

The Public Private Partnership (PPP) Model and the EURASIA TUNNEL PROJECT



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This study has been carried out under the leadership of **Dr. Ersin Arıoğlu** and **Başar Arıoğlu**.

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UPDATE NOTES (14.10.2022)

Some of the data and references, which were updated between the date of submission of Report to the Ministry in February 2022 and its release on the project web site (www.avrasyatuneli.com) in October 2022, are provided in the below table.

Nb	Explanation	Page
1	A total of 92 million vehicles have passed through the Eurasia Tunnel since December 22, 2016, when it was put into service until September 30, 2022.	89, 92
2	The Eurasia Tunnel reached 90% of 70.223, which represents the minimum guaranteed traffic, in September 2022 as a result of daily passes in the average of 63.294 -unit vehicles.	15, 78, 89, 93
3	Between January 2022- September 2022, the average daily traffic per month was 33.674, 45.774, 44.457, 46.185, 52,665, 51.862, 41.286, 54.266, 63.294-unit vehicles, respectively.	147 (<i>Annex14</i>)
4	The guaranteed payment amount for 2021 was 35 million dollars; the total of guaranteed payments until today amounted to 207 million dollars.	78, 96
5	The Tunnel was opened to the use of motorcycle as of May 1, 2022 upon the direction of Ministry. The motorcycle toll fee is determined to be 10,35 TL between the hours of 00:00-05:00, 20,70 TL between the hours of 05:00-00:00. The average motorcycle pass per month reaches 1.005 .	78, 79
6	As per the data declared by the Presidency of the Republic of Turkey Presidency of Strategy and Budget in January 2022, a total of 261 PPP projects were completed in Turkey between the years of 1986 and 2021; the investment amount of projects reached 88,5 billion dollars.	13, 18, 43, 105
7	The loan amount of 960 million dollars constitutes 77% of 1,245 -billion-dollar worth investment; due to a typing error it was written 88% in the report.	96
8	According to 2021 year-end report of World Bank; the total of PPP infrastructure investments in 2021 reached 76,2 billion US dollars with a total of 240 projects, corresponding to 0,26% of GDP of all low and middle-income countries. (https://ppi.worldbank.org/content/dam/%20PPI/documents/PPI-2021-Annual Report.pdf) This rate is calculated to be four per thousand in Türkiye for 2022	13, 17, 31, 38, 75
9	As per the modification made in Article 30 of Law no 6001 as of July 1, 2022, in case of toll violations, for payments made between 15 days and 45 days, a penalty equal to one toll fee will be applied, and for payments after 45 days, a penalty of 4 times of toll will be applied. (https://www.mevzuat.gov.tr/MevzuatMetin/1.5.6001.pdf)	103
10	“General Summary” section was added to the report.	General Summary

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ABBREVIATIONS

ABD	: The United Nations of America
AFAD	: Disaster And Emergency Management Presidency
AR-GE	: Research and Development
ATAŞ	: Eurasia Tunnel Operation Construction and Investment Inc.
AYGM	: General Directorate for Infrastructure Investments
CCTV	: Closed-circuit camera system (<i>Closed Circuit Television</i>)
CPI	: Consumer Price Index
ESIA	: Environmental and Social Impact Assessment
DYY	: Direct Foreign Investment
EBRD	: European Bank for Reconstruction and Development
EC	: European Commission
EIB	: European Investment Bank
ENR	: “Engineering News Record” Journal
GEB	: Golden Ears Bridge
GSYH	: Gross Domestic Product
HCM	: Highway Capacity Manual
HGA	: Value for Money Analysis
IFC	: International Finance Corporation
IMF	: International Monetary Fund
IRF	: International Road Federation
ISO	: International Standards Organization
ITA	: ITA-International Tunnelling and Underground Space Association
İBB	: İstanbul Municipality Metropolitan
İSG	: Occupational Health & Safety
KGM	: General Directorate of Highways
KÖİ	: Public Private Partnership
LEED	: Leadership in Energy and Environmental Design
MTG	: Minimum Traffic Guarantee
NATM	: New Austria Tunneling Technique
NCE	: “New Civil Engineer” Journey
PFI	: Project Finance Initiative
PIARC	: Permanent International Association of Road Congresses
SÇED	: Environmental and Social Impact Assessment
SCADA	: Supervisory Control and Data Acquisition
SKH	: Sustainable Development Goals
TBM	: Tunnel Boring Machine
TÜİK	: Turkish Statistical Institute
UNESCO	: United Nations Educational, Scientific and Cultural Organization
VFM	: Value for Money
VMS	: Variable Message Sign
VTs	: Variable Traffic Signage
YİD	: Build – Operate – Transfer
YMSK-JV	: Yapı Merkezi – SK E&C Ordinary Partnership
ZD	: Value of Time

PRESENTATION

Human beings have continuously produced knowledge to solve the problems they have encountered since the ancient times of history. **Today, the knowledge level of our civilization is rising at a speed that has never been witnessed by humanity.** On the one hand, we experience developments in terms of technology and level of knowledge; on the other hand, we are confronted by complicated issues of primary importance such as unfair income distribution on a global scale, population increases, the irrational use of goods and energy, environmental exhaustion, and climate change.

The pressure caused by the necessity to find a timely solution to global warming and rising needs urge **a healthier urbanization, more qualified infrastructures, more productive knowledge, development of faster and safer means of transportation.** These problems will be solved **with fewer resources, more durable and long-lasting, faster, and multi-option, and ecofriendly vehicles** in the future.

Until recently, government agencies and private organizations have been perceived as two completely separate sectors under the names of “**public sector**” and “**private sector**”. After a long period of time during which the government was unwilling to share its power, the partnership understanding **accompanied by modern democracies** which pieces “**public**” and “**private sector**” together has been acknowledged and become prevalent.

Pursuant to the logic of equality and transparency, the contemporary democracies have established 5 indispensably essential principles: (1) Granting equal right to the candidates in expressing their political views. (2) Conscious understanding by voters on the voting issues. (3) Fair elections at periodic intervals to supervise the agenda and government. (4) Voter participation in elections. (5) Equality of votes. These principles secured governments **to prepare programs, to explain these programs to the voters and to become entitled to put these plans into practice.** In return, the individuals who are dissatisfied with the programs of governments get a chance to manifest their criticisms under the responsibility of opposition.

The “partnership” understanding which currently allows the public and private sector to work together **has materialized a robust synergy in the development of public services by combining the distinctive characteristics of the parties.** This understanding is a prospective “**shared wisdom**” based on knowledge, experience, and problem-solving ability. **Public Private Partnership (PPP) model has emerged as a future investment method in line with this understanding.**

For these reasons, **a wide range of infrastructure projects in several countries and sectors are carried into effect under the PPP model.** In the developed and developing countries without exception, bridges, roads, tunnels, schools, treatment, electricity and gas facilities, hospitals, ports, and airports were completed and made available to people around the world through PPP projects. As concerns Turkey, the Eurasia Tunnel, which was successfully realized, shines out as one of the best practices of this model.

However, **infollution**, which is not based on accurate data, has been **recently** observed with respect to the essence of the model, the manner of its application, its potential benefits, and drawbacks. **For the purpose of eliminating this misconception, a working group** has been established in an attempt to prepare a comprehensive report intended for general public on both the Eurasia project and the PPP model.

The above-mentioned **“Working Group”** composed of academicians, engineers, executives, consultants, economists, and financial experts have addressed the PPP model, the Eurasia Tunnel and the questions regarding the topics discussed by the public as a whole within the scope of study that lasted four months. With an object to enable swift access to the practices applied in the Eurasia Tunnel regarding the details of PPP model and to indicate the equivalents of model in practice in a simple manner, the Eurasia Tunnel practices were given in color boxes right after the relevant sections in the report.

Modern global practices, the advantages of partnership for the parties, the points to take into account for a successful project lifecycle have been covered in the **report** and also **the evaluation and further development of PPP model in the light of science** have been intended. In conclusion, it is expected that this study **will serve as a scientific and truthful response to the objects at issue in public** as well as the criticisms on the PPP model.

GENERAL SUMMARY

PUBLIC – PRIVATE SECTOR DIVERGENCE AND CONVERGENCE

Until the recent past, public institutions and private institutions would be perceived as two completely separate and unrelated sectors, named “**public sector**” and “**private sector**”, respectively.

Today, these two sectors, particularly in over-costing infrastructure investment projects, merge their distinctive characteristics under the “**partnership**” understanding and successfully complete the infrastructure investments intended for public service. This understanding, called “**Public-Private Partnership**” (*PPP*), enables the emergence of “**shared wisdom**” and a powerful synergy with the combination of knowledge, experience, and problem-solving capabilities of the two sectors.

IMPORTANCE OF INFRASTRUCTURE INVESTMENTS

The competency, quality, accessibility, integrity, and the economy of infrastructure systems of a country demonstrate the level of development in that country. Therefore, infrastructure investments are of significant importance for the socio-economic developments of societies.

PPP MODEL IN INFRASTRUCTURE PROJECTS

World:

In various countries across the world, beginning from the second half of the 20th century, the public sector has increased the partnership with private sector in order to meet the production rate, quality, technology, and finance required by the growing infrastructure need. The PPP model has been preferred for major infrastructure projects notably in Germany, Britain, France, Australia, Canada, Brazil, Columbia, China, Philippines, South Korea, Japan, Russia, and Türkiye.

The Labour Party leader Blair pioneered the foundation of national “**Public Private Partnership Centre**” in Britain in 1997, as the first institutional example in the world. The PPP model was successfully implemented firstly by social democrat Schröder and then by Merkel government in Germany. A number of 133 PPP infrastructure projects with an investment cost amounting to 22 billion dollars were materialized in various countries across the world regardless of political ideologies.

Türkiye:

Galata-Beyoğlu Tunnel, as the first example of PPP model in our country, dates back to the Ottoman Era and was constructed under build-operate-transfer scheme and put into service in 1874.

A total of 257 PPP projects were completed in our country during the years of 1984 and 2020, when the infrastructure investments intensified, and the investment cost of them reached 85 billion dollars.

BENEFITS OF PPP MODEL FOR THE PUBLIC

- ❖ Acceleration in macro-economic and regional development,
- ❖ Predictable construction period and investment budget,
- ❖ Tax equity secured via the 'User pays' principle,
- ❖ Spreading the economic growth to the grassroots and creating market,
- ❖ Benefiting from the potential of private sector,
- ❖ Providing efficiency in public budget,
- ❖ Improving service quality standard,
- ❖ Improving investment environment and attracting direct foreign investment,
- ❖ Effective and multi-stakeholder inspection mechanism,
- ❖ Development of legal infrastructure to improve the investment attraction,
- ❖ Technology transfer and R&D development,
- ❖ Sustainability and contribution to the environment.

BENEFITS OF PPP MODEL FOR THE PRIVATE SECTOR

- ❖ Long-term contracts,
- ❖ Opportunity for opening to new markets,
- ❖ Acquisition of business culture and ethics with public and international companies,
- ❖ Innovation development,
- ❖ Reputation and confidence building.

CHARACTERISTICS OF PPP MODEL

- ❖ PPP contracts are long-term contracts concluded between a public authority and private sector with an intent to deliver public service or build a public asset, in scope of which private sector undertakes significant risks throughout construction and operation period, and the payments to be effected by public depends on service performance and quality, and which envisages the transfer of given asset to the public institution free from any and all commitment and debt.
- ❖ The financial structure of PPP project presents a “**financial engineering**” solution created by taking into account the involving risks, loan sources and rates, tax regulations, payback period, cash capabilities and the value for money leverages for the public sector, and the required profitability calculations for the private sector.
- ❖ The fact that the financial providers monitor the service performance of investor from the beginning of project throughout the construction and operation periods, furnishes a firewall concerning the service quality standard delivered by the PPP model.
- ❖ The correct risk sharing for the purpose of reaching effective solutions rather than the transfer of risks forms the basis of PPP projects. The determination of the party that would manage the risks the best shall reduce the cost of risks.

In conclusion; PPP model seems to be the optimum solution for the over-costing infrastructure investments. Since the last century, a number of infrastructure investment projects in energy and health sectors in several countries; bridges, highways, tunnels, harbors, airports, hospitals, electricity, natural gas, and treatment plants have been built through PPP model in growing frequencies. The Eurasia Tunnel, ranking among successful examples of PPP model, comes to the forefront with its merits in our country.

EURASIA TUNNEL

The leading problem of a metropolitan city as İstanbul is the management of local traffic. In fact, since the bidding of Eurasia Tunnel project until today, the total number of vehicles circulating in İstanbul traffic has increased from 2,7 million to 4,5 million.

The Eurasia Tunnel is the first and only two-deck highway tunnel that combines the Asian and European continents underneath the seabed. The project breaks a ground in technical terms with the use of certain technologies for the first time. The 3,4 km-long strait passage phase of which deepest point is 106,4 meter under sea, was completed by the use of “**TBM**”, tunneling machine, specifically produced for this project.

The construction of project was completed, on December 22, 2016, in 3 years and 11 months, being 8 months earlier than scheduled.

The “revenue sharing” model was used for the first time in Türkiye within the scope of project. According to this model, the public shall receive 30% share from the obtained revenue once the business starts to make profit.

The Eurasia Tunnel has the longest maturity term (18 years) among the infrastructure investments in Türkiye, possesses a credit package which was completely funded by foreign loans.

The Eurasia Tunnel is an engineering artifact which stands as a manifestation of the level of our civilization, and in which multi-inspection mechanisms and monitoring structure as well as the cutting-edge technological solutions were employed.

In the architecture of Eurasia Tunnel, it was intended to pay homage to the historical identity of city without damaging the silhouette of İstanbul, the state-of-art technological solutions were generated such as seismic bracelets to eliminate the earthquake risks.

New trees identified to positively contribute to the air quality were planted in the project site, quadrupling the number of existing trees. The “**biofiltration application**” as a green concept was put into practice for the first time in Türkiye.

The response time to the problems in Eurasia Tunnel during the operation stage within the framework of human-oriented service understanding decreased to 1 minute 55 seconds.

The Eurasia Tunnel is an “integrated and rationalist” investment, which completely improves itself and utilizes an “awarded” innovative lighting system beyond the global standards, has a website and open data understanding, delivers 7/24 service with transparent communication policy and management by means of over 400 camera and automatic incident detection system.

The average daily traffic on a monthly basis reached 73% of Minimum Traffic Guarantee (“**MTG**”) in December 2021.

It is predicted that the project will reach the minimum traffic guarantee in 2026. As of that date, owing to the revenue sharing model implemented in the project, public will have received all the guaranteed payments to be effected until 2026 back in 2039 on the basis of its share on the revenue to be earned from users on MTG.

According to the Economic Impact and Value for Money Analysis (“HGA”) report drawn up in 2021, building the Eurasia Tunnel via PPP model earned a saving in the amount of 769 million dollar (30%) compared to the conventional method.

The Eurasia Tunnel is expected to make a public saving in the amount of 8,6 billion dollars and creates employment for 53.734 people since the day it was put into service until the end of its operation period.

The Eurasia Tunnel Project contributed approximately 972 million dollars to the national economy between the years of 2016 and 2021.

The Eurasia Tunnel Project contributed to 25-million-hour time saving, 35 thousand tons of fuel saving, 65-million-vehicle reduction and thusly accident cost saving, and 10-thousand emission reduction in 2021, which amount to approximately 226 million dollar-worth contribution to the national economy in one year.

REWARDS

The Eurasia Tunnel was deemed worthy of thirteen (13) awards in total; 5 awards during financial period, 5 awards during construction period, and 3 awards during operating period.

Financial

- 1) Euromoney Magazine, The Best Project Financing Agreement of Europe (2012)
- 2) Infrastructure Magazine, The Most Innovative Transportation Project (2012)
- 3) Thomson Reuters Project Finance International, the Best Infrastructure Project Financing Agreement (2012)
- 4) EMEA Finance Magazine, The Best Public-Private Partnership (2012)
- 5) International Road Federation (IRF), Project Financing and Economy Award (2019)

Construction

- 1) European Bank for Reconstruction and Development, The Best Environmental and Social Implementation (2015)
- 2) International Tunnelling and Underground Space Association, Project of the Year (2015)
- 3) ENR Magazine, the Best Project (2016)
- 4) Korean Society of Civil Engineers, Structure of the Year Award (2017)
- 5) International Road Federation (IRF), Global Achievement Award (2017)

Business/Operation

- 1) The Illuminating Engineering Society of North America, Architectural Lighting Award (2017)
- 2) New Civil Engineers magazine, Maintenance and Renovation Method (2018)
- 3) Enterprise Asian Enterprise, International Innovation Award (2020)

EXECUTIVE SUMMARY

The sufficiency, quality, accessibility, integrity, and economy of infrastructure systems of a country determine the level of civilization in that country. Therefore, **infrastructure investments have crucial place in the socio-economic development of societies.** Due to their direct impact on the development, the importance of these investments cannot be overlooked. **They promote the welfare and development of people and improve their life quality in the long term.**

The studies on the economic impacts of infrastructure investments reveal that each 100 unit of investment increases the production by %17 on an average in the long term.¹ **The European Investment Bank envisages that the infrastructure investment needs induced by digitalization as well as possible climate change, population growth and pandemic-driven changes will increase twofold in between 2025 and 2030 compared to the present day.**

In the first half of 20th century, the public sector was in charge of both construction and financing as well as operation of infrastructure investments. At the beginning of the second half of 20th century (*post-war*), **public sector enhanced its partnership with the private sector with an aim to provide production rate, quality, technology, and financing required by the rising infrastructure needs.** In the early 1980s and **particularly after 1990**, the PPP model was preferred for significant infrastructure projects across the world especially in **Germany, Australia, United Kingdom, Brazil, China, Philippines, France, South Korea, Japan, Canada, Colombia, Russia, and Turkey.**

Depending on the needs of countries and the necessities of time when the project was executed, the PPP models involved various types such as Build-Operate-Transfer, Design-Build-Operate, Build-Lease-Operate and so forth. Considering the last 20 years, the PPP projects have been increasingly employed. **The model currently being in use in 134 developing countries** has contributed about %15-20 of total infrastructure investment. **Only in the first quarter of 2021, a number of 133 PPP infrastructure projects were implemented with the investment cost of 22 billion dollars.**²

The interoperability culture of public and private sector dates back two thousand years to the Roman Empire.³ In conjunction with **the Industrial Revolution**, the participation of private sector has expanded in several public services such as railway transportation networks, water supply and distribution. **The expansion of model in the modern world** and its employment in a widespread manner as a source of inspiration for other countries root in 1990s when **Tony Blair as the Leader of Labor Party redefined the “Project Finance Initiative-PFI” philosophy in the framework of a political program.** The Blair Government in 1997⁴, pioneered the establishment of national **“Partnerships UK”** as the first example of PPP in the world. In literature, the political sources attribute the triumph of Blair as the longest-serving leader of Labor Party in three successive elections to these policies.

