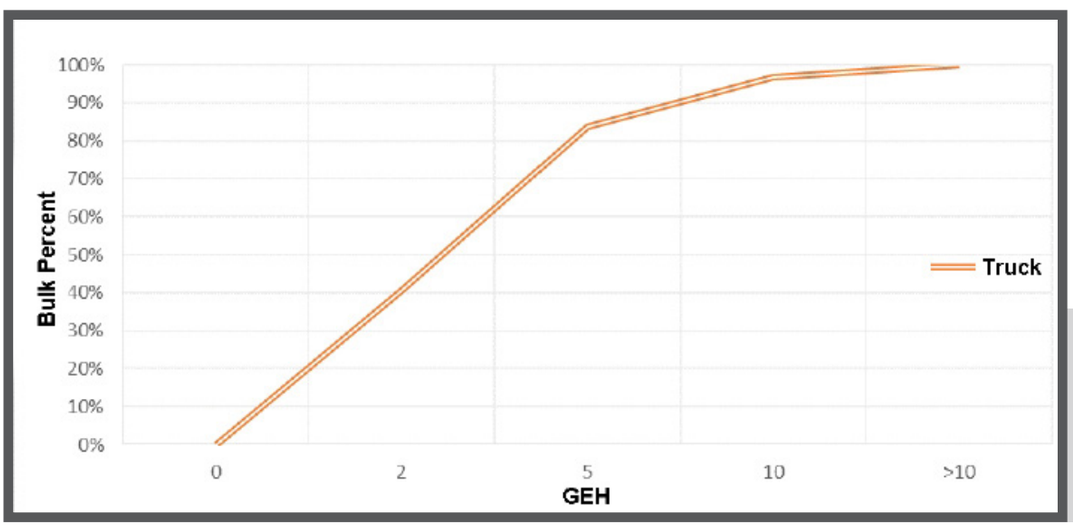

Figure 23: GEH results for trucks

For GEH statistics, values greater than 10 are 127 for 0-2, 62 for 2-5, 22 for 5-10, and 3 points were calculated from 214 cross-section counting stations in trailers. Below are the additional values of GEH Statistics calculated for trailers. According to the calculations, 88% of the GEH values of the trailer numbers observed and calculated on the links are below 5, and the average value is 2.3 (see Figure 24).

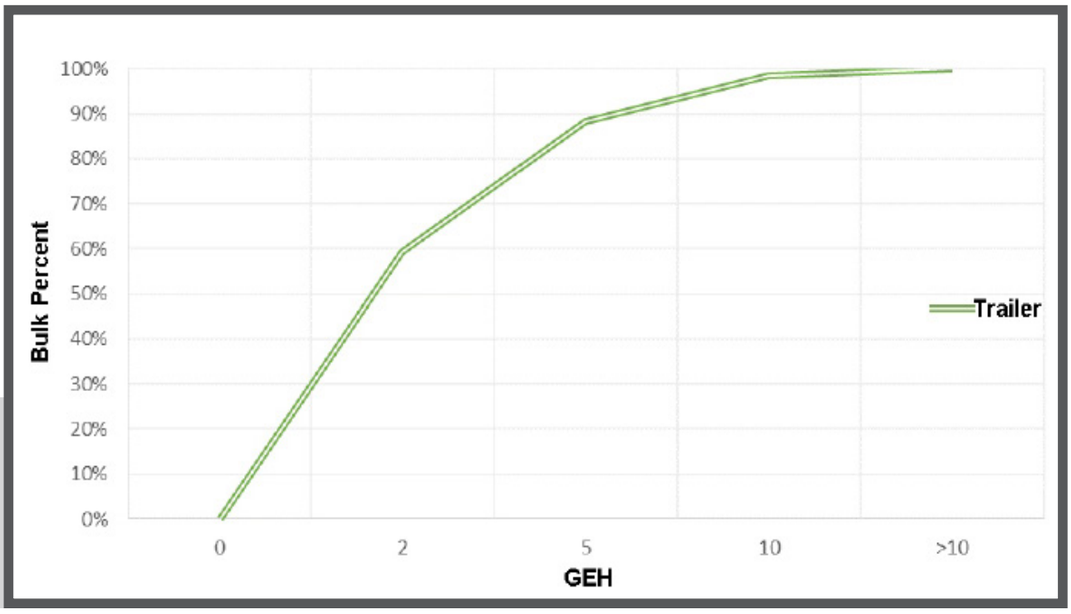

Figure 24: GEH results for trailers

TARGET YEAR SOCIOECONOMIC STRUCTURE

4. TARGET YEAR SOCIOECONOMIC PROJECTIONS

4.1. Introduction

Data about logistics activities throughout Izmir province were collected and analyzed within the scope of the LOPI. In this section, with the help of modeling, the environmental impacts of the logistics sector on the urban transportation infrastructure were calculated, and the problems that await the city and the sector in line with the trend alternative have been identified as inadequacies. This section first addresses the current situation model and the problems identified, then updates the passenger model and logistics model inputs for the 2030 target year. As a result of passenger and freight vehicle assignments for 2030, problems within the target year have been identified.

4.2. Models and Current Status

For the current stuation analysis, modeling studies must be explained first. The modeling studies described in detail in the “B7 Development of the Models and Analysis” report are summarized in this section.

Network Information

The network elements; analysis zones, connectors, nodes, and links are digitized within the scope of the logistics plan model.

The numerical equivalents of the parameters used within the scope of the Model are given on the side. The data for the logistics macro model prepared under the LOPI are as follows (see Figure 25 and Figure 26).

- 14,027 Nodes
- 38,704 Links
- 825 Analysis Zone
- 3.252 Connectors

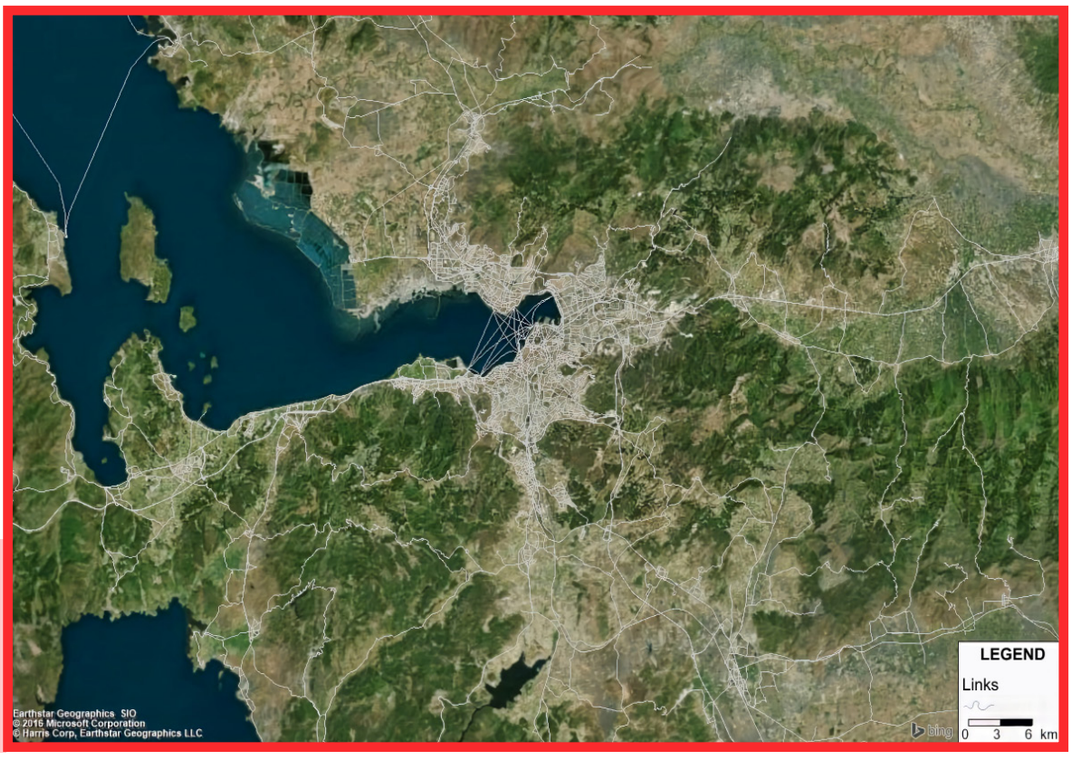

Figure 25: Road networks used in the model

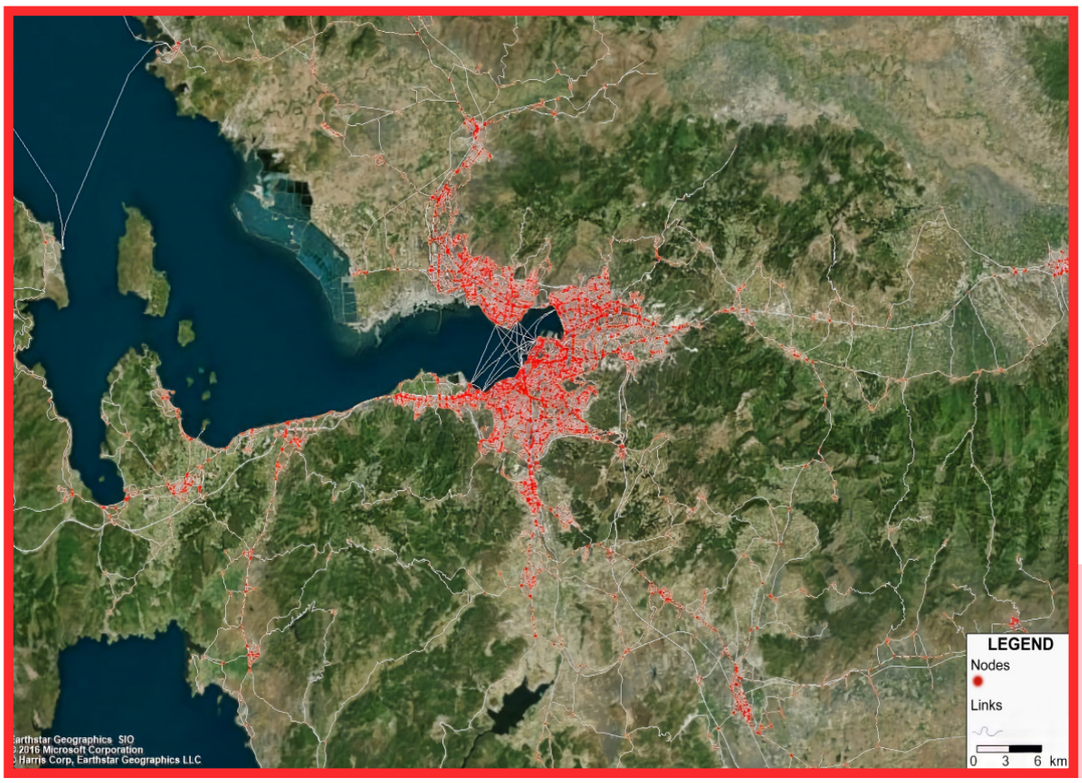

Figure 26: Junctions used in the model

4.2.1. Current Situation Analysis

In line with the data obtained from the modeling studies conducted in the current situation analysis, evaluations were made under two headings: transportation infrastructure and environmental indicators.

Current State of Transportation Infrastructure

Some indicators were calculated using the assignment model under the LOPI. As a result of the link-based determination of freight and passenger travel by assignment model, the capacity, speed limits, and accessibility of the roads in the transportation network of Izmir province can be calculated within the scope of current situation analysis. In the following figure, the general structure of the transportation network under the LOPI and the UPI and the road classifications and capacities in the Izmir road network as of 2018 are given (see Figure 27 and Figure 28).

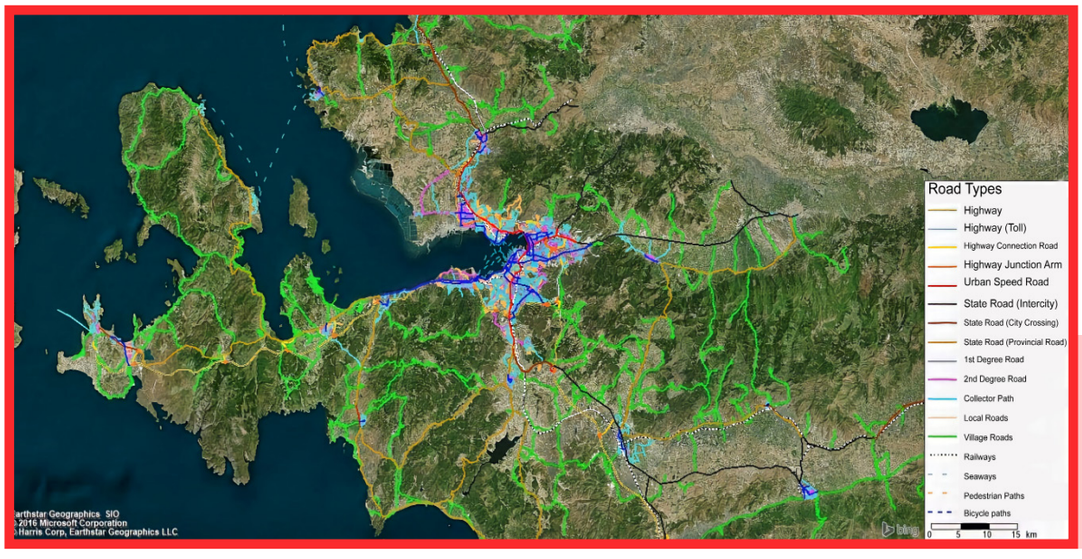

Figure 27: Current road network in Izmir

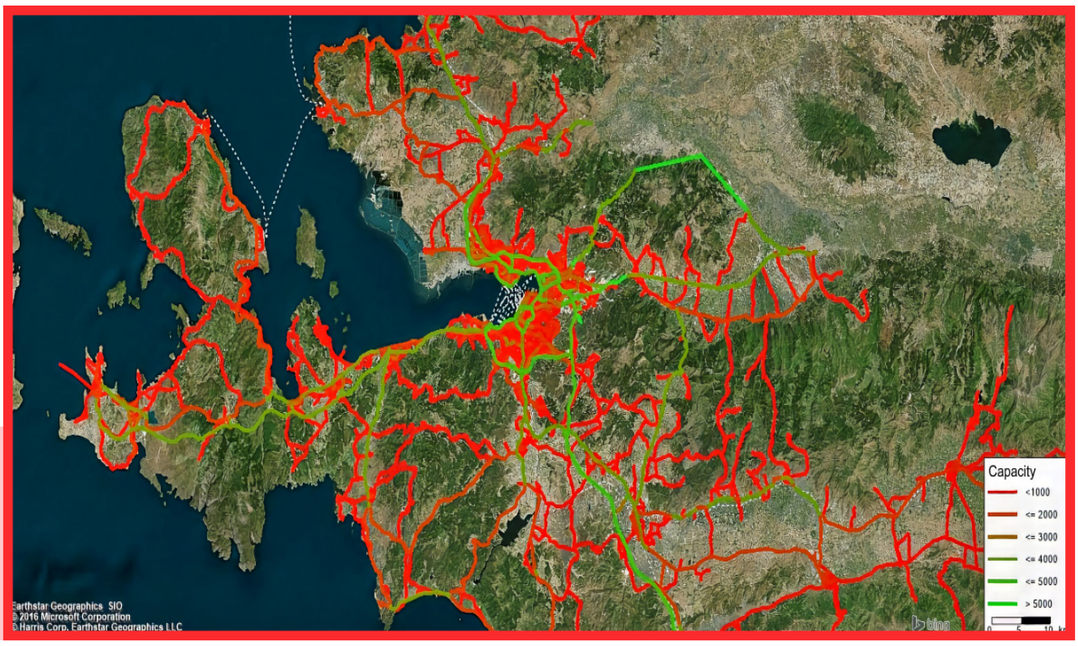

Figure 28: Road capacity values (2018)

According to the co-unit map of the travel time created by reference to the entry point from Manisa, where the city of Izmir is largely trading, transportation accessibility times within Izmir are generally less than 2 hours (see Figure 29).

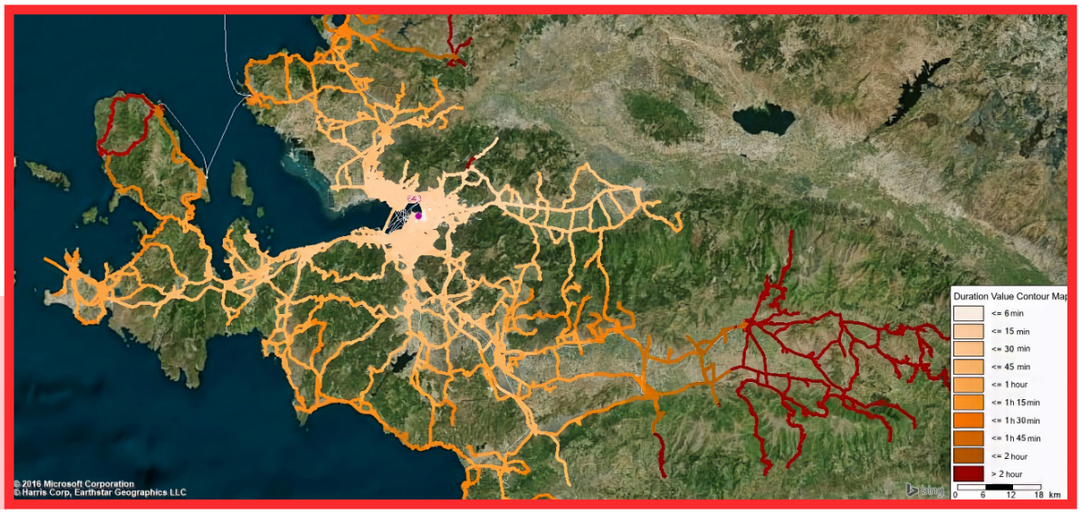

Figure 29: Travel time co-unit map (2018)

Volume/capacity values were examined in detail as a result of the Model (see Figure 30-Figure 31). In Figure 32- 33, volume/capacity values are given on the urban center scale. There are usually two methods for calculating volume/capacity values. One method is that the volume/capacity values of the roads are given over the total vehicle, and another, where this parameter is given in the equivalent car unit (ECU) on the road.

Figure 30: Total volume / capacity values (city scale, 2018)

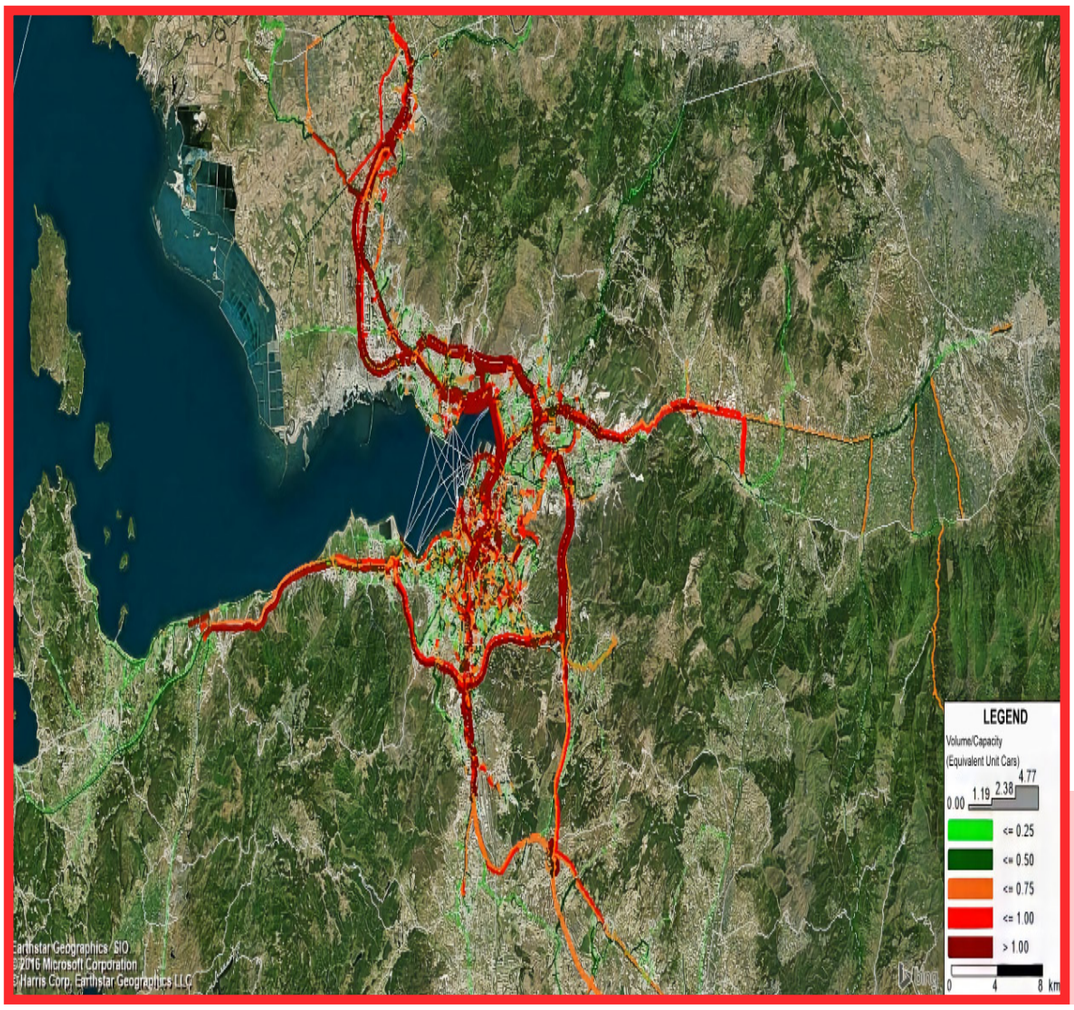

Figure 31: ECU volume / capacity values (city scale, 2018)

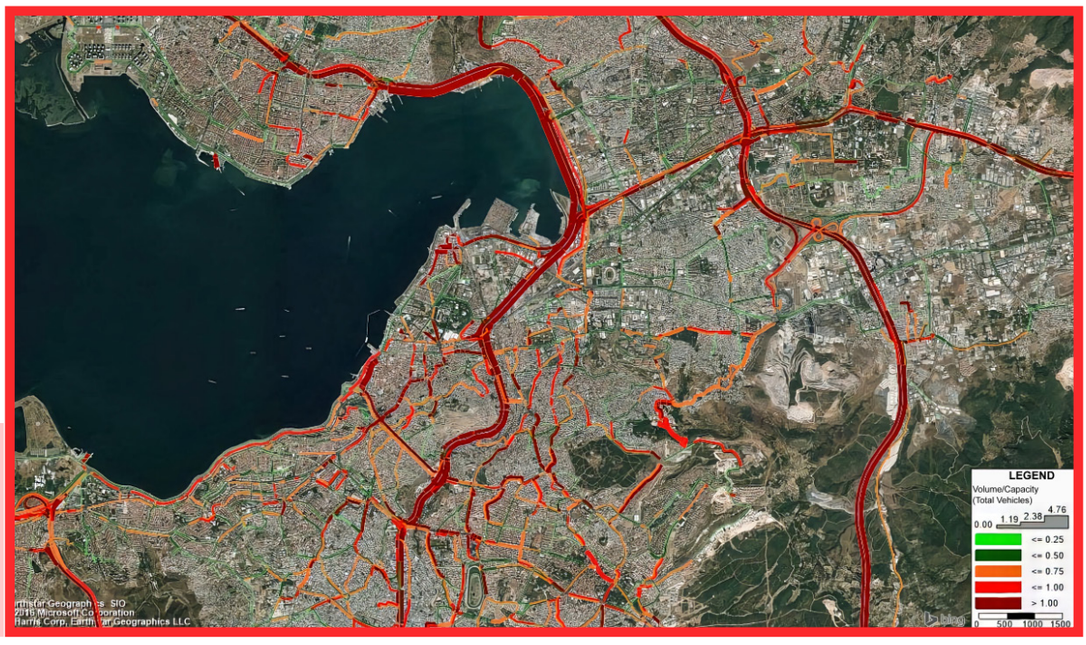

Figure 32: Total vehicle volume / capacity values (city center scale, 2018)

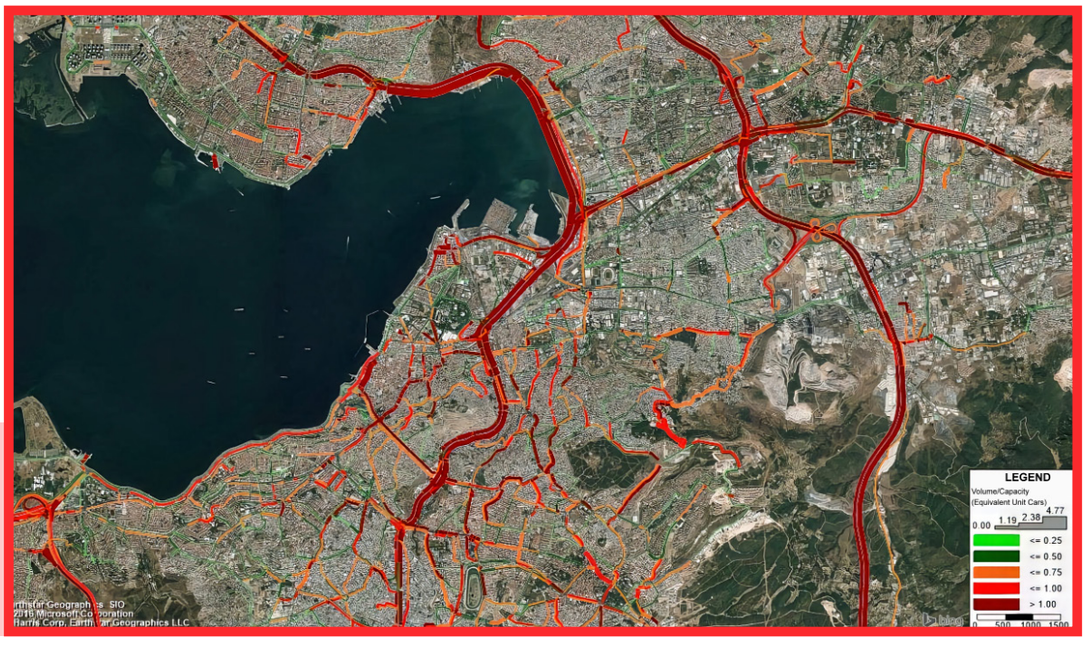

Figure 33: EUC volume / capacity values (city center scale, 2018)

The volume/capacity values calculated by the equivalent car unit method, as seen from the above figures (see Figure 30) exceeds 1 or 100% in almost all of the main arteries of Izmir province. There is no volume/capacity value below 50% in the main highways. Volume/capacity values of these arteries are given as items in detail;

- Liman Street; 1.14
- Altınyol Street; 1.9
- Ankara Street; 1-1.3
- Anadolu Street; 1.5
- Periphery Road; 1-1.8

The parameters that will contribute to the development of the LOPI are given in the morning for peak hours.