¹ Josh Bivens, The Potential Macroeconomic Benefits From Increasing Infrastructure Investment, Economic Policy Institute, Temmuz 2017

² Private Participation in Infrastructure (PPI), 2021 Half Year Report, World Bank, s.2

³ Nathan Associates, Public - Private Partnerships A Basic Introduction for Non-Specialists, EPS Peaks, DFID, Şubat 2017

⁴ www.partnershipsuk.org.uk/AboutPUK/PUKBackground.asp

It is also observed that the PPP model was successfully employed by **social democratic governments**, for instance by Schröder in Germany. In 2015, the Federal Government of Germany led by Merkel launched a PPP program valued at 15 billion Euros for the construction of a highway at the length of 600-km highway.

Besides, the one-third of all railway services in Japan during the era when liberal parties were in power **were operated by private sector through the PPP model**.^{5,6} . **A number 651 PPP projects were completed with 88 billion dollars of investment in South Korea between the years of 1999 and 2013.**

Having regard to the examples of UK, Germany, Japan and South Korea, the PPP model has contributed to the development of countries and has been successfully implemented by governments with varying political views regardless of their ideologies.

The first implementation of Public Private Partnership in Turkey traces to the Ottoman Era. The Galata-Beyoğlu Tunnel, first put into service in 1874, was constructed under Build-Operate-Transfer model including the operation phase of 42 years as the world's second oldest underground transportation unit⁷. **During 1984 and 2020, a total of 257 PPP projects were completed in Turkey and the investment cost of these projects reached 85 billion dollars.**⁸ **The extent of PPP projects in Turkey and their relationship with the public finance are presented in Table 5 (See Page 40).**

Public Private Partnership Model, why?

The primary objective of public is to promote public benefit **while utilizing public funding, in a word, to provide cheaper and more qualified service to the users.** Through PPP model, **public ensures the purchase of a service flow, of which standards have been predetermined, instead of purchasing an asset.** In this context, **it serves as a “financial engineering” solution executed considering the financial structure of model, involving risks, sources of credit and rates, tax regulations, payback period, cash capabilities, value for money advantages for the public along with profitability calculations for the private sector.**

The PPP model **does not require preliminary capital apart from the expropriation and pre-feasibility expenditures which are relatively not high for infrastructure investments of the public.** In addition, **the public renders payment based on the performance outcomes set at the service procurement phase.** Thereby, it determines the quality and framework of service to be procured. As for the PPP projects, **the quality of governance between the shareholders directly influences the effectiveness of project contract and constitutes the building block of success.** The thorough monitoring by the financial providers of service performance beginning from the outset of project **up till the last phase, including the operation,** serves as a security shield for sustaining the service quality standard provided by the PPP model.

⁵ Keidanren, Japan Business Federation, Towards Strategic Promotion of the Infrastructure Export, Kasım 2017

⁶ www.bmvi.de/SharedDocs/EN/Articles/StB/ppp-contracts.html, Kasım 2021

⁷ Zeynep Çelik, 19. Yüzyılda Osmanlı Başkenti; Değişen İstanbul, İstanbul, Tarih Vakfı Yurt Yay. 1986, s. 81

⁸ koi.sbb.gov.tr, Cumhurbaşkanlığı Strateji Bütçe Başkanlığı, KÖİ Dairesi İstatistikleri, Ocak 2022

The risk management is a key aspect of an effective PPP project. In theory, it is easy to anticipate which party will manage the risks. However, in practice, **the main objective of public sector must be to plan an environment which will allow for the best management of risk and to choose the partner rather than laying the burden of risks completely on the private sector.**

The two major problems concerning large infrastructure projects undertaken by the public sector **are excess cost and substantially delayed due dates.**⁹ On a global scale, the major obvious problem of conventional model arises as the handling of costs in a “**delusional optimism**” manner at the pre-project planning phase. A study examining 258 large transportation infrastructure projects encompassing 20 countries performed through the conventional model revealed that 90% of projects costed further above the original estimates.

The PPP model is exploited as an important instrument with an objective to make various infrastructure investments, notably in transportation, **faster within the estimated budget, with the use of more advanced technologies, without placing a burden on the state budget and in a safe and observable manner.** The significant advantage of this model is the fact that it enables the effective materialization of investments by dint of the dynamism and management skills of private sector, which are otherwise difficult to be swiftly performed by the public sector in technical, financial, and legal infrastructure terms.

Benefits of Public-Private Partnership Projects:

- ❖ Acceleration of macro-economic and regional development,
- ❖ Predictable construction period and investment budget,
- ❖ Tax equity based on ‘User pays’ Principle,
- ❖ The capability of spreading economic growth to the grassroot and creating new markets,
- ❖ Effective exploitation of private sector potential,
- ❖ Efficiency provided by the public budget,
- ❖ Improvement of Service Quality Standard,
- ❖ Improvement of investment climate and its contribution to the attraction of direct foreign investment,
- ❖ Development of effective and multi-stakeholder monitoring mechanism,
- ❖ Development of legal infrastructure which will increase the attractiveness of investments,
- ❖ Technology transfer and R&D development,
- ❖ Sustainability and contribution to the environment

⁹ G.J. Hodgson, ‘Design and Build - Effects of Contractor Design on Highway Schemes’, Proc. Civil Engineers 108, 1995, s. 64-76.

The Public Private Partnership projects involve a set of sensitive areas along with the above-mentioned benefits. Principally, these kinds of projects in general **require an extensive know-how**. Compared to the conventional model, **project development phase takes longer and cost more**. The Senior consultants are required to work in coordination and harmony with the public authority. Lastly, **the complicated and contractual structures in the PPP projects must be implemented through sound management and coordination**. A significant accumulation of capacity is needed both in public and private sector for these processes.

The Eurasia Tunnel Project carried out by the PPP Model

The number of vehicles and mobilization across the two sides of Istanbul are increasing on each passing day. Since the bidding date of project in 2008 up till now, the number of vehicles in İstanbul traffic has risen from 2,7 million to 4,5 million. To this respect, the Eurasia Tunnel sets a good example for the infrastructure investments demanding management.

Today, in this emerging civilization, the solutions **are expected to be achieved with less resources but more durable, more solid, faster, lighter, multiple choice and necessarily “greener” and more “aesthetical” understanding**. The Eurasia Tunnel is a successfully implemented PPP project in terms of innovation, financing, and management model.

The project **is the first and sole two-layered highway tunnel** connecting the European and Asian continents beneath the seafloor. (Annex-3) The characteristic of project is beyond the conventional tunnel structures; and **it was built as a unique, durable, and always preferable transportation infrastructure that reflects the identity of Istanbul**. **The project opened a new epoch in global tunneling sector by successfully breaking several grounds** both at construction and operation phases. The project launched in 2013 was completed, in 3 years and 11 months on December 22, 2016, being 8 months earlier than scheduled.

With a total route of **14,6 km** and **length of 5,0 km**, the tunnel distinguishes as one of the exemplary structures completed with the use of mind power, engineering capacity and machine technology. 3,4 km-long strait passage line of which deepest point is 106,4 m below the sea level was completed by the use of a specially manufactured tunnel boring machine called **“TBM”**. Another feature of Eurasia Tunnel which characterizes it as one of the distinctive structures in Turkey is **the seismic bracelet utilized in tunnel in order to enhance its resistance to an earthquake**. Thanks to these seismic bracelets, the tunnel was determined to resist to an earthquake which may occur once in a 500-year period without detriment to its “service conditions” and to an earthquake which may occur only once every 2500 years without the detriment to its “security requirements”.

The Eurasia Tunnel was built as **an extremely solid engineering structure** involving the above-mentioned details which will never be visible to the main users. **All design and construction works** in the historical peninsula of İstanbul which is registered on the UNESCO World Heritage List UNESCO **were performed pursuant to the recommendations of UNESCO. For the purpose of paying tribute to the history and the Great Architect Sinan**, the motifs and lines manifested in the works of the Great architect Sinan such as “**rosette**” and “**passion-flower**” were preferred in interior architecture and lightning designs, line arches and portal entrances. (Annex-7)

The project of which total investment cost determined to be 1, 245 billion dollars did not exceed the budget. In this respect, the Eurasia Tunnel Project shines out as a rarely seen concept which meets its own investment cost and yields a revenue for the public while providing a quality service.

The revenue sharing model was applied in the Eurasia Tunnel Project. **When the project starts to earn revenue higher than the guarantees issued, the portion exceeding the guaranteed amount will be shared with the government. The minimum traffic guarantee is envisaged to be reached in 2026.**

The answers provided in a realistic and scientific approach to the below questions commonly discussed by the public and the critics concerning the PPP model are addressed in Section 3, which are as follows:

- ❖ Why did the government issue a traffic guarantee for the project?
- ❖ How are the toll charges determined?
- ❖ How do the fluctuations in the exchange rate affect the Appointed Company? Are the contract open to the public?
- ❖ Which law is applicable to the project contract?
- ❖ Why did the traffic guarantees continue to be paid during the pandemic?
- ❖ What is the procedure applied to the unlawful passages?

Eventually, the report has two principal objectives. The first of these is to shed light on scientifically unfounded statements about the PPP projects. The second one is to share valuable information with the readers about the Eurasia Tunnel as one the primary projects contributing to İstanbul and to the macro-economics in broad sense which **was completed with mind power, engineering capacity and machine technology, and provides comfortable, contented, and fast service for the users.**

It is expected that these discussions will be clarified in the light of science and common sense, **and the facts** about the benefits of PPP model in general and specific to the Eurasia Tunnel **will become clear.**

TERMS

Assumption of Indebtedness	❖ In the case of termination of PPP contract, the agreement of public to assume the debt obligations of private sector. In simple terms, it means that the public will replace the Appointed Company to execute the project under full responsibility.
Environmental and Social Impact Assessment Report	❖ An official report drawn up to assess the positive or negative environmental impacts of a project. This report, typically, is prepared by an independent organization or institution apart from the employer authority. It may require certain additional requests or necessary changes in the design and execution of project.
Equator Principles	❖ A risk management framework adopted by financial institutions to identify, evaluate, and manage the environmental and social risks involved in the projects.
Financial Closure	❖ A date on which all project-related documents are signed, all conditions precedent for the project financing are met and the project finance becomes available.
Feasibility Report	❖ An analysis covering all relevant factors of a project including the economic, technical, legal, and timing topics in order to determine the possibility to complete the project successfully.
Revenue Sharing	❖ Pursuant to the conditions of master contract of a PPP project, the model which envisages the sharing of revenue obtained at the operational stage in between the public and private sector.
Appointed Company	❖ A separate legal entity established to band all companies party to the PPP together in order to manage the project and share the risks and revenues.
Value for money	❖ The optimum combination of all life cycle costs, risks, completion period and quality to meet the public requirements.
Public Guarantee	❖ The exercising of power actively by the public authority in the capacity of project owner to support the project and ensure that it is financially viable for the creditors. For instance, the payment guarantees or minimum income support delivered by the contracting authority.
Public tender	❖ The infrastructure services procurement process based upon the conditions and prices considered to be in the best interest of the employer public institution as it involves a competitive process.
Public Private Partnership	❖ A risk sharing relationship based on mutual desire between public and private sector in order to provide a public service accepted by the public.

PPP Implementation Contract	❖ An agreement subject to a private law, which establishes the scope and conditions of project and is concluded between the contracting authority in public and its partner from the private sector.
Project Finance	❖ Negotiation and constitution of long-term debt financing of a project of which loan basis is composed of cash flow generated by the project.
Project Life cycle Costing	❖ The maintenance and repair costs of an ongoing project through the economic life of a project.
Risk Sharing	❖ Agreement to assign to one of the parties the responsibility of dealing with the results of each risk or addressing the risk through a certain mechanism that will involve the risk sharing.
Sustainability	❖ Social, economic, and environmental balance required for long-term durability.
Design - Build - Finance - Operate	❖ The form of master contract which holds PPP service provider responsible for the design, construction, financing, and operation of an asset.
Transfer of Facility to the Public	❖ Once a PPP contract is finalized, the transfer of facility to the public in working order and free of debt.
Traffic Guarantee	❖ In order to earn financeability to an infrastructure project, payment commitment made in different models by public to its partner in private sector based on the structure or operation quality of facility in compliance with the nature of project.
Build - Operate - Transfer (BOT)	❖ A particular financial model devised to materialize projects requiring cutting-edge technology or high pecuniary resources, which signifies the payment of investment value (including the profit to be obtained) to the equity company or foreign company by means of purchase of goods and services produced by the company during the operation period by the beneficiaries of management or service.
Build - Lease - Transfer	❖ A model which involves the financing and execution of construction works intended for public service by the Executive/ Appointed Company/ Contractor, its leasing to the management on the basis of a price determined limited to the contract duration, the fulfilment of other services by the contractor on the basis of price determined in the contract and the transfer of asset to the management at the end of the period.

METHODOLOGY

The primary objective of this study is to **shed light on the commonly discussed issues** by the public concerning the PPP model and to establish **a healthy basis for discussion** by adopting a **scientific standpoint** through the instrument of theoretical and practical data vis-à-vis misevaluations stemmed from lack of information.

At the outset, the **World Bank PPPP publications** were analyzed, and the related terms were listed. Then, **a total of 5.570 items of news read by 35 million people** were identified in traditional (*printed and visual*) and new generation digital media based on selected terms related to both PPP model and Eurasia Tunnel, specifically, and **a comprehensive press and media scanning** was performed.

A comprehensive body of study was established intended for areas identified to be unsatisfactory involving **the technical properties of project, the gains delivered by the project to Turkey, public authority and users, globally recognized information and the latest developments relevant to the PPP model** and lastly, **direct answers to some most frequently asked questions in the press and media** with an objective to provide science-based assessment about the controversial topics reached on the basis of press and media data.

The study covers general information related to the PPP model acknowledged in the publications of international institutions and academic studies, visual data pertaining to the project, improvement efforts for the enhancement of service quality, schemes representing the development of traffic, and an extensive annex section including the course and results of studies carried out in environmental and social domains; thus, unreservedly presents data-driven approach, statement and assessments to the public.

Considering the scope and level of detail of this study, it was intended to convey information in the most refined manner possible. However, all researchers, public officials, academicians and readers can communicate any questions, opinions and evaluations that they may have related to the findings of study through e-mail address **bilgi@avrasyatuneli.com**, call center **(0850) 222 80 20** and website **www.avrasyatuneli.com** .

INTRODUCTION

Humanity has learnt to organize as states and business enterprises in order to overcome the problems. **States**, being the first of these organizations, is responsible for **performing public service**. In other respects, **private sector** aims at achieving the most effective result by **using knowledge, past experiences, and financial resources** at its disposal.

The primary purpose and duty of public administration is to “**ease the life of people, ensure their peace, security and wellbeing, improve the life quality, remove the obstacles which prevent the exercise of individual rights and freedoms, and to fulfill the duties and services entrusted by law.**”¹⁰ Government executives try to perform the mentioned services through the collected taxes. Today with a continuous and rapid increase in the expectations and demands, **the public strives to strike a balance to meet the unlimited needs with the limited resources**. For this reason, **the effective use of public resources means the fulfilment of needs within the most reasonable time**.

The state, in essence, is responsible for making production or getting it done **on an adequate scale and distributing the benefits of production in a fairly manner**. For the purpose of fulfilling these two basic activities, **it collects taxes so as to meet the costs of investments** intended for providing service to the people. The collected taxes are used for infrastructure investments in the fields of transportation, education, and health. These facilities are generally constructed by private sector companies selected through tender method and funded from a budget accumulated by taxes. **If and when the cost of investment is astronomical and cannot be funded through taxes, that investment is postponed for years until a sufficient financing is received**.

Infrastructure investments are of vital importance for the development of societies in economic and social aspects. Thanks to their direct contribution to the development, the importance of these investments cannot be overlooked: to promote the wellbeing and development of people and to improve the life quality in the long term. **Infrastructure investments step forth as a significant determinant in terms of level of development in a country**.

In the broadest sense, investment encompasses, in its entirety, the basic “assets investments” such as highways, tunnels, bridges, stations, harbors, airports, transportation networks, health and education along with the “economic investments” comprising fields such as production, mining and agriculture.¹¹ Infrastructure stock is significant for the **rapid economic development of countries and their integration with other economies around the world**.¹² Being that, infrastructure projects implemented both at macro and local level bring along a wide range of positive advantages. For this reason, all infrastructure investments must be considered as part of

¹⁰ Kamu Yönetiminin Temel İlkeleri ve Yeniden Yapılandırılması Hakkında Kanun, Kanun No. 5227, Kabul Tarihi: 15.7.2004

¹¹ Jan Tinbergen, Mapping the World Economy, New York Twentieth Century Fund, 1962

¹² Inter-American Development Bank, The Infrastructure Strategy, Aralık 2013, s.9

the development strategy for countries. However, development process is not rapid and easy. For this reason, public sector **has to create new finance for investments that will enable sustainable development and constantly improve service quality** for the continuity of societal development.

UK prime Minister and leader of Labor Party, Tony Blair¹³, classified the public investments as **“efficient or inefficient”**. Then, for the purpose of spreading out the public services at the grass root level and ensuring more efficiency, Tony Blair redefined the philosophy of **“Private Finance Initiative (PFI)”** in the mid- ‘90s.

This new definition provided the inspiration for other countries and in recent years, government executives **have preferred to implement all processes involving design, construction, financing, and operation phases of investments required for public services through private sector.**

Today, this construct has become a substantial instrument for the materialization of numerous infrastructure investments, particularly transportation, **in a safe, measurable, and observable manner by the use of advanced technology and rapidly and by respecting the estimated budget.**

To put it explicitly, it is understood that creating solutions to problems in a **more “compact” teams and on a “project basis”** has proved to be **more “efficient”** in the last 50 years. **The shining stars of the new civilization will be the organizations which can work “on project basis”.**

One of the most determinant features of model is its capability to put investments such as technical, financial, and legal infrastructure, which are otherwise difficult to be implemented by public, at the disposal of users in an efficient manner by the virtue of dynamism and management skills inherited in private sector. The other gain of the model is the fact that it enables **more resource allocation for public services** requiring to be completely financed by the capital budget and **of which social aspects outweigh and are incapable of generating revenue.**

For instance, these criteria have been evaluated specific to the Eurasia Tunnel. In this framework, the positive results including tender process, project development, engineering solutions and construction, operation phases and maintenance & repair works yielded to the macro-economy, public administrators and notably to the users of projects in the meantime by the **Eurasia Tunnel** Project developed through the PPP model that was handled with an approach that includes scientific, global and comparative analysis.

¹³ tr.wikipedia.org/wiki/Tony_Blair, Kasım 2021

1. PUBLIC PRIVATE PARTNERSHIP (PPP) MODEL

In parallel with the improvement in knowledge level of civilization, **basic infrastructure needs such as healthier urbanization, more qualified infrastructures, faster and safe transportation increase**. State is expected to make investments so as to fulfil these growing needs. Changing level of knowledge and need **necessitates more solid, more durable, and more eco-friendly solutions with fewer resources in the future**.

The developments compel countries to review their understanding of development model. Besides, **the insufficiency of public resources in funding the high-cost infrastructure investments drive the expansion of Public Private Partnership model**.¹⁴

The PPP model does not provide an environment where the parties stand against one another rather **it ensures that both parties provide the public services in the most appropriate manner utilizing their separate resources together**. **Win-win relationship is established in projects thanks to this partnership**.

For certain, there are differences between the parties in terms of management. On one side **public aspires to keep the project under strict control from beginning to end**; on the other side, **private sector seeks for the most appropriate environment to be able to execute the project**. This different point of view enables the implementation of public service in the shortest time while at the same time the emerging new investment **creates job opportunities and a social impact**.

1.1. WHY DO THE INFRASTRUCTURE INVESTMENTS MATTER?¹⁵

It is to the common knowledge that there are **enormous infrastructure deficits worldwide** in the fields of energy systems, construction of smart cities, transportation, and water. **The need for infrastructure investment on a global scale is estimated to reach 94 trillion dollars in total by 2040**.¹⁶ Due to pandemic and global warming, the increasing investment needs in social fields such as transportation, education, and health boost the infrastructure investment demands. The European Investment Bank envisages that the global GDP will amount up to 4% and 10% in between the years of 2015 and 2030. Only the investments required for transportation infrastructure alone constitute more than 50% of these needs.¹⁷

¹⁴ Sıla Kulaksız, Altyapı Yatırımlarında Alternatif Finansman Araçlarının Değerlendirilmesi: Türkiye Uygulaması İçin Öneriler, Hazine Uzmanlık Tezi, Ankara, 2017.

¹⁵ Darrin Grimsey, Mervyn Lewis, Global Developments in Public Infrastructure Procurement, Aralık 2019

¹⁶ Outlook 2020, GI HUB, s.1

¹⁷ Outlook 2020, GI HUB, s.6

We are going through an era of unprecedented increase in the infrastructure needs and high levels of urbanization in history. On the other side, **international trade, and relations** as the other triggering factors of infrastructure investment **is rapidly increasing.** It is a known fact that the cargo ports and aircraft cargo transportation will triple while the civil aviation demand will double by 2030 on the basis of present data.¹⁸

In the near future;

- ❖ Aging population will cause major changes in infrastructure needs,
- ❖ Urban infrastructure need will increase in parallel to the rapid urbanization,
- ❖ Digitalization will radically change the infrastructure investment environment

*With respect to the traditional economic theory*¹⁹, **investments in the transportation infrastructure take the lead as triggering factors for macro-economic growth of countries and regional developments.** These investments are keys to **rapid economic growth and economic integration with other countries.**²⁰ In fact, **a one-kilometer road that a country possesses, amounts to 10 million dollars of contribution in the GNP of that country.**²¹ Numerous studies addressing the economic impacts of infrastructure investments indicate that each 100 unit of investment spent in this field boosts the production by 17% on average in the long term.²²

Despite the infrastructure spending²³ such as highways and railways, tunnels, bridges, ports, energy plants and airports that **amounts to 4 trillion dollars per year, countries worldwide still lag far more behind in investments they have to make.**²⁴ The global climate and environment pressure compel all public administrators to produce **sustainable, modern, safe, flexible** and above all **rapid solutions.** The rapid pace of private sector to keep up with the technology, its capability to create additional financing along with its engineering experiences and skills enhance the participation of private sector in public infrastructure investments.²⁵

As of the early 1980s, **the Public Private Partnership model has been increasingly drawn upon for significant infrastructure projects across the world; notably in Germany, Australia, the UK, Brazil, China, Philippines, France, South Korea, Japan, Canada, Colombia, Russia, and Turkey.**

¹⁸ David Thodey, Roadblocks to Global Growth, 30 Temmuz 2014

¹⁹ Krugman, 1991; Holtz - Eakin & Lovely, 1996; Glaeser & Kohlhase, 2004

²⁰ Inter-American Development Bank, The Infrastructure Strategy, Aralık 2013, s.9

²¹ Dr. Ersin Arıoğlu, ÇOK Geri Sayım Güncesi Dergi, Sayı 7, s. 17

²² Josh Bivens, The Potential Macroeconomic Benefits from Increasing Infrastructure Investment, Economic Policy Institute, Temmuz 2017

²³ Ayesha J., Infrastructure: Meaning and Importance | Economic Growth | Economics

²⁴ Elyse Martin, What Successful PPP Do?, Harvard Business Review, Ocak 2019

²⁵ Beyaz Saray, ABD altyapı harcamalarında önerilen 1,5 trilyon dolar yatırımın özel sektör tarafından yapılmasını önermektedir.

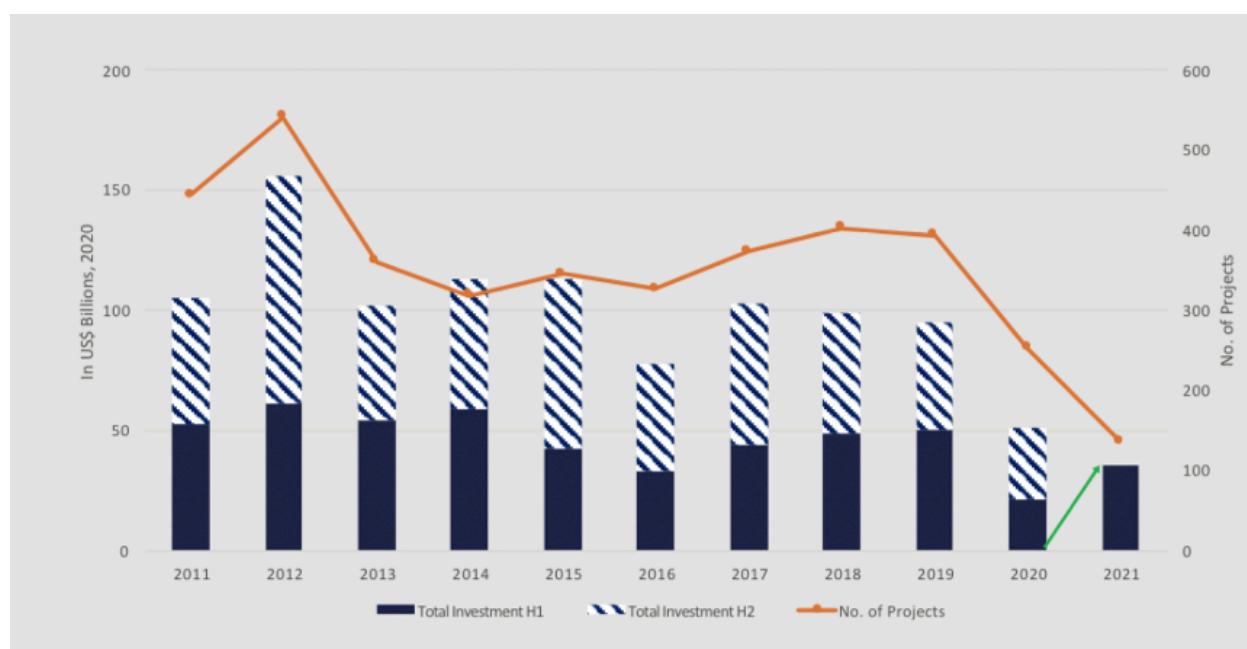


Figure 1: Investment Commitment for Infrastructure Projects with Private Sector participation in Developing Sectors and Countries, 2011 - 2021 First half

In the first half of 2021, the number of countries launching PPP investments have increased compared to the previous year. The first half of 2021 has also demonstrated that the PPP investments continue above the average of previous five years (*Figure 1*). A total of 133 projects and PPP investment commitment of 35,6 billion dollars' worth in the first half of 2021 have increased by 68% compared to the first quarter of 2020 and this trend continues.

It is observed that the pandemic that disrupted all countries and investment plants globally has also affected public infrastructure programs and naturally PPP projects. Nonetheless, on the grounds of the fact that, during the pandemic, the public resources were principally channeled to the health, the protection of vulnerable and the hard-hit sectors in forms of aid and loans, no sufficient resources could be allocated to the infrastructure investments. Although some experts and academicians consider that the pandemic will negatively affect the future and number of PPP projects, the data reflecting the period in question prove that the private sector has further tended towards public investments and this process is in progress.²⁶

Another remarkable development on a global scale is the investment dimension of PPP projects. The average size of project in the first half of 2021 amounted up to 268 million US dollars while the average extent of project in the first half of 2020 was registered as 172 million US dollars. An increase trend in the size of projects is on the carpet in the post-pandemic period. Likewise, investments in small-scale projects (< 100 million US dollars) dropped from 66% of share in the first half of 2020 to 46% of share in the first half of 2021.

²⁶ World Bank, PPI Half 1 Report, 2021

Medium scale projects (100 million US dollars to 500 million US dollars) rose from 26% to 39% in the first half of 2021 while the project shares ranging from 500 million US dollars to 1 billion US dollars climbed from 6% to 11%, reaching almost twofold. **The share of mega projects (>1 billion US dollars) rose from 2% to 5%.** (Figure 2).

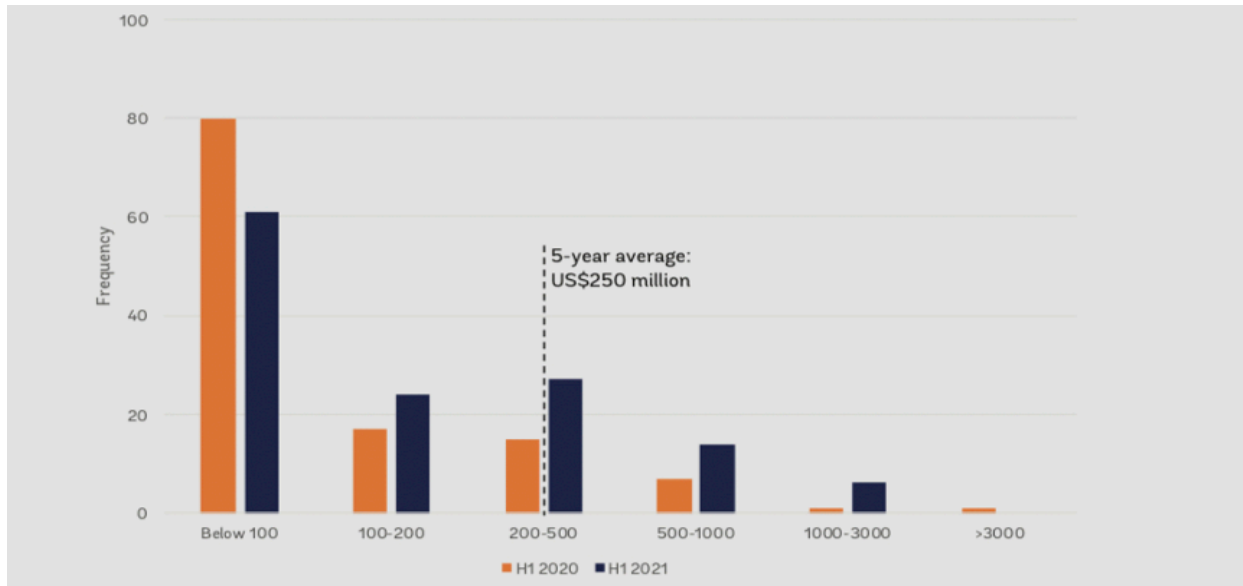


Figure 2: The Distribution of Investment Size of Infrastructure Projects in the Developing Countries, Comparison of the first half of 2020 with the second half of 2021 (Source: World Bank 2021 First half report)

The World Bank data point out a tendency towards mega projects around the world. Turkey has also followed this trend. Based on the available records, there are scarcely any PPP projects that failed. This fact proves the efficient management of projects and appropriate risk sharing in Turkey.

1.2. WHAT DOES PUBLIC PRIVATE PARTNERSHIP MODEL MEAN?

1.2.1. Philosophy and Definition of Partnership

Philosophy of Partnership: The PPP model, of which first examples date back to the Romans, has been utilized by societies throughout the history and survived till today and became prevalent. By virtue of the competitive race, the model serves as a method for providing public service that avails the maximization of public interest **“in a sharp and living, adaptable and improvable manner”**. The political power, on the condition of retaining the initiative, builds cooperation with the private sector on the basis of two main purposes. These are as follows:

- ❖ To execute programs avowed to the society **“timely and within budget”** in order to boost development and growth rate in welfare in the cases where public resources **(knowledge/experience, technology/specialization, and finance)** fall short,
- ❖ To ensure the quality and efficient operation of massive infrastructure investments **“throughout the project lifecycle”**.

In the light of this philosophy, Partnership model is an **instrument for enhancing civilization and promoting community development**. The political power retains initiative in the construction of model. However, throughout the history, whenever the opposition power swaps places with the ruling power, regardless of different political ideologies, the model has been implemented by making a constant progress and adopting to the needs of the period in question as a civilization and development tool and proved its **independence from the political ideologies**.

Definition: Public Private Partnership model can be adjusted to the needs of the relevant country, sector, chosen contract, and financing structure. Each phase of an PPP project such as design, construction, operation/maintenance, and financing determine the manner of application, structure, and definition of the chosen model.

The PPP model is an alliance of miscellaneous and contentful regulations. By virtue of this feature, it is referred to as a financing model in the strict sense by some countries and institutions while it can be described as a political choice that determines the serving preference, a method to devise a new infrastructure project or renewing the existing one and sometimes an alternative public procurement contract in a broad sense. (Annex-23)

In accordance with the scope of study and the course of addressing the issues, a consensus was reached on the below-mentioned definition for the “**Public Private Partnership**” (PPP) concept.

- *“It is a project development method based on a strong cooperation between a public institution and private sector with an aim to provide a public infrastructure project or service to fulfil the public needs in the best manner in which each partner openly draws its expertise forth and the special partner substantially undertakes the significant risks as well as the responsibility for construction, financing, management and operation under certain conditions and in the scope of a long-term agreement; and upon the provision of service the public makes a performance-based payment to the special partner and at the end of the contract the asset in question is transferred to the public in working order.”*

1.2.2. Model Properties

- **“Purpose of cooperation”:** to provide a public infrastructure asset or service at an optimum communal cost between “**Public**” and “**private sector**” institutions.
- **“Scope of Cooperation”:** involves the whole or part of the responsibility for planning, construction, management, financing, operation, and maintenance phases of investments.
- **“Power of Cooperation”:** the fact that the contracts between the parties’ base on pre-arranged PPP legislation, the asset is transferred to the public in working order and free of debt at the end of the contract, and the key risks of investment are distributed in parallel with the overwhelming capabilities of partners.

- **“Basic characteristics” of Cooperation:** As the **“Public Borrowing”** is transferred to the private sector, the debt on investment does not appear in the government’s balance sheet; the service charge is directly collected from the users based on the **“users pay”** principle so that **“tax equity”** could be ensured.

The Partnership along with its defined objective, scope, strengths, and basic characteristics is a political, socio-economic, technical, financial, legal, administrative, multi-dimensional, problem solving, open to creativity and rationalist **“investment production method”** (*building infrastructure and providing service*) which can be adapted to various sectors.

- **“Sensitivity of Partnership”:** These projects arising from the partnership are very sensitive to the political stability and macro-economic parameters of a country. Its implementation by the government parties as an infrastructure production instrument induces the opposition to take a stand against the model. However, the method as a long-term investment method independent from administrative ideologies is an effective tool for both government and opposition parties. Looking from the historical perspective, it can be noticed that this model has been successfully executed by liberal and social democratic political powers. The setbacks caused by current changes in the macro-economic parameters are widely criticized. In general, the points which are subject to criticism do not present the **“core reasons”**. To this respect, the criticisms remain shallow, create an unnecessarily insecure environment among public against PPP method and damages investor-public relationship.

In sum:

- ❖ A public and private sector become parties to the partnership.
- ❖ A public infrastructure project or public service is implemented.
- ❖ The separate specialties of parties as public and private sector are incorporated into the project.
- ❖ The Private sector finances ‘an asset or service’ through its own equities and loans.
- ❖ The Partnership is limited to a specific time by a long-term contract.
- ❖ Public repays ‘the asset or service’ by fees collected from users depending on the performance of private sector.
- ❖ The private sector transfers the asset free from all debts and in working order to the public at the end of the contract.

Public Private Partnership Model, is an infrastructure production model embracing divergent properties of public and private sector; Public,

- ❖ Is competent to exercise legislative and executive power,
- ❖ Has high competency in project planning and supervision,
- ❖ Is able to integrate the projects throughout the state,
- ❖ Is able to determine and supervise the service quality to be procured as necessary,
- ❖ Is able to accelerate the project processes via its ability to access to information.