- The average travel speed of all links is 38 km/h;
- Volume/capacity values exceed 1 in about 5-6% of links;
- Non-route vehicles at the links (private) travel comes to a total of 103 thousand hours per peak hour;
- Total of 98 thousand vehicles per hour peak type of automobile-hour;
- Commercial vehicle type peak hour in total 800 vehicles-hours;
- Truck type peak hour in total 2,75 thousand vehicles-hours;
- The type of trailer has a total value of 1.25 thousand vehicles-hours per peak hour;
- When compared in terms of vehicle hours, 95% of the value of all vehicle hours constitute the automobile; type, the rest of the freight vehicles or heavy vehicles constitute;
- Small solid waste trucks peak hour 78 vehicles-hours;
- Large solid waste vehicles have a peak hour value of 70 vehicles-hours;
- The total value of vehicles-km on the roads during peak hour is 3.74 million: About this value;.
- 35 thousand commercial vehicles;
- 130 thousand trucks;
- Sixty-two thousand of trailer vehicles constitutes.
- In this way, 93% of the total vehicle-km value constitutes the type of cars. The remaining 7 % is divided between freight vehicles and / or heavy vehicles;
- Heavy vehicles are considered as trucks, trailers and large solid waste trucks, but the average rate of heavy vehicles per peak hour on all links is 4.3 %;
- The proportion of heavy vehicles in 2% of the roads is 50% and more of all vehicles

Environmental Indicators

Carbon dioxide, methane, and nitro-oxide gases from greenhouse gases were studied under the LOPI Model. Although air quality measurements are carried out in Turkey or Izmir province, there is no comprehensive study on unit greenhouse gas emissions of vehicle types registered with traffic. A UK-based study published in 2018 has, therefore, been used as part of the project. In the study, unit emission values of air pollutants were given separately according to fuel and vehicle types on a kg basis and compared with vehicles registered in Turkey. In this sense, the average carbon dioxide with an emission value of 180-200 gr/km (DBEIS, 2018) for an average passenger vehicle with gasoline fuel was found to be suitable for Turkish conditions under the study. Thus, carbon dioxide, methane, and nitrous oxide gases were studied in the transport network.

The transport sector releases the most carbon dioxide, which is the result of burning fossil fuels. Therefore, carbon dioxide remains extremely heavy compared to other gases. Therefore, the researchers ensured that all gases were translated into carbon dioxide equivalence. Carbon dioxide equivalence values calculated on kg/vehicle-km basis are given on a connection basis for peak hour off-route travel (cars, vans, trucks, trailers). The equivalent amount of carbon dioxide released from all off-route travel between 07:45 and 08:45 in the morning is 850 thousand kg of gas. (see Figure 34).

Figure 34: Peak hour carbon dioxide equivalent gas release (2018)

Peak hour total

- Carbon dioxide emissions 845 tons,
- Methane gas release 190 kg,
- The nitro-oxide gas release is 5 tons.

One of the external indicators and one of the parameters that can be evaluated within the economic criteria is the noise level caused by transportation. The noise level is important for human health, and the passage of the main roads close to residential areas is seen as a pollutant in this respect. It is possible to divide the noise measurements into sound power and sound pressure. Noise power deals with sound emanating from the source. It can also be expressed as the volume measured at the Limit value. When the calculated sound powers are examined, the forces generated by the movements of the vehicles at the source, so on the road axis, are at the level of 150 dB. Especially on the main axles, these values rise above 180 dB. Although this level decreases as you move away from the source, it has been determined that the sound level on many axles is at a level that will affect human health (see Figure 35).

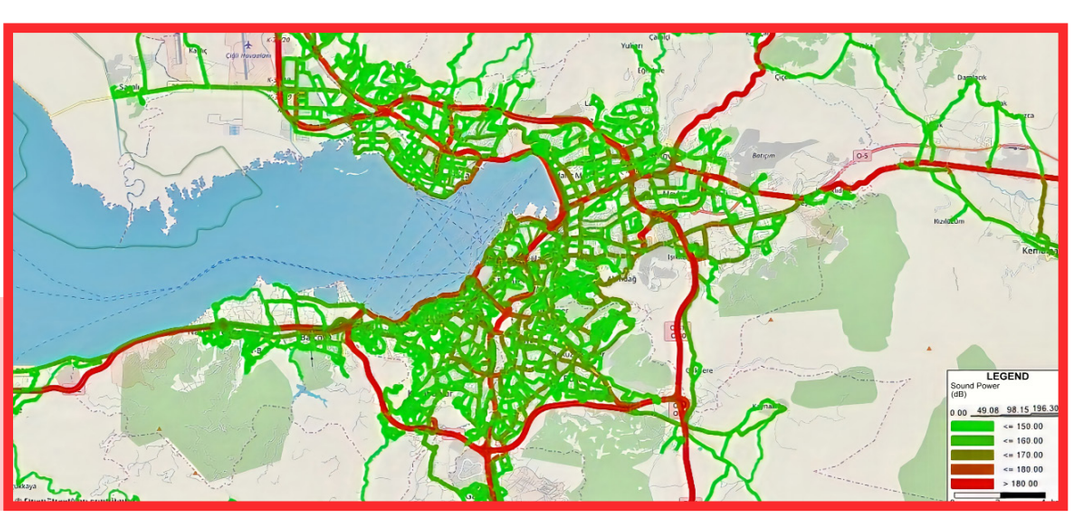

Figure 35: Izmir-wide noise model output (2018)

4.3. Future Situation Analysis

The model was re-run on the network, which was updated for 2030, following the target year projections. At this stage, the freight travel production and distribution model, which are calibrated in the current situation, were also used for the target year. Similar to the current state model, the assignments are carried out as follows:

- Capacity - restrained equilibrium assignment model:
    - o Car,
    - o Van,
    - o Truck,
    - o Trailer
- Timetable - based public transport assignment:
    - o Bus,
    - o Ferry,
    - o Minibus
- Traffic system - based public transport
    - o Salid waste transport

BPR was used as the cost function in the method used to determine routes for assignments, and iterative methods were repeated similar to the current situation model.

Peak hour has been evaluated as peak hour, similar to the current state model. Rates corresponding to freight traffic at peak hours were used. In the study of converting vehicle types into automobile equivalents, the ratios in TS 6407 were used, similar to the ones given in the abstract.

After the calculations are performed, the maps given for the current status assignment results are given again within the target year model, and the changes between the two working years are intended to be observed. The car matrix obtained by re-updating the current state model of the UPI study was shown as a result of vehicle types assignment obtained as a result of LOPI model studies (see Figure 36).

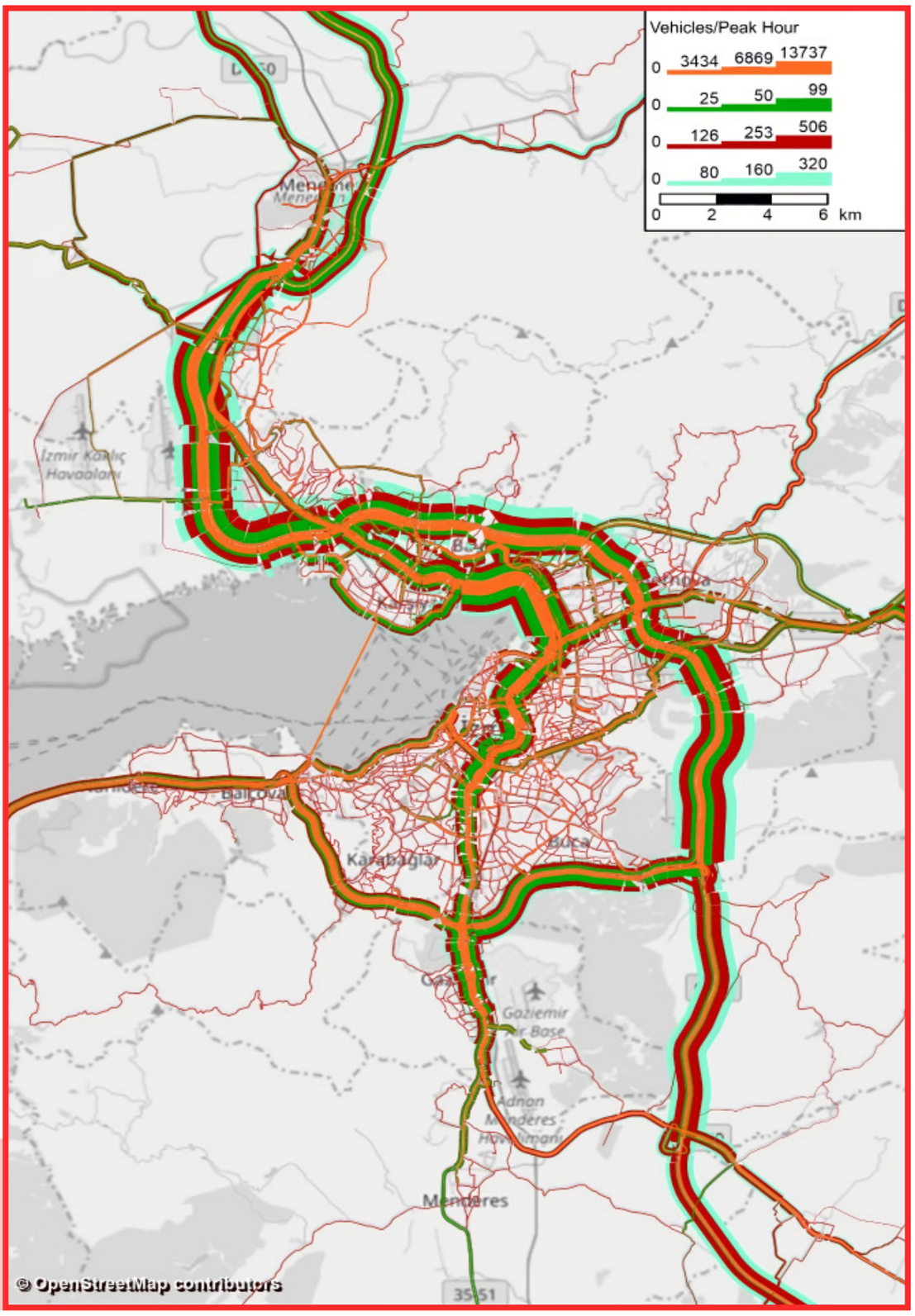

Figure 36: Vehicle types assignment result (2030)

TARGET YEAR LOGISTICS MOBILITY ESTIMATES AND DETERMINATIONS OF PROBLEMS

5. TARGET YEAR LOGISTICS MOBILITY ESTIMATES AND DETERMINATIONS OF PROBLEMS

5.1. Introduction

Existing data on the transportation and logistics infrastructure of Izmir province has been obtained, and new data has been collected through field studies within the scope of the Izmir sustainable urban logistics plan. The data obtained were used as inputs to the logistics model of Izmir, and the model was established for the year 2030, which is the target year with the current situation. The analysis of the inadequacy at Izmir was obtained by future situation analysis and is included in this section.

5.2. Insufficiency Analysis

Two topics were evaluated under the analysis carried out for the target year modeling: transportation infrastructure and environmental indicators. Vehicle traffic, volume/capacity values, heavy vehicle ratios, etc. the conditions of the variables in the target year have been determined. In the heading of environmental (external) indicators, the status of air quality and noise levels resulting from transportation in the target year is calculated. Thus, the values taken by the parameters are calculated as a result of the model are determined within the framework of sustainable urban logistics or transportation.

Indicators In The Target Year Of Transportation Infrastructure

As a result of the capacity-restrained equilibrium assignment model, travel times on existing roads in Izmir have been revealed, and co-unit maps have been created based on the initial times, taking into account the current times after the assignment. Travel time co-unit maps were calculated bi-directionally. For distributions from the center, a point center was accepted from the Konak district. For distributions from the outer regions, a point center was accepted from the entrance to Manisa (see Figure 37 and figure 38).

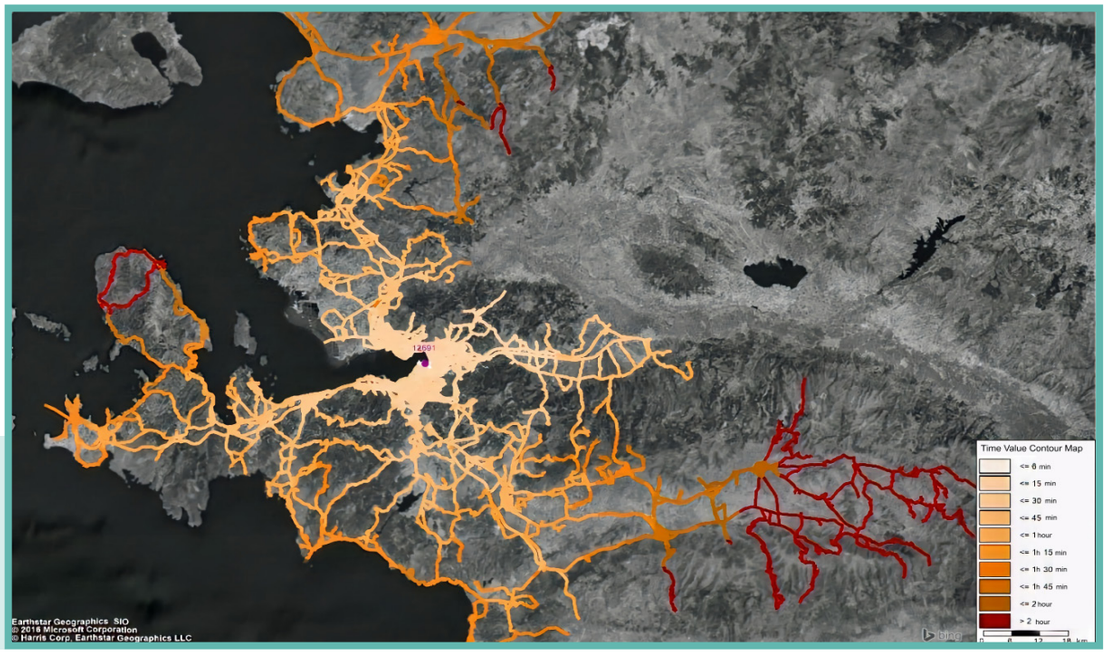

Figure 37: Konak district travel time co-unit map (2030)

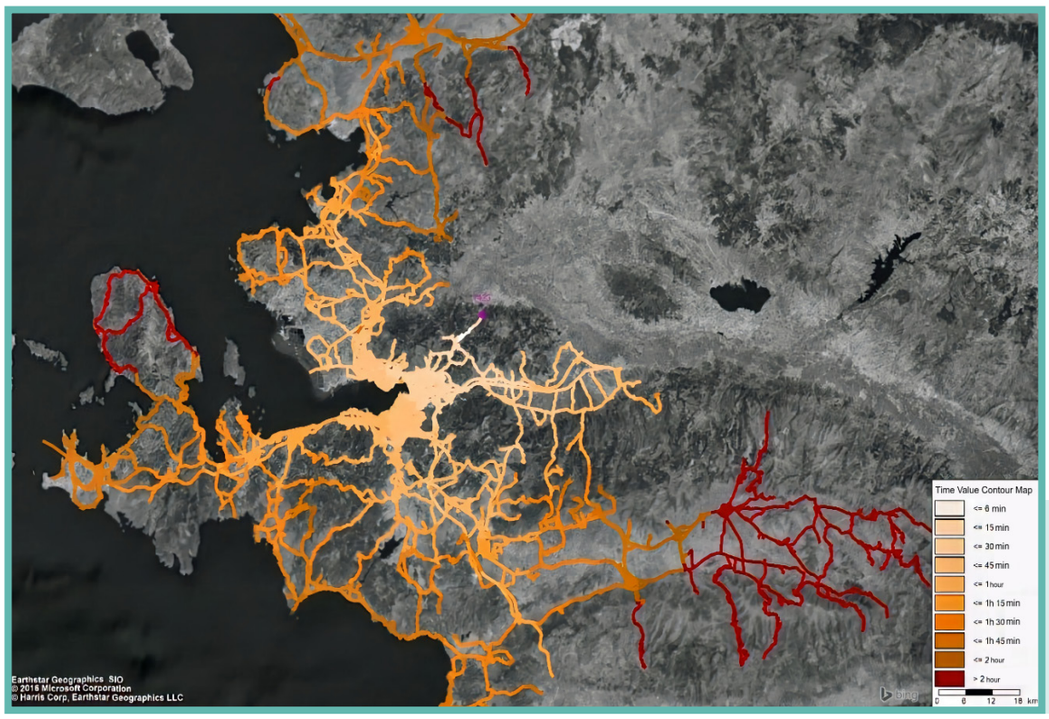

Figure 38: Manisa entry travel time co-unit map (2030)

Travel times compared to the same maps in 2018, under the trend alternative, the average transportation travel times in Izmir province have accelerated by about 15 minutes due to investment decisions already under plans. However, to reflect on the deficiencies, other indicators were also examined under the heading.

In addition to travel times, volume/capacity values on road network tracks were calculated within the framework of the indicators for the target year of transportation infrastructure. Volume / capacity values are given both in total vehicles and in equivalent units of cars (see Figure 39-Figure 42).

Figure 39: Total vehicle volume / capacity values (city scale, 2030)

Figure 40: ECU volume / capacity values (city scale, 2030)

Figure 41: Total vehicle volume / capacity values (city center scale, 2030)

Figure 42: ECU volume / capacity values (city center scale, 2030)

As in the present case, the volume/capacity value of the roads is not below 50%. The volume/capacity detail values are given as items.

- Liman Street; 1.59
- Altınyol Street; 2.01
- Ankara Street; 1.25
- Anadolu Street; 1.5
- Periphery Road; 1-2

The parameters that will contribute to the development of LOPI are given in the morning peak hour:

- The average travel speed of all links is 32 km/h,
- Volume/capacity values exceed 1 in about 5% of links,
- Non-route vehicles at the links (private) are travelling for a total of 146 thousand hours per peak hour,
    - Total of 140 thousand vehicles per hour peak type of car-hours,
    - Commercial Vehicle type peak hour in total thousand vehicles-hours,
    - Truck type peak hour in total 4.5 thousand vehicles-hours,
    - Trailer type has a total value of 2.5 thousand vehicles-hours per peak hour,
    - When compared in terms of vehicle hours, 94% of the value constitute vehicle hours for cars; the rest are freight vehicles or heavy vehicles.

- The total vehicle-km value of the peak hour on the roads is 3.44 million,
    - 3.4 million of these cars,
    - 40 thousand Comercial Vehicles,
    - 174 thousand trucks,
    - 100 thousand of them are Trailer vehicles.
    - In this way, 91% of the total vehicle-km value of the type of car constitutes private transport. The remaining 9% is divided between freight vehicles and/or heavy vehicles.

- Heavy vehicles are considered as trucks, trailers and large solid waste trucks, but the average rate of heavy vehicles in peak hour is 5% on all links;
- The proportion of heavy vehicles in 2% of the roads is 50% and more of all vehicles.

Environmental Indicators

Carbon dioxide, methane, and nitro-oxide gases from greenhouse gases were studied under the Model. Although air quality measurements are carried out in Turkey or Izmir province, there is no comprehensive study on unit greenhouse gas emissions of vehicle types registered with traffic. A UK-based study published in 2018 has, therefore, been used as part of the project. In the study, unit emission values of air pollutants given separately according to fuel and vehicle types were given on a kg basis and compared with vehicles registered in Turkey. In this sense, the average carbon dioxide emission value of 180-200 gr/km (DBEIS, 2018) for an average passenger vehicle with gasoline fuel was found to be suitable for Turkish conditions under the study. Thus, carbon dioxide, methane, and nitrous oxide gases were studied in the transport network.

The transport sector releases the most carbon dioxide, which is the result of burning fossil fuels. Therefore, carbon dioxide remains extremely heavy compared to other gases. For this reason, the researchers ensured that all gases were translated into carbon dioxide equivalence. Carbon dioxide equivalence values calculated on Kg / vehicle-km basis are given on a link basis for ITMP peak hour non-route travel (cars, vans, trucks, trailers). The amount of carbon dioxide equivalent gas emissions from all non-route travel between 07:45 and 08:45 in the morning is approximately 860 thousand kg (860 tons) (see Figure 43).

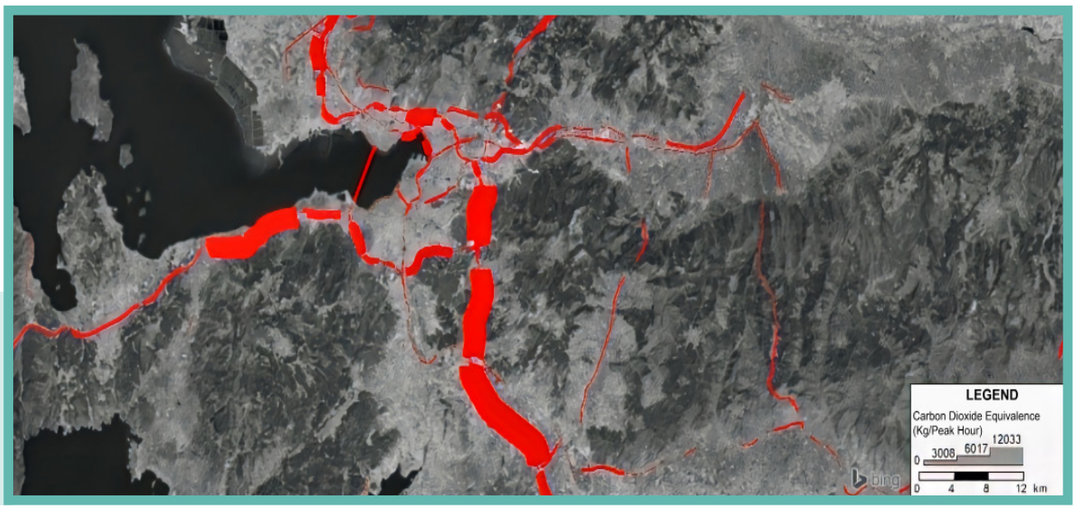

Figure 43: Peak hour carbon dioxide equivalent gas emissions (2030

At peak hour,

- Carbon dioxide emissions 854 tons,
- Methane gas release 160 kg,
- The nitro-oxide gas release is 6 tons.

One of the external indicators and parameters that can be evaluated within the economic criteria is the noise level caused by transportation. The noise level is important for human health, and the passage of the main roads close to residential areas is seen as a pollutant in this respect. It is possible to divide the noise measurements into sound power and sound pressure. Sound power deals with sound emanating from the source. It can also be expressed as the volume measured at the Limit value. Sound Power expression is given in the following equation (Maraş & Sesli, 2016).

$$Lw = 46 + 30\log V_{50} + C + 10\log\left(\frac{Q + Q\%\,\frac{PL(EQ-1)}{100}}{V_{50}}\right) - 30$$

Q: Vehicle volume (vehicle/hour/track)
PL: Percentage of heavy vehicles
EQ: Light Vehicle - Heavy Vehicle equivalence
V_{50}***:*** Average traffic speed in km/h, (V_{50}<50 if V_{50}=50 is taken)
C: Traffic flow (smooth traffic: 0, discrete traffic: 2, accelerating traffic: 3)

Sound power, as one of the external indicators within the scope of the model output, is calculated with the help of the equation given above (see Figure 44). It has been determined that the sound level on many axles is at a level that will affect human health.