Private sector,

- ❖ Is able to manage certain risks of a project better than public.
- ❖ Is able to bring an innovative understanding to the management of infrastructure investment.
- ❖ Is able to build and operate a project more effective than public.
- ❖ Is able to demonstrate a skill to create a new market via PPP model.

The abovementioned properties are considered among the reasons for the preferability of PPP model by the public administrators. The projects developed by PPP model demonstrate some characteristic features. These features diverge PPP model from the conventional public procurements. Each PPP project, though in different sectors, possesses the characteristic features given in Table 1.

Table 1: Characteristic Features of PPP Projects

- ❖ Scale of investments (*costs that may amount to billions of dollars*),
- ❖ Long term (*contract duration that may last tens of years*),
- ❖ Private sector's involvement in the project financing with its own funds,
- ❖ Risk sharing among partners based on the management capabilities,
- ❖ Throughout the lifecycle of project, thorough evaluation of incurred cost and revenue,
- ❖ Throughout the whole project, from the feasibility to the public transfer phase, to ensure that all information related to the objectives, benefits and transaction costs are measurable and transparent.

Several **Public Private Partnership Model Implementation vary depending on the weight of private sector involvement**. Among these are Build-Transfer- Operate, Build-Operate-Transfer, Build-Lease-Transfer, Build-Own-Operate-Transfer, Design-Build-Finance-Operate etc. (*Figure 3*).²⁷ The distinctive feature of Public Private Partnership compared to the privatization is the fact in PPP projects, no property transfer is made pertaining to the relevant asset from public to the private sector. For this reason, PPP model completely devises a different collaboration method than privatization which signifies the purchase of public ownership by completely private sector.

²⁷ Darrin Grimsey, Mervyn Lewis, Global Developments in Public Infrastructure Development, Aralık 2019

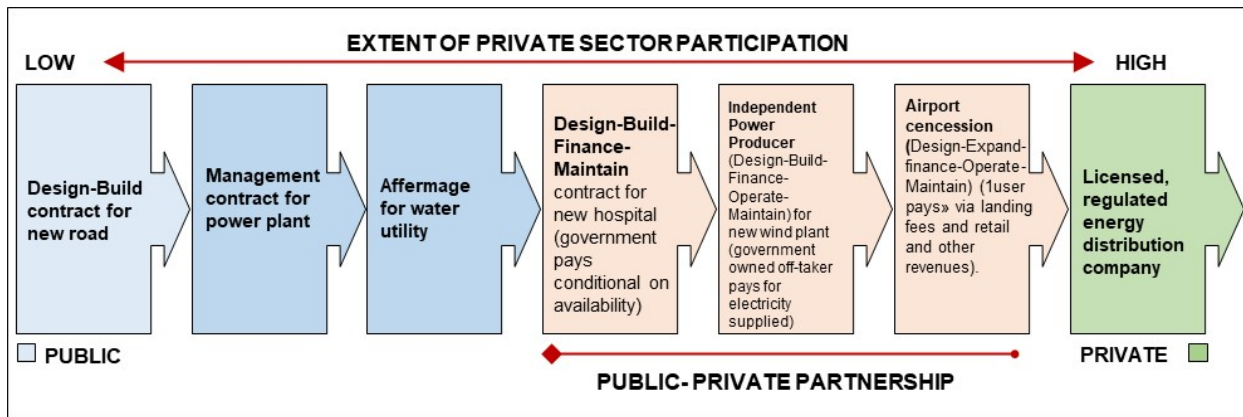


Figure 3: Public Project Management Models²⁸

1.2.3. History of Model

The history of model named as Public Private Partnership today dates back hundred years (*Figure 4*). For instance, the interoperability culture of public and private sector in Europe goes back thousand years, to the **Roman Empire**²⁹. The establishment of mail terminals, mail service, maintenance, and operation of highways and even the construction and operation of ports were managed by legionnaires during the Roman Empire. The model, which was not favored after the collapse of Roman Empire, has been used in a wide range of areas such as channel construction, road building, waste collection, street lightning, mail services and even in public transportation in Europe, **particularly England and France, as of the beginning of the century. During the Industrial Revolution**, PPP model lived its glory days, the involvement of private sector in various public services such as railway access networks, water supply and distribution expanded.

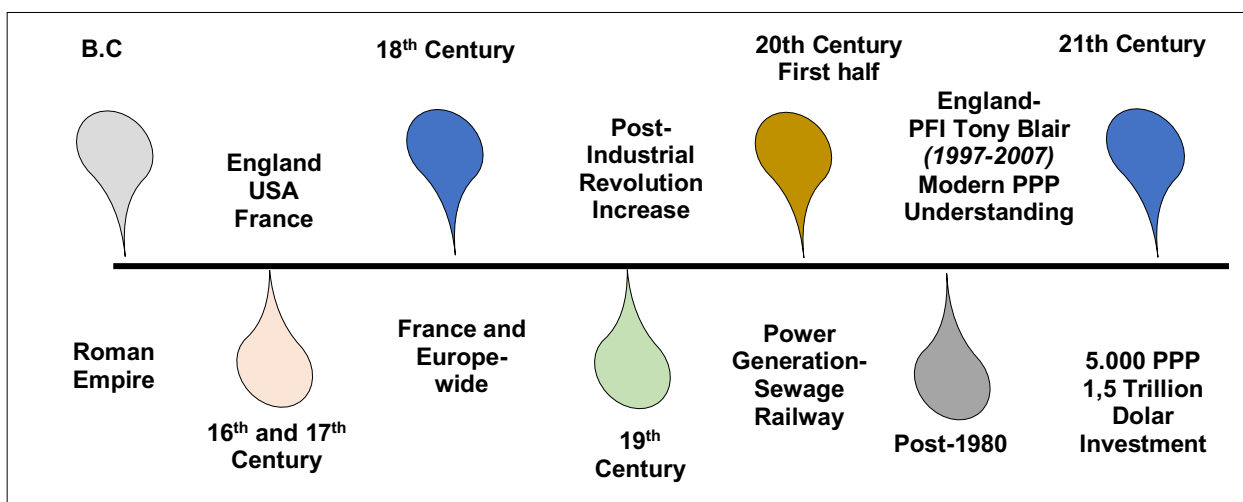


Figure 4: PPP Model Development

The first practices in the 17th century were observed in the **USA, England, France, and other European countries**. The examples of Public Private Partnership model

²⁸ World Bank, PPP Reference Guide, 3.0, 2017

²⁹ Nathan Associates, Public - Private Partnerships A Basic Introduction for Non-Specialists, EPS Peaks, DFID, Şubat 2017

agreements in the modern sense were put forward in the 18th century in France.³⁰ In 1782, the projects of Périer Brothers³¹ on the water distribution system in Paris present the first examples of providing public services through private sector. It is possible to multiply the other examples of the model in Europe and the USA prior to that date:

- 1640, Boston-Charlestown Ferry Line, Harvard University³²
- 1663, London Turnpike, England³³
- 1707, London - Holyhead Highway, England
- 1782, Paris Water Infrastructure, France
- 1792, Philadelphia and Lancaster Toll Road, Pennsylvania,
- 1808, New York and New Jersey Steamship Transportation,
- 1815, Highways, New Jersey,
- 1894, London Subway first 3 lines,
- 1898, Railway, Newfoundland,

The definition and implementation methods of PPP take different shapes in every country. The past experiences of a country concerning the PPP, the public service understanding, cultural changes, population, regional impacts, private sector's participation in services and the development levels of countries lead to different PPP projects depending on the area of implementation.

Today, there are several infrastructure projects developed in collaboration with the private sector to deliver public services in various countries. In particular, the model attracted considerable attention between 1991 and 2015; a number of public investments were put into practice through Public Private Partnership model in various countries around the world, notably in the advanced economies. In between these years, **the number of PPP projects in total reached approximately 5000 in 121 countries amounting up to 1,5 trillion dollars.**³⁴

Considering the last 20 years, the implementation of PPP projects has been gradually increasing. Today, the model, being implemented in 134 developing countries, has contributed to approximately 15-20% of the total infrastructure investment.³⁵

³⁰ Francois Bergere, Ten Years of PPP: An Initial Assessment OECD Journal on Budgeting, Sayı 2015/1, OECD 2016

³¹ Naren Prasad, 'Privatization of Water: A Historical Perspective', 3/2 Law, Environment and Development Journal, s. 217, 2007

³² Lorman, Brief History of Public Private Partnerships, Haziran 19, 2018

³³ Arthur Cossons, The Turnpike Road of Nottinghamshire, Historical Association Leaflet, No.97, 1934

³⁴ The State of PPPs - Infrastructure Public - Private Partnerships in Emerging Markets & Developing Economies, Haziran 1991-2015

³⁵ World Bank Group Support to Public - Private Partnerships Lessons From Experience in Client Countries, fY02-12,

Only in the first quarter of 2021, a number of 133 PPP infrastructure projects were realized with an investment value of 22 billion dollars.³⁶ Today, the world economy generates a 700 trillion-dollar revenue, 7% of which is allocated to the infrastructure investments. Of total infrastructure investments, 6% is put into practice through PPP model. The history of PPP model in certain selected countries, notably in England as the pioneer for interpreting and implementing the model in the modern sense as of the mid 1990s, their field of implementation and current situation have been explained below in detail.

Britain :

The second significant rise of Public Private Partnership model implementations date back to post-1980. The model has been further preferred for the development of infrastructure in Europe and Asia Pacific countries, and notably in Britain, Australia, Canada, and the USA.

The model owes its spread in the modern world and its reutilization as a source of inspiration in other countries to the redefinition of “Private Finance Initiative (PFI)” philosophy by Labor Party leader Tony Blair in 1990s.

Tony Blair, elected as prime minister in 1997³⁷, widened the PPP approach with an aim to spread the public services in the grassroots and make them more productive. He argued that **the public infrastructure investments had to be built on rationalism rather than ideology**, and these investments could be evaluated as **“productive or not productive investments”**.³⁸

Blair, as the longest-serving prime minister in Britain (1997-2007), scaled up the PPP model implementation across several fields (*school, hospital, highway, jail, police station*). He announced the new policies of New Labor, which conducted to the rediscovery of two-thousand-year-old model in the modern sense, before his election as Prime Minister and has arrived at the undermentioned concrete outcomes throughout these years. (Annex-19)

❖ In 1996³⁹, Blair described the ideology of New Labour (*New Labour Party*) in his speech in Derby as follows:

- *“The key to get our people and business world prepared for economic and technological change is to strengthen the **“partnership economy”**”*⁴⁰.
- *The essence of this strengthening is not to confer additional power to the shareholders but to enable Britain to reach prosperity by providing opportunities that will lead citizens to success.”*

³⁶ World Bank, PPI, First Half Report, 2021

³⁷ tr.wikipedia.org/wiki/Tony_Blair, Kasım 2021

³⁸ Global Etik Vakfı, Tony Blair Tübingen Konuşması, 30 Haziran 2000

³⁹ Parlamento Konuşması, Tony Blair, Derby, 18 Ocak 1996

⁴⁰ en.wikipedia.org/wiki/Stakeholder_theory

- ❖ In 1997,⁴¹ Blair's government pioneered the establishment of national Public Private Partnership (*Partnerships UK*), setting the first example in the world.
- ❖ In 1998,⁴² Blair's government included a new strategic planning in its program which promotes the investments and *'public private partnership'*.
 - This plan set forth six objectives which aim at strengthening the economy, decreasing the inflation and interest rates⁴³; the first of said six objectives was to revitalize the private sector investments tending towards the public infrastructure investments.
- ❖ In 2007,⁴⁴ **John Van Reenen**, economy professor at the London School of Economics, summed up the economy and policies under Blair's Prime Ministership in his article titled **"Blair's Economic Legacy"** as follows:
 - ***"Blair has left behind an economy in better shape than previous Labour leaders."***
 - ***"Britain enjoyed an uninterrupted growth over 15 years with low inflation."***
 - ***"...the unemployment rate stood at the lowest level in its history."***
 - ***"... Britain narrowed the gap between its great rivals in terms of productivity and even kept pace with the productivity miracle (in that period) of the USA."***

The accountability and efficiency of public services in Britain improved pursuant to the performance of public services through private sector. **A number 563 PPP projects valued at 35,5 billion pounds of investment were carried out in a record time of 6 years (1997-2003).**⁴⁵

The PPP projects have continued to be implemented in Britain after 2010. Considering the last 5 years, Britain has stepped forward as one of the leading countries by having executed 20% of PPP projects totally valued at 57 billion EURO throughout the European Union. This trend continues.⁴⁶

Japan:

The interest in PPP model in Japan started pursuant to the deterioration of the majority of infrastructures and the rise of re-investment need. The infrastructures were developed by the enterprises, presenting the first forms of PPP model, which were jointly established by public and private sector, in the early 1980s. At the turn of millennium, the fact that the budget required only for the maintenance of existing infrastructures could meet about 30% to 40% of the actual need turned this model into an attractive alternative.⁴⁷

⁴¹ www.partnershipsuk.org.uk/AboutPUK/PUKBackground.asp

⁴² Burcu Kâhyaoğlu, Public - Private Partnerships in Developing and Developed Countries: The UK and Turkish Cases, s. 263

⁴³ www.labour-party.org.uk/manifestos/1997/1997-labour-manifesto.shtml, 1998

⁴⁴ John Van Reenen, Center Piece Dergisi, 2007

⁴⁵ House of Commons, Treasury, 2002-3 Raporu

⁴⁶ Avrupa Yatırım Bankası, EPEC Update Market Report, 2016-2020

⁴⁷ PPP, (*Conseil International du Bâtiment*), Performance Measurement Framework in PPP Projects, 2013, s.14

During the Abe government, Liberal Democratic Party being at the helm (2012-2013), the **necessity to allocate more private sector share in public services** was emphasized in the investment strategy paper published in Japan.⁴⁸ This Action Plan promoted PPP model and a private sector funding was targeted at the level of 10-12 trillion yen (100-120 billion dollars), being the threefold or quadruple of existing PPP project.

In the light of action plans and targets, **one-third of all railway services in Japan** as one of the leading countries across the world to use the railway for mass transportation and to provide the safest transportation, **started to be operated by private sector**.⁴⁹ Pursuant to the legal reforms, PPP model has been used in a wide range of areas such as transportation, airport, highway maintenance. Just after this investment thrust; several projects were realized through PPP model as follows:⁵⁰

- ❖ Sendai Airport,
- ❖ Fukuoka Airport,
- ❖ Kobe Airport and Shizuoka Airport,
- ❖ Yeni Kansai International Airport.

Germany:

Public Private Partnership model expanded the range of application during the coalition government formed by Schröder's leader of Social Democratic Party and the Green Party in 2001. In this period, a **"PPP Central Unit"** (similar to Tony Blair's model) was established with an aim to enhance and coordinate the PPP implementations. Also, an **"Advisory Committee"** was founded to determine whether or not the projects would be realized through PPP model or conventional public procurement model.

Following these developments, the model was notably preferred for widening highways, constructing new toll roads, and rehabilitating schools. Subsequent to the delegation of authority to the Ministries to execute a PPP project, the range of application for PPP investments has extremely widened.

The Federal Government of Germany launched a PPP program at the value of 15 billion Euro for the construction of 600 km-long highway in 2015.⁵¹ Half of this mentioned total amount- namely, 7,5 billion Euro was allocated for the construction, and the other half was allocated for maintenance and operation. The investment program encompasses 10 transportation projects:⁵²

⁴⁸ Keidanren, Japan Business Federation, Towards Strategic Promotion of the Infrastructure Export Our Interest and Challenges in Main Target Countries for 2015

⁴⁹ Keidanren, Japan Business Federation, Towards Strategic Promotion of the Infrastructure Export, Kasim 2017

⁵⁰ Country Practice Report, IFLR 1000, Energy and Infrastructure 2016

⁵¹ www.bmvi.de/SharedDocs/EN/Articles/StB/ppp-contracts.html, Kasim 2021

⁵² thelawreviews.co.uk/title/the-public-private-partnership-law-review/germany#footnote-058, Kasim 2021

For instance, the financial closure of “**No 10 and No 24**” highways between Neuruppin and Pankow, which require an investment worth 1,4 billion Euro, was made in February 2018. The construction was envisaged to be completed in December 2022. The operation of project was transferred to the private sector for 26 years. Besides, another project involving the construction of a new 70 km-long road and the maintenance of a sperate 76 km-long road was contracted out for 30 years at the cost of 2,8 billion Euro.

The works for improving the transparency of projects are underway. Some sections of contract have been published on the website of the German Federal Ministry of Transportation. Publishing of these sections by blacking out of trade secrets and confidential information is still being discussed.

South Korea:

Another interesting example for the implementation of model comes in view in South Korea. From 1960 to 1994 private sector participated in public investments by means of independent laws. In 1994, “*Private Equity Incentive Law*” was created in parallel to the global developments. By virtue of this law, PPP implementation began to sprawl. PPP projects played a significant role in satisfying the increasing public infrastructure needs in South Korea between 1994 and 2005.

During the economic crises in Asia in 1999, the PPP Law was modified in a manner to promote PPP market. In 2005, the range of implementation of the model was expanded through a new PPP center and a new law.⁵³ PPP projects realized in South Korea as of 2011 and relevant investment costs are given in Table 2. Along with all these developments, **a total of 651 PPP projects at the cost of 88 billion dollars were completed in South Korea by 2013.**

Table 2: PPP Projects signed in South Korea (as of December 2011)

		TOTAL (Nb of Projects) Project Cost		Operation	Construction	Preparation
		(Billion Dollars)	(%)			
TOTAL		(600) 79,6	(100) 100	(417) 46,1	(143) 22,1	(40) 11,3
Competent Authority	Centralized Government	(151) 46,6	(25,2) 58,4	(79) 26,2	(52) 10,9	(20) 9,6
	Local Government	(449) 33,0	(75,2) 41,6	(338) 19,8	(91) 11,2	(20) 1,8
Project Type	Build-Transfer-Operate	(200) 57,9	(33,3) 72,9	(144) 34,9	(34) 12,7	(22) 10,2
	Build-Transfer-Lease	(400) 21,7	(66,6) 27,3	(273) 11,1	(109) 9,4	(18) 1,1

⁵³ Public and Private Infrastructure Investment Management Center (PIMAC), Success Stories and Lessons Learned from Public-Private Partnership Projects in Korea, Eylül 2014

In general, comprehensive legal arrangements were executed to support PPP model. These arrangements specified each step of PPP process with clear rules and criteria. Also, a PPP Central Unit was established to coordinate all the projects and monitor the developments. Today, South Korea has become a quite attractive country for PPP model.

Developments in Other Countries:

The number of PPP projects and their investment amount are increasing in many countries almost on every continent (*Table 3-4*). Countries develop their legal infrastructures in accordance with their investment programs. The efforts to improve the construct of PPP projects and further develop social oriented projects are gradually increasing in the developed countries such as Australia and Canada. The developing countries need private sector investments in basic development areas such as health, education, and transportation.

Table 3: The number of PPP Project Implementation at a Global Scale

Country	Number of Projects	Years
Brazil	1074 projects	1996 - 2020
China	1934 projects	2013 - 2020
France	150 projects	2004 - 2012 ⁵⁴
Britain	725 projects	1997 - 2013 ⁵⁵
Japan	1/3 of railways is owned by the private sector	1980 - 2020
India	1128 projects	2004 - 2020
Egypt	58 projects	1999 - 2020
Russia	300 projects	2005 - 2013 ⁵⁶

Table 4: The first 5 countries to implement PPP projects in 2020⁵⁷

Country	Investment Amount
Brazil	12,5 billion dollars
China	5,8 billion dollars
Vietnam	2,2 billion dollars
India	2,1 billion dollars
Uzbekistan	1,9 billion dollars

⁵⁴ Stéphane Saussier, Phuong Tra Tran, Sorbonne Business School, The Efficiency of Public - Private Partnerships in France: An Initial Quantitative Evaluation

⁵⁵ Margarita Khoteeva, Daria Khoteeva, Public - Private Partnerships: A Solution for Infrastructure Development in the UK? Case Study of the London Underground Public - Private Partnership Project, International Review of Management and Marketing

⁵⁶ en.wikipedia.org/wiki/Public-private_partnerships_by_country

⁵⁷ World Bank, PPI Report H1, 2021

Turkey:

The history of first Public Private Partnership implementations date back to the Ottoman Era. Galata-Beyoğlu Tunnel, put into service in **1874**, was realized **under Build-Transfer-Operate scheme with a right to operate for 42 years** as the second oldest underground transportation unit⁵⁸.

The participation of private sector in the power generation was prevalently observed in the early 20th century. The private sector continued to get involved in public investments for the establishment of power plants in the aftermath of 1950 and between 1950 and 1960 several power plants were finished by this method.⁵⁹ As of today, **a total of 13 thousand private schools** owned by private sector enterprises set a case in point for PPP implementations in the field of education and dates back to 1884.

In modern sense, the model re-gained prominence in public infrastructure investments such as power distribution, airports, and harbors in the mid-1980s. In Turkey, the range of implementation and cooperation in respect of PPP model expanded post millennium. **A total of 257 PPP projects**, particularly health investments, highways, bridges, tunnels, airports, and harbors, **with an investment amount of 85 billion⁶⁰ dollars were finalized in Turkey between the years of 1984 and 2020.**⁶¹

When guaranteed costs and PPP contract sums are compared to the gross domestic products of countries, **it is recommended to keep the upper limit of PPP investments at 10% of GDP as an overall tendency.** The current PPP contract sums amounting to **about 80 billion dollars (excluding transfer of operating rights)** in Turkey maintains close to that level. Besides, the guarantees granted in PPP projects are one of the most disputable topics. In general, these discussions base on misevaluations.

These discussions are carried on completely from technical perspective in countries with very low changes in foreign exchange rate among one another in terms of Dollar, Euro, Japanese Yen, Pound. However, discussions on guaranteed costs in countries, of which domestic currency bears the risk of change more frequently than the aforementioned countries, create contradiction in terms. The guarantee related issues are addressed from a wide range of perspectives such as rate, inflation, macro-economic demonstrators, and the relevant discussions are diversified and at times lead to different interpretations on the basis of ideological thoughts. To overcome this situation, PPP investments must be either compared with budget data or domestic income in terms of same currency. **The size and relationship of PPP projects with public finance in Turkey are presented in Table 5.**

⁵⁸ Zeynep Çelik, 19. Yüzyılda Osmanlı Başkenti; Değişen İstanbul, İstanbul, Tarih Vakfı Yurt Yay. 1986, s. 81

⁵⁹ Nadir Yurtoğlu, Cumhuriyet Türkiye'sinde Elektrik Enerjisi Üretimi ve Enerji Politikaları (1923-1960), Atatürk Araştırma Merkezi Dergisi: 2018; 34 (2): 98: 227-280

⁶⁰ Some academics prefer to include operating expenses as the total investment amount. However, in some investments where the transfer of operating rights is in question, it is a more correct approach not to include service expenses when calculating the total investments in terms of the public's rental and service income. Because rent payments made to the public are not investments. Otherwise, as a result of miscalculating the investment amounts, there is a danger of showing the investment amount more than it is. For this reason, transfer of operating rights costs are not included in the investment amounts given above. The amount of investment given is energy, transportation, health, etc. covers projects in the sectors.

⁶¹ koi.sbb.gov.tr, Cumhurbaşkanlığı Strateji Bütçe Başkanlığı, KÖİ Dairesi İstatistikleri

In Turkey, the ratio of public gross debt stock to GDP meets the criteria of Maastricht. Even if PPP investments are added to this debt, overstepping the said criteria is out of question. In [Annex-21](#), you may find a detailed information about Maastricht criteria.

Table 5: PPP Guaranteed Payments

2022 Budget Data	Billion TL	Percentage	Formula
Gross Domestic Product (GDP)	7.880	-	A
Central Administration Budget	1.751	%100	B
Total Public Investments	184	%11,0	C
2022 PPP Guaranteed Payments (excluding remuneration)	35 ⁶²	%2,0	D
2022 PPP Guaranteed Payments / GDP	-	%0,4	D/A
PPP Guaranteed Payments / Total Public Investments	-	%19,0	D/C
2022 Total Public Investments / GDP	-	%2,3	C/A

* Original calculations of authors.

PPP Guaranteed Payments in 2022 budget constitutes 2,0% of the Central Administration Budget and %0,4 of Gross Domestic Product. The PPP Guaranteed Payments soared up to 19% of Total Public Investments due to pandemic and economic difficulties; the share of Total Public Investments in 2022 Budget fell to the level of 2,3% in GDP.

Considering the pre-pandemic era, the share of Total Public Investments in GDP is noticed to have been ranging at about 4% in the recent years. During the post-pandemic period, when the country starts to work within the limits of normal budget, the share of PPP Guaranteed payments within Total Public investments may be expected to come down to 6-8%.

Turkey has been shown as a model around the world with successful infrastructure projects taken into operation in the recent years. Projects demanding superior engineering and infrastructure construction skills, notably in transportation and health, were completed and put into service in time. Bridges, highways, hospitals have been an inspiration to several countries and Turkey has been setting an example in the areas of contract preparation, construction experience, operation, and post-operation troubleshooting. The collaboration efforts of Development Banks and infrastructure funds with the companies of Turkey possessing PPP experience increasingly continue not only in Turkey but all around the world. By this means, Turkish companies have undertaken infrastructure development activities through PPP projects in various countries of Northern Africa, Eastern Europe, Sub-Saharan, and Middle East, and particularly Central Asia.

⁶² Ulaştırma sektörü ve sağlık sektörü garanti ödemelerinden Sağlık yatırımlarındaki hizmet ödemeleri çıkartılmıştır. 7,5 milyar TL tutarındaki bu ödeme garanti ödemesi olmayıp, sunulan sağlık hizmeti karşılığı yapılan ödemelerdir.

Especially during the pandemic, it can be stated that PPP projects-related process was successfully managed in Turkey. During full lockdown due to epidemic, maintenance and repair works of business in transportation projects were performed, none of the business have terminated labor contracts with their workers as per the law, government removed the obligations provided that the service remains at sdisposal and the parties have completely fulfilled their obligations stipulated in the contract and set an exemplary management practice in terms of relationship between PPP projects and pandemic for the whole world. The city hospital built through PPP model have assumed important role during pandemic and these hospitals have put forth quite successful results. In sum, public and private sector have completely fulfilled all the commitments specified in all international contracts.

As a consequence, today, PPP model is being employed in 134 countries. The developed countries concentrate on maintenance and repair of the worn-out infrastructure investments while the developing countries focus on new infrastructure investments. In many countries, legal background is steadily being regulated for the employment of model. In parallel to the increase in demand for new infrastructure investments due to new factors such as technology use and global warming, the private sector will further get involved in the public services in the future.

1.3. FUNDAMENTAL STRUCTURE OF PPP MODEL

Public administrators by nature show interest to develop infrastructure investments at all times for a variety of reasons such as their strategic importance, their impact on other sectors, public safety related issues and the use of natural resources, regardless the fact that they are performed by public or private sector. They are essentially in quest of **achieving value for money, so to say to deliver cheaper and more quality service to the users while exploiting the public funding.** For this reason, the relevant public authority is required to conduct a comprehensive work through meticulous assessments before deciding on the investment model.

Certain conditions have to be formed for the project to prefer the Public Private Partnership model. **In the case that the public does not possess a technology or human resource to execute the project, then it will be easier to determine the demanded service outcome to be long standing (15-30 years) instead of developing technological features related to the service.** However, the model bears complicated structure in *financial and legal* terms. The will to achieve more effective value for money on the part of public and to make a safer and long-lasting contract on the part of private sector places Public Private Partnership projects on **two core structures comprised of finance and law.** The processes applicable for **almost all Public Private Partnership projects** are as follows:

- ❖ **Preparation, tender, funding, and execution process** of project,
- ❖ **Completion within the estimated budget and time,**
- ❖ **Flawless commissioning,**
- ❖ **Fulfilment of service standards as envisaged in the contract,**
- ❖ **Reflection of technology and management skills by private sector as planned,**
- ❖ **Settlement of disputes** arising in the contracts **through designated mechanisms,**
- ❖ **Effective management of risks** distributed to the parties at the outset of project,
- ❖ **Deployment of performance intervention factors, when required,**
- ❖ **Complete performance of maintenance-repair works** throughout the service duration,
- ❖ **Transfer of investment to the public freed from all debts and commitments and in well-maintained and utilizable form.**

All these factors constitute a complicated structure for the model offering multi-stakeholder and multiple audit opportunity.

1.3.1. Financial Structure of Model

PPP projects cannot be explained from a narrow viewpoint as financing of public infrastructure by private sector.⁶³ The project financing is an important element for the model; in essence, **it enables the public to procure a service with predetermined standards rather than purchasing an asset.**⁶⁴ Therefore, Public Private Partnership stands as a **coherent contracting procedure** which **necessitates public incentives to achieve success** and **requires each shareholder to undertake long-term commitments** at every stage.

As for **financing**, it signifies **revenue stream extended over time** and conversion of revenue stream to the present. Typical financial instruments are grouped under four topics:

- ❖ Loans,
- ❖ Securities,
- ❖ Equity Securities,
- ❖ Leasing.

The key feature of financing is the fact that it holds a cost element. It requires that each supplied resource be paid back along with its cost. Thus, for the investments to be applicable, the investments have to be sufficiently feasible and revenue-generating to be able to repay the financing within a proper time period.

⁶³ Darrin Grimsey, Mervyn Lewis, Public Private Public Infrastructure, 2004

⁶⁴ Darrin Grimsey, Mervyn Lewis, Global Development in Public Infrastructure Procurement

Thus, model **enables the improvement of project outcomes in cooperation at every stage** by making use of knowledge and experiences of parties. At time same time, PPP model **provides cost economy for the public thanks to its capacity to propose innovative solutions and deliver timely service** compared to the conventional procurement method.

Within this context, a PPP project is a “*financial engineering*” solution developed by **taking into consideration the financial structure, involving risks, sources of loan and loan rates, tax regulations, payback period, cash capabilities, value for money advantages on the part of public and profitability calculations on the part of the private sector.**

Public authority deemed to become indebted for cheaper amounts compared to the private sector, **has to get into competition with experienced private sector companies concerning more effective borrowing when it comes to infrastructure investments requiring high investment amounts, particularly technology need, advanced engineering, and integrated project management skills.** The private sector possessing the mentioned factors can occasionally attract global sources of finance more easily.

On the other side, the **public extends payments over quite different timeframes** thanks to PPP model. There is a crystal-clear difference between PPP project financing and conventional public financing in terms of payment obligations of the public. On the part of public sector, **pre-capital is not required for infrastructure investments** within the PPP model.

The guaranteed payments and other obligations may step in during the first years after the projects commence operation. Quite the contrary, **it makes payment in accordance with the specified performance criteria at the service procurement stage.** However, in the forthcoming years, projects finance their own revenues to a large extent thanks to the factors such as the increase in usage revenues and the improvement of economic conditions in the country. On the other side, conventional public investments require a larger pre-capital financing while spending relatively lower operating expenses throughout the operation life. For this reason, **PPP model is an alluring model for countries in need of considerable infrastructure and with limited domestic saving rate.**⁶⁵ Besides, it is regarded as a preferable method in the developed countries to be able to make more investments.

In sum, mutual understanding between partners in PPP projects is the essential condition for the success of projects. At times, changing global parameters may allow to clear the existing debt of project and restructure it at a more convenient cost. The mutual understanding between partners makes it possible to take this occasion. Such an implementation ensures the continuity of contract and service.

⁶⁵ Darrin Grimsey, Mervyn Lewis, Public Private Public Infrastructure, 2004

1.3.2. Contract Structure of Model

The ownership of all infrastructure investments by nature belong to the public authority. The owner of asset and the service generated from that asset ultimately belongs to the state. **The fundamental duty of public is to establish an effective tax collection system, to collect and spend taxes fairly.** The well-constructed PPP projects and contracts invite private sector to make investments that will deliver public service. This agreement concluded between the parties means the **transfer of risks** associated with certain public services to be provided on behalf of public **to the private sector.** A standard PPP project has a pretty comprehensive and detailed structure encompassing contractual arrangements among a wide range of parties, including the public, project investor, project executer and operator, suppliers, contractors, engineers, independent third parties, commercial banks, financial providers, international development institutions, local and global partners. A typical example of this multilateral contract structure is shown in Figure 5 for the Eurasia Tunnel.

The most appropriate model is chosen with regard to the legal and socio-cultural conditions of countries, and the financial and technical properties of relevant projects and sectors. The public has direct and indirect duties in each of these models. Within the scope of contract, the public administration **undertakes certain tasks such as providing miscellaneous incentives** including the **risk sharing and loan guarantees**; while the **private sector** is expected to develop the project and **undertake the risks that may arise** throughout the construction and operation period and **the other elements related to the mentioned risks.** The long-dated PPP contracts are required to **set forth certain prediction and foresight skills.** The way to share the obligations are specified in the contracts in the case that an **unexpected situation** that may affect the project structure and activity **occurs.**

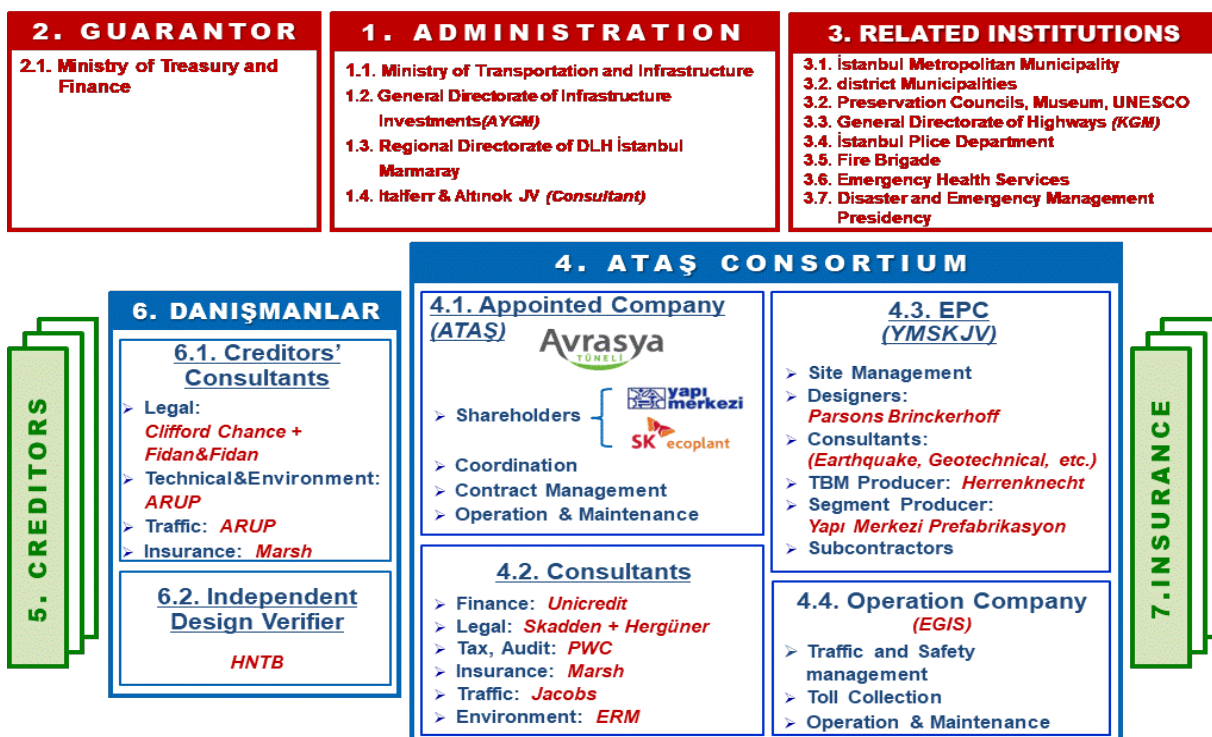


Figure 5: Eurasia Tunnel Contract Model

In general, additional contracts and documents elaborating on the details related to the project development and financing phases are signed among the Entrusted Company, Administration, and loan institutions due to the fact that all details in large infrastructure projects because of their complicated and multilateral relations cannot be regulated solely in the Implementation Contract. **An Operation Protocol** between the Administration and the Entrusted Company for the supervision of service structure and sustainability quality; and **an Operations Coordination Protocol** are devised in a manner to involve all other actors. In brief, various actors become a party to the contract of PPP project. **The quality of governance between the parties directly affects the effectiveness of project contract and constitutes the core building block of success.** The fact that the financial providers control the project contract from the outset of project through the construction and operations stages and monitor the service performance of investor at the operation stage builds a security shield to maintain the service quality delivered by PPP model at the same level throughout the contract duration.