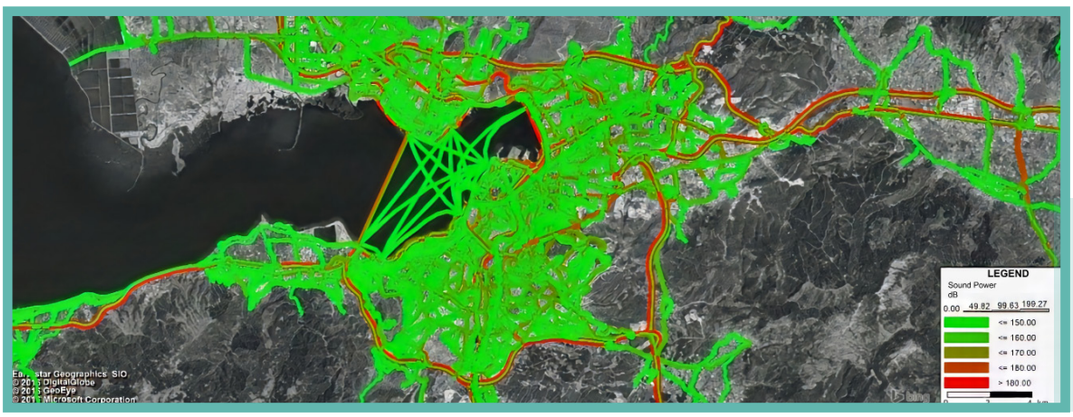

Figure 44: Izmir-wide Sound Power model output (2030)

The structure of the network elements and analysis regions has been updated in the context of the inadequacy analysis studies carried out within the framework of a do-nothing alternative. One for all commuters and road network since the type of automobile vehicle is still the most dominant type today. It affects the degree. For this reason, freight vehicles cannot be considered separate from passenger vehicles. The same is true for passenger vehicles. Due to this, the UPI was used as a base in the LOPI studies, and the reflections of the inter-interactive vehicles on the road network were observed in the model studies. The passenger model is needed first to display the picture of the logistics model in 2030. The passenger model performed in 2015 has been updated primarily to 2018 in the LOPI current status model framework, and to 2030 in the incapacity analysis framework. In this way, the effects of all types of vehicles on each other can be observed. The output is given through the model; in addition, in the result section, some of the parameters required to compare the two models are given as schemas, templates (see Figure 45-Figure 51).

Figure 45: Journey parameters (2018)

Figure 46: Journey parameters (2030)

Figure 47: Logistics parameters (2018)

Figure 48: Logistic parameters (2030)

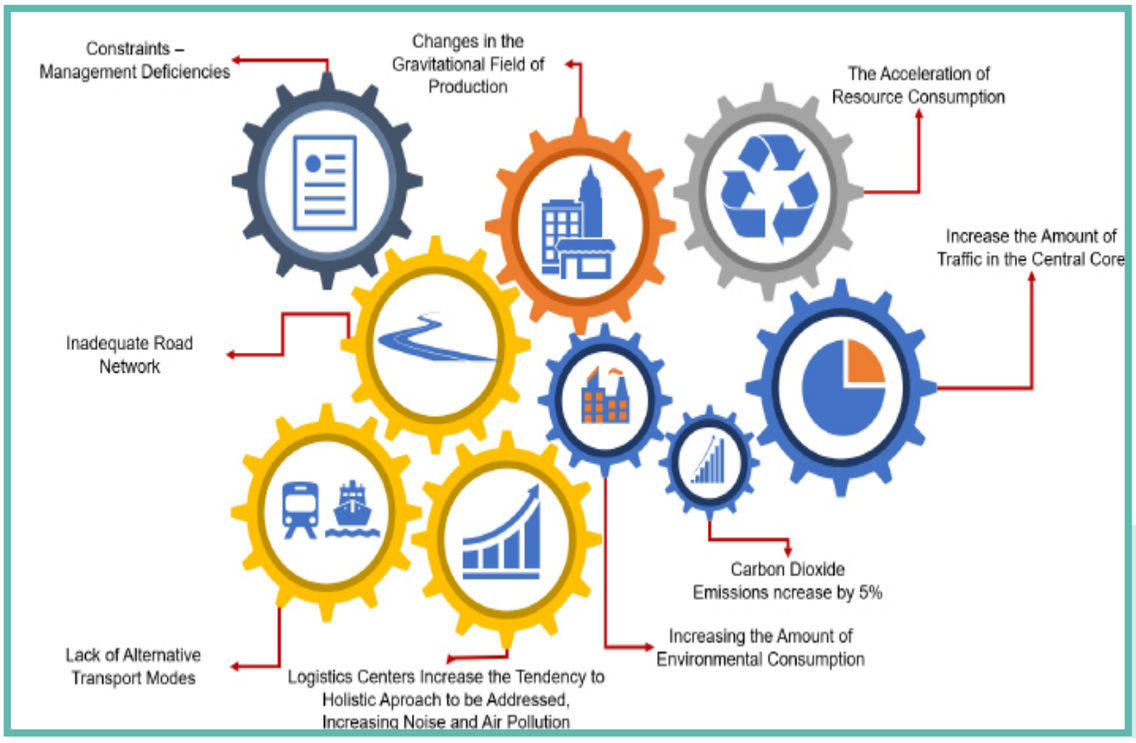

Figure 49: expected problems in the future.

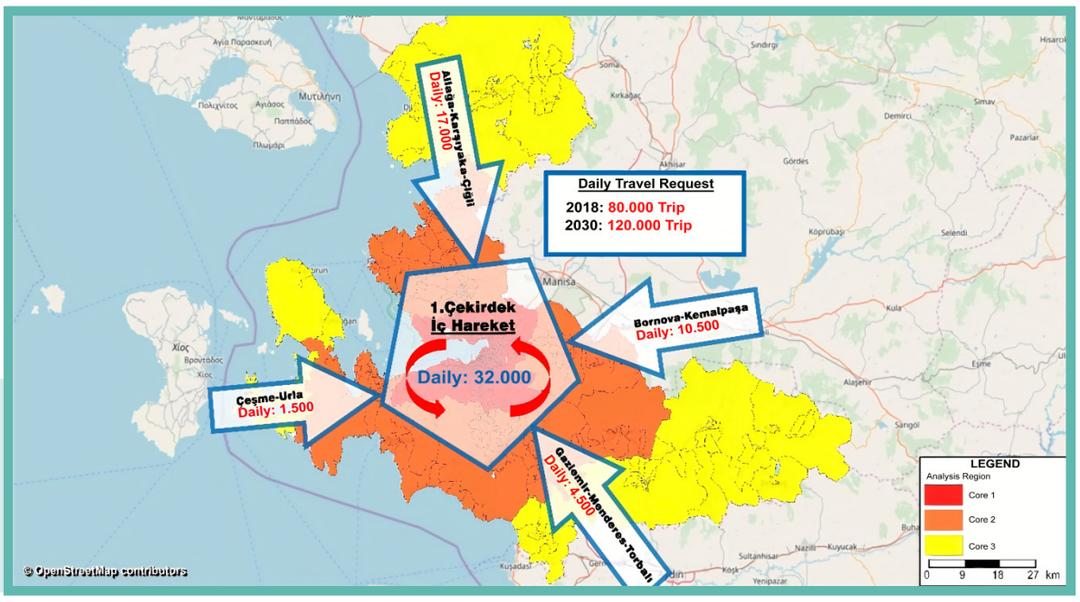

Figure 50: Freight corridors travels (total vehicles)

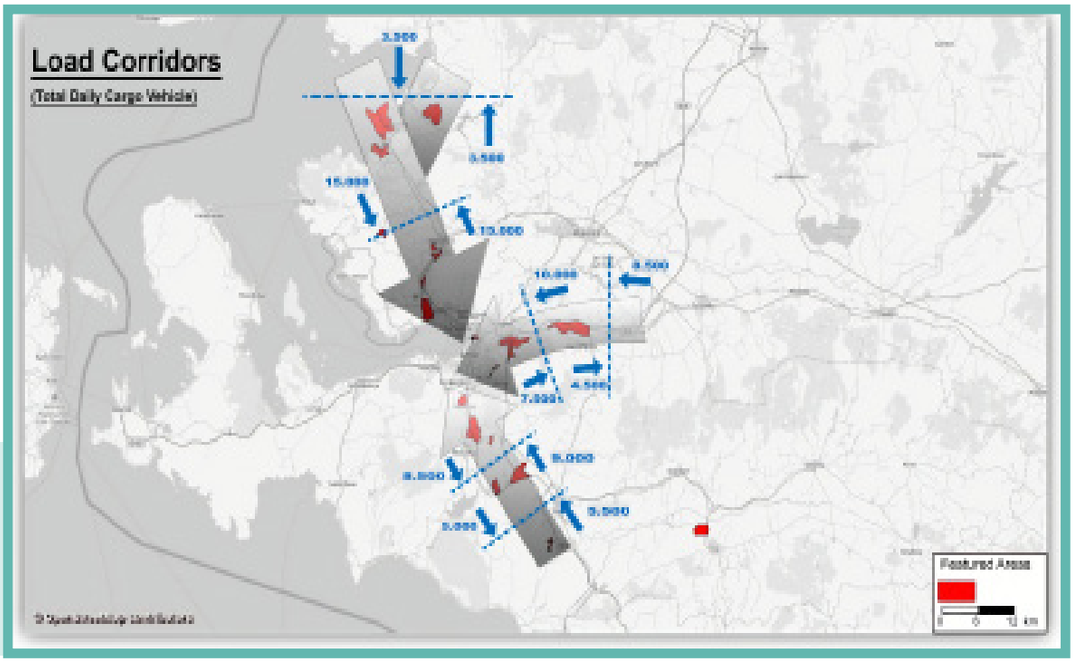

Figure 51: Freight corridors travel characteristics (total vehicles/ day, 2030)

PARTICIPATION MODEL, LOGISTICS PLAN AND GOAL SETTINGS AND STRATEGIES

6. PARTICIPATION MODEL, LOGISTICS PLAN, GOAL SETTINGS AND STRATEGIES

6.1. Participation Model

Sustainable urban logistics planning cannot be examined independently of current implementation conditions and its possible impacts. From the planning stage to the implementation stage, stakeholders involved in the urban logistics planning process and having different levels of responsibility and expectations are forced to fight with various obstacles. These obstacles can manifest themselves in economic, social, political, physical, and technological dimensions, which also have a dynamic structure. One of the main reasons for tackling obstacles from planning to implementation is the creation and implementation of a simple, viable, and sustainable model of participation. The main objective is to ensure that the plan is developed in a strong and qualified manner based on the principle of common mind with the relevant stakeholders. The information to be obtained from stakeholders during the participation process creates input to the models, projects, and activities to be created within the scope of planning. The participation model ensures that the project is supported by the relevant parties with the participation of the stakeholders involved in the process, and also makes it possible to prevent or reduce potential resistances before they arise, especially during the implementation phase. The stakeholder eco-system that interacts in the Sustainable Urban Logistics Plan (SULP) studies is shown below (see Figure 52).

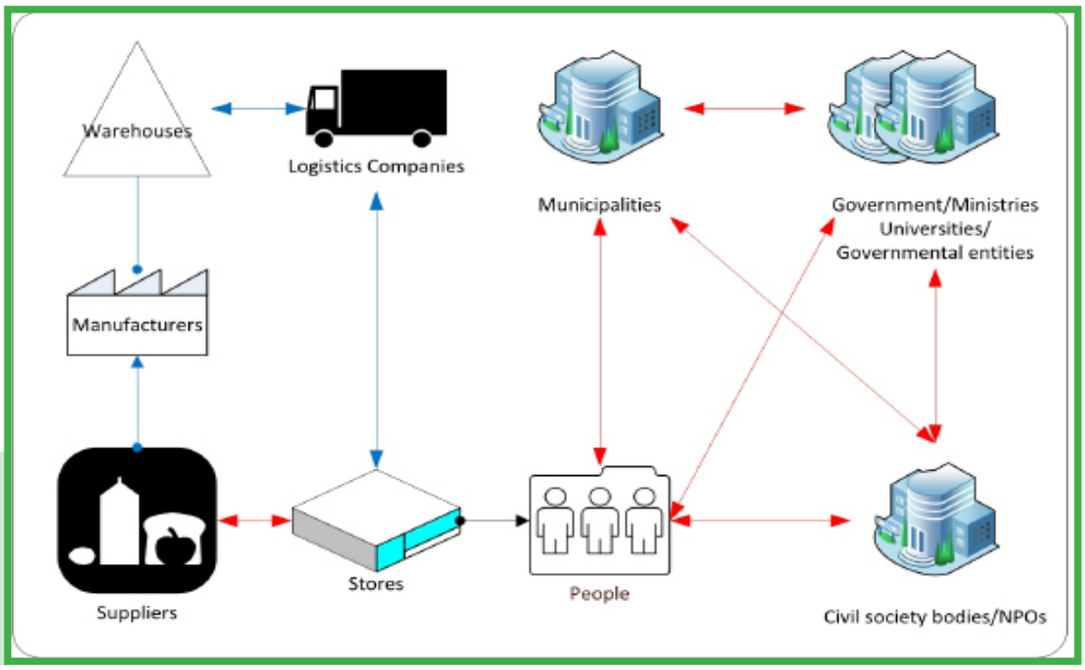

Figure 52: SULP stakeholder interaction

In the first phase of the LOPI Project, Strengths, Weaknesses, Opportunities, and Threats (SWOT) workshop was conducted with the participation of over one hundred stakeholders within the context of the participation model. In the workshop, the stakeholders expressed their thoughts and views on the current state of urban logistics activities. In the SWOT workshop, the need for urban freight mobility, needs for the elimination expectations, the city of the practicability of freight transport, accessibility of individuals with and without disabilities within the city, social quality of life, traffic safety, noise have been considered. And considering all the factors such as environmental effects, the infrastructure of Izmir province, superstructure, legislation, development plans/arrangements, supervision, technology/ Information management, and integration have been reached out in important areas such as perceptual identification.

In the “future” workshop, evaluations were made for future situation planning of urban logistics processes for both urban and rural areas. This meeting aimed to determine the primary strategic priorities for Izmir to have a sustainable city logistics in the future, to identify the targets, and to determine the projects and policies for achieving these goals.

Then PESTEL Analysis was carried out for urban, rural development and solid waste logistics projects, which were suggested based on the unique logistics model developed by the project team using the existing and new data collected during the project. The PESTEL study evaluated the proposed projects in terms of political, economic, social, technological, environmental, and legal factors and provided information about increasing their applicability and sustainability.

6.2. Logistics Plan Strategies and Basic Objectives

In general, the framework taken by LOPI studies is in parallel to that used by the Turkey Logistics Master Plan’s approach of the strategy document for urban logistics. This framework benefits from information technologies for economic, environmental, and social sustainability, consider effective land-use decisions, and aims the enhancement of required human resources. Thus it is considered a suitable guideline for LOPI in the context of national and international compliance. As a result of the literature study, the evaluation of the SULP document, and the participation process workshops, 11 strategic objectives were determined for LOPI:

- **(S1):** Reducing the impact of urban logistics activities on the mobility of urban residents,
- **(S2):** Supporting the development of rural, historical, cultural, and tourist activities and ensuring their economic sustainability
- **(S3):** Reducing the impact of logistics activities on the environmental ecosystem,
- **(S4):** Development of incentive mechanisms for the implementation of green vehicles and alternative transport types,
- **(S5):** Optimization of logistics activities,
- **(S6):** Periodic realization and implementation of urban logistics plans following city transportation main plans,
- **(S7):** Commissioning of intelligent transport and logistics IT applications,
- **(S8):** Ensuring effective coordination of logistics activities in the city,
- **(S9):** Improving the performance of city logistics management,
- **(S10):** Development and updating of legislation for regulation and supervision of urban logistics activities,
- **(S11):** Reducing the negative impact of waste logistics on urban quality of life

Participation processes, which were given high importance at every stage of LOPI studies, also took an important place in the goal-setting phase and became effective. The goals in LOPI studies were defined as short-term (K), Medium-Term (O), and long-term (U). The relationship between the objectives and the sustainability parameters was also defined as economic (E), Environmental (C), and Social (S). The target proposals were developed as a result of the evaluations of the LOPI project team and presented in relation to the strategic objectives (see Table 22).

Table 22. The relationship between goals and strategic objectives determined for LOPI

Target No	Target	Perspective			Effectiveon			Strategic Goals										
		K	O	U	E	Ç	S	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
H1.1	By 2025, improving the quantity and quality of public transportation by 25% to attraction points like shopping centers, cultural zones sports centers and hospitals etc. (to ease the logistics activities)			X	X	X	X	X	X									
H1.2	By 2030, increasing the length of the railway system used for public transportation by 25%.			X	X	X	X	X	X									
H1.3.	By 2025, assuring the commercial trucks entering the city center is at least 90% full.			X		X	X	X		X		X				X		
H2.1.	By 2021, development of detailed policy document for "consume where produced"	X	X		X	X			X	X								
H2.2.	By 2021, determining and enhancing the local solution mechanisms to support the urban and rural community development	X	X		X	X			X	X								
H2.3.	By 2021, development of legislation to control the entrance of load trucks to cultural, touristic and historical sites where pedestrian movement is high	X			X		X		X							X		
H2.4.	By 2025, the ratio of the fully electric and hybrid logistic vehicles used in cultural, touristic and historical sites will be 50% of the total number of vehicles. By 2030 the ratio is to be increased to 60%.		X	X	X	X			X	X	X							
H3.1.	By 2021, development and application of a system which is supported by both hardware and software to observe the environmental performance of urban logistics activities in İzmir	X				X				X				X		X	X	
H3.2.	By 2025, improving the environmental performance of urban logistics activities in İzmir by 15%, and by 2030 by 25%.		X	X	X	X				X	X	X				X		
H4.1.	The use of renewable energy resources in logistic centers will be increased to 30% and 40% by 2025 and by 2030 respectively.		X	X	X	X				X	X	X				X		
H.4.2	The portion of full-electric and hybrid logistic vehicles used in İzmir city center will be 35% and 50% by 2025 and by 2030 respectively		X	X	X	X	X	X		X	X					X		
H.4.3	The portion of load transportation on the bicycle (electric powered included) in the city center will be 20% and 30% by 2025 and by 2030 respectively.		X	X		X	X	X		X	X					X		
H.5.1	By 2021, route optimization studies will be developed and integrated into the city's GIS.	X			X	X	X	X		X		X		X	X	X		

K-Short Term; O-Medium Term; U-Long Term / E-Economic; O-Environmental; S-Social

Table 22. The relationship between the goals and strategic objectives determined for LOPI (continued)

Target No	Target	Perspective			Effectiveon			Strategic Goals										
		K	O	U	E	Ç	S	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
H.6.1	Urban logistics plan will be integrated into the first transportation master plan ahead			X		X	X	X	X	X				X			X	X
H.6.2	By 2025, in the city center, parking areas of load trucks will be planned and organized			X		X	X	X					X	X			X	
H.6.3	By 2030, all logistics vehicle parking facilities including those for trailers will be enhanced and open for use and will also be supported by the smart city applications			X	X	X	X					X	X	X		X		
H.7.1	By 2021, development of the digital model of the urban logistics model	X			X	X	X	X		X					X	X	X	
H.7.2	Putting into practice the Urban Logistics Module of IZUM by 2023.		X		X	X		X		X		X		X	X	X		
H.7.3	By 2022, the dynamic message system will be developed for the purpose of urban logistics		X		X	X	X	X		X		X	X	X		X	X	
H.7.4	Increasing the smart intersection applications by 5-10% yearly by giving priority to intersections with heavy urban load movement.	X	X	X	X	X						X	X	X		X	X	
H.8.1	By 2021, under the supervision of İzmir Municipality, a coordination mechanism consisting of all related parties will be developed to plan and oversee the logistics application in the city	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X
H.8.2	The portion of certified and qualified workers in the logistics activities will be 25% by 2025 and 50% by 2030 respectively.		X	X	X				X			X				X		
H.8.3	Increasing the collaborative transportation by 10% annually.	X	X	X	X	X		X	X	X		X			X	X		
H.8.4	Decreasing the portion of highway based load transportation by 5% annually.	X	X	X		X				X					X	X		
H.9.1	By 2021, developing an international-based benchmarking system for urban logistics and planning and implementation activities.	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X
H.10.1	On a yearly basis, evaluation of logistics-related legislations and developing a report for possible revision requirements	X	X	X	X	X	X										X	

K-Short Term; O-Medium Term; U-Long Term / E-Economic; O-Environmental; S-Social

Table 22. The relationship between the goals and strategic objectives determined for LOPI (continued)

Target No	Target	Perspective			Effectiveon			Strategic Goals										
		K	O	U	E	Ç	S	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
H.10.2	By 2021, putting in place an analysis guideline to evaluate the urban effect of companies with logistics activities	X			X	X	X									X	X	
H.10.3	By 2021, develop a legislation to define and determine the vehicles used for the city logistics and their routes	X			X	X	X									X	X	
H.11.1	Putting into practice the Solid Waste Module of IZUM by 2023.		X			X	X					X		X		X		X
H.11.2	By 2025, improving the environmental performance of Solid Waste management activities in İzmir by 15%; and in 2030 by 25%.		X	X		X	X			X						X		X

K-Short Term; O-Medium Term; U-Long Term / E-Economic; O-Environmental; S-Social

DEVELOPMENT OF ALTERNATIVE SCENARIOS

7. DEVELOPING ALTERNATIVE SCENARIOS

7.1. Introduction

As a result of the existing data, new data and modeling studies collected within the scope of the "LOPI project" covering the responsibility area of Izmir Metropolitan Municipality (IBB), "Urban Logistics proposals and evaluation" were carried out in this part of the report for the province general. It is apparent that some concepts need to be defined before suggestions and evaluations are made. Urban Logistics is at the foremost of these concepts. Urban logistics: it can be defined as a multi-parameter system involving different stakeholders such as retailers and other urban commercial-service locations, wholesalers and distribution companies, transport and logistics carriers, public administrations, and real estate agents. Furthermore, Urban Logistics is crucial to the quality of life of citizens living in the city, playing an economic role that provides benefits for multiple stakeholders across a complex and dynamic supply chain. Movements of commercial vehicles to meet the needs have a negative effect on transport networks (road, rail, sea, and airline) in terms of both traffic congestion and greenhouse gas emissions. The LOPI project, developed for the regulation and management of Urban Freight Transport, includes the assessment of urban logistics measures and measures for Izmir province in line with objectives, policies, modeling, and legal framework. Proposals for the whole of the city are presented in this section. These suggestions are grouped into 8 main topics.

1. Logistics and Transportation Infrastructure Proposals
2. Recommendations for Special Regions
3. Proposals for Heavy Vehicle Parks
4. Recommendations for Dangerous Goods Transport
5. Alternative and Green Vehicles
6. Freight Travel Demand and Land Use Management
7. Intelligent Transportation Systems
8. Regulatory Organizational Structure and Education

At the end of the chapter, these proposals have been linked to the project strategy and objectives.

7.2. Logistic and Transportation Infrastructure Recommendations

As a result of the in-depth interviews conducted in the LOPI process, the SWOT brainstorming meeting conducted within the scope of the participation model, the opinions obtained by the future situation Planning Workshop and PESTEL workshop and the joint meetings held with the administration in line with the target year inadequacies analysies, a total of 20 proposal packages in the form of 5 main and 4 sub-scenarios were set as a result of testing of the proposal packages in the model. The most effective proposal package was determined throughout the province and in the urban area. These studies are detailed in the report entitled "development of B9 target year alternatives". The model and process selected as a result of the detailed studies are described below.

The proposal packages include investments that can be reflected in the developed computer-aided model and the effects of which can be seen directly through this model. These proposals, which can be defined as logistics and transportation infrastructure, are given (see Figure 53).

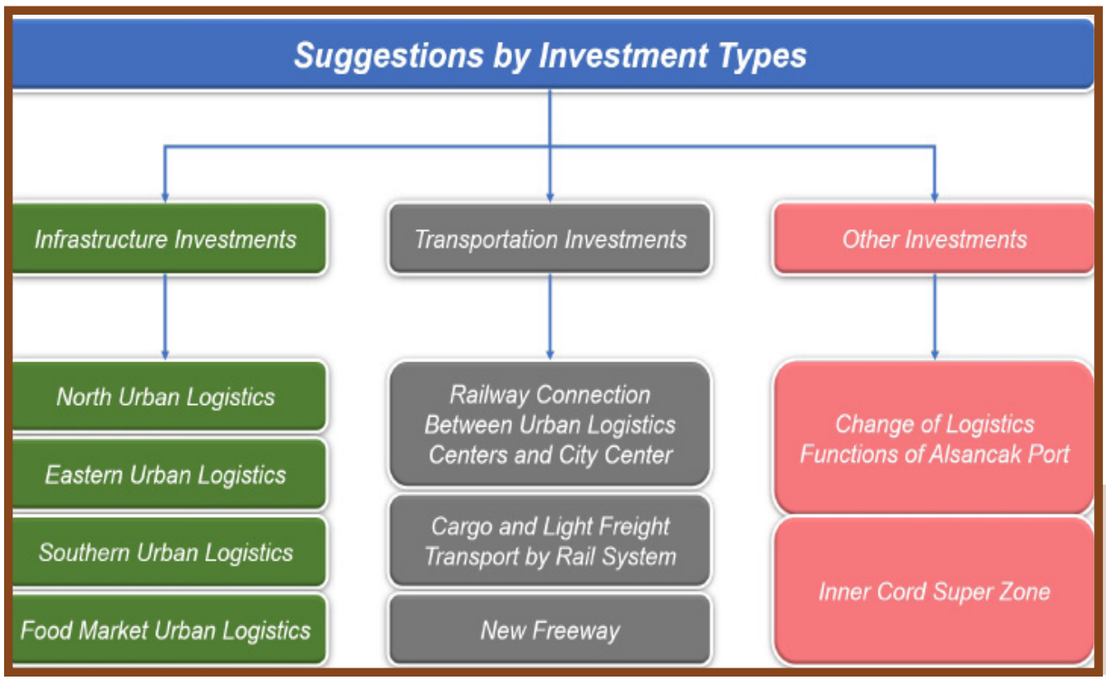

Figure 53: Project proposals that can be reflected in the model according to investment types

LOPI process;

1. Northern Urban Logistics Center
2. Eastern Urban Logistics Center
3. Southern Urban Logistics Center
4. ULC's were proposed to be the Food Market Urban Logistics Center, and it was aimed to select the most effective ULC by testing the scenarios in the proposal packages.

Under the topic of transportation investments, the planned railway connections of ULC's with the city center, the use of the urban rail system for cargo transportation, and the city bypass road project in the area near the urban area are included in the proposal packages.