The long-dated PPP contracts go through various economic, financial, and political processes throughout the operating duration. For this reason, the primary concern is to ensure that contracts successfully maintain their lives. In the case that radical changes occur in economic conjuncture, the flexibilities (*provided that they will be temporary or retrieved when the problem is eliminated*) providing public subsidy for price mechanisms are considerably contributive for the continuity of contracts and success of projects

1.4. RISK MANAGEMENT

Risk management is a key element in an effective PPP project. The failure to strike a proper balance between partners as regards risk sharing increases the cost and prevents either party or both parties from fulfilling their potentials completely. In theory, it is possible to foresee which party will manage the risks. For instance, public authority discharges from investment-related risks by preferring PPP investment. As soon as the service starts, it starts to purchase a product freed from risks and in conformity with certain performance criteria.

In practice, **the main objective of public is to create an investment environment which will enable an effective risk sharing by taking a number of factors into consideration. At this point, for the purpose of reaching the best result, it orchestrates a range of factors such as projecting an environment for the best management of risk and choosing the best partners instead of putting the risks on the shoulders of private sector.** By this means, it aims at achieving the utmost return in exchange for public spending. Thus, compared to the conventional public procurement models, it enhances the public interest.

Private sector approaches every project by performing a meticulous analysis with the help of its risk assessment and management skills. **Private sector primarily adds the cost corresponding to the risks to be undertaken on its finance,** be it whether a direct

public financing or PPP method. The riskier the investment is, the higher the return of private sector will be. However, private sector does not only concentrate on return but also abstains from investment if the risk is high. Additionally, private sector evaluates political and economic instability. The most scaring thing for private sector is the instability.

In sum, the primary goal of PPP projects is **to resolve the risk at optimum cost**. The transfer of risk from public to private sector increases the financing cost as each risk creates a corresponding cost. For this reason, it is a well-accepted practice by public authority to optimize and manage certain risks which are costly to be transferred to the private sector. The reason behind the public guarantees is the reward of this optimization. In PPP projects, proper risk sharing rather than risk transfer constitutes the basis. To identify the party that will manage the risk in the best way decreases the cost of risk. With regards to general practices, the basic risks undertaken by the parties are given in Table 6.

Table 6: Risk Types and Distribution⁶⁶

Risk Owner	Risk Perspective	Variables	Key Risks
Public Administration	Value for money	Contract value	Tender Quality
	Contractual obligations until the financial closure		Interest Rates
Private Sector	Impact on revenue	Equity capital cost	<ul style="list-style-type: none"> ❖ Execution and Construction – Operation cost ❖ Demand factors – Investment Cost ❖ Performance
Banks	Noredemption of principal debt and interests or Default	Debt Service Coverage Ratio	<ul style="list-style-type: none"> ❖ Demand factors – Investment Cost ❖ Operation Cost - Performance ❖ Construction

In PPP projects, all components such as project implementation, construction, operating, and maintenance services require **a specialized management capability**. **A successful operating period for projects depends on strong cash flow**. Financial providers intend to control the risk processes so as to ensure the loan repayment stability, the continuity of service quality by public administration, optimum profitability and to avert from criminal action by private sector. A PPP project bears a range of different but interdependent risk elements from the idea stage to the transfer stage. The types of risks, details and the managing parties are presented as a whole in Table 7.

⁶⁶ PPP in Infrastructure Resource Center for Contracts, Laws and Regulations (PPPIRC) Robert Phillips, LEGPS, 2008

Table 7: Risk Types and Sharing

Risk Type	Risk Sharing	
	Public	Private Sector
Investment Area Risk		
Field Conditions	✓	
Field Preparedness	✓	
Space Usage	✓	
Technical Risks	✓	

Risk Type	Risk Sharing	
	Public	Private Sector
Construction Risk		
Cost Increase		✓
Delay in Delivery		✓
Deviation from Performance Criteria		✓
Operation Risk		
Increase in Operating Expenses		✓
Delay in Operation		✓
Deviation from Performance Criteria		✓
Revenue Risk		
Increase in Input Cost		✓
Change in Taxes and Tariffs	✓	✓
Demand State	✓	✓
Financial Risk		
Financing Rate	✓	✓
Inflation	✓	✓
Force Majeure Risk	✓	✓
Legal Risks		
Law Amendments	✓	✓

As one can see, the PPP projects carry divergent risk elements at different stages. It is required to strike a multi-factor risk balance from the feasibility to the transfer stage of project. Proper distribution of risks is one of the main components of project success. The distribution of risks among partners may vary throughout the project life. From various points of view, there may be admiring as well as criticizing approaches to the risk distribution.

In Eurasia Tunnel, an effective and balanced distribution is noticed between public and private sector. The risk distribution is given in Table 8.

Table 8: Eurasia Tunnel – Risk Types and Sharing

Risk Category	Risk Definition	Risk Owner in Eurasia Tunnel
Design	Delay in project approval and permissions (<i>design, feasibility approvals</i>)	Public/Private
	Changes in design and building during construction period	Public/ Private
Construction field	Site suitability	Public
	Geotechnical and ground conditions	Public
	Environment (<i>water / air / land pollution – continuing or emerging do to work in progress</i>)	Private
Construction	Workforce availability	Private
	Material availability	Private
	Conformity with the quality assurance, control/construction standard and specifications	Private
	Damage/loss incurred to 3 rd parties, public services, and works	Private
	Delay in construction	Private
	Cost overrun in construction	Private
	Design flaw	Private
	Subcontractor conflicts / bankruptcy	Private
Operation/ Maintenance and Performance	Higher actual operation and maintenance costs than expected	Private
	Traffic management and accidents	Private
Political	Law amendments	Public
	Tax changes	Public
Economical	Fluctuation in interest rate	Public/ Private
	Fluctuation in Inflation rate	Public/ Private
	Fluctuation in exchange rate	Public/ Private
Demand	Demands of users for project service	Public/ Private

The decisions regarding the methods to perform projects put forward the quality and success of artifacts. At the project development phase, multiplying alternative scenarios and deciding accordingly by the public brings great benefits. The more the scenario number is, the more successful the projections will be. It saves time for all processes. Each decision has two basic thinking processes. **Setting forth possible alternatives and choosing of the alternatives.** For sure, these processes are riddled with uncertainties.

There are 5 types of uncertainties, in general: ⁶⁷

- ❖ Uncertainty of future,
- ❖ Insufficiency, scarcity, and fallacy of data,
- ❖ Incompatibility of mathematical models with reality,
- ❖ Statistical variability of properties such as material and load etc.,
- ❖ Human behaviors and errors.

PPP projects pledge to produce solutions for the future rife with uncertainty. However, a significant aspect affecting the accuracy of decisions made for such projects is the fact that one of the shareholders of these projects is lenders. Banks, credit institutions, funders endeavor to make a longtime prediction for such projects. For this reason, they put forward a number of scenarios based on the available information. In sum, each PPP project is selected as a result of analysis performed on alternatives.

Having regard to information and models put forward by public in respect of alternatives, private sector looks from its own perspective and decides whether or not to be involved in. As for the lenders, they work on many alternative scenarios based on data and information put forth by both public and private sector and takes up its position. Thus, as a result of multilayer money analysis, PPP model is chosen as an infrastructure generation method.

1.5. A COMPARISON BETWEEN PPP MODEL AND CONVENTIONAL MODEL

When conventional procurement methods and PPP model are compared, a number of differences are observed. The strengths of conventional procurement can be described as the weakness of PPP model. For certain, the other way around is also true. For this reason, **these two procurement types do not substitute one another, and they both have an indisputable role for public.** Both types should complement each other instead of competing. The long-term goal of public institutions is to determine from which tenders they can benefit more (*not only economically but also in terms of innovations, delivery time etc.*) for each tangible product and choose the procurement model.

The involvement of private sector in the project (*ideally from the preparation stage until the final implementation of project*), in general, **brings forth technical information and innovation resulting in higher material value, higher service quality and higher productivity in the implementation of project.** Public sector which executes PPP model ensures more productive control, more balanced risk distribution and more transparency over future costs compared to public procurement contract.

⁶⁷ Dr. Ersin Arıoğlu, “Mühendisliğin Temel Nitelikleri ve Mühendislik Jeolojisi Üzerine”, MuhJeo 2021, Sunum

There are some factors that conduce PPP model to be preferred to conventional procurement. The underlying reason for enhancing the involvement of private sector in public investments is **to improve public service quality and to minimize the user dissatisfaction and weak financial audits.**⁶⁸

Two primary concerns confronted by public in large infrastructure projects are **cost overruns and delivery period extensions.**⁶⁹ On a global scale, the major distinctive problem of conventional method is the fact that preliminary project costs are treated with “**optimism bias**”. A study examining a number of 258 large transportation projects executed through conventional model and encompassing 20 countries has revealed that costs are underestimated in 90% of projects. For railway projects, actual costs were determined to be about 45% higher than the estimated figures while this rate is about 37% for bridges and about 20% for highway projects.⁷⁰ Likewise, similar increases are observed with respect to the delays in due dates. Delays in due dates are %35 for railway projects, 21% for tunnels and %39 for highway projects.⁷¹

The most comprehensive project evaluation was conducted in 2002 covering the period between 1980 and 2000; a total of 50 large public investments were analyzed involving offices, hospitals, prisons, airports, highways, railways, and tunnels.⁷² For all projects examined with respect to the results based on the optimism bias, 17% increase in construction durations, 47% increase in construction costs, 41% cost overrun in operating expenses were noticed.

On one hand, PPP model develops more outcome-oriented approach in investments. **Financing of transportation infrastructure (highways, bridges, tunnels) outside of general budget allows the public to allocate financial resources among other sectors fairly and efficiently.** On the other hand, this opportunity increases the number of other public investments while contributes to the decrease in debt ratio. The strengths and weakness of PPP and conventional procurement models are separately demonstrated in Table 9.

⁶⁸ Dünya Bankası - PPIAF, Public Private Partnership Units, EASSD, 2007

⁶⁹ G.J. Hodgson, 'Design and Build - Effects of Contractor Design on Highway Schemes', Proc. Civil Engineers 108, Mayıs 1995

⁷⁰ Bent Flyvbjerg, Underestimating Costs in Public Works Projects: Error or Lie?, 2002 - Mott MacDonald, Review of Large Public Procurement in the UK, 2002

⁷¹ Bent Flyvbjerg, Mette K. Skamris Holm, Søren L. Buhl, 2002, “Underestimating Costs in Public Works Projects: Error or Lie?” Journal of the American Planning Association, Vol. 68, No. 3, Summer

⁷² Margarita Khoteeva, Daria Khoteeva, Public - Private Partnerships: A Solution for Infrastructure Development in the UK. Case Study of the London Underground Public - Private Partnership Project

Table 9: Benefits of PPP Projects and Eurasia Tunnel Implementation Examples

Benefits of PPP Projects	Eurasia Tunnel Project Implementation Examples
❖ Provides value for money for public.	❖ <i>Eurasia Tunnel provided 769-million-dollar public saving compared to the conventional method.</i>
❖ Public deals with one party throughout the project.	❖ <i>Eurasia Tunnel Project was executed by ATAŞ during investment and operating period.</i>
❖ The party which will manage the best undertakes the risk.	❖ <i>In Eurasia Tunnel Project, all risks associated to construction, notably technology and engineering related risks, tunnel connecting two sides 106 m below the sea level were undertaken by the Commissioned Company and the construction was successfully finalized 8 months prior to the estimated date and the project was put into service.</i>
❖ Primary risks (design, construction, operation, demand risk...) may be transferred to the private sector.	❖ <i>In Eurasia Tunnel Project, ATAŞ undertook the majority of design, investment, construction, and operating risks.</i>
❖ Innovation ability of private sector in incorporated into the project.	❖ <i>Innovations in In Eurasia Tunnel Project are as follows: the use of tunnel boring machine “TBM” which ranks first across the world in terms of cutting head power; the application of seismic bracelet in tunnel to enhance its resistance to earthquakes; the application of biofiltration for the first time in Turkey known for its positive impacts on air quality; LED lightning used for the first time in Turkey; spaciousness inside the tunnel by dint of ceiling paint and lightning above the global standards; development of Pacemaker; sophisticated SCADA system, first responder fire motorcycles etc.</i>
❖ Public does not make a payment throughout investment period.	❖ <i>In Eurasia Tunnel, an amount of 1,245 billion dollars’ worth investment was made composed of equity capital and loans. For financing, the longest maturity period in Turkey, being 18 years, was obtained.</i>
❖ Public investment is monitored in a transparent manner from the beginning to the end of project thanks to 3 rd parties (bank, development agencies and insurance).	❖ <i>In Eurasia Tunnel Project, administration and financial providers supervise, monitor, and report the project from the beginning to the end in a transparent manner through technical consultants.</i>

❖ Public service performance can be measured, and payments are made accordingly.	❖ <i>In Eurasia Tunnel Project, the operating quality is periodically measured.</i>
❖ Projects are constantly supervised by public through multiple control mechanism during investment and operating period.	❖ <i>In Eurasia Tunnel Project, compatibility to international operating standards, response standards, air quality inside the tunnel, air quality outside the tunnel, winter maintenance, tunnel control room, coordination with emergency services respecting the tunnel operating security, operating & maintenance guidelines and procedures, water analysis, earthquake resistance and building health monitoring systems are periodically measured.</i>
❖ Provides an integrated working opportunity for design and construction processes.	❖ <i>In Eurasia Tunnel Project, design projects involving all parties were enacted and by this manner, improvement works and innovations could be performed at the construction stage.</i>

When the assumptions set forth as a result of comprehensive feasibility are established in credible manner and everything goes to the plan ⁷³, the costs are kept under control and the investments are reimbursed by the users. This system provides an opportunity to **ensure 100% tax equity** as a structure which supports the **efficient and effective use of public budget** the most. The PPP model envisaging a partnership structure in essence must be considered as a process designed to ensure that all risks are assessed and taken into consideration significantly. As both parties attribute source and prestige to the success of project, the partnership is based on the detailed analysis of cost sharing adjustments, risk mitigation and risk allocation (*Table 10*).

Table 10: Differences between PPP and Conventional Public Procurement⁷⁴

Examined Concept	Public – Private Partnership	Conventional Public Procurement
Project Development Costs	Project development costs within the scope of PPP are higher than those of conventional public procurement in general; because PPPs require detailed analysis by external consultants for Value for Money/ Cost Benefit Analysis, Prefeasibility and Feasibility Works These costs are covered by public sector.	Project development costs within the scope of conventional public procurement are much lower in general; however, risks are not sufficiently considered.

⁷³ Bent Flyvbjerg, Bruzelius, & Rothengatter, Policy and Planning for Large Infrastructure Projects: Problems, Causes, Cures 2003

⁷⁴ Nathan Associates, Public - Private Partnerships A Basic Introduction for Non-Specialists, Şubat 2017

Examined Concept	Public – Private Partnership	Conventional Public Procurement
Construction Costs	Private sector is responsible for construction costs and thus, strives to build the investment within time and budget. Any additional expenditure related to the construction has an impact on private sector's profit. PPP projects require stricter regulatory controls.	In the first stages of project, public sector covers the construction costs that require large amount of Investment. Additionally, contractors are subject to non-flexible public procurement methods, in general; they may limit the innovation and extend the process.
Financial Costs	Private sector's financing is more expensive than that of public sector.	Financing (<i>interest cost</i>) is cheaper than that of private sector.
Planning Time	Planning Stage (<i>including Project Identification and Preparation</i>) lasts about 9 to 12 months in general. At this stage, government performs various analysis such as value for money and feasibility.	Conventional procurements may be attractive due to rapid planning. However, without detailed feasibility analysis, the project will likely incur damage due to low usage rate or higher construction costs.
Procurement Period	Due to competitive proposal process, tendering and proposal selection for PPP is much longer than conventional public procurement which usually lasts 6 to 12 months. Proposal Stage, in general, involves Declaration of Will and Proposal stage which encompasses both candidate briefing, shareholder consultations and multilateral coordination.	Through usual public procurements, the duration between tendering and proposal selection is much shorter than that of PPP procedure.
Project Contract	By enabling the control of one contractor on the whole life cycle of a project, allows for lower construction and operating costs as the performance of each subcontractor will have an impact on the profitability of contractor as well as paving the way for more innovation in planning. Additionally, the continuity and consistency among the different stages of PPP provide obvious advantages and there is a "project manager" responsible for advancing the project.	Each stage of project can be executed with different bidders on a contractual basis; in this way, the contractor is expected to manage each subcontractor effectively in order to complete the project within time and budget.
Assumed Risk	The party that will manage the risk best will assume it. This fact allows public and private sector to possess equal risk and reward.	Public sector assumes all risks, even those associated with the construction and design of project.

1.6. BENEFITS OF PPP MODEL

PPP model is used as a significant instrument to **materialize several infrastructure investments, notably transportation, more rapidly, by respecting the budget and exploiting more advance technology, in a safe and monitorable way without being a burden to state budget during the investment period. The obvious advantage of this model is the fact that it enables the materialization of investments thanks to the dynamism and management skills of private sector, which are otherwise difficult to put into practice by public in regard to technical, financial, and legal infrastructure.** Model has certain benefits such as **providing long-term funding for the public, transferring specific risks to the private sector, and not allocating budget to the investment at the construction stage.**

Projects demanding large investments are of capital importance in that they demonstrate and enhance recognizability, familiarity and prestige and leap of a country with respect to investments. The assumption of PPP projects by private sector attracts considerable direct foreign investment, enables creating innovation culture, technology transfer and acquiring up-to-date information and facilitates integration with global economy. Local companies involving in great projects improve their capabilities.⁷⁵

With regard to this model, private sector strives to execute its investment in the fastest time and within the estimated budget as it will be able to gain income only after the construction is completed. On the other side, it endeavors to execute its construction or operating-maintenance investments in a manner to ensure that no deduction-penalty and high maintenance cost will be incurred on itself during monitoring stage. This cycle highlights a series of benefits of PPP model.

The principal motivation of this model for public and private sector is explained in detail hereinafter.

1.6.1. Benefits to the Public

a. Macroeconomic and Regional Development

The existence of effective infrastructures have direct impact on five main factors of a country:⁷⁶

- ❖ Production capability,
- ❖ Development of human resource,
- ❖ Logistic costs,
- ❖ Foreign trade,
- ❖ Mobilization capability of goods and services.

⁷⁵ KÖİ projelerinde yerli bir ortağın bulunması ve liderliğinin yerli firmalar tarafından üstlenilmesi şartının getirilmesi ülkedeki özel sektörün gelişimine büyük katkı sağlar.

⁷⁶ Fedderke ve Garlick, University of Cape Town and Economic Research Southern Africa, No.12, s. 1-29. 2008

Today, economic decision-making with respect to the place of production in modern economies is based on “**goods transport costs and duration**”.⁷⁷ The difficulty of mobilization, length of duration and costs are explained with the concept of “**iceberg**” transport costs, which implies the assumption that “**some fractions of goods melts during transport from one region to another**”.⁷⁸ For this reason, infrastructure investments are utilized as an effective instrument to steer the economic development of countries and from time to time the development policy of a specific region.⁷⁹

Golden Ears (GEB) bridge connecting the two sides of Fraser River in Canada, which was materialized in 3,5-year construction time with 32-year-long operating and 900-million-dollar investment cost in **2009**, sets one of the significant examples of large infrastructure investments executed through PPP model aiming at contributing to the macro and regional economic development.⁸⁰ The bridge, which will render service for 20 million vehicles on an average annually during operating period, will achieve a total of **3.6 billion dollar** saving throughout operating period by enabling users to save travel time, providing depreciation cost saving and security advantages, which amount to 1,6 billion dollars, 1.4 billion dollars and 0.6 billion dollars, respectively. (Table 11).⁸¹

Table 11: Golden Ears Bridge Economic Contribution

FACTOR	VALUE
Total Length	14 km. connecting roads 2,5 km. bridge length
Saving of Travel Time	1,6 billion dollar
Vehicle Operating Costs (<i>Fuel and Maintenance</i>) Saving	1,4 billion dollar
Accident Cost Saving	0,6 billion dollar
Total User Benefit throughout the Operating period	3,6 billion dollar

***Eurasia Tunnel Project**, in this sense, stands out as an infrastructure investment that has made considerable contributions to the national economy. It will provide a total of 8,6 billion dollars' worth contribution throughout its operating period by enabling timesaving as a result of usage for 25-year-long operating period, fuel saving, emission reduction and accident cost saving at the amount of 7 billion dollars, 1.4 billion dollars, 117 million dollars and 95 million dollars, respectively. (Table 12) (Annex-18)*

Table 12: Eurasia Tunnel Operating Period Economic Contribution

FACTOR	VALUE
Total length	10 km connecting roads 5 km tunnel length
Saving of Travel Time	7,0 billion dollars
Vehicle Operating Costs (<i>Fuel</i>) Saving	1,4 billion dollars
Accident Cost Saving	95 million dollars
Emission Reduction	117 million dollars
Total User Benefit throughout Operating Period	8,6 billion dollars

⁷⁷ K. Glaser, H.A. Goldstein, Research Universities As Actors in the Governance of Local and Regional Development, The Journal of Technology Transfer, Volume 37, Pages 158–174, 201

⁷⁸ Paul Samuelson - Charlot 2000, s.2

⁷⁹ Prof. Dr. Mustafa Kemal DEĞER, Arş. Gör. Muharrem Akın DOĞANAY, Ekonomik Büyüme Üzerinde Altyapı Yatırımlarının Etkisi: Seçilmiş Ülke Grupları İçin Panel Veri Analizleri s.5, 2015

⁸⁰ Trans Link, Golden Ears Bridge Value for Money Report, Haziran 2006, s.9

⁸¹ Trans Link, Golden Ears Bridge Value for Money Report, Haziran 2006, s.7

b. Predictable Construction Time and Investment Budget

One of the appealing aspects of PPP model is its **capacity to eliminate excess cost overruns and delays** in public **infrastructure projects**.⁸² The model provides a predictable picture for the decision-making authority. Infrastructure investments, by nature, are such investments that possess sophisticated engineering structure, require high volume investment, and have long-term contracts. One of the primary parameters used as a base to compare PPP model with conventional procurement method is the completion of project **“in time”** and **“within the predicted budget”**. PPP model draws a predictable road map for administration and investors in terms of construction periods which are directly linked to engineering structure and project budget across the world.

The conventional model built on the progress of work upon progress payment procedure that is put out to tender in return for fund allocated from public budget binds the owner administration and the future of project to the funds allocated within the budget period of the relevant year. In PPP model contract structure, the private sector is anticipated to cover design and construction budget at the investment stage. The payments linked to the launch of operational activities in the scope of project can only be made to the private sector on condition that quality standard and duration specified in the tender specifications are satisfied. This situation -around the world- led PPP model to achieve more successful performance compared to the conventional model as regards the predicted construction time and planned budget parameters. Some examples related to the studies demonstrating the **“time and cost”** parameter comparison are presented in Table 13, 14, 15, 16 and 17.

PERFORMANCE INDICATORS ACROSS THE WORLD

Table 13: UK National Audit Office 2000 - 2004 Review

(In UK, 39 large infrastructure project review⁸³)

MODEL	TIME	COST
Conventional	%17-time increase	%47 cost increase
PPP Model		%22 to 24 cost increase

Table 14: UK National Audit Office 2003 - 2005 Review⁸⁴

MODEL	TIME	COST
Conventional	%30 in time	%27 within budget
PPP model	%76 in time	%78 within budget

⁸² Deloitte, Closing the Infrastructure Gap: The Role of PPP, 2006

⁸³ UK National Audit Office, “PFI: Construction Performance,” 2003. Note: Previous Experience Based on 1999 Government Survey. PFI Experience is Based on NAO Survey of 37 Projects.

⁸⁴ Matt McDonald, Review of Large Public Procurement in the UK, 2002

Table 15: Europe Investment Bank Review⁸⁵

MODEL	TIME and COST
Conventional- 50 projects	%60- delay more than a year
PPP model- 10 projects	%3- time and cost overrun

Table 16: Europe Investment Bank 2000 - 2008 Review

MODEL	TIME and COST
PPP model- 200 projects	%85 in time
	%80 within budget

Table 17: Australia Infrastructure Projects Review⁸⁶

MODEL	TIME	COST
Conventional-	%25,9-time increase	%18,9 cost increase
PPP model	%1,4-time increase	%4,3 cost increase

Eurasia Tunnel project has displayed extremely good performance to this respect. Launched in 2013, the project was completed in 3 years and 11 months on 22 December 2016, 8 months earlier than planned despite and technical difficulties. The total investment cost determined to be 1.245 billion dollars was not exceeded.

c. Justice in Taxation secured by User Pays Principle

Both macro and local level infrastructure projects bring along several positive externality. For this reason, all infrastructure investments are built as a part of development strategy for countries. In PPP model, the payments to be paid by public for the project starts at the stage of investment. At this stage, public choses project payments in three models:

- ❖ For the infrastructure investment users, User pays model f
- ❖ Direct payment from public budget model
 - Payment at disposal (*fixed payment periodically*)
 - Shadow crossing payment (*flat rate pay in proportion to user count*)
- ❖ Mixed model incorporating two payment mechanisms

The system as part of which public infrastructure investment users pay is called “**paid use**” model; the payment made from public budget is called “**taxpayer contribution model**”.⁸⁷

⁸⁵ Robert Bain, Review of Lessons from Completed PPP Projects Financed by the EIB, European Investment Bank, 2009

⁸⁶ Performance of PPP and Traditional Procurement in Australia, Infrastructure Australia (IPA), 2007

⁸⁷ ITF Forum - OECD, Better Regulation of Public-Private Partnerships for Transport Infrastructure, 26 Eylül 2013

Infrastructure investments contribute to economic development while creating new job opportunities and business areas and provide added value to the lives of people in the region. **The entire taxpayers bear the cost of relevant investment made from public budget regardless of region, location, and sector.** On the other side, the fact that those who use the project, shorten its economic life, damage, and batter it bear the cost of investment as they use the project, enables other taxpayers who do not use this work, or are unlikely to use it or do not avail of economic returns to bear the investment cost less. The infrastructure investments capable of creating their own revenue as a whole or in part through the services they provide by themselves except for projects such as school, sports facilities and residences make significant contributions to the fair distribution of common tax system in the countries. For this reason, **PPP model is the nearest model capable of ensuring full justice in taxation in a country owing to the fact that it is not borne by who do not use the structure but instead by those who use the infrastructure, damage or distress and batter it.**

When the United Kingdom, which did not switch to toll road system until 1990, completed several infrastructure investments through “**shadow payment**” model in London and Manchester regions in between the years of 1986 and 1994, while things were appropriate and on the course for the users in those regions; Liverpool residents launched a serious campaign denouncing the non-toll roads which do not contribute to the economic development of their region, ease their lives, but instead serve to people from other cities using these roads. Following this development, Britain switched to the “**User Pays**” model.

*To this respect, **Eurasia Tunnel Project has a precious project design that bears its own investment cost and ensures earning revenue while providing quality service to the public.** Being that, the analysis demonstrate that **the minimum traffic guarantee could be reached in 2026.** As from that day, by means of the revenue sharing model applied in the project, **all of the guaranteed payments made up till 2026 will have been repaid in 2039** through the share of revenue that the public has received from users on MTG.*

d. Spreading the Economic Growth to the Grassroots and Creating Market

Public and private sector are two significant sectors independent from each other. **While the public is responsible for enriching investment environment in a country, the private sector makes production by keeping pace with changes in line with its potentials and seeking profit.**

Public is responsible for realizing investments that come up with solution to all demands it keeps receiving. It unites all actors into the cooperation approach with an eye to respond these needs. This cooperation brings out synergy and solutions. **Innovation and research are inevitable for the development of societies.** Rapid, active learning, continuity of growth climate and development that would improve social benefit can only be achieved to the extent of the power of cooperation. **As the university industry partnership matters for the industrial development of a country so does the public and private sector partnership for responding the needs of society and current requirements.**

Effective partnership has five main benefits for society:

- ❖ Develops learning method,
- ❖ Spreads knowledge,
- ❖ Passes on knowledge to the grassroots,
- ❖ Increases synergy and potential,
- ❖ Produces sensible outcomes.

The partnership understanding that constitutes the foundation of PPP model, brings the basic needs of society into open by observing the abovementioned benefits. The stronger the partnership between actors is, the more beneficial it will be for the society.

e. Benefiting from the Potential of Private Sector

Countries impel private sector funding in order to eliminate the differences between infrastructure needs and resources and improve service quality.⁸⁸ The PPP model brings with it **management, technical and operational expertise** for comprehensive infrastructure projects as well as creating additional resource for countries. The innovative and competitive dynamics of private sector provide **alternative funding opportunity for public**. Besides, there are additional advantages associated with the participation of private sector to the infrastructure investments, which are:

- ❖ Completing investments faster and within estimated budget,
- ❖ Determining and measuring service quality standards,
- ❖ Transferring a public asset to the administration at the end of operation period unconditionally, for free and without any repair maintenance need,
- ❖ Bringing in contemporary engineering and advance technology to the infrastructure investments of a country.

The analysis which reveals that the infrastructure borrowing by private sector is more expensive generally overlooks the invisible contributions and associated expenses made by public within the scope public financing for the projects procured through conventional means. For this reason, in order to make a fair comparison between private and public financing cost, the implicit government guarantees within the public financing have to be identified and priced.⁸⁹ **The construction costs, lifetime operation and maintenance costs of PPP projects are the fields where the model provides cost advantage.** The PPP project examples in Britain, the USA and Australia provided significant cost advantage. The PPP project examples in Britain, the USA and Australia providing cost advantage are shown in Table 18.

⁸⁸ Paul Vandenberg, Senior Economist, ADBI Policy Brief No. Eylül 4. Sayı, 2015

⁸⁹ Wim Verdouw, The Private Financing Component in Public - Private Partnerships, IISD - International Institute for Sustainable Development, Ağustos 2015

Table 18: PPP Model Projects Saving Percentages

PROJECTS	MEAN SAVING PERCENTAGE
UK Treasury Report - (2000) 29 PPP projects ⁹⁰	%17
USA - Denver E-470 Toll Road ⁹¹	%30
Australia, Partnerships Victoria Projects ⁹²	%9

The investment cost of Eurasia Tunnel Project amounting to 1,245 billion US Dollars was covered by a loan package that has the longest-term maturity among PPP projects realized in Turkey by virtue of the background of investor, its credibility and equity capital power (285 million US dollars). This well-structured financing model received five awards from international financing circle. According to the value for money analysis (HGA) prepared in 2021, the motives underlying the preference for conventional method and PPP model were compared specific to projects. A whole range of factors such as all risks transferred to the private sector, number of guaranteed vehicles undertaken by public and price reduction were taken into consideration; as a result of this evaluation, it was revealed that preferring PPP model for a project earned public value for money amounting up to 30%. (Annex-18)

f. Providing Efficiency in Public Budget

Properly structured PPP projects **ensure that public focuses on outcomes rather than the expenses of infrastructure projects**. The effective use of **public resources means the satisfaction of public needs in most reasonably optimized time.**⁹³ The credit viability of an infrastructure project by banks through user pays and/or payment at disposal method enables PPP model to be considered as an alternative for that project. Thus, instead of allocating public resource for infrastructure projects that are capable of bearing the whole or part of their own investments through the income they generated themselves, **allocating resource to public services of which social and macro-economic aspects outweigh and are unlikely to get loan**, facilitates the effective use of resource on the part of public and enables to avoid opportunity cost. Allocating more resource to structural investments which are required to be fully covered by public budget in essence stands out as one of the significant gains of projects where the applicable PPP models provide for the public finance.

⁹⁰ Grahame Allen, "The Private Finance Initiative (PFI)", 2003

⁹¹ U.S. Department of Transportation, "Report to Congress on Public Private Partnerships," Bölüm 3, s. 44 Aralık 2004
www.fhwa.dot.gov/reports/pppdec2004/pppdec2004.pdf.

⁹² Peter Fitzgerald, Review of Partnerships Victoria Provided Infrastructure, Ocak 2004
www.un.org/esa/coordination/Alliance/PPPInfrastructure.pdf

⁹³ Teresa Curristine, Zsuzsanna Lonti and Isabelle Jourard, Improving Public Sector Efficiency: Challenges and Opportunities - OECD Journal on Budgeting Volume 7 – No. 1, 2007

Eurasia Tunnel Project offered a solution that will meet the demand of commuters in Istanbul for transportation between the two continents in a very short time. This investment which might have extended for years via public budget started providing service to public and allowed for channelization of public budget to other fields.

*In the **Economic Impact and Value for Money Analysis (“HGA”)** report prepared in 2021, economic benefits and value for money earned throughout the lifetime of project were calculated. As a result of analysis, it was determined that the financial value of saving provided by Public Private Sector Partnership method for Eurasia Tunnel Project compared to the conventional method amounted to 769 million US dollars in terms of 2021 prices. (Annex-18)*

g. Improving Service Quality Standard

Two main success factors of PPP projects are **the value for money and improvement of service quality.**⁹⁴

Supervising the performances of PPP projects enables the protection of interests of all shareholders (*public - investor - user – financial providers*) **in a sustainable manner without prejudice to the interests of future generations from economic, environmental, and social aspects.**⁹⁵

The sustainability of service quality is directly related to the performance measurements for PPP projects. Today, several countries prefer PPP model not only due to financial constraints but also to **reach predictable, measurable, reliable, rapid, and sustainable service quality.**

*In Eurasia Tunnel Project, performance criteria were determined pursuant to the international standards, and are periodically supervised by project parties. Parameters related to both maintenance and supervision and to service provided to the users are constantly measured and international standards are met successfully in light of “**always for the better**” philosophy. (Annex-20)*

h. Improving Investment Environment and Attracting Direct Foreign Investment

Multilateral development banks play a significant role in the involvement of private sector in public services in developing countries. It **catalyzes the involvement of global investors in projects** while supplying critical capital and knowledge need. It leads to embark on joint venture with local companies in the project country. **Direct Foreign Investments for developing countries (DYY)** are of critical importance of macro-economic development and welfare. In the recent years, international financial institutions and development banks have focused on infrastructure investments and PPP model. As exemplified in Table 19, the role of international investment banks has grown in developing countries.

⁹⁴ Bing Li, Akintola Akintoye, Peter Edwards, Critical Success Factors for PPP/PFI Projects in the UK Construction Industry, Ocak 2014

⁹⁵ Yanhong Liang 1 & Hongdi Wang, Sustainable Performance Measurements for Public - Private Partnership Projects: Empirical Evidence from China, 3 Haziran 2019

Table 19: The involvement of International Financial Institutions in the Infrastructure Investments of Developing Countries⁹⁶

IFC 2009	<ul style="list-style-type: none"> ➤ Energy supply for 132 million people ➤ Power distribution for 30 million people ➤ Water infrastructure for 35 million people
ADB 1998-2006	<ul style="list-style-type: none"> ➤ 12.700 MW energy supply ➤ 23 million Telecom users ➤ 50 thousand water users
AfDB 2008-2010	<ul style="list-style-type: none"> ➤ 4.800 MW energy supply ➤ Power distribution for 16, 5 million people ➤ Highway infrastructure investment for 16 million people
Algeria Water Treatment Investment - 2009	<ul style="list-style-type: none"> ➤ Daily 200 thousand cubic meter water treatment capacity ➤ 200 million dollars investment
South Africa Highway Project - 2009	<ul style="list-style-type: none"> ➤ IFC 25% capital contribution ➤ 200 million dollars investment
Senegal Integrated Infrastructure System – 2011	<ul style="list-style-type: none"> ➤ Logistics infrastructure, airport, energy infrastructure ➤ 240 million Euro investment ➤ 500 million Euro development bank loans

Eurasia Tunnel Project had success in this respect. A total of 960 million dollars' worth of investment was acquired from 10 different financial providers, including two development banks and one EXIM bank. Considering the 50% capital from the foreign partner because of which 89% of investment was provided, it is seen that the Direct Foreign Investment (DYY) carried a significant weight on the Project.

i. Improvement of Effective and Multi-Stakeholder Inspection Mechanism

In conventional model, the commissioning administration inspects and/or controls the commissioned party. However, unlike PPP model, an inspection and control mechanism involving an independent third party is out of frame. None the less, one of the advantages of PPP model which frequently escapes attention is the **multi-effective inspection** mechanism in place from the beginning phase of public infrastructure project till the last phase. Owing to the fact that PPP model offers solutions that require particularly high investment cost and advanced technology, the projects are designed, funded, and constructed within multi-stakeholder structure and after operating phase, are transferred to the public.