As can be seen in the international literature, it is of great importance that ULC's have city center and port railway connections for ULC's to operate effectively. In this context, freight transfer points should be established in order to be able to handle between modes at different points locations with ULC rail connections, such as at ports. In this context, it is proposed to establish railway connections and freight transfer stations between ULC's and centers.

As can be seen in the inadequacy analysies, it is observed that the volume/capacity values of the connection axles connecting the North and south of Izmir are quite high when the traffic congestion is experienced in the Izmir city center. In this context, it is proposed to combine the Karsıyaka tramway located north of the Bay Area and the Konak tramway located south of the Bay Area to reduce the intensity experienced on these axles. This will increase the rate of use of public transport between the southern and northern parts of the city. In case the southern and Northern centers of the city are merged with the railway, under LOPI, it is also proposed that this line be used in the distribution processes of cargo and various light loads at appropriate times.

Current situation and target year inadequacy analysies show that CEU volume/capacity values for periphery road and Anadolu/Altınyol Street are very high. At the in-depth interviews and workshops, it was pointed out that the main reason for the current intensity in Altınyol is that vehicles carrying hazardous materials from Aliaga region cannot use the perimeter road because of its flagged tunnels, and the only alternative is to use the Anadolu Street – Altinyol Avenue route in the Gulf.

As a solution to this situation by, the General Directorate of Highways 2., it is proposed that the necessary ventilation and improvements should be made to allow the tunnels within the area Directorate Bayraklı tunnel operation to carry fuel oil. However, the current CEU situation of the freeway volume/capacity target for the year of 1.8 the value is 2, given that the Ministry of transport and infrastructure raised by Buca-Cigli in the axle which allows you to carry hazardous materials, it is recommended that a new freeway be made. General Directorate of Highways 2, region, is under the authority and responsibility of the Regional Directorate. The related proposal aims to remove transit vehicle traffic from within the city and eliminate bottlenecks within the city.

Figure 54: New by-pass road

In line with the evaluation meetings held with the administration, it was decided to create proposal packages in order to examine the individual effects and common effects of the projects. Also, it has been decided that the investment decisions of each proposal package should be analyzed with no-exist scenarios for project proposals that are not directly under the initiative of the Izmir Metropolitan Municipality. Izmir Kemalpasa Logistics Village project and the village of Alsancak and Aliaga port connections with this project in connection with logistics for running the scenarios in the target year of 2030 when all the packages are decided to be the New Port of Alsancak and the periphery road proposal change of logistics activities (rehabilitation) yes/no scenarios to be analyzed it was decided.

Under these circumstances, it was decided by the administration to analyze the impact of each proposal package for the target year in a computer-aided model developed with four sub-scenarios. Following these acceptances, a package of 20 suggestions consisting of 5 main and 4 sub-scenarios is given below (see Figure 55).

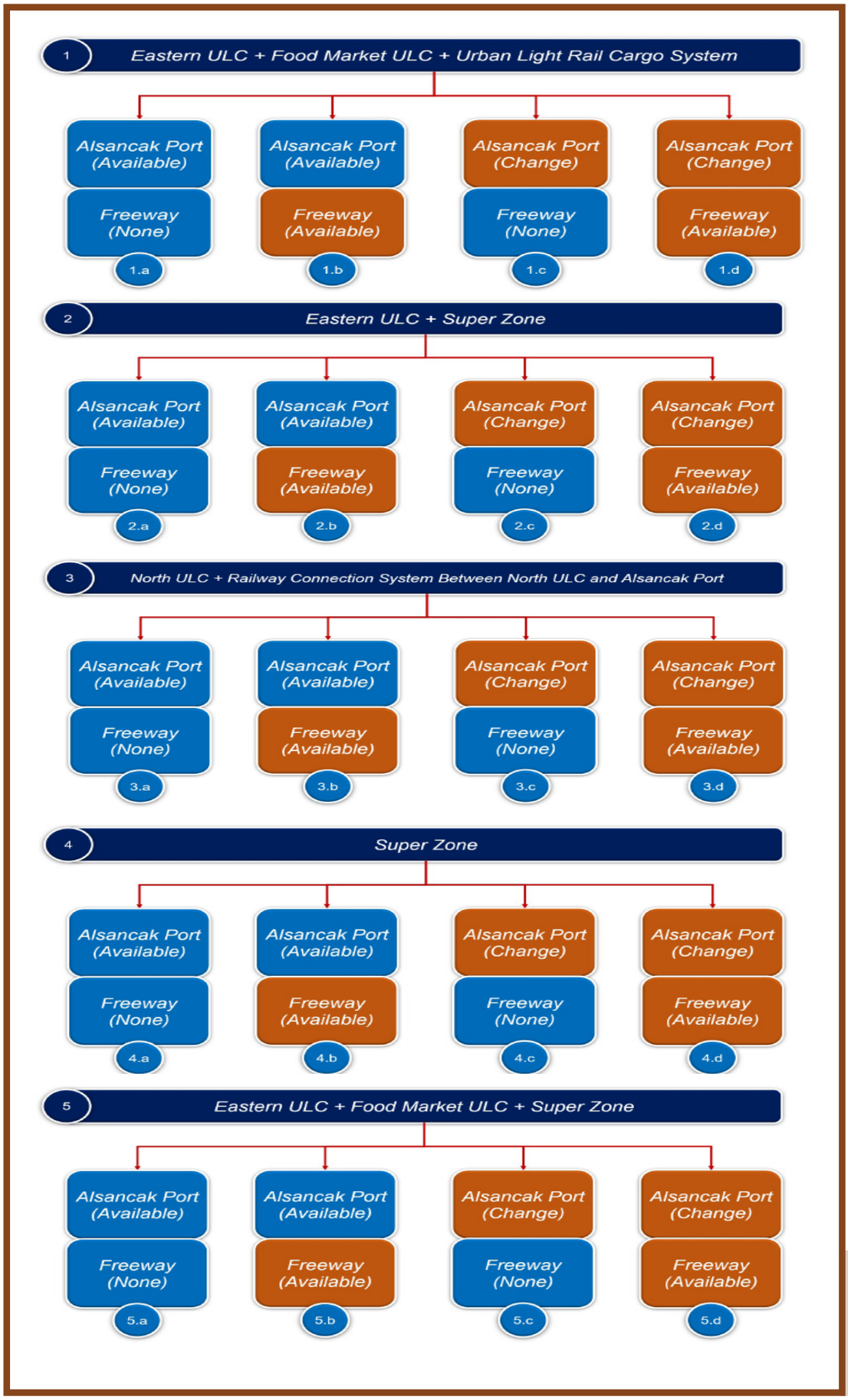

Figure 55: Proposal packages

7.3. Evaluation of Alternative Scenarios based on Model Results

This report gives us an insight into the solutions that are supported by the participation processes and shaped by the meetings conducted within the administration, which are then analyzed with the help of the freight demand model. As a result of the studies, changes in parameters were evaluated comparatively in urban areas and province-wide based on the sub-scenarios of proposal packages.

Comparison of the Effects of Proposal Packages In Urban Areas

The effects of recommendation packs on CO_2 emissions are given (see Table 23). As a result of the analysies, the main scenarios that reduce the emission values of all vehicle classes and freight vehicles in the urban area have been obtained in Scenario 1 and scenario 5.

Table 23. The effects of proposal packages on CO_2 emissions in urban areas

Main	Sub	CO_2 Emission		Improvement Ratio	
		Kg (Total)	Kg (Freight Vehicles)	Kg (Total)	Kg (Freight Vehicles)
1	a	467.218	103.621	%0,21	%0,97
	b	462.622	98.142	%1,19	%6,20
	c	466.654	102.686	%0.33	%1,86
	d	462.033	97.714	%1,32	%6,61
2	a	467.883	104.665	%0,07	%-0,03
	b	463.295	98.955	%1,05	%5,43
	c	467.318	103.721	%0,19	%0,87
	d	462.705	98.523	%1,18	%5,84
3	a	469.928	106.681	%-0,37	%-1,96
	b	465.459	101.442	%0,59	%3,05
	c	469.361	105.719	%-0,25	%-1,04
	d	464.866	100.999	%0,71	%3,47
4	a	468.640	105181	%-0,09	%-0,52
	b	463.605	99.323	%0,98	%5,07
	c	468.055	104.407	%0,03	%0,22
	d	463.453	98.801	%1,02	%5,57
5	a	467.206	104.445	%0,22	%0,18
	b	463.121	98.895	%1,09	%5,48
	c	466.548	103.618	%0,36	%0,97
	d	462.825	98.407	%1,15	%5,95
Trend		468.213	104.633		

The impact of proposal packages in the urban area was evaluated by taking into account the traffic density parameter (see Table 24). In the urban transport network, the volume/capacity ratio of the links is higher than 0.9, and the assessment is made with an improvement rate of up to 40%, as seen in scenario 5. That was the main scenario would have the most positive impact on traffic density.

Table 24. The impact of proposal packages on traffic density in urban areas

Main	Sub	v/c	Improvement Ratio
		>0,9	
1	a	%8,7	%-0,71
	b	%7,3	%15,15
	c	%8,7	%-0,71
	d	%7,4	%14,46
2	a	%8,7	%-0,71
	b	%7,4	%14,10
	c	%8,7	%-0,71
	d	%7,4	%13,41
3	a	%8,7	%-1,77
	b	%7,3	%13,76
	c	%8,7	%-1,77
	d	%7,4	%13,06
4	a	%8,5	%1,06
	b	%7,4	%14,10
	c	%8,7	%-1,06
	d	%7,4	%13,76
5	a	%6,4	%25,53
	b	%5,2	%39,49
	c	%6,6	%23,20
	d	%5,1	%40,66
Trend		%8,6	

The effects of the total amount of travel per peak hour on the total level of vehicles and freight vehicles are given comparatively (see Table 25). As a result of the calculations made for scenarios 1 and 5, along with the sub-scenarios, there has been shown to provide the best result in vehicle-km recovery rates for freight and vehicles.

Table 25. The impact of proposal packages on peak hour travel length in urban areas

Main	Sub	Car.km						Improvement Ratio	
		Total	Freight Vehicles	S-2	S-4	S-5	S-E	Total	Freight Vehicles
1	a	2.060.085	122.863	20.515	69.117	32.399	832	%0,03	%0,51
	b	2.058.725	116.801	20.452	66.738	28.780	831	%0,09	%5,42
	c	2.061.080	121.980	20.524	68.959	31.639	858	%-0,02	%1,22
	d	2.057.398	116.329	20.378	66.643	28.438	868	%0,16	%5,80
2	a	2.059.431	124.230	21.530	69.630	32.467	603	%0,06	%-0,60
	b	2.059.073	117.892	21.418	67.078	28.796	600	%0,08	%4,53
	c	2.060.426	123.337	21.539	69.471	31.705	622	%0,01	%0,12
	d	2.057.746	117.405	21.341	66.983	28.454	627	%0,14	%4,93
3	a	2.061.912	126.558	21.423	71.365	32.971	799	%-0,06	%-2,49
	b	2.060.269	120.811	21.396	69.115	29.466	834	%0,02	%2,17
	c	2.062.908	125.655	21.432	71.202	32.197	824	%-0,11	%-1,76
	d	2.058.941	120.324	21.319	69.017	29.116	872	%0,08	%2,56
4	a	2.060.655	124.169	21.496	70.094	32.579		%0,00	%-0,55
	b	2.058.520	117.648	21.329	67.439	28.880		%0,10	%4,73
	c	2.060.818	123.324	21.529	69.906	31.889		%-0,01	%0,13
	d	2.059.961	117.117	21.427	67.202	28.488		%0,03	%5,16
5	a	2.056.811	124.041	21.283	69.522	32.470	766	%0,18	%-0,45
	b	2.058489	117.913	21.246	67.102	28.800	765	%0,10	%4,51
	c	2.056.841	123.172	21.323	69.301	31.753	795	%0,18	%0,26
	d	2.059.001	117.406	21.273	66.877	28.474	782	%0,08	%4,93
Trend		2.060.623	123.488	21.301	69.652	32.535			

The effects of proposal packages on the number of vehicles traveling in the urban area at peak hours are given comparatively (see Table 26). As a result of the calculations, it was seen that the proposal packages share the recovery rates to a close extent.

Considering the effects of proposal packages at the urban level for the 1. and 5. the main scenarios were shown to have high performance in environmental pollutants and vehicle-km and vehicle-hour quantities. However, the Food Market and the surrounding area 5.scenario its effective arrangement with the main scenario has resulted in a significant improvement in volume/capacity ratios in the urban area, the scenario 5's another positive effect is the reduction of environmental pollution from transit vehicles in the central business and recreation area.

Table 26. The impact of proposal packages on the number of commuters at peak hour in the urban area

Main	Sub	Car.Hour						Improvement Ratio	
		Total	Freight Vehicle	S-2	S-4	S-5	S-E	Total	Freight Vehicle
1	a	105.292	4.400	684	2.513	1.182	21	%0,10	%0,70
	b	65.776	2.600	475	1.526	581	18	%37,59	%41,32
	c	105.373	4.330	682	2.486	1.141	21	%0,02	%2,28
	d	65.606	2.590	475	1.518	577	20	%37,75	%41,55
2	a	105.482	4.443	728	2.523	1.180	12	%-0,08	%-0,27
	b	65.815	2.639	508	1.536	584	11	%37,56	%40,44
	c	105.563	4.373	726	2.496	1.139	12	%-0,16	%1,31
	d	65.645	2.628	508	1.528	580	12	%37,72	%40,69
3	a	106.278	4.601	731	2.595	1.213	62	%-0,83	%-3,84
	b	65.919	2.693	506	1.566	592	29	%37,46	%39,22
	c	106.360	4.529	729	2.567	1.171	62	%-0,91	%-2,21
	d	65.749	2.683	506	1.558	588	32	%37,62	%39,44
4	a	105.447	4.455	728	2.541	1.186		%-0,05	%-0,54
	b	65.831	2.643	509	1.549	585		%37,54	%40,35
	c	104.789	4.380	726	2.511	1.143		%0,58	%1,15
	d	65.743	2.635	509	1.543	583		%37,62	%40,53
5	a	105.861	4.516	726	2.562	1.210	18	%-0,44	%-1,92
	b	65.564	2.630	502	1.530	582	16	%37,79	%40,65
	c	104.929	4.411	722	2.515	1.155	19	%0,45	%0,45
	d	65.532	2.621	503	1.523	579	16	%37,82	%40,85
Trend		105.399	4.431	722	2.527	1.182			

Comparison Of The Effects Of Proposal Packages Across The Province

The effects of the proposal packages on CO2 emissions throughout the province are given (see Table 27). Proposal package 4 with an improvement of 0.32% in all vehicle classes and 3.28% in freight vehicles as a result of the analysis has been identified as the most effective proposal package throughout the province.

Table 27. Provincial effects of proposal packages on CO_2 emissions

Main	Sub	CO_2 Emission		Improvement Ratio	
		Kg (Total)	Kg (Freight Vehicles)	Total	Freight Vehicles
1	a	863.379	273.885	%-0,37	%-0,30
	b	862.143	268.429	%-0,22	%1,70
	c	859.427	269.804	%0,09	%1,19
	d	858.464	264.833	%0,20	%3,01
2	a	861.788	275.068	%-0,18	%-0,74
	b	862.184	269.293	%-0,23	%1,38
	c	857.843	270.969	%0,28	%0,77
	d	858.505	265.685	%0,20	%2,70

Table 27. Provincial effects of proposal packages on CO_2 emissions (continued)

Main	Sub	CO_2 Emission		Improvement Ratio	
		Kg (Total)	Kg (Freight Vehicles)	Total	Freight Vehicles
3	a	864.493	275.412	%-0,50	%-0,86
	b	863.971	270.582	%-0,44	%0,91
	c	860.536	271.308	%-0,04	%0,64
	d	860.284	266.957	%-0,01	%2,24
4	a	860.617	273.514	%-0,05	%-0,17
	b	860.789	267.921	%-0,07	%1,88
	c	859.142	269.595	%0,12	%1,27
	d	857.469	264.095	%0,32	%3,28
5	a	863.659	274.764	%-0,40	%-0,62
	b	862.689	269.288	%-0,29	%1,38
	c	859.517	270.778	%0,08	%0,84
	d	859.290	265.566	%0,11	%2,74
Trend		860.212	273.060		

Affect of proposal packages on the number of vehicles and traveling at peak hours across the province has been compared (see Table 28 and Table 29). Taking into account the total distance traveled at peak hour, proposal package 4 sub Scenario d was determined as the most effective proposal with the effect of reducing the vehicle-km values of all freight vehicles by 3.1%.

Table 28. Provincial-wide effects of proposal packages on peak hour travel length

Main	Sub	Car.Km						Improvement Ratio				
		S-2	S-4	S-5	S-E	Total	Freight Vehicles	S-2	S-4	S-5	Total	Freight Vehicles
1	a	37.669	174.970	102.964	1.199	3.457.587	316.802	%1,88	%-0,56	%-0,31	%-0,41	%-0,56
	b	37.740	172.462	99.430	1.198	3.474.102	310.830	%1,70	%0,88	%3,14	%-0,89	%1,34
	c	37.591	173.687	99.762	1.245	3.453.858	312.285	%2,08	%0,18	%2,81	%-0,31	%0,87
	d	37.622	171.471	96.490	1.254	3.469.712	306.837	%2,00	%1,45	%6,00	%-0,77	%2,60
2	a	38.725	175.540	103.104	969	3.444.347	318.338	%-0,87	%-0,88	%-0,44	%-0,03	%-1,05
	b	38.712	172.839	99.461	965	3.470.865	311.977	%-0,84	%0,67	%3,11	%-0,80	%0,97
	c	38.645	174.253	99.898	1.006	3.440.632	313.802	%-0,66	%-0,14	%2,68	%0,08	%0,39
	d	38.591	171.846	96.520	1.010	3.466.479	307.967	%-0,52	%1,24	%5,97	%-0,67	%2,25
3	a	38.507	176.000	103.131	938	3.457.164	318.576	%-0,30	%-1,15	%-0,47	%-0,40	%-1,12
	b	38.637	173.928	99.809	972	3.474.891	313.346	%-0,64	%0,04	%2,77	%-0,92	%0,54
	c	38.427	174.710	99.924	974	3.453.435	314.035	%-0,09	%-0,41	%2,66	%-0,29	%0,32
	d	38.516	172.929	96.858	1.017	3.470.500	309.320	%-0,33	%0,62	%5,64	%-0,79	%1,82
4	a	38.067	174.382	102.640		3.443.678	315.089	%0,84	%-0,22	%0,01	%-0,01	%-0,01
	b	38.529	171.827	99.085		3.468.203	309.441	%-0,36	%1,25	%3,47	%-0,72	%1,78
	c	38.532	173.243	99.979		3.452.327	311.754	%-0,37	%0,44	%2,60	%-0,26	%1,04
	d	38.585	170.648	95.996		3.466.687	305.229	%-0,51	%1,93	%6,48	%-0,68	%3,11
5	a	38.490	175.406	103.035	1132	3.455.662	318.063	%-0,26	%-0,81	%-0,38	%-0,36	%-0,96
	b	38.553	172.891	99.491	1131	3.473.670	312.066	%-0,42	%0,64	%3,08	%-0,88	%0,94
	c	38.419	174.132	99.937	1179	3.450.434	313.667	%-0,07	%-0,08	%2,64	%-0,21	%0,44
	d	38.534	171.731	96.540	1166	3.471.300	307.971	%-0,37	%1,30	%5,95	%-0,81	%2,24
Trend		38.391	174.001	102.650		3.443.351	315.042					

Table 29. Provincial-wide effects of proposal packages on peak hour travel length

Main	Sub	Car.Hour						Improvement Ratio				
		S-2	S-4	S-5	S-E	Total	Freight Vehicles	S-2	S-4	S-5	Total	Freight Vehicles
1	a	1.030	4.551	2.543	25	146.796	8.149	%3,47	%-0,37	%-0,28	%-0,27	%-0,15
	b	770	3.214	1.688	23	94.576	5.695	%27,84	%29,11	%33,44	%35,40	%30,01
	c	1.026	4.491	2.431	25	145.637	7.973	%3,83	%0,95	%4,14	%0,53	%2,01
	d	769	3.189	1.637	23	94.276	5.618	%27,92	%29,66	%35,45	%35,61	%30,95
2	a	1.074	4.559	2.542	16	146.539	8.191	%-0,66	%-0,55	%-0,24	%-0,09	%-0,66
	b	803	3.226	1.691	15	94.520	5.735	%24,74	%28,85	%33,32	%35,44	%29,52
	c	1.070	4.499	2.430	16	145.382	8.015	%-0,28	%0,77	%4,18	%0,70	%1,50
	d	802	3.201	1.640	15	94.220	5.658	%24,84	%29,40	%35,33	%35,65	%30,47
3	a	1.074	4.593	2.556	70	147.582	8.293	%-0,66	%-1,30	%-0,79	%-0,80	%-1,92
	b	801	3.241	1.696	32	94.785	5.770	%24,93	%28,52	%33,12	%35,26	%29,09
	c	1070	4.533	2.443	70	146.417	8.116	%-0,28	%0,03	%3,65	%-0,01	%0,26
	d	800	3.216	1.645	32	94.484	5.693	%25,02	%29,07	%35,14	%35,46	%30,04
4	a	1.073	4.457	2.540		146.427	8.160	%-0,56	%-0,29	%-0,16	-0,01	%-0,28
	b	802	3.221	1.687		94.502	5.710	%24,84	%28,96	%33,48	%35,45	%29,83
	c	1.609	4.488	2.426		145.899	7.983	%-0,19	%1,01	%4,34	%0,35	%1,89
	d	801	3.197	1.637		94.328	5.635	%24,93	%29,49	%35,45	%35,57	%30,75
5	a	1.072	4.596	2.570	23	147.279	8.261	%-0,47	%-1,37	%-1,34	%-0,60	%-1,52
	b	797	3.220	1.690	20	94.386	5.727	%25,30	%28,98	%33,36	%35,53	%29,62
	c	1.065	4.516	2.444	23	146.041	8.048	%0,19	%0,40	%3,63	%0,25	%1,09
	d	796	3.194	1.638	21	94.204	5.649	%25,40	%29,55	%35,41	%35,66	%30,58
Trend		1.067	4.534	2.536		146.407	8.137					

When the 5th Main scenario is examined in terms of mode choice, 68.27% of the cargoes coming to Aliaga port are coming by road and 31.73% by rail, while 72.65% of the cargoes coming by road and 27.35% are being sent by rail. 44.31% of the cargo coming to the port of Alsancak, 55.69% of the cargo coming by road, while 56.92% of the cargo coming by road, 43.08% are sent by rail. 39.72% of the cargoes coming to Kemalpasa Logistics Village 60.28% of the cargoes coming by road while 24.90% of the cargoes coming by road 75.10% are sent by rail.

The results of Super zone implementation in the urban area studied mainly with proposal package 4 are given (see also Table 30). The area designated as the Super Zone is given in the demand column, which uses commuters using it as a start, finish, or transition. According to this, 28,000 private vehicles and 1,000 cargo transports use this region. The values given in the transit demand section indicate the amount of transit traffic passing through the Super zone, and it is planned that this demand will be diverted to other routes. The CO_2 emission savings achieved by this orientation are given in the last column. The application of the Super zone was also analyzed by taking into account the functional change of Kemalpasa Logistics Village, periphery Road, and Alsancak Port.

Table 30. Super Zone practice results

	Vehicle Class	Total Demand	Used Demand	Transit Demand	CO_2 Saving (kg)
A	S-1	178.027	27.934	4.536	2.128
	S-2	1.165	267	62	77
	S-4	3.449	677	219	510
	S-5	1.433	49	13	28
	YT	**6.047**	**993**	**294**	**615**
B	S-1	178.027	27.755	4.340	2.036
	S-2	1.165	259	53	67
	S-4	3.450	661	202	472
	S-5	1.433	42	5	11
	YT	**6.048**	**962**	**260**	**550**
C	S-1	178.027	28.992	5.441	2.553
	S-2	1.165	286	79	98
	S-4	3.443	720	259	605
	S-5	1.435	54	17	38
	YT	**6.043**	**1.060**	**355**	**741**
D	S-1	178.027	28.667	5.116	2.400
	S-2	1.166	270	63	79
	S-4	3.443	695	235	549
	S-5	1.435	45	8	19
	YT	**6.044**	**1.011**	**306**	**647**

Within the framework of the target year logistics model established within the scope of the LOPI Project, 5 main scenarios and 20 sub-scenarios were determined and executed together with the upper-scale investment decisions. When the environmental and infrastructural advantages and improvement ratios by trends considered, the fifth scenario that consist of Food Market Logistics Center and Eastern Urban Logistics Center that will work with the Kemalpasa Logistics Village, regional infrastructure arrangements and Super Zone with low-emission urban logistics regulation has been rated as the most advantageous scenario.

IZMIR SUSTAINABLE URBAN LOGISTICS PLAN DECISIONS

8. IZMIR SUSTAINABLE URBAN LOGISTICS PLAN DECISIONS

8.1. City-Wide

8.1.1. Recommendations for Specific Regions

SULP guidelines were followed under the LOPI, in the districts of Izmir in the organized industrial zones, solid waste storage facilities, load centers, such as ramp systems, input–output analysis physical and geometrical properties of the points. They were taken for the purpose of examination and records of 22 – 11 dates between 26.06.2019 in the industrial zone, free zone, Solid Waste Disposal Facility 2 and 12 with between 1 to 1.5 minutes in video recording unmanned aerial vehicles were taken. A list of areas studied is given (see list of areas studied). Table 31). The locations of the regions mentioned in the report are given (see Figure 56 and figure 57).

Table 31. List of study areas

Organized Industrial Zones	Free Zones	Solid Waste Facilities
Aliaga Chemistry Specialization and Mixed	Aegean Free Zone	Harmandalı
Kınık	Izmir Free Zone	Karsıyaka
Bergama		Halkapınar
Izmir Ataturk		Foca
Kemalpasa		Turkelli
Buca Ege		Gediz
Izmir Pancar		Kısık
Izmir Tekeli		Torbalı
Izmir Torbalı		Urla
Tire		Karaburun
Odemis		Cesme
		Odemis

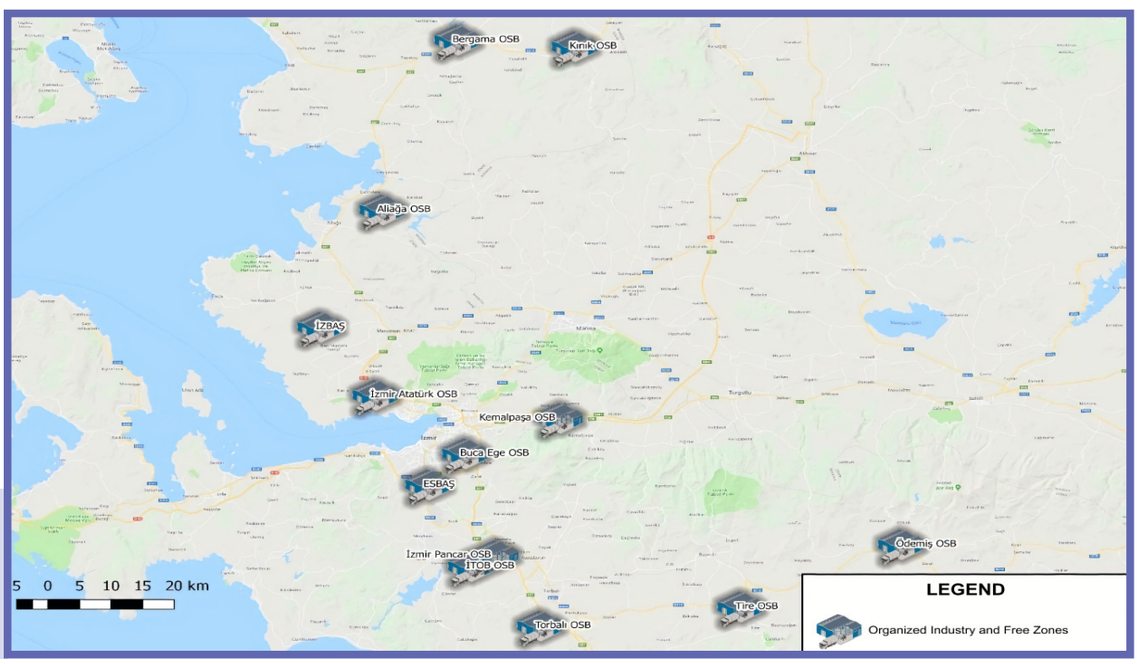

Figure 56: Locations of Organized Industrial Zones and free zones

Figure 57: Locations of solid waste facilities

Recommendations

The common problem seen in all facilities in the study is the lack of horizontal and vertical markings resulting from increasing the road capacity volume cannot be used with the full meaning. With the realization of the proposed markups, the road capacity is intended to be used efficiently. In general, there are physical inadequacies on the roads to access facilities. Eroded coatings, undulations have occurred on the road surface, and insufficient lane widths have been identified. Facilities in rural areas (see rural areas) Torbalı, Karaburun, Foca, Turkelli Solid Waste facilities) although the entrance–exit door is wide enough, there is no driving comfort due to degradation of the route roads of the facility. There is also heavy traffic congestion and blockages caused by insufficient lane widths. Logistics transportation infrastructure proposals " B10: City-wide Logistics Analysis and Recommendations" are given in detail in the report. An example of the recommendations is given in the following figure (see Figure 58).

Figure 58: Satellite view of Halkapınar facility

8.1.2. Recommendations for Heavy Vehicle Parking Spaces

Recommendations

A parking area with a capacity of 1,000 vehicles/day has been proposed in Bornova, Isikkent area, considering operational data cannot be obtained (see Figure 59). Based on the studies carried out in the region, it was determined that an average of 900 vehicles are served daily in active parking areas.

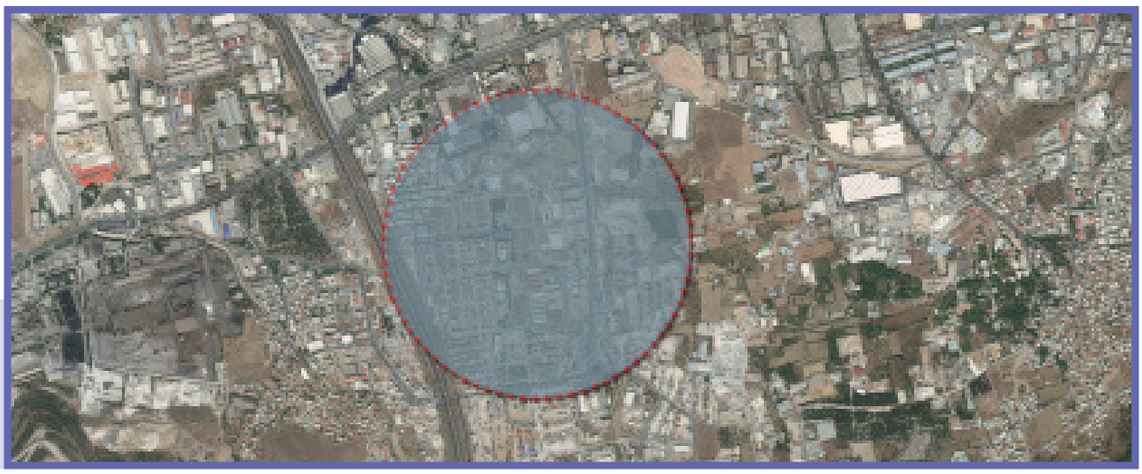

Figure 59: Proposed area for Isıkkent region

The facility to be built in the area shown in the figure will help to regulate heavy vehicle traffic in the Isıkkent region by preventing roadside parking. At the same time, it will allow the cargo to be transported by connecting directly to the E – 87 Izmir by-pass road without getting involved in the inner city traffic.

Kemalpasa Logistics Village in Kemalpasa district of Izmir province and Kemalpasa Organized Industrial Zone (KOIZ) in the region need for heavy vehicle parking area was determined as a result of the studies. The lack of a limited parking area in KOIZ causes heavy vehicles to be parked on the side of the road. Therefore, the lack of parking space in the logistical village will continue to exist in the future which will cause traffic jams in the future. Therefore, a proposal for a heavy vehicle parking area has been given in the area (see Figure 60).

Figure 60: Proposed area for Kemalpasa District

In this area, with the foresight that the logistics village will divert heavy vehicles from the Isıkkent region in the future, it is aimed to design the parking area with a capacity of 2,000 vehicles/day. This will prevent roadside parking of heavy vehicle parks on the roads within the borders of KOIZ and to park the heavy vehicles that Kemalpasa logistics Village will attract in this area. The proximity of these two freight centers in thise selection of the area will allow the transportation of the cargo via E–96 Ankara Asfaltı Street without interfering with the inner-city traffic. In the event of a decision to invest in an Urban Logistics Center in Kemalpasa district, the framework of this area should be further developed and the warehouses' site should be moved to this area, and integration between the logistics Village, Urban Logistics Center, and the Truck Park should be ensured. Sustainable urban logistics center of Izmir Torbalı in approved County activities proposed under the plan, with the launch of Torbalı organized industrial zone in that area in the north of the borough and OIZ existing axis expansion plans of the area considering the need for heavy vehicle parking space Torbalı district will increase. For this reason, a park area was proposed, but because the exact location of the urban logistics center is not known, the park area was preferred in an area close to the O – 31 Izmir – Aydın Highway to transport the cargo to the city center without too much interference with the Organized Industrial Zone of Torbalı (see Izmir-Aydin Highway. (See Figure 61).

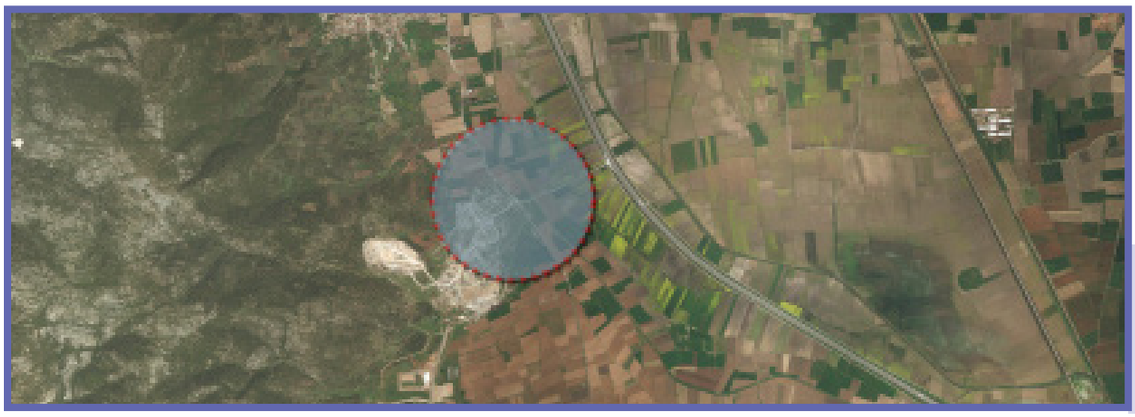

Figure 61: Proposed area for Torbalı district

A parking place with a capacity of 1,500 vehicles/day is proposed for the area given in the figure, while physical improvements to the transportation network are required for accessibility to the planned parking space for the facility.

The reason for proposing this area is to relieve highway traffic and increase the accessibility of the parking area in the organized industrial zone by taking the heavy vehicles coming from the city center away from the highway traffic after a certain kilometer to the 15th Avenue providing transportation between Yenikoy and Ahmetkoy. In case of a decision to invest in an Urban Logistics Center in the district of Torbalı, it is necessary to develop the defined area further and move the warehouses' site to this area and to ensure integration between the Urban Logistics Center and the Truck Parking.

It has been determined that heavy vehicle traffic will endure in the region due to the heavy load mobility in the Aliaga district of Izmir province, the lack of an alternative other than E–87 for transportation to the district, and the active use of Candarlı Port in the following years. However, it is expected that roadside parking, which is the main problem in Isıkkent, will also be seen in the Aliaga region.

The region is among the leading districts in Izmir province in terms of port sector and industry. The ports being Aliaga PETKIM refinery, SOCAR facilities, APM Port, Habas Nemrut, IDC Nemrut, Ege Celik, Newport, Ege Dung, Aliaga PETKIM Ports. In the category of zones is the Aliaga Chemical Specialized and Mixed Organized Industrial Zone in Aliaga, which while creating heavily congested vehicle traffic, parking areas for these vehicles are limited. There are only two heavy vehicle parking areas in the area. One of them is connected to an organized industry, while the other is Aliaga Truck Parking, which serves mainly in the Petkim region. In addition to these, there is one tanker park that works with the TUPRAS refinery. A satellite image of the area gives the location of the proposed parking area (see Figure 62).

As a result of the cross–section counts carried out in the region, heavy vehicular traffic of 5,136 vehicles/day in both directions in Aliaga – Yenisakran direction, 6,409 vehicles/day in both directions in Aliaga – Menemen direction, and 9,135 vehicles/day in both directions in Aliaga-Buruncuk direction were observed, while roadside parking was observed even though facilities in Aliaga is limited. With this problem in mind, a parking area with a capacity of 1,500 vehicles/day has been proposed for the region.

In case of a decision to invest in an Urban Logistics Center in Aliaga district, it is necessary to further develop the defined area framework and move the Ambarlar site to this area and to ensure integration between the Urban Logistics Center and the Truck Park.

Figure 62: Location of the planned area in Aliaga region

8.1.3. Recommendations for Dangerous Goods Transportation

The current situation studies, evaluation of new data, and recommendations for the identified problems related to the transportation of hazardous materials in Izmir are given below. First of all, special rules to be considered for the transport of hazardous materials are listed. In addition to ADR, the following provisions must be complied with for the transport of dangerous goods.

- Vehicles loaded with explosives and compressed gas are allowed to cross the Bosphorus bridges and the Bosphorus tube crossings by the governorates in accordance with the procedures and principles determined by taking into account the opinion of the General Directorate of highways.
- Vehicles loaded with explosives cannot use tunnels with tunnel delimitation codes B, B1000C, C5000D and E, while vehicles loaded with compressed gas cannot use tunnels with tunnel delimitation codes B1D, C1D and D. However, in cases where there is no alternative route or due to unfavorable reasons such as climate, geographical conditions, road maintenance and repair, traffic is stopped at both ends of the tunnel by the governor's office, taking into account the opinion of the General Directorate of highways, these vehicles are allowed to cross the tunnel.
- Vehicles loaded with or empty of explosives but not adequately cleaned are not allowed to travel in residential areas except on highways or state roads or on routes designated by the competent authorities. These vehicles may be allowed to go to evacuation points in residential areas under the supervision of the traffic police or police.

The categorization of tunnels is based on the three main hazards that will occur in the tunnel. It is divided into five categories: A-B-C-D-E. These three main hazards: explosion, release of toxic gases possibility and classified as fire tunnels if;

TUNNEL A= There are no restrictions for carrying hazardous materials.
TUNNEL B= Restricted tunnel for hazardous materials that could cause a major explosion.
TUNNEL C= A very large explosion, a large explosion, and a restricted tunnel for hazardous materials that can release toxic substances that can affect the wide area.
TUNNEL D= Restricted tunnel for dangerous substances that can cause a very large explosion, a large explosion and release of toxic substances that can affect the large area or a large fire.
TUNNEL E= The tunnel, restricted for all types of hazardous materials.

In accordance with this general information given regarding tunnels and hazardous materials transportation;

- Izmir city-wide tunnels Class A “no restrictions for the transport of hazardous materials” tunnels to be raised to the status of a Joint Working Group with the General Directorate of highways to prepare the project and feasibility to be taken into the investment program,
- Creation of exclusive parking spaces for vehicles carrying hazardous materials to be able to park at the points of entry to the urban area during the hours when entry and exit to the urban area is prohibited,
- Fuel stations etc. delivery and supply of hazardous materials in facilities, where possible under supervision and outside of peak hours,
- Cooperation with unions and manufacturers within the scope of Social Responsibility projects in driver training,
- Realization of cooperative or similar organization works for coordination of logistics needs of facilities that produce and use hazardous materials,
- Evaluation of the suitability of the place by obtaining information about the logistics activities in the permit processes for the new facilities to be opened, etc. It is anticipated that the primary proposals will reduce the risks of hazardous material transport in the urban area in the short to medium term.

The long term facilities that use hazardous materials in a specialized area of collection from urban areas and significant land-use decisions such as the removal and the transit of the carriage of dangerous goods vehicles that use the rail system in Izmir as the point of the entrances to other urban areas that enable you to change the kind of infrastructure investments can be planned.

In addition, it is important to strengthen the rail system connection of the Aliaga region, where fuel oil and derivatives are produced in the long term. And also, to raise the agenda of projects aimed at using the rail system more effectively from the point of production, in the long run, both in terms of accelerating the economy and minimizing the risks.

8.1.4. Alternative Vehicles Types for Urban Logistics

- Alternative and green vehicles related SADA, IZKA etc. expansion of supported projects and opening up new business areas,
- The reduction of accidents as a result of the development of green and green vehicles which are common to the general population with those used in the logistics field,
- Increasing social-environmental awareness,
- Reduction of air and environmental pollution,
- Development of specific legal regulations and standards on alternative species and green vehicle use,
- Creation of micro consolidation centers,
- Electric cargo bikes for end point logistics (see Figure 63 and figure 64).
- Dissemination of cargo train (hopper) use for city logistics (see Figure 65).

Figure 63: Electric cargo example of cycling

Figure 64: Electric cargo example of cycling-2

Figure 65: Cargo Whooper example

- Reduced road maintenance costs and workloads
- Reduced traffic congestion in application areas
- Increased delivery time efficiency

8.1.5. Freight Travel Demand and Land Use

Because Urban Freight Transport is derived demand, it widely affects land use structure, distribution, and the corresponding order of activity in cities. Advanced modeling procedures need to be developed to predict the load-related effects of future land-use models. Recently in many cities, logistical facilities such as warehouses have been moved from city centers to places close to highways or outer periphery roads.

The parameters used in the freight travel model within the scope of LOPI are grouped according to the structure of the enterprises. The area covered in Izmir in the target year of the activities was calculated by using the 1/25.000 land use planning. Planned zones falling into or intersecting zones were used in the calculations using algorithms of Geographic Information Systems Software. Tourism regions, tourism zones, daily, markets, agricultural trade, Agricultural, industrial areas, Agricultural areas of specialization, industrial areas, storage areas, industrial zones, residential areas, small industrial zones, public agencies, development areas, storage facilities, Trade Centers 1, and 2 and 3. Degree Trade Centers were evaluated in the logistics plan, and developments of the same areas of activity in 2018 were monitored under the Land-use plans. Thus the 2018 fields have been updated. A separate study was carried out of these for the featured areas. As a result of the studies, all the OIZs in Izmir were examined and their occupancy status was obtained, and although some OIZs had a Border Trail, it was found that they were not full yet. For this reason, transactions were made with the regions that were full in the 2018 model and freight travel values were calculated by accepting that the OIZ border tracks were full in the target year. The Transport Master Plan has been used to draw the parameters used in the passenger model from the current year of 2018 to the target year of 2030, while the above-mentioned steps have been followed in the projections for the target year of the freight travel model. Calculated values of 2018 and 2030 on the district basis of featured areas are given.

8.1.6. Super Zone

Low Emission Zones (LEZ) are the areas where the most polluting vehicles are regulated. Usually, these zones are made by prohibiting the entry of higher emission vehicles into the zone. Low Emission Zones are also known as Super zones, Super blocks, and perimeter zones.

The Super Zone application is a new mobility model that reconstructs a typical urban road network. This application seeks solutions to the problems of urban mobility and aims to improve the availability and quality of public spaces for pedestrian traffic. In the Super Zone application, a grid structure consisting of basic paths forming a polygon approximately 400 x 400 meters in size with both internal and external components are formed. Intside the grid, underground parking and pedestrian traffic are closed to motor vehicles and applications. However, it is preferable, under particular circumstances, for housing, traffic, services, emergency vehicles, and loading/unloading by vehicles. The areas around or outside of these areas are the places where motor traffic travels and forms the basic roads.

Super zone applications aim to improve urban quality while reducing the environmental impact of vehicles. In this way, environmental awareness is expected to increase. This practice aims to improve the quality of life of residents and visitors in a social sense and also increases social cohesion and economic activity. It should also be noted that safety is enhanced by the necessity of extremely low-speed limits such as 10 km/h in these areas, and that there is a legal regulatory requirement in this regard. Super zones may legally require an overhaul in shipping axles and land use, as well as new regulation and Directive requirements. Also, urban aesthetics areas may need new fixes.

In the LOPI project B_9 report, the inner cord is proposed as a low emission area (Super zone). This proposal was enacted by the Ministry of Transport and infrastructure's "regulation on procedures and principles for increasing energy efficiency in transportation" published in the Official Gazette No. 30762 dated May 2, 2019. This regulation paved the way for Low Emission Zone applications aimed at reducing traffic congestion and improving the quality of life in urban centers, which are frequently encountered in international urban logistics applications. The key areas that are experiencing a traffic jam across the city during the hours of heavy traffic, and to relieve the city to provide savings in energy and time, opinions of institutions and organizations were taken. Based on the inputs provided like the start and end times of peak hours and to monitor fuel consumption, flexible working and remote working possibilities the use of common and environmentally-friendly vehicles. To promote alternative energy systems in transportation, infrastructure plans will be created that will enable electric vehicles to be charged on the streets. Parks to be built at city entrances will be operated free of charge or with a fixed and low parking fee with no time limit, and commercial vehicles carrying freight will not be allowed to enter the desginated lines.

In addition, municipalities, on the condition that the Ministry of Environment and Urban Planning take appropriate opinion, urban centers, and neighborhood-scale areas where heavy traffic and air pollution is detected may be declared as low emission areas. Low-emission area, fuel usage, and engine technologies are checked, accordingly to be in line with national and international standards classified according to emission class vehicles. Depending on traffic density, the entry will be prohibited or will block the way to those areas or made chargeable. The area will be accessed on the basis of daily vehicle numbers and air quality maps. Alternative transportation facilities and routes will be planned for vehicles whose entry to the area will be restricted. In limitation and charging, vehicle emission class, entered road, traffic density, zone and time zone will be taken into account.

Within the scope of LOPI, it is proposed to establish a Super zone for the Alsancak inner cord Zone (see figure 66). In this way, the vehicles within the city core travel within the low emission vehicles; in turn, the city core instead of the use of roads outside the zone is targeted to provide transit.

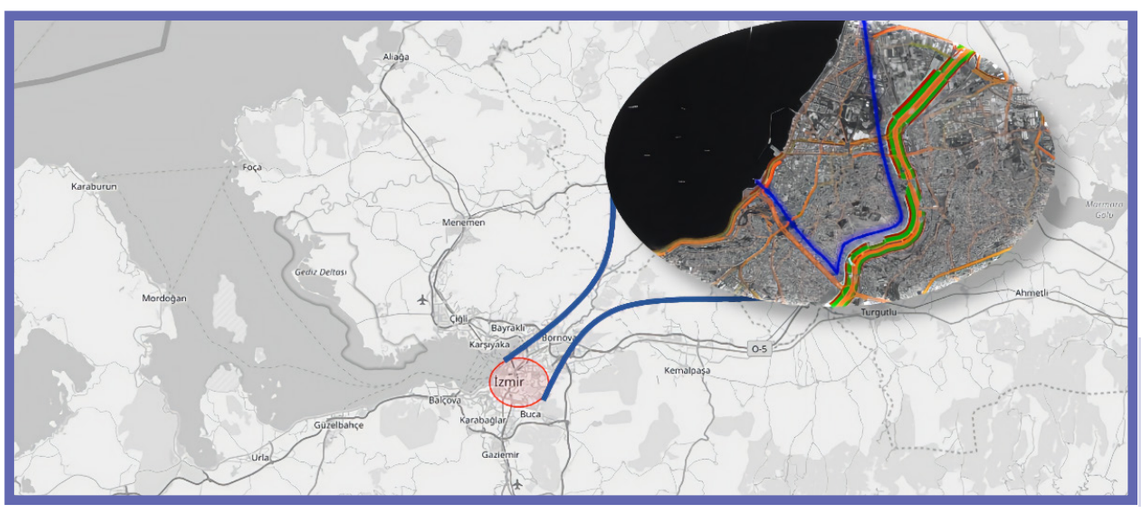

Figure 66: Super Zone area

When the land-use decisions given in the tables above are examined, the growth rate of commercial areas affecting freight travel demand in 2030 will around 33% by 2018. The growth in this land use structure in 2030 is mainly due to the OIZs and Kemalpasa Logistics Village. In addition to increasing land-use decisions for the rapidly migrating and industrialized Izmir, there is a need to manage the demand. In this context, the total vehicle volume/ capacity values on the city center scale for the 2030 target year as a result of LOPI modeling there is no volume/capacity value below 50% in the roads as in the present case. Volume/capacity detail values of these roads are given as items:

In this case, demand management is inevitable when the need for new road investment is considered to be costly

- Liman Street; 1.59
- Altınyol Street; 2.01
- Ankara Street; 1.25
- Anadolu Street; 1.5
- By-pass road found to be around 1-2.

8.1.7. Intelligent Transportation System

Urban Logistics is based on a systems approach that involves a range of technical processes, such as modeling, evaluation, and implementation of Information Technologies. Advances in information and Communication Technology (ICT) provide opportunities to improve the performance of urban freight transport systems. ICT also creates the potential to develop more advanced urban freight management systems such as joint distribution systems and road pricing plans.

With the development and deployment of ICT and Intelligent Transport Systems (ITS), the low cost “big data” of goods movements in urban areas of commercial vehicles can be collected. As Global Positioning Systems (GPS) devices are typically the system that allows the exact measurement of the vehicle’s position every second, this data can be collected in an integrated manner with the Izmir Transportation Center (IZUM).

Analysis of the movements of commercial vehicles in urban areas, analysis of their data and the behavior of drivers can be done with data collected by GPS. Within the scope of ITS, the following measures can be taken concerning urban logistics by taking into account Transportation Policy, zoning plans, and IZUM for Izmir province. These are:

Reduction of transit of freight vehicles within the city center, identification of commercial vehicle routes,
Enforcement of restrictions for commercial vehicles,
Implementation of low emission vehicles,
Provision and supervision of out-of-town parking for heavy freight vehicles,
It is the enforcement of parking regulations for commercial vehicles and also the control of technical standards in terms of noise and emission levels.

In addition, the following studies can be done with ITS practitioners. These include:

- Integration between policy tools involving different types of Transportation;
- Integration of policy tools including infrastructure provision, management, information, and pricing;
- Integration between transport measures and land use planning measures; and
- Data integration with other policy areas such as health or environmental protection.

With ITS applications;

- Economic impacts: traffic congestion, mobility barriers, accidents, transportation facility costs, consumer transportation costs, depletion of non-renewable resources,
- Social effects: impact inequality, mobility impairment, human health effects, community cohesion, community livability, aesthetics,
- Environmental effects: air pollution, climate change, habitat loss, water pollution, hydrological effects, noise pollution measurements, and analysies are required.

Measures to be taken with ITS;

- Input control,
- Tracking delivery zones,
- Automatic switching systems,
- Moving weight for heavy load transport,
- Traffic management,
- On-line download zone reservation,
- Vehicle navigation and fleet management systems can be proposed.

As a result, it will be appropriate to evaluate SUMP's freight transport components effectively and efficiently so that an active freight transport can be carried out, distributed, collected, inspected, and mitigated by commercial vehicles to expand IZUM's field of activity. A description of freight transport targets is given (see Table 32).

Table 32. Proposed freight transport components of sustainable urban mobility plan

Components of Effective and Efficient Freight Transport	**System Accessibility**	**Road and Railway Transportation Infrastructure**
		Commercial vehicle parking system integrated with IZUM traffic management system
	Sustainable and efficient urban distribution	Regulatory system to support urban delivery
		Integration of freight stakeholders
	Modern technologies in urban transport	ITS for optimization of freight traffic
		Low emission solutions (Super Zone, demand management, etc.)

Table 33. Measures under sump Urban Freight Transport targets
Regulation System Supporting Urban Delivery
• Verifying the institutional potential of the city and planning communication channels and principles among the responsible departments in urban freight transportation planning, • Developing the methodology for collecting and processing freight transport data according to the current and foreseen changes in the planning and management capacity of the city, that is, the use of transportation modeling solutions and traffic management system, İZUM, • Road network classification according to commercial vehicle and traffic characteristics, • Combining weight and / size regulations from the city center and the transit road network to the port, • Methodology for planning of special distribution zones
Integration of Urban Freight Transport Stakeholders
• Identification of Urban Freight Transport (UFT) stakeholders, anxiety detection, to develop a common understanding of the problems related to the load;
Intelligent Transportation Systems for Optimizing Freight Traffic
• Using the potential of traffic management system and related transportation modeling solutions to improve planning and forecasting of urban freight transport measures, • Guidance and implementation of freight transport vehicles, especially heavy goods vehicles, • Provide real-time traffic information for route planning, including traffic congestion.
Low Emission Transport Solutions
• Verification of entry conditions (requirements and benefits) to low emission zones • Promoting potential solutions to support the purchase of new technologies.

8.2. Logistics Analysis and Recommendations for Urban Development Regions

8.2.1. Identify Current Problems

Mobility based on rural and agricultural activities in Izmir was measured within limits defined in the scope of the study. The studies are expected to be evaluated in terms of integration by taking into consideration the provincial borders and all spatial/strategic planning studies carried out within them. Measurement attempts also required the identification of some data groups in terms of the planning model and decision options developed within the scope of the study.

In this respect, it has been necessary to analyze the current problems to evaluate the logistics plan options. Data collection stages and survey applications for the determination of the current situation have been obtained, and the resulting issues have been systemized. Furthermore, these findings were placed in a specific problem grouping context, and it was also agreed that solution approaches would be sought within the same grouping. Problems are identified under the global and local problem groups, and their titles are listed below.

Categories of Common Problems

- Marketing Problems
- Transportation and Infrastructure Problems
- Depot Problems
- Problems Arising From Location Selection Decisions and Applications

- Agricultural Product Diversity Issues
- Health Problems Experienced in Terms of Agriculture and Breeding
- Emerging Problems Related to the Management of Marketing Areas and Marketing

Categories of Local Problems

- Points Of Marketing Problems
- Local points of Transportation and infrastructure problems
- Places of marketing and storage problems
- Places of health problems in terms of Agriculture and breeding
- Problems arising from the management of marketing areas and marketing in the municipalities of Torbalı and Bayındır District

8.2.2. Project Recommendations and Reviews

Project proposals for Rural Development regions have been given at Izmir provincial level and local level, as well as at small-medium, and long-term investments. With this approach, the separation of short to-medium-term project proposals would be a strategic choice, leaving them to work in the future under the control of the Izmir Metropolitan Municipality. The target of the long-term projects is the year 2030, which has been deemed appropriate for the work of the Izmir Transportation Master Plan with 1/25.000 environmental land use plans. At the provincial level, the long-term projects have also been the subject of decisions outside the boundaries set within the field of study. The reason for this is that the rural areas interact extensively with the provinces and non-provinces in commercial and spatial ways.

Provincial Level Projects in Short and Medium Term

- Proposition 1: creation of depot areas in Isıkkent
- Proposition 2: creation of Truck parking areas in Isıkkent
- Proposition 3: moving the logistics activities from Alsancak to Isıkkent and making the area an urban logistics center in accordance with the standards.
- Proposition 4: Istanbul and Izmir urban logistics flow arrangements.

Local Projects in the Short and Medium Term

Topics covered in general within the scope of local projects in the short and medium-term: Support and sustainability of production of the producer organizations, organic farming evaluation of the sector, good agricultural practices, and the transportation of products were considered. Also, the evaluation of agricultural waste, the development of cooperatives, in terms of logistics and logistics education and Information Studies understanding of any modification, storage, distribution, and marketing process assessment, improvement in logistics areas and roads that provide access to ensure the continuity of the superstructure studies were also analyzed. It can be listed as solutions for improving marketing channels, as well as other problems and suggestions.

Market is the first day of the year in which rural producers meet their products directly with consumers, and the number of markets and area sizes in urban areas is insufficient. In line with this;

- Marketing opportunities in Kınık and Beydag districts in rural areas can be explored, and new investments can be planned with a detailed study,
- Market and marketing areas such as Cesme and Foca in the tourist districts are studied in a detailed examination and, if needed, seasonal regulations and multi-purpose areas with the development of the need to be determined by the market area can be eliminated.

- Increasing marketplace areas where consumers and rural producers can come together in urban areas.
- By controlling the logistics movements in the process of reaching products to consumers in the sense of regular open or closed marketplace areas, the effects of fresh vegetable and fruit movements on traffic and the environment can be reduced.

During the LOPI process, a macro-level evaluation was made, and some suggestions were presented in marketplace areas. However, in the aftermath of LOPI, essential and concrete projects should be developed both for rural district producers and for urban logistics activities through detailed needs analysis and location selection decisions.

Evaluation of Buca vegetable and fruit marketplace;

Analysies was made, and suggestions were made under the heading. The problems of the situation and development proposals are also presented concerning the connection with rural areas. The facility outside the work area has commercial, spatial, and physical interaction with rural areas, and the current possibilities and inadequacies affect producers and shippers in rural areas.

Cold storage / Meat Integrated Facilities current status and recommendations;

Analysies was made under the heading. Problems of states and development proposals were presented considering their connection to rural areas, and detailed analysies was made. Accordingly, the locations of the identified cold storage areas and meat-integrated facilities are given (see Figure 67). Location recommendations for cold storage units are made according to traffic assignments, and analysies are presented in the following sections.

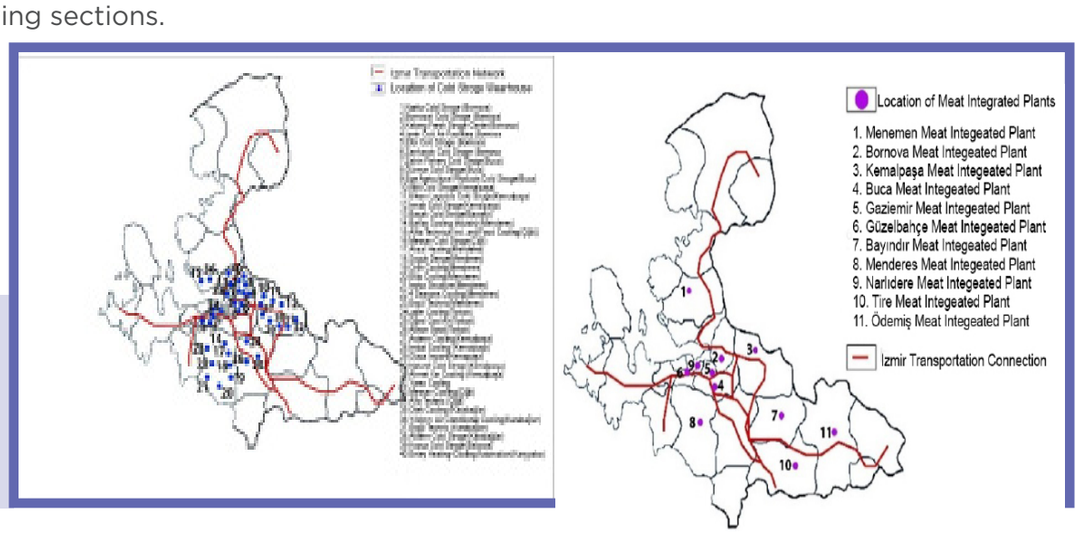

Figure 67: Locations of cold storage areas and meat-integrated facilities

Promoting/establishing/disseminating feed storage and distribution facilities;

Analysies were made, and suggestions were made under the heading. The Izmir Metropolitan Municipality is expected to provide the necessary support for the delivery of feed supplies to small producers on a periodical, low cost, and standard quality. For this purpose, it is proposed to increase projects such as "feed-milk exchange project," "development of feed collection and distribution network," and "feed support to hyphen-Odemis Milk Cooperatives" and to ensure that "feed production and distribution facilities" are expanded by the municipality. Izmir Metropolitan Municipality can work on a system in which it can distribute "Barley Flake" or "Corn Flake" products, which it operates directly or through its production cooperatives, in its locally opened production, storage and distribution centers. In this case, the local producers in the supply of raw materials to the brokers will be removed from the hiatus, and producers will be supported indirectly at the same time milk production, and the sector will be able to start to develop more effectively. In this direction, it is suggested that the municipality should carry out detailed surveys on the proposed titles. Research topics can be listed as the establishment of storage facilities, opening of production facilities and supply of the machinery, expansion of the system, installation of the clearing system and feed grants.

Within the scope of the study, the feasibility of two mixed feed production facilities was examined and presented to the municipality. Thus, preliminary ideas regarding estimated fixed investment costs, operating costs, and income situations related to the planned mixed feed production facility are given.

Promoting/establishing/disseminating fruit and Vegetable Drying facilities;

Analysies were made, and suggestions were made under the heading. According to this, it is recommended to expand fruit and Vegetable Drying facilities, to evaluate fresh vegetables and fruits in the canning industry, to turn them into vegetable and fruit juice, to turn them into frozen vegetables and fruit. Accordingly, it is suggested that the Izmir Metropolitan Municipality should invest or take the initiative in the field of fruit and Vegetable Drying facility/direct/encourage and disseminate cooperatives. At the same time, facilities must be modernized, and handicaps such as the harms and low capacity inflicted by traditional methods must be overcome.

For this purpose, the feasibility of three fresh fruit and Vegetable Drying facilities were examined in the scope of the study. The estimated fixed cost of investment, operating cost, and income related to the facilities are presented to the administration to provide preliminary insight into the situation.

Processes related to transport and Urban Logistics activities;

The evaluation of freight vehicles entering and leaving rural areas was made under the heading. An assessment of freight traffic between rural-featured districts was then given. Accordingly, it is seen that the Odemis-Tire region was at the forefront of the travel production and shooting of Pergamon. The production and shooting rates of the peninsula region, Dikili, Kınık, and Beydag districts are low. The travel production and shooting rates of the Kiraz zone have been found to be close by hyphens (see Figure 68).

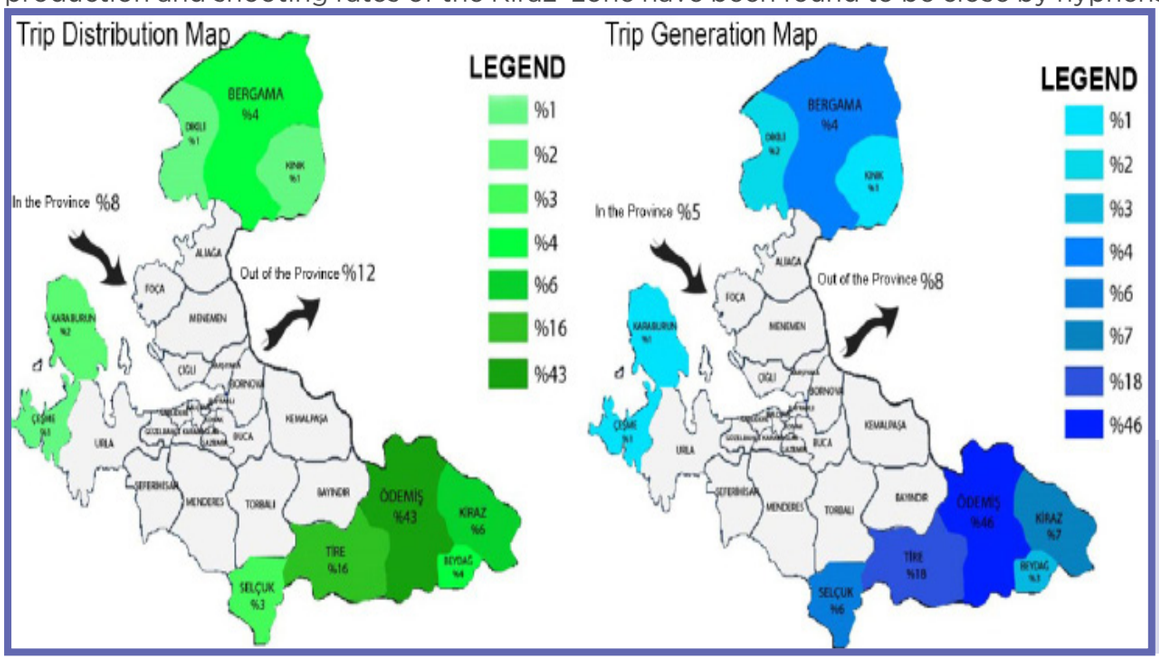

Figure 68: Weighted travel attraction and production map

The data obtained in accordance with the survey results and the results of the traffic assignments were analyzed. Accordingly, from the results obtained as a result of establishing the logistics model and managing the traffic assignment, it is observed that the North (Bergama-Kınık-Dikili) corridor and the east (Beydag-Kiraz, Odemis, Tire) corridor show a high load mobility. The southern corridor and Selcuk region are considered to be located on the transit traffic. It has been determined that freight traffic in the peninsula region is low in volume compared to other corridors (see Figure 69-Figure 72).

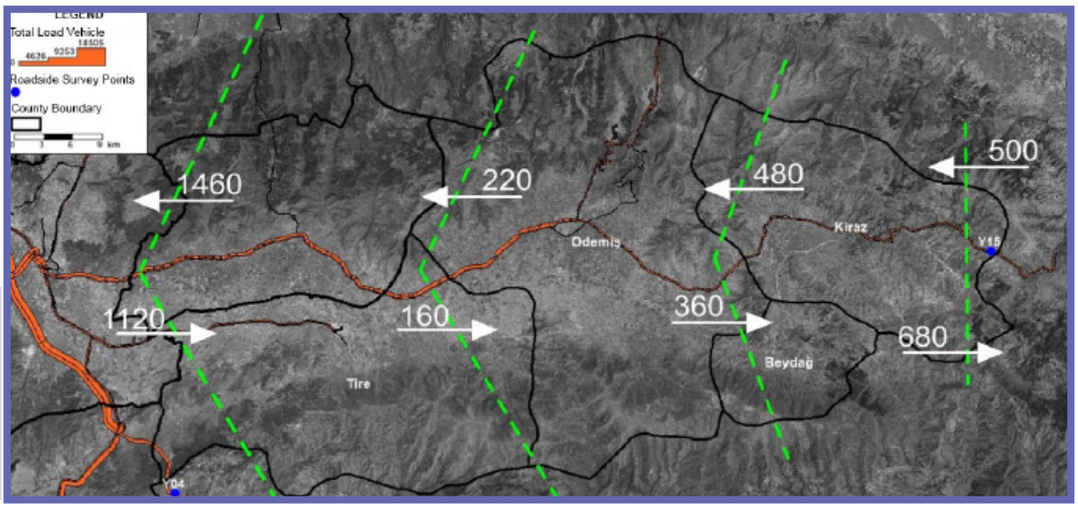

Figure 69: Freight line mobility of Kiraz, Odemis and Tire

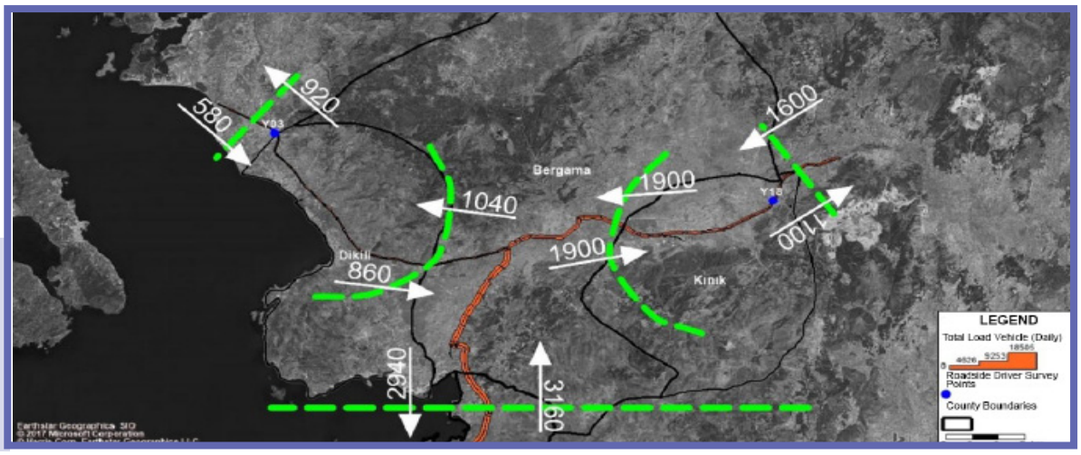

Figure 70: Freight line mobility of Bergama Dikili and Kınık

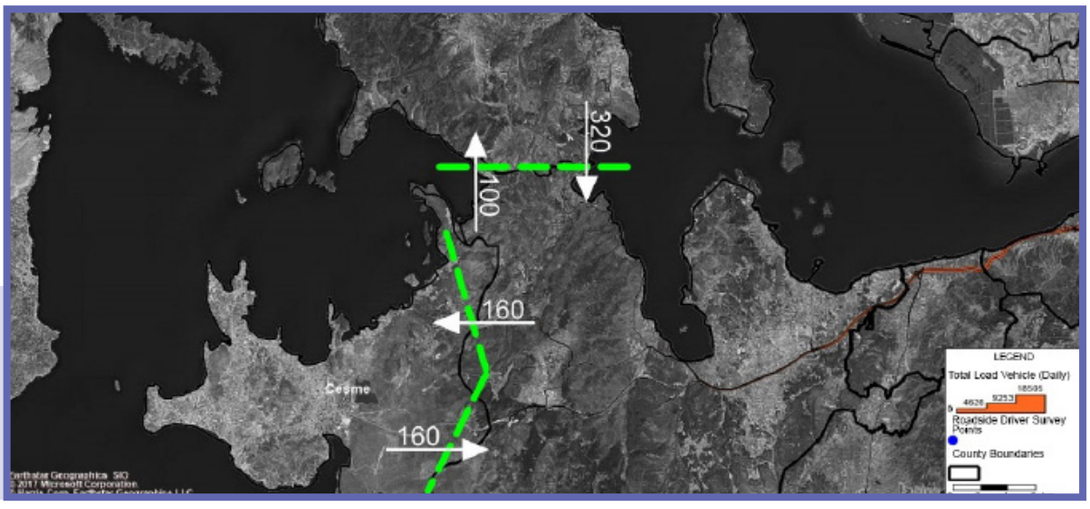

Figure 71: Freight line mobility of Karaburun and Cesme area

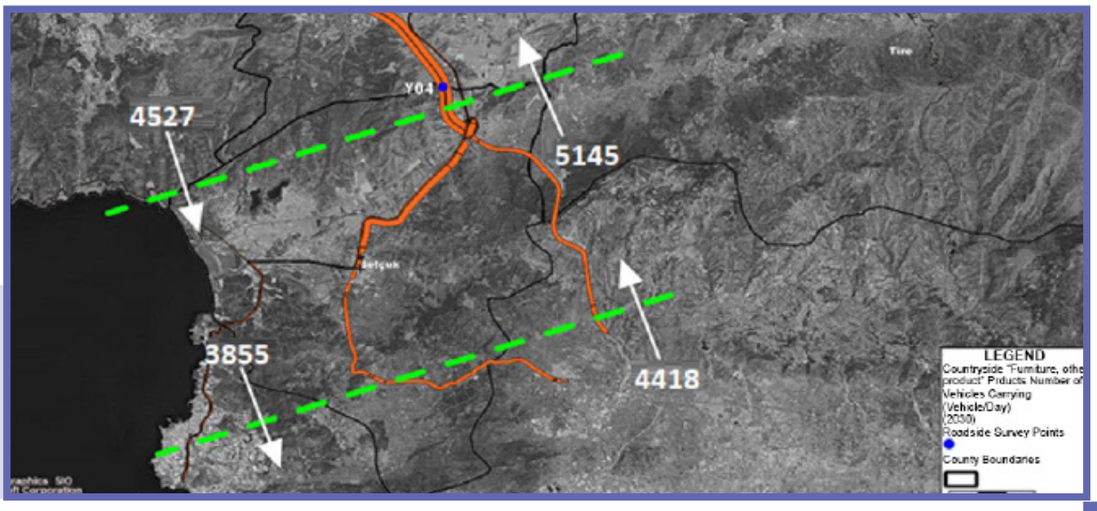

Figure 72: Freight line mobility of Selcuk area

Support of local producers in terms of Transportation and logistics (Municipal Logistics Support Project-MLSP);

Within the scope of this project, a social-minded collective Logistics Support Project framework was presented, which aims to solve the problems that small manufacturers face in marketing their products and strengthen them in the face of capital-owning intermediaries (see Figure 73).

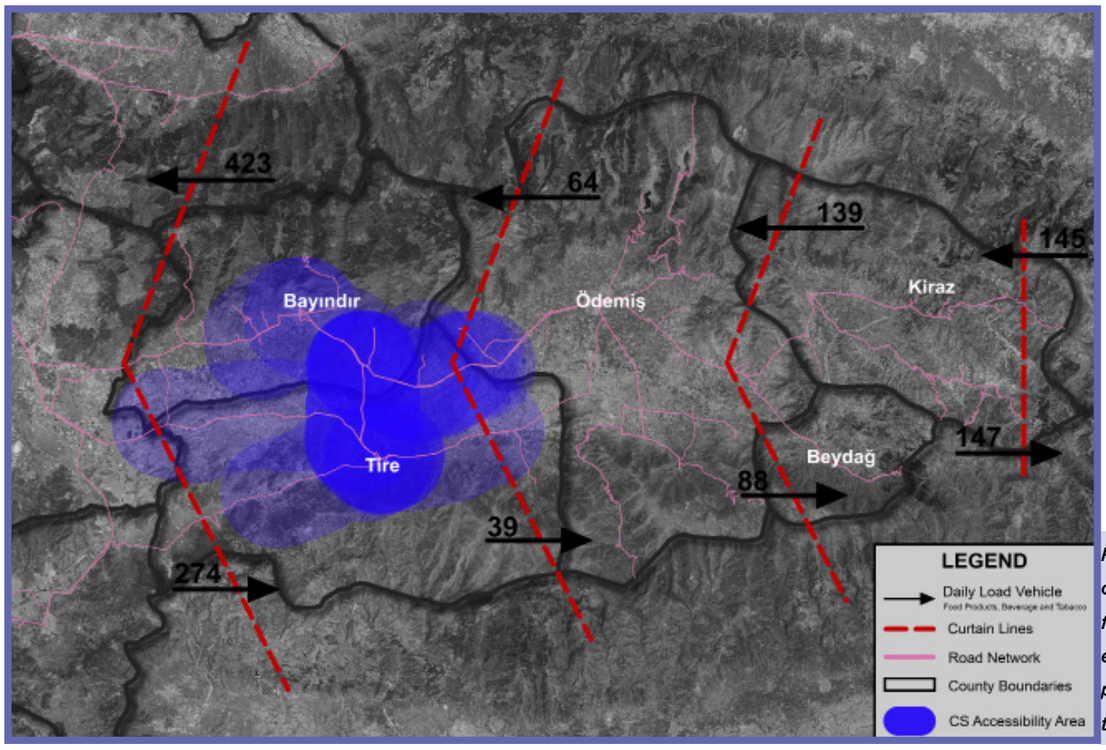

Figure 73: Representation of the area deemed suitable for cold storage in the eastern corridor (food products, beverages and tobacco)

Within the scope of the project, it is aimed to gather small producers in need from the stops established in rural areas and take them to the marketplace to make their sales and leave them again to the same points.

The administration's review and evaluation of the "conditions for renting a marketplace counter from the municipality" is recommended to make arrangements that do not conflict with the general rules of trade and to review its guidelines in this way. At this stage, a road map has also been presented during the process of reviewing the legislation. A list of legislation to be examined and evaluated in detail is given.

Evaluation of RDZP's and Recommendations Produced On The Basis of District;

Under it, Rural Development Zones producer surveys were implemented across all rural areas. The survey was conducted in three categories: Enterprise, rural, and roadside surveys.

When the rural district survey results of all districts were evaluated, the results were determined as to which issues were gaining weight in which areas and which topics should be given priority. The recommendations developed for these results on the basis of districts were given for Bergama, Beydag, Cesme, Dikili, Karaburun, Kınık, Kiraz, Odemis, Selcuk, and Tire.

The problems and proposals have gained weight mainly in the proposals "strengthening raw material supply opportunities in the local area," "increasing sales opportunities in the local area," and "improving access channels to Warehouse/Warehouse/Cross-shipment points". The fact that the solution proposals focus on economic systems and access systems in the local region indicates that the solution is in site development/ local development.

Long-Term Provincial-Level Projects:
Proposals involving high-scale and indirect rural areas are presented in the following categories.

- Proposition 1: freight transport integration studies between Izmir and Istanbul
- Proposition 2: regulation of roads in areas where the terrain is rough
- Proposition 3: to eliminate the shortage of Truck parks and to create alternative roads to ensure that heavy tonnage vehicles do not enter the city, to increase traffic safety and service quality
- Proposal 4: proposal for new parking spaces for organized industrial zones

Long-Term Local Rural Projects:
General proposals were made to support producer organizations, ensure the sustainability of production, establish/disseminate, and promote packaging/longitude/storage facilities for cold chains and processed cold food. Because the agricultural products in Izmir are impervious, if they are not subjected to special processes, they must be brought to the market immediately after the harvest. The marketing of processed and frozen agricultural products is much more profitable for producers. In production zones, it is necessary to expand the cold storage system and to install the cold chain. With the development of technology and science, frozen foods that are kept in the cold and kept fresh are required to be stored at specific temperatures in all processes ranging from production to consumption. The mechanism that will provide this is considered to be the cold chain mechanism.

Investments in processed food production are more profitable in terms of initial investment costs compared to types such as UHT facilities, despite the high profitability they generate. It is obtained by packaging processed foods with a Shock Corridor and making the products ready to shock. After this process, the products should be kept in cold storage and primarily transported by "cold chain vehicles with cooling properties."

Determining the regional locations of cold storage units;
It is considered appropriate that the storage tanks should be carried out in or around the settlements of the areas which are intended to store only fruits and vegetables without longitudinal, packaging, and similar additional facilities. It is evaluated that cold storage for cold chain and processed food and related facilities should be positioned in transit zones for vehicles for food products, beverages, and tobacco groups in terms of accessibility. The areas deemed suitable for the North and East Corridor are given (see Figure 74 and Figure 75).

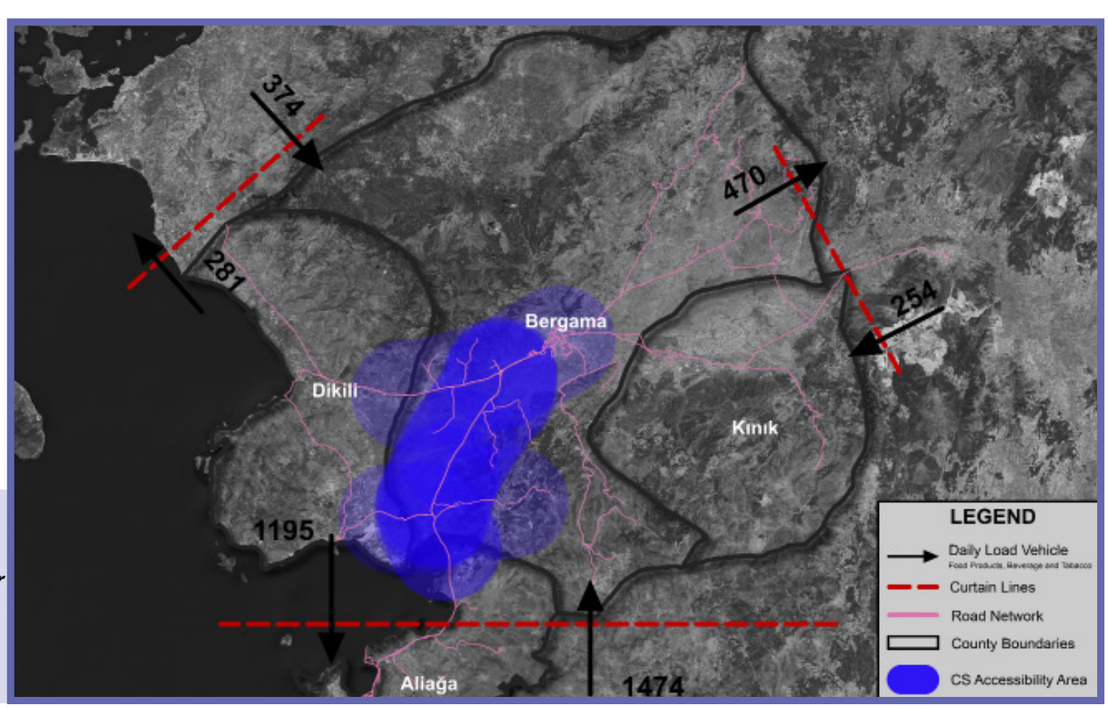

Figure 74: Representation of the area deemed suitable for cold storage in the north corridor (food products, beverages and tobacco)

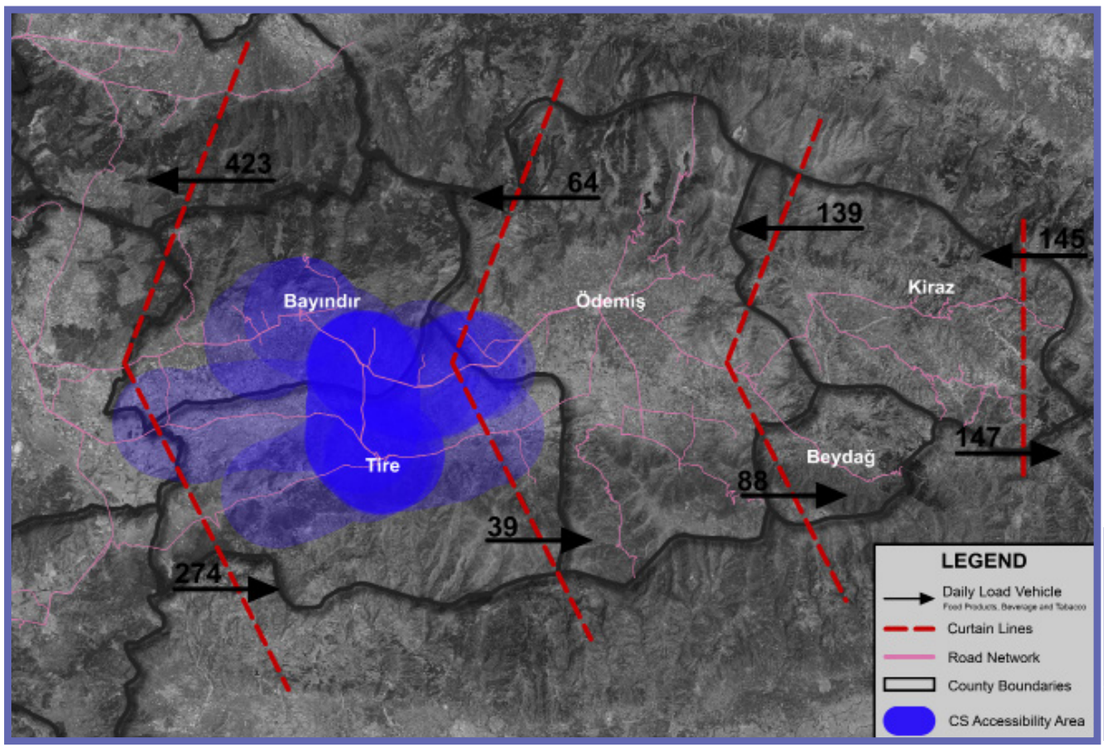

Figure 75: Representation of the area deemed suitable for cold storage in the eastern corridor (food products, beverages and tobacco)

Fresh Fruits and vegetable Cold Storage;

For detailed evaluations, three "Cold Storage feasibility studies" were examined for samples and submitted to the administration. Thus, preliminary information about estimated fixed investment cost, operating cost, and income status related to the planned Cold Storage was considered.

Establishment of UHT and packaging facilities/ promotion of cooperatives in order to complete localization in milk corridors;

Recommendations are as follows: Izmir Metropolitan Municipality should make efforts to localize the process entirely by establishing a facility for food and dairy products or by directing cooperatives in this regard. By controlling the budget allocated for UHT processing and packaging, both financial supports provided to producers and social benefits provided to consumers should be reached, or manufacturers should be supported in this direction. Today, UHT and packaging operations have high initial investment costs. The widespread impact and social aspect of the project requires the local government in Izmir to take the necessary measures in this regard. At this point, it is important for Izmir Metropolitan Municipality to take priority by either investing in UHT facilities or directing cooperatives and to develop social municipality understanding and finalize the local chain in the milk corridor. The milk distribution process of the hyphen Cooperative is given schematically (see Figure 76).

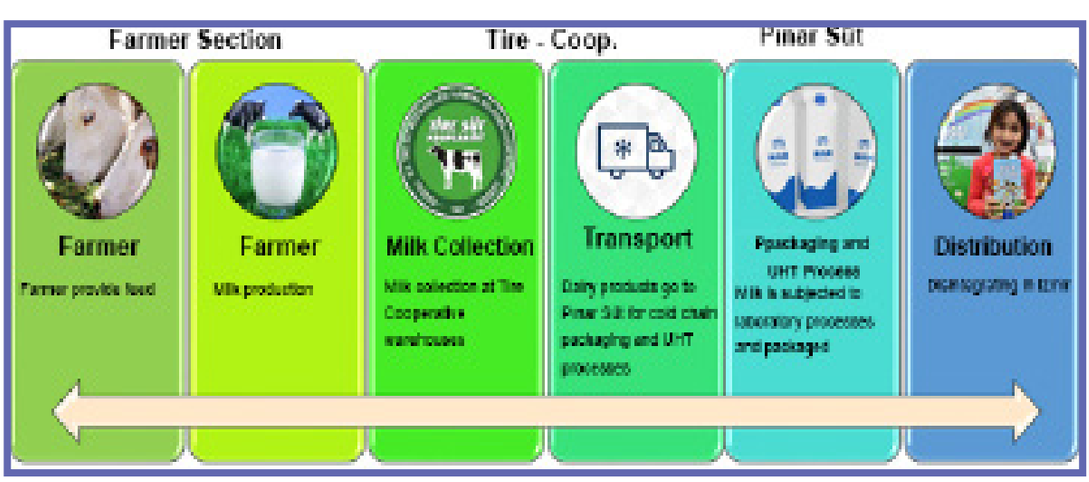

Figure 76: Tire Cooperative Milk Collection and distribution process

Proposals For Heavy Vehicle Parking Areas In Rural Development Areas;

The UKOME states it; there have been continuous complaints from citizens in almost all counties regarding the adverse effects of trucks and trucks on traffic. For this reason, it can be said that there is a need for parking spaces in all districts for truck parks and other heavy vehicles.

In this respect, the capacity, usage status, and similar information for the Truck parks were obtained through interviews with all the district municipalities in the rural borders. The daily number of heavy vehicles in traffic assignments is used in capacity calculations of heavy vehicle parking areas. It was determined by roadside surveys conducted in the counties, how many of the heavy vehicles in the counties had parking space problems, and the waiting period after the operation. By using the proportion of heavy vehicles waiting period of more than one day and more during post-operation waiting times, it was determined how many vehicles were on standby, and in fact, there was a need for parking space. At this point, in-house parking vehicles do not park in the facilities, and the need to be directed to the parking areas has been taken into consideration. The need for the number of heavy vehicle parking required for each district is given (see Table 34).

Table 34. The number of heavy vehicle parking required for each district needs

District	Direction of going to Izmir			Direction of arrival and departure from İzmir				Internal Movement Heavy Vehicle Number			1 Day or More Waiting Period Rate	Total Parking Lot Requirement (2030)
	Login	Exit	Internal Movement	Login	Exit	Internal Movement	Vehicle Type Rate	Direction of Going to İzmir	Arrival Direction From İzmir	Total		
Odemis	220	480	260	360	160	200	0.58	151	116	267	0.42	112
Kiraz-Beydag	480	500	20	680	360	320	0.58	12	186	197	0.42	83
Kınık	1600	1.900	300	1.900	1.100	800	0.82	246	656	902	0.19	171
Dikili	580	860	280	1.040	920	120	0.87	244	104	348	0.82	285
Bergama	1.040	1.900	860	1.900	860	1040	0.82	705	853	1.558	0.19	296
Karaburun	100	320	220	0	0	0	0.70	154	0	154	0.66	102
Cesme	160	160	0	0	0	0	0.70	0	0	0	0.66	0
Tire	220	1.460	1.240	1.120	160	960	0.58	719	557	1.276	0.64	817
Selcuk	4.418	5.145	727	4.527	3.855	672	0.94	683	632	1.315	0.64	842
Seferihisar	160	300	140	420	200	220	0.43	60.20	94.60	155	0.40	62
Torbalı	7.120	9.040	1.920	8.300	6.280	2.020	0.48	921.60	969.60	1.891	0.82	1.551

In this respect, recommendations regarding the capacity and location of the Truck parks in the districts are given together with the determination of the location selection parameters and their benefits. In line with the traffic assignments made within the scope of the study, corridor movements for the product groups of 2018 and 2030 were examined, and recommendations and assessments were made about the sectors. The daily movements of the corridors, which have the highest agricultural and industrial characteristics of Izmir, described as the eastern corridor and the northern corridor, were examined. This review examined food, metal, and ore in mineral stones, goods and items not elsewhere classified, agricultural products, and furniture products. The aforementioned assessment is made as a comparison of traffic assignment results for 2018 and traffic assignment results for 2030 daily, and the increase rates are detailed in the "logistics analysis and recommendations for B11 Rural Development Regions" report. The product groups in the East and North Corridor are given sample visuals for the years 2018 and 2030 (see Figure 77-Figure 80).

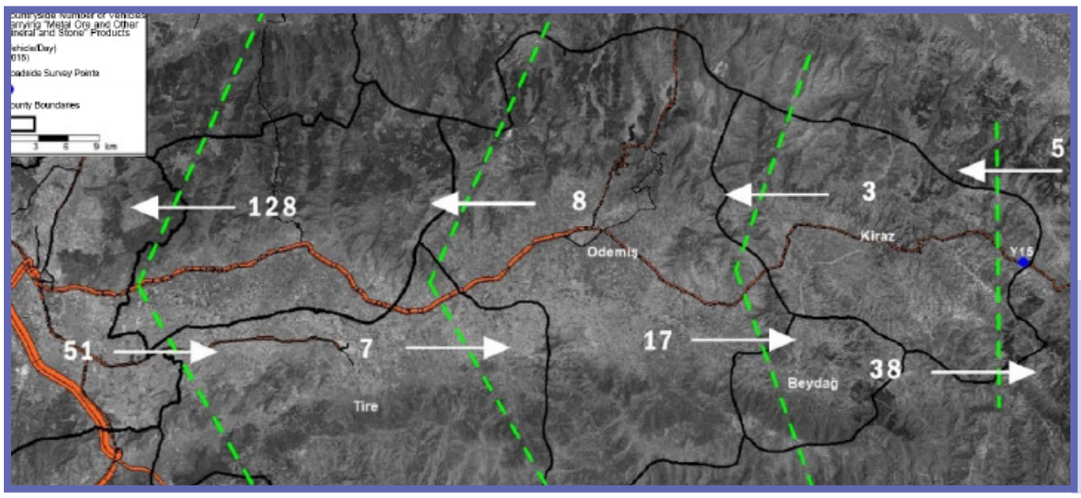

Figure 77: Daily assignment results for the Eastern Corridor, metal, ore and other type of mine and stone for 2018

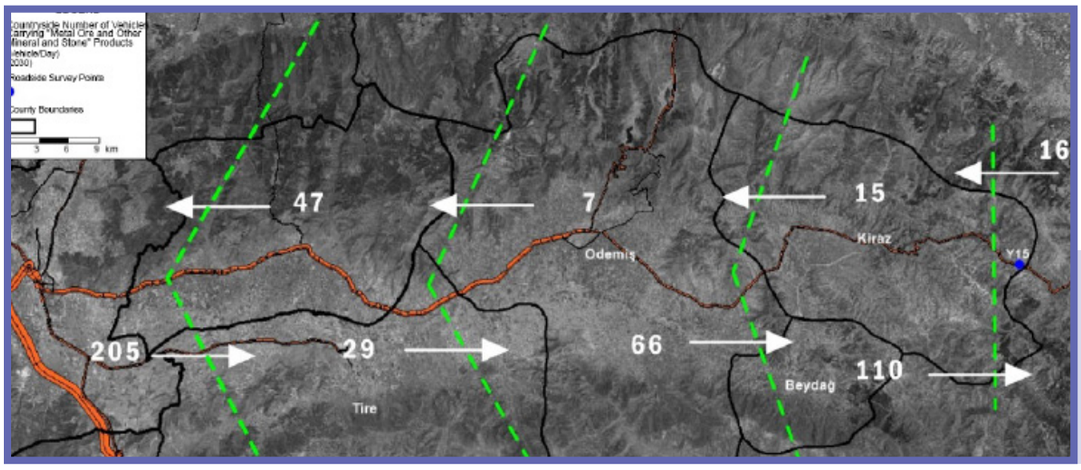

Figure 78: Daily assignment results for the Eastern Corridor, metal, ore and other type of mine and stone by 2030

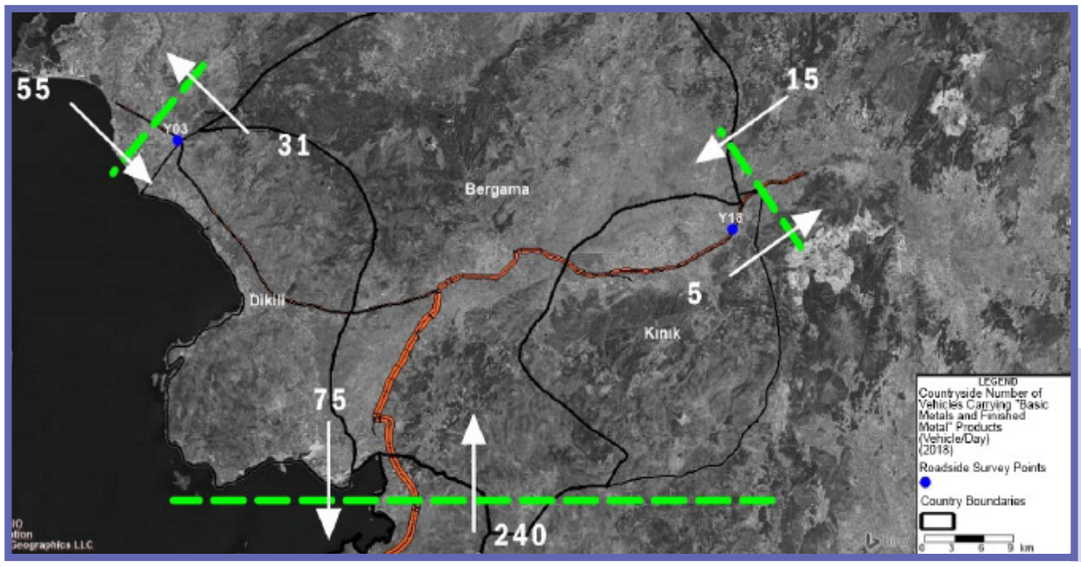

Figure 79: Daily assignment results for the North Corridor, metal ore and other type of mine and stone for 2018

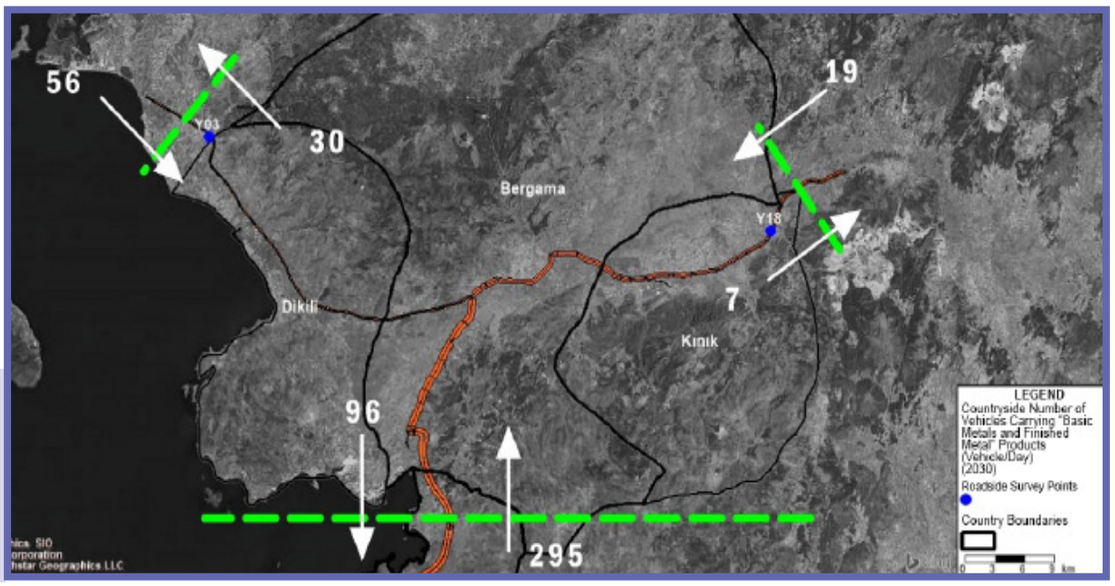

Figure 80: Daily assignment results for the north corridor, metal, ore and other type of mine and stone by 2030

Supported logistical ideas and other conceptual suggestions;

Accessibility network studies for mountain villages under the title (see Figure 81), needs of land logistics facilities for Culture fishing, and general recommendations for support of smallpox Animal Husbandry are given.

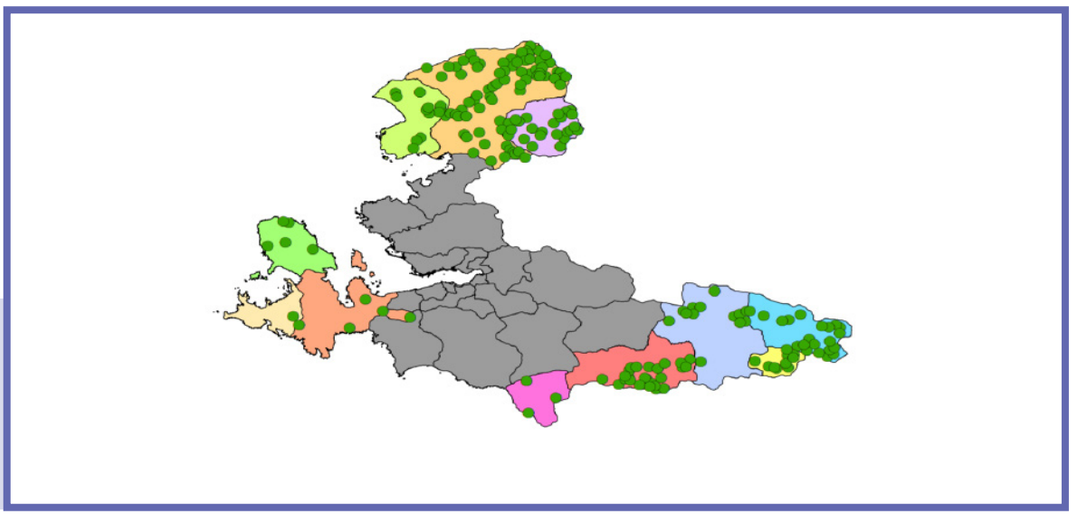

Figure 81: Low accessibility level distribution of villages

8.3. Analysis and Recommendations for Solid Waste Logistics

One of the works carried out within the scope of the Izmir Sustainable Urban Logistics Master Plan, which was started to be built within the borders of the Izmir Metropolitan Municipality, is the Sustainable Urban Solid Waste logistics business. Within the scope of the solid waste logistics business, one of Izmir's problems on, waste collection, transfer, disposal, and the operation of all these in an optimized manner has been examined, and solution proposals have been developed. In the scope of the study, the current situation analyses were made, and new data were collected, including information on the Planning and work of the Izmir Metropolitan Municipality in the near term. Scenarios that can respond to the needs of Izmir province and eliminate their inadequacies have been created by creating inadequacy analyses for the current situation.

As a result of the surveys conducted for Izmir province, it was determined that the annual Waste amount was 2,026,374 tons, and the daily amount of solid waste per person was 1.32 kg/day. The average daily waste per capita in Turkey in the same year is 1.17 kg (TSI, 2016). The amount of waste collected by municipalities in Izmir is more than 5,551 tons per day. General information about Solid Waste Services for Izmir province is given (see Table 35).

Table 35. The number of municipalities providing waste services in Izmir, its population and the amount of waste collected

Total population	4.223.545 erson
Total number of municipalities	31
Municipal population providing waste service	4.207.197 person
Municipal population providing waste service	%99,6
Amount of waste collected	2.026.374 ton/year
Average amount of waste collected per person	1,32 kg/person-day

The number of flights from transshipment stations to landfills in 2017 was 41,912, and the number of voyages from catchment areas to transshipment stations was 203,961. Izmir's current situation when solid waste load handling movements were examined, and the information obtained was compiled, the amount of load that Gediz Transfer Station pulled and produced daily was 1,347,495 kg/day. Considering that the garbage transportation vehicles, which are assumed to have a body volume of 13-15 m3, can carry an average of 18 tons of waste, an average of 75 trips per day are required for Gediz. When you take into account that the vehicles go full and return empty, 150 flights are arranged daily.

The amount of urban solid waste to be generated within the borders of Izmir by 2050 is calculated according to the population estimates made on the basis of the district and the data of the Metropolitan Municipality. Similarly, assessments were made, taking into account the waste characterization made by the Metropolitan Municipality.

Five different scenarios have been developed for the Integrated Solid Waste Management System, adhering to existing regulations. When determining the scenarios, it was observed that the proposed systems were alternative and comparable to each other. The following table provides the scenarios set out (see Table 36).

Table 36. Scenarios of Integrated Solid Waste Management System in Izmir province

Scenario	Explanation	Waste Collection and Disposal Methods
S1	The Current Situation is Improved and Continued	• Continuous landfill and use of existing facilities, improving the system with waste separation and recycling • Mixed Collection • A Waste Separation Plant With Transport Center
S2	Regional Waste Management	• Reducing waste transport traffic and highest level of evaluation with separate disposal solutions for tourism regions, city center and rural areas. • Binary collection, waste separation, biodegradable waste assessment and final storage
S3	Disposal by Incineration	• Binary collection, waste separation, waste-derived fuel production, incineration plant and final storage
S4	Solid Waste Disposal with Plasma Gasification Method	• Plasma gasification technology, energy, waste assessment, final storage
S5	Combination of Regional Waste Management System and Plasma Gasification Method and Solid Waste Disposal	• Moving directly to the disposal site, integrating the S2 and S4 scenarios

The parameters that must be considered when creating scenarios are as follows:

- Increase in waste amounts
- Minimizing waste transport traffic
- Waste management legislation
- Minimizing waste
- Small amounts of waste to be stored, even the formation
- Continued use of existing facilities and projects

8.3.1. Scenario 1: The Current Situation Continues to Improve

As a basic case scenario, this scenario has been developed as a continuation of the existing waste management system, which is not compatible with the current legislation, with some improvements. Packaging waste that cannot be collected separately and other waste will be sent mixed to the landfill facility. Packaging waste that comes with mechanical recovery facilities (MRF) to be established in solid waste landfills will be included in the recycling. It has been accepted that the maximum amount of packaging waste that can be recovered at MRF will be 30%. The amount of waste that can be included in the waste market will reach 50% by 2025 if it is accepted that an average of 20% is separated by the existing waste piggybacks, the collection points created, and the unreserved informal collection within the city.

8.3.2. Scenario 2: Regional Solid Waste Management System

The main principle of the second scenario is the separate collection of the waste at its source in accordance with EU directives, and the disposal system is explicitly planned for the four regions of the city. In the new waste management system, the assessment of packaging waste, the evaluation of organic waste, and the

establishment of separate facilities for the assessment of collected materials are required.

In addition, since storage will be made as the final disposal method, a minimum amount of storage must be made to use the landfills for the most exrended period. Installing all of the facilities in a single area increases the internal circulation of waste, bringing down significant transportation costs to the municipality of Büyükşehir. There are two priorities in this scenario;

1. The system created will be a system that complies with current waste management legislation and meets the targets set out in the legislation.
2. Waste circulation will be minimized thanks to the reduction and evaluation of waste at the source.

In the implementation of the system, the city is divided into four districts. Disposal facilities are explicitly grouped into these four zones. The waste management system was conceived as an integrated system to cover all regions (see waste Figure 82).

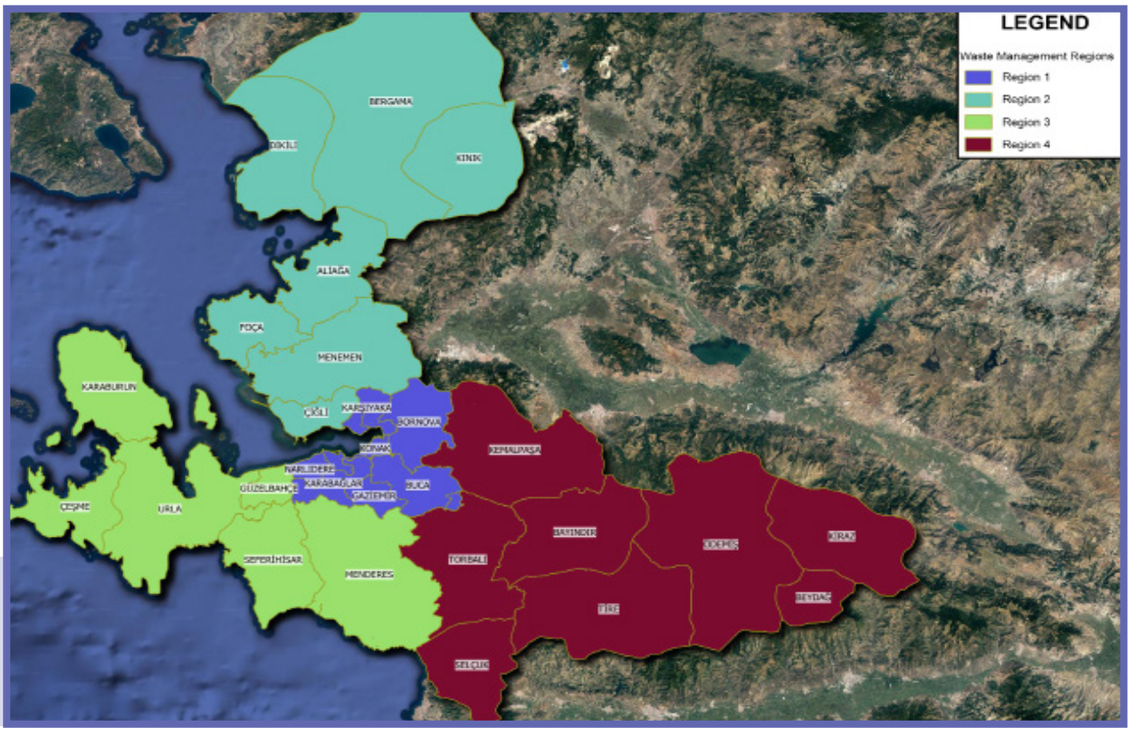

Figure 82: Scenario 2-Waste Management Zones

The basis of the system is the separate collection of wastes at the source. Separate collection of organic and packaging wastes will be provided with a dual collection system. As a result of the collection activities carried out within the city, the target rate of packaging waste to be collected separately was determined as 50%. This goal will be achieved by increasing separate collection rates over the years. Separate collection targets at source were envisaged for all waste management zones at 20% by 2021, 22% by 2022, 40% by 2023, and 50% by 2024. A mechanical extraction facility with a capacity of 40 tons/hour to be installed in landfills allows almost all of the packaging waste to be recovered without storage. As stated in the first scenario, packaging waste processed at MRF can be recovered with 80% efficiency and collected wastes mixed with 20% that cannot be recovered will be sent to the landfill facility.

In addition to packaging wastes, the evaluation of organic wastes by separately collecting them is an important step in the evaluation of waste and is an obligation brought about by waste legislation. The legislation set a target for 2018 for organic waste to be taken to the final disposal facility as 50% of the amount of waste in 2005 and 65% of the amount in 2018 by 2025. In this scenario, an increase of 4% per

year is targeted for the collection of organic waste. 30% of organic waste can be evaluated at the end of the MRF. The amount of organic waste to be disposed of in landfills when these rates are captured is the target set in the legislation in 2028. In the second scenario, the average amount of organic waste assessment is about 50%

8.3.3. Scenario 3: Combustion Disposal System

In this scenario, packaging waste which has high material value and which cannot be burned will be separately collected partially at the source and added to the economy, the rest of the waste will be collected, mixed and thermal disposal will be done. In this method, it is assumed that 27% of the waste entering the thermal facility will form ash by weight. Accordingly, 585 tons of ash will be released in 2020, and this amount will increase to 1.1 million tons in 2050.

8.3.4. Scenario 4: Solid Waste Disposal By Plasma Gasification Method

Plasma technology involves creating a continuous electric arc by passing the electric current through a gas in a process, a process considered to be electrical decay. Compared to other disposal and incineration methods, plasma technology is an environmental technology thanks to its products. Developed countries prefer plasma technology as environmentally friendly because of the advantages of not having any heavy metal outlet outside, not having dioxin and furan groups due to high temperatures. 6 facilities with a daily capacity of 1,000 tons are planned for Izmir.

8.3.5. Scenario 5: Regional Waste Management System and Plasma Gasification Method Together with Solid Waste Disposal System

Scenario 2 Regional Waste Management the development of the system with one of the facilities proposed in the fourth scenario together with the system will maximize implementation efficiency. Although initial investment costs are high, especially waste density is high and waste transfer to existing disposal sites is difficult 3. A plasma facility with a capacity of 1,000 tons will be installed in the region, reducing the load of solid waste by half, creating a deep-rooted solution to Izmir's medical waste disposal, and providing a significant public benefit through the high energy available.

BENEFITS

9. BENEFITS

9.1. Introduction

With the increasing population and the proportion of the population living in the cities, the quality of life in the cities has decreased, and the effects of urban problems have been felt more comprehensively. People living in the city are increasingly demanding that problems be reduced and that economic, social, and social quality of life is improved. One of the main factors affecting this expectation negatively for urban dwellers is urban traffic. One of the factors affecting the increase in traffic problems is the freight vehicles moving in the city. These vehicles and their impact on the city are of interest to urban logistics.

Urban Logistics is a sub-field of logistics that covers the study, planning, maintenance, and improvement of existing logistics activities in residential areas. Urban Freight Transport has to deal with many significant problems such as high traffic congestion, harmful environmental factors such as noise and emissions, and increasing costs. Like its examples in the world, Izmir, one of the most important cities in our country, is experiencing a similar development. Izmir Metropolitan Municipality has completed the Izmir sustainable urban logistics Plan project (LOPI) with a 2030 perspective in accordance with its future vision. LOPI was organized to minimize the negative social and environmental impacts of urban logistics activities while preserving the economic viability of Izmir.

In the LOPI project, data collection forms designed within the scope of the project, field visits, and extensive research related to load mobility in Izmir city and rural areas were obtained, and a large number of documents and reports produced before were examined. The academic and technical team of experts in the field carried out extensive modeling and simulation studies based on scientific studies. A very effective participation model has been developed and implemented at LOPI to use the data obtained by ensuring the participation of all relevant stakeholders with different levels of responsibility and expectations in the development of the project, starting from the planning stage. All stakeholders have determined that it is essential for Izmir to achieve the following basic objectives.

- Relief of urban mobility,
- Support its development and economic sustainability,
- Reducing environmental impacts,
- Greater use of green vehicles,
- Optimization in logistics activities,
- Transportation master plan and logistics plan integration,
- Increase of intelligent transportation and logistics IT applications,
- Ensuring effective logistics coordination,
- Increased logistics management performance,
- Implementing effective urban logistics legislation,
- Reducing the impact of waste logistics on urban quality of life

The above-mentioned objectives are in order to achieve urban freight mobility needs and expectations of freight transport, economic and social activities, traffic safety, noise, waste management, environmental, and rural development. This is taken with consideration of the effects of Izmir province on all the elements such as, infrastructure, superstructure, legislation, development plans/arrangements, supervision, technology/information management and integration projects in areas such as these which have revealed LOPI, It is believed that, Izmir and will contribute to the future vision of a sustainable future.

9.2. Benefits for the whole city, Izmir

Under the first title, ***"Logistics and Transportation Infrastructure Proposals"*** are presented. As a result of the in-depth interviews conducted in the LOPI process, the Swot brainstorming meeting conducted within the scope of the participation model, the opinions obtained by the future situation Planning Workshop, the PESTEL workshop, and the joint meetings with the administration in line with the target year inadequacies analyses, a total of 16 proposal packages in the form of 4 main and 4 sub-scenarios were proposed. As a result of testing of the proposal packages in the model, the most effective proposal package was determined throughout the province and in the urban area. ***As a result of the analyzes, 1.d and 5.d emerged as the most effective suggestion packages both in the urban area and throughout the province.***

Proposal Pack 1d. explained below;

Eastern ULC, Food ULC, Urban Light Rail Cargo System proposal package The presence of Kemalpaşa Logistics Village, the presence of logistic village port connections, the change of Alsancak Port's logistic functions (recreation), and the existence of a new ring road were evaluated.

Within the scope of the suggestion package 5.d;

The presence of Doğu ULC, Food ULC, Supper Zone, Kemalpaşa Logistics Village, the presence of logistic village port connections, the change of Alsancak Port's logistic functions (recreation) and the existence of the new ring road have been evaluated.

In the Pestel workshop conducted under the participation model of the LOPI project, the participants expressed that the most important dimension for Eastern ULC and food ULC is economical and that environmental factors should be taken into account. In the workshop, where it was stated that the implementation and sustainability of the Urban Light Rail Cargo System also depend mainly on economic factors, the participants related the issues related to the Port of Alsancak to more environmental aspects. The construction and sustainability of the periphery roads were also evaluated with its economic dimension. As a result, Kemalpasa logistics Village, which is of great importance for Izmir, 2. Changes in the logistics functions of the periphery road and the Port of Alsancak (recreation) projects are seen as investments that will have a significant impact on the freight transport in Izmir in the coming years. If the uncertainties for these investments are removed and investments are realized by 2030, they will produce positive results in the Izmir transportation network, traffic conditions, and environmental parameters. They will benefit the local government's investments in this area to realize efficient and effective projects.

Special Regions; Within the scope of LOPI, 11 industrial zones, 2 free zones and 12 solid waste facilities were examined in order to record and analyze the physical and geometric characteristics of entry and exit points in the load centers such as organized industrial zones, solid waste storage facilities, ramp systems in the districts of Izmir province. As a result of the studies, the common problem seen in all facilities is the lack of horizontal and vertical markings resulting from the road enlargement and thus can not be used with the full meaning. The realization of the proposed markups can achieve the efficient use of road capacity. In general, there are physical inadequacies on the roads to access facilities. Eroded coatings, undulations have occurred on the road surface, and insufficient lane widths have been identified. Facilities in rural areas (see rural areas) Torbalı, Karaburun, Foca, Turkelli Solid Waste facilities) although the entry–exit points are wide enough, there is no driving comfort due to road degradation on the route roads to the facility, and there are heavy traffic congestions caused by insufficient lane widths.

Heavy Vehicle Parks; Within the scope of LOPI, truck and truck parking surveys were carried out at 24 locations throughout Izmir province. As a result of the studies, it is clear that there is a shortage of heavy vehicle parking spaces throughout Izmir province. The occupancy rates of the parking spaces are in the 50-60% bands, not because heavy vehicles are outnumbered in the region.; the operating policies of heavy vehicles, irregular and incorrect distribution of parking spaces in Izmir province. Due to reasons such as physical inadequacy, drivers do not prefer parking areas to the side of the road with less density in the parking areas, at the same time, roadside parking at the roadside causes, traffic flow disruption.

For this reason, it was proposed in this study that heavy vehicle parking areas were revised throughout Izmir province and that regular facilities provided physical and geometrical competence as well as areas positioned in optimum proximity to the points where load transfer would be achieved. In this context, it was proposed to build international Truck parks in Isıkkent, Kemalpasa, Torbalı, and Aliaga regions. In addition, in the event of the implementation of the Urban Logistics Center project under the heading of logistics and transportation infrastructure proposals, the TIR Park should be located within the boundaries of the Urban Logistics Center and the warehouses site at Bornova Belkahve should be moved here.

The fourth title includes “recommendations for the transportation of Hazardous Materials.” 454 first-class non-sanitary facilities are producing hazardous materials in the city center.

Short and Medium Term Benefits;

- Izmir city-wide tunnels Class A “no restrictions for the transport of hazardous materials” tunnels to be raised to the status of a Joint Working Group with the General Directorate of highways to prepare the project and feasibility to be taken into the investment program,
- Creation of unique parking spaces for vehicles carrying hazardous materials to be able to park at the points of entry to the urban area during the hours when entry and exit to the urban area is prohibited,
- Fuel stations etc. delivery and supply of hazardous materials in facilities where possible under supervision and outside of peak hours,
- Cooperation with unions and manufacturers within the scope of Social Responsibility projects in driver training,
- Realization of cooperative or similar organization works for coordination of logistics needs of facilities that produce and use hazardous materials, evaluation of the suitability of the place by obtaining information about logistics activities in permit processes for new facilities to be opened, etc. Such primary proposals are expected to reduce risks from hazardous material transport in the urban area in the short to medium term.

Long-Term Benefits;

- Collection of facilities using hazardous materials to a specialized area,
- Major land-use decisions such as removal from urban areas and infrastructure investments that can enable vehicles using Izmir as a transit system, especially in the transportation of hazardous materials and, to change the type at city entrances and the entrances to urban areas can be planned.
- Strengthening the rail system connection of the Aliaga region, where fuel and derivatives are produced, and raising the agenda of projects aimed at using the rail system more effectively from the point of production. It is important in the long run in terms of both accelerating the economy and minimizing the risks throughout the city.

Alternative Species and Green Vehicles; The use of alternative vehicle types and environmentally sensitive green vehicles is preferred in urban logistics applications all over the world. However, the positive and negative effects of their use must be considered by decision-makers. The gains of “alternative species and green vehicles “ under LOPI are as follows;

- Alternative species and green vehicles related SADA, IZKA etc. expansion of supported projects and opening up new business areas
- The reduction of accidents as a result of the development of green and green vehicles which are common to the general population with those used in the logistics field
- Increasing social-environmental awareness
- Reduction of air and environmental pollution
- Development of specific legal regulations and standards on alternative species and green vehicle use
- Creation of micro consolidation centers
- Electric cargo bikes for end point logistics
- Widespread use of cargo train (hopper) for city logistics
- Reduced road maintenance costs and workloads
- Reduced traffic congestion in application areas
- It can be listed as increasing time efficiency in delivery.

Freight Travel Demand and Land Use Management; have been submitted under heading six. The growth rate of commercial areas affecting freight travel demand for the target year 2030 is projected to be around 33% by 2018. The growth in this land-use structure in 2030 is largely due to the OIZs and Kemalpasa Logistics Village. For Izmir, which is rapidly migrating and industrializing, there is a need to manage demand rather than increase land-use decisions. In this context, as a result of LOPI modeling, total vehicle volume/capacity values in the city center scale for the 2030 target year are present, as well as there are no volume/capacity values in arteries below 50%. When volume/capacity values were examined in some of these roads, it was found to be around 1.59 for Liman Street, 2.01 for Altınyol Street, 1.25 for Ankara Street, 1.5 for Anadolu Street and 1-2 for the periphery road. In this context, demand management applications are of great importance when it is considered that the need for new road investment is costly.

However, there is a need to develop models to determine the best type of road pricing or fare plan to reduce the effects of freight transport in urban areas. Therefore, Izmir province for congestion and/or road-pricing system because it is not the responsibility of the Metropolitan Municipality with the central government regarding sustainable urban logistic plan of pricing as a measure necessary legal arrangements can be made. In addition, freight vehicles can be inspected with IZUM intelligent transportation system. On the other hand, the Ministry of Transport and Infrastructure "Regulation on the procedures and principles related to increasing energy efficiency in Transportation has been published in the Official Gazette dated 2 May 2019 and numbered 30762. This regulation paved the way for Low Emission Zone applications aimed at reducing traffic congestion and improving the quality of life in urban centers, which are frequently encountered in international urban logistics applications. Through the relevant legislation, municipalities may declare areas where heavy traffic and air pollution are experienced as low emission areas in urban centers and district scale, provided that they receive the appropriate opinion of the Ministry of Environment and Urban Planning. In this context, the inner cord under LOPI has been proposed as a low emission area (Super zone). ***As a result of modeling and analysis performed within the scope of LOPI, it is stated that the application of the Super zone will have prevented the entry of 4,600-5,796 vehicles per peak hour. Thus the CO_2 emissions of 2,586-3,294 kg per hour can be reduced so that the Alsancak region (Inner cord) will be suitable to be converted to Super zone in the medium term.***

Intelligent Transportation Systems (ITS); For the province of Izmir within the scope of the ITS, transportation policy, land use plans, IZUM, considering the passage of freight vehicles for urban logistics in the city center with the reduction of commercial vehicle routes identification, implementation of restrictions for commercial vehicles, low emission vehicles, implementation and monitoring of the provision of parking outside the city and heavy load vehicles, and the enforcement of parking regulations for commercial vehicles and also noise and emission control measures have been proposed in terms of levels of technical

standards. In line with these recommendations, under LOPI, T.C. Izmir Metropolitan Municipality Transportation Department Directorate of Public Transportation Services has been put into operation by the recommendation of the trucking freight transportation directive. Also, integration between different types of transport with especially ITS policy that contains the tools, infrastructure provisioning, management, and pricing information that includes the integration of policy tools, measures and integration between transport measures, and land use planning integration with other policy areas such as health or environmental protection to ensure work can be performed with data. ***With ITS, proposals for entry control, delivery zone monitoring, automatic transit systems, moving weight for heavy cargo transport, traffic management, on-line loading zone reservation, vehicle navigation and fleet management systems were put forward.***

9.3. Rural Development Benefits

Short and Medium Term Benefits

- Isıkkent depot areas and truck parking are proposed to ensure that the area is operated in a more planned way
- Marketplace, marketing opportunities development in Menderes, Kınık, Kiraz and Tire districts / seasonal arrangements in market areas in tourist districts such as Cesme and Foca
- Revitalization of market culture that tends to fall
- More efficient and qualified planning of Buca vegetable and fruit market
- Setting up of feed storage and distribution facilities, clearing and distribution systems of barley and Corn Flake at needed points
- Expansion of fruit and Vegetable Drying facilities
- Supporting the transportation and logistics needs of local manufacturers with the Municipal Logistics Support Project
- Strengthening raw material supply opportunities in local areas
- Increasing local sales opportunities
- Improving accessibility channels to Warehouse / Warehouse / Cross-shipment points.

Long-Term Benefits

- Eliminating the shortage of Truck parks and creating alternative roads to ensure that heavy tonnage vehicles do not enter the city, improving traffic safety and service quality
- Proposed new parking spaces for organized industrial zones
- Establishment of cold chain and expansion of transportation and trade with cold chain vehicles with cooling properties
- Increasing the cold storage of fresh vegetables and fruits and strengthening the hands of manufacturers in selling their products
- Completion of localization in milk corridors/establishment of UHT facilities and associated packaging facilities
- Replacing asphalt works in rural areas with roller compacted concrete (SSB) systems
- Determination of location and capacity of heavy vehicle parking areas in rural areas
- Regional determination of cold storage locations
- Determination of future logistics work areas

9.4. Solid Waste Logistics Benefits

Currently, two landfills and one dump site are being used in Izmir for waste disposal. The system does not fully meet the requirements of both modern management systems and waste legislation, even if Side operations such as obtaining energy to the extent possible by the facilities are carried out in these facilities.

Furthermore, it is not possible to talk about a waste management system in the Izmir region because all

the district municipalities and the Metropolitan Municipality have created their own systems and these systems are not connected with each other. The main drawback of this situation is the burden on waste handling and disposal costs. Because Izmir Metropolitan Municipality creates a transfer point for almost every district and carries the waste to distances over 100 km, all of these transfers are run according to the collection times of the districts, so unnecessary shifts occur and the number of flights due to this irregularity increases. In line with this data, 5 alternative scenarios have been developed.

Scenario 1 is based on the development and maintenance of the existing system. By taking into account the problem of locating disposal sites, it is a proposal to improve the system against possible location problems. The most important criteria here is to develop a system for separate collection of packaging wastes; to establish a packaging waste transfer or mechanical recovery facility at the Gediz Transfer Station, where waste is brought heavily instead of being extracted at landfills and whose geographical conditions are conducive to this solution. Thus, the waste will be reduced by almost 30% even without being moved to the landfill. This reduction rate will naturally be reflected in the number of expedition.

In Scenario 2, the disposal methods introduced by the legislation were proposed to be implemented by spreading them around the city to reduce the load. Although at first glance, there are many disposal and waste processing points spread throughout the city, the returns of this system are summarized below.

- The need for transfer stations will be greatly reduced due to the different waste processing points within the city.
- Districts will be able to bring their waste directly to these disposal and processing areas.
- A coordination of waste management and waste management discipline will be established between metropolitan and districts. The participation and evaluation of waste in the waste market will be at the highest level.
- It is observed that the wastes are valued at up to 62%. The 62% ratio also means that the waste is taken to the final disposal landfills at this rate. It is an important return both in terms of preserving the field life and in terms of alleviating the carrying load.

In Scenario 3, thermal processes were proposed for the Izmir region. With this scenario, the targets brought by the legislation will be achieved, but the energy rate obtained from the disposal of waste will also be much higher. Although the operating costs of the system are much higher than in other scenarios, it is one of the most effective solutions to the waste disposal problem in the Izmir region.

In Scenario 4, a solution proposal containing the most advanced technology in the world is presented in the field of waste disposal. This technology has not yet been used in the field of waste disposal in our country. With plasma gasification technology, 6 daily 1,000 tons of waste facilities have been proposed in Izmir province. The initial installation cost of these facilities is quite high. Due to the high installation costs of 6 1,000 tons/day facilities proposed for the whole of Izmir, these facilities can be gradually installed by evaluating them together with the proposed solution proposals in other scenarios. This scenario proposal provides a very fundamental solution to Izmir's waste problem and also provides solutions for all types of waste, including medical waste and hazardous waste, which require a special process to be disposed of. In this scenario, 98% of the waste is recovered/converted. The capacity of each facility in the power generation area is close to 50 MWh. In this scenario, if all of the projected facilities are implemented, an electrical power generation with a capacity of more than 250 MWh will be possible. To give an example for comparison, the total installed power of the natural gas-fired thermal power facility established in Aliaga, Izmir, is 180 MWh.

Scenario 5 was designed as a scenario where 1 of the plasma gasification facilities envisioned in Scenario 2 and Scenario 4 could be applied together, so a new scenario was developed that together with the Regional Waste Management System, waste disposal with advanced technology plasma gasification method could be applied for the first time in our country, thus creating an opportunity for technology transfer.

As a result, 5 scenarios were worked on within the scope of the project and the final decision was left to the IMM.

İZMİR
METROPOLITAN
MUNICIPALITY

Transportation and logistics activities are an indispensable part of the city and activities for economic, environmental and social sustainability must be provided to all stakeholders in a sustainable and quality way without disruption.

We will continue to work together hand in hand for Izmir, a livable and sustainable city that realizes the principles, and plan Izmir, a city of happy people together.

M. TUNÇ SOYER

MAYOR OF IZMIR