During construction phase, the independent advisers who regularly inspect the project on behalf of public and file reports lend assistance. Besides the administrations, financial institutions covering a major part of project funding (*except for equity capital obligation from*

⁹⁶ International Finance Corporation, IFC, Development Through Private Sector, 2011

20% up to 30% in developing countries) execute Value for Money Analysis (HGA), affordability analysis, environmental and sustainability analysis, risk management and process monitoring. Financial institutions control the project through their independent inspectors and sometimes by applying their own inspection processes in order to ensure that the construction phase is seamlessly completed, and the project revenue is collected in time.

During operating phase, regular controls are maintained. The public service quality is preserved at the established standards until the end of contract period. By this means, a sustainable public service is achieved. Considering the fact that payment periods in PPP projects extend over long years, the service quality controls by financial providers continue until the loan repayment is completed. PPP projects provide multi-actor effective inspection mechanism via complicated inspection processes from the project beginning phase to the construction, and from operating phase to the transfer of asset to the public.

*By virtue of the significance of investment in **Eurasia Tunnel Project**, top-ranked companies worldwide have participated in the design and inspection of this very special project. (Annex-2) In the project, Arup (creditor) Italferr & Altinok-JV (AYGM) and HNTB (independent design) assumed adviser and inspector roles. **A complicated multi-inspection structure** continued from the project development phase till the end of construction. Today, at operating phase, the project is being inspected and monitored on a periodical basis by international independent inspection firms.*

j. Development of Legal Infrastructure

The macro-economic situation, investment environment, borrowing capacity, organizational structure and financial capabilities of a country are required elements to attract long-term infrastructure investments. Programs implemented via PPP model give rise to “**governance environment**” as a general rule by developing a public and private sector relationship in a country. The availability of PPP law or regulations related to the PPP model **help attract investors to the country by developing and clarifying the valid legal framework**. This situation does not only create a center of attraction for global investors specific to the project but also regarding other investment fields. PPP laws are credited with containing clear and comprehensive provisions and providing inclusive legal guidance on key issues. This situation accelerates public investments while providing a more secure investment environment.

In sum, the benefits of a well-designed PPP law can be wrapped up as follows:⁹⁷

- ❖ Creating an effective competitive environment for public,
- ❖ Defining the distribution of responsibilities among project shareholders,
- ❖ Ensuring a transparent tender process and submitting standard project documents,
- ❖ Facilitating an easy integration with global investor environment,
- ❖ Providing a clear environment for project planning and identifying sectors of first priority,
- ❖ Ensuring the control and inspection of project by public authorities and submitting clear and exact directives related to the implementation of project following the tender.

⁹⁷ FEMIP, Study on PPP Legal & Financial Frameworks in the Mediterranean Partner Countries, Volume 1 – A Regional Approach, EIB, Mayis 2011

*The **Eurasia Tunnel Project**, during its development period, pioneered PPP model contracts in particular, trilateral agreements among public-private sector-bank and revenue sharing model. The project **documentation** as a whole **carried an archival value, served, and set a model for a number of subsequent PPP projects.***

k. Technology Transfer and R & D Development

PPP projects present an effective model which involves modern engineering knowledge, predicts the utilization of technological devices, or facilitates the replacement of equipment requiring upgrade in the face of technological developments throughout the operating period. PPP contracts, by nature, require providing service through long ages. The use of technology in certain key sectors such as health, education is gradually becoming widespread and increasing in number.

Within this galloping period, PPP projects help public be more sensitive and creative vis-à-vis the changing nature and socio-global challenge*s of science, technology, and innovation fields. Additionally, the desire of private sector to keep up and align with the technological development, to break the routine, and to lead the field drive it to adopt more innovative culture of thinking and approach.

For the part of private sector, developing joint undertaking with public through PPP projects, lead to acquire new capabilities, gather courage and strength for new markets, create value through partnership and co-production. More to the point, PPP projects help open door for private sector into adopting novelty and creating new industrial clusters. In order to achieve these results, private sector gets the chance to develop new financial sources, raise the business capital, be disposed to make new investments, and become powerful in growing competitive environments.⁹⁸

*The **3,4 km-strait road crossing stage of the Eurasia Tunnel Project of which lowest depth under sea level is 106,4 meter** was completed by a custom-engineered tunnel boring machine called “TBM”. TBM was on the first rank in the world with its cutterhead load of 33,3 kW/m², ranked number two with 12 bar- design pressure and was ranked as the sixth with 13,7 km-excavation diameter. At the operating stage, in addition to the LED lighting solution first to be utilized in a tunnel in Turkey, **Pacemaker**, which was put into use as of June 2020, facilitated to stabilize the speed of vehicles at 70 km.*

⁹⁸ L.Witters, R. Marom, K. Steinert, Alcatel-Lucent, The Role of Public - Private Partnerships in Driving Innovation, 2012

I. Sustainability and Contribution to the Environment

In essence, the ultimate logic of PPP projects is to ensure value for money-in other words, compared to conventional public procurement model- to improve the scope, access and quality of service provided to the users in a cost-effective manner.

The infrastructure investments materialized via PPP model are expected to meet Sustainable Development Goals (SDG), Ecuador criteria and IFC standards and Green Deal criteria which became a current issue in the post-pandemic era. A propensity to invest in **sustainable, reliable, durable, and environmentally conscious infrastructures** is noted among financial institutions and country governments worldwide. Global financial circles for a long-time demand negative environmental and social impacts become net zero in order to fund an investment. While the development banks and financial institutions want to hear the voice of shareholders, they do not want to hear jangling in social and environmental aspects in no case.

The efficiency of control processes of global institutions over the project, in particular, enhances the productivity of PPP projects in terms of sustainability principles. Standards established by a PPP project and all environmental and social regulations requested by development banks or other financial institutions now set a lower limit for other public infrastructures. Therefore, with respect to the SDH and environmental control processes, the standards set forth in the country improve in its course of nature.

In the Eurasia Tunnel Project, the potential environmental and social impacts of project both during construction and operating periods were meticulously analyzed. Significant steps were taken in extremely critical areas such as air quality, biofiltration, landscaping, afforestation activities, observing aesthetical concerns, conservation of UNESCO historical heritage and was granted an award in the field of “Best Environmental and Social Practices”.

1.6.2. Benefits to the Private Sector

a. Long-Term Contracts

For the part of private sector, the most essential advantage of a PPP project is the fact that it launches a long-term partnership. This fact enables the private sector to make long-term plans. The private sector representative who devises investment programs in this framework gains an opportunity to focus on different projects.

b. Opening to New Markets

PPP projects are of capital importance from a technical aspect. By nature of projects, competence for innovation and technology is gained. These competences along with the experiences of companies to complete works pioneer creating new opportunities in different markets. The private sector representatives, who deal with sophisticated structures, acquire capability to develop alternative solutions in new markets.

c. Acquisition of Business Culture and Ethics with Public and International Companies

The hardest two competences to acquire for private sector is to have working culture with public authorities and working ability with global companies. PPP projects, by nature, encompass both public authorities and global companies in general. To this respect, PPP projects enable local companies in the countries of implementation to gain miscellaneous competences.

d. Reputation, Innovation and Earning Trust

The implementation and production methods of PPP projects involve a number of opportunities for private sector to acquire significant skills. Primarily, private sector seeks for novelty and innovative solution at every stage in order to complete the construction within the required time and -without deviating from public requests- within the optimal cost. Secondly, it transfers the fund of knowledge owned by global companies it formed a partnership with. Besides, while large infrastructure projects build up considerable reputation for companies, they also help enhance trust placed in them.

1.6.3. Other Benefits of Model

Public Private Partnership has a stream of positive outputs as well as specific benefits it brought along. In an infrastructure investment, an approach encompassing the project as a whole from design to construction, operation to maintenance and repair increases competition. Also, it makes project management effective and productive.

PPP projects requiring large investments stand out as essential projects that manifest and reinforce the breakthrough made by a country, its recognition, popularity, and prestige in the international arena.

The undertaking of PPP projects by private sector leads to attract direct foreign investment, create innovation, enable technology transfer, obtain current information, and integrate with world economy. The local companies participating in large projects along with international partners develop their capabilities.⁹⁹

The materialization of project is only possible on condition that several actors focus on the same goal and common issues. Financial sources give weight to the feasibility of project, decision processes, engineering opportunities and company capabilities.

The areas of focus by parties:

- ❖ Companies; on project duration, return, earned reputation and competences,
- ❖ Public; on the quality of public service to be procured, social benefit, investment time and budget,
- ❖ Banks; on the success of project they funded and the healthy repayment system.

⁹⁹ KÖİ projelerinde yerli bir ortağın bulunması ve liderliğinin yerli firmalar tarafından üstlenilmesi şartının getirilmesi ülkedeki özel sektörün gelişimine büyük katkı sağlar.

These three actors, being quite different from one another, meet at the same point and materialize the investment as a **shared wisdom project**. Model help private sector obtain new opportunities in new markets based on experiences gained via projects. Lastly, completing projects bearing difficult technical competences help companies gain considerable reputation.

1.7. PROBLEMS THAT MAY BE ENCOUNTERED IN PPP MODEL

Public Private Partnership projects have a range of problematical areas apart from the benefits explained in detail. Principally, these sorts of projects, in general, **require vast technical knowledge**. Compared to the conventional model, **the project development process is longer and relatively costly**. Senior consultants have to work in coordination and harmony with public authority.

As is the case with Eurasia Tunnel project, challenges, and difficulties at 106 meter below the sea level prone to hinder the continuity of project may be encountered. The private sector has to take all these construction-related risks with great courage and self-confidence.

In the meantime, **the success of projects also depends on the effective and productive operating periods**. The payments to be received by private sector from the public are directly depends on the operation, in other words on the performance.

The macroeconomic development during the operating period is of particular concern to the operating company in so much as a successful operation. Generally, the companies in developing countries which take a loan in foreign currency collect their revenues in local currency. The fluctuations in the exchange rates directly influence the users' reflexes and their interests in project. For this reason, the success of project operation is not solely linked to the effective management but also to the stability in macro-economics.

One of the significant yield of high cost-investments in the field of transportation is the fact that it **saves time** for the users. The time that is saved is more valuable than it can be ever measured in many circumstances. As the national income level increases so does the **value of time**.

One of the challenges in the implementation of PPP method is the fact that the construct and formal characteristics of **"financial agreements"** impede them to be adapted to the time-varying conditions (*rapid change in macroeconomic parameters etc.*). Developing economies compared to the mature economies are a whole lot more in need to be adapted to changes in the long run.

However, the need of creditors to distribute the risks to other institutional structures through various instruments bring along interdependent and complicated debt structuring. This situation weakens the adaptability of system.

With regard to crises caused by the rapid changes in the macro-economic parameters, the option to renegotiate for PPP projects was tried once in Portugal in the last 20 years. As is the case with Portugal, of which economy was hit by global financial crisis in 2008, the renegotiation option for PPP projects relying on international agreements was proved to be not so productive and observed to be unfavorable in many aspects and cannot be considered appropriate due to its contradiction to “**fundamental doctrines of international law**”.

The main underlying reason for the renegotiation of PPP projects in the Portugal example is not directly related to the PPP projects. Portugal requested financial assistance from the European Union to overcome financial difficulty following 2008. The European Union (*Troika*) laid down cutting cost to the bone as a condition in every area so that the rescue package (*78 billion Euro*) could become effective. The scope of services was narrowed, periodical maintenance terms were extended, and even minimum road lighting standards were forced to be able to make saving in PPP projects.

These measures shortened the life of asset and led to concession in the service quality provided to users. Nevertheless, the renegotiation or a similar method was not applied in Spain and Greece, which went through similar economic difficulties, due to the abovementioned problems.

However, the principal lesson to be derived from Portugal is the fact that the risk distribution was applied in a non-conforming manner to the modern definition of PPP model. For the purpose of fixing elements that force the budget during the financial and economic crises era, the Troika (*EU Commission + IMF + EU Central Bank*) with which Portugal reached agreement, recommended that the toll fees borne by the public be replaced by user pay model (*Real Tolls*) and ensured that it was put into practice.¹⁰⁰ Hence, risk distribution-driven problems non-conforming to the modern definition of PPP model were eliminated.

In sum, the Portugal case sets an example not as an unclearly framed renegotiation for PPPs, but as a means to ensure the continuity of services within the limits of savings cut to the bone under the principle of preserving the existence of agreements.¹⁰¹

Due to the fact that the contractual change made even for the purpose of gaining public benefit pose contradiction to the continuity of state as the principal partner is the state, is not a preferable rationalist approach because it is prone to cause multifaceted financial and legal problems and create insecure environment for foreign finance that may come in the future.

¹⁰⁰ EPEC, EIB, Portugal, PPP Units, Related Institutional Framework, s.5, 2014
www.eib.org/attachments/epec/epec_portugal_ppp_unit_and_related_institutional_framework_en.pdf

¹⁰¹ Ricardo Ferreira Reis, Joaquim Miranda Sarmiento, “Cutting Costs to the Bone”: The Portuguese Experience in Renegotiating Public Private Partnerships Highways During the Financial Crisis, 2017

In the near future, the infrastructure needs of countries will rapidly increase in quantitative and financial dimensions due to reasons such as pandemic and climate change. The PPP projects will inevitably come into prominence in order to meet these needs. A need for international partnership structuring (*suchlike World Bank*) proves to be obvious to be able to ensure ease of implementation for PPP projects, improve the success of projects and particularly fix the rigidity in the financial structure.

Lastly, complicated financial and contractual structures in PPP projects need good management and coordination. An expert and qualified capacity accumulation possessing international experience is required both in public and private sector for these processes. It is considered that a holistic institutional structuring encompassing various sectors shall be beneficial with an aim to meet these needs on a constant basis and to archive and make use of the mentioned knowledge and know-how in a sustainable manner.

However, despite the fact that the required qualified capacity and long-standing project preparation phase seem to be troublesome for PPP method, the private sector of which technical know-how, creativity, experience, and qualified manpower are referred to, manages this rocky road so as to improve the quality of public service to be provided. In this way, users attain the innovative, quality public service that is in tune with the times.

1.8. THE FUTURE OF PPP MODEL

It must be ensured that PPP projects turn further to strategic sectors in the new era and **are designed by projecting future needs** instead of today's needs, **resources are used efficiently, and current resources are turned into productive investments**.

Along with areas requiring R&D and technology, infrastructures with strong environmental relations will come into prominence. Today, at this point, our current assets evolve in a manner to facilitate finding a solution to the complicated issues such as unfair income distribution facing our civilization, population growth, irrational goods and energy consumption, exhaustion of nature and **climate change** as sum of all.

In future, public infrastructure investments will tend towards more environment-friendly and services incorporating higher technology. Therefore, the transfer of technology will have quite a place in the development of PPP projects and area of effectiveness. The renewable energy projects will create a leverage effect for the development economy. The PPP projects are of capital importance not only for the materialization of infrastructure investments needed by the country but also for increasing the production competence of the products with high import-dependence and/or for those requiring the improvement of production competence.

So much as environmental factors, another significant area for future investment of countries is the technological transformation and big data-related developments. Areas such as the **transformation of industry, the use of data and the optimization of services** determine the future areas of PPP model.

The solutions in the emerging civilization **are expected to be materialized by the use of fewer resources but in light of more long-lasting, robust, rapid, lighter, multiple-choice, and absolutely “greener”, more “aesthetical” understanding.** The private sector has to take further role for the extension of these solutions and innovative approaches to public services.

Table 20: Alteration trend in Thoughts and Values¹⁰²

TENDENCIES OF CHANGE IN THINKING AND VALUES	
<i>Yesterday was important</i>	<i>Tomorrow will be more important</i>
Material Resources	* Human Potential
Rationalism	* Wisdom [Expanding your mind with love in your hearth]
Laws of Nature and Technology	* [Nature+ Virtue] laws and responsibilities
Hierarchical Structure	* Structuring in the mesh
BUSINESSES	* PROJECT TEAMS
Forcing with Force	* Agreement/reconciliation with values
Discourse	* Action
Doing duty	* Focus on your duty
Growth	* Development / LEARNING
NEWBORN CIVILIZATION	
<i>Sustainable Development in Measure: "MEASURE SOCIETY"</i>	
Fundamental Problem : Climate Change	

In sum, **the growing concerns about pandemic and climate change** in the recent times **will change the socio-economic ecosystems** in which the PPP model is implemented. The investors are more interested in Sustainable Development Goals (SDG), notably the development banks. The Ecuador Principles which address the environmental and social impacts and make it obligatory in all infrastructures is requested by 97 financial institutions from 37 countries today.

For this reason, the PPP model will be a significant instrument in order to close the increasing infrastructure funding gap. **However, it is required to develop infrastructure investments that are compatible with the United Nations Sustainable Development Goals (SDG) and are focused on human needs.**

¹⁰² Dr. Ersin Arıoğlu, “Proje Yönetimine Genel Bir Bakış ve “Avrasya Tüneli”, İTÜ, 11 Nisan 2017

1.9. CONCLUSION AND EVALUATION

- ❖ *The duty of public authority is **to produce the best service and distribute the output to the users in the fairest manner** by properly exploiting the resources for the advancement and development of a country.*
- ❖ *The PPP model enables the parties to provide the public service in the most appropriate way by making use of the different resources possessed by both parties rather than turning the parties against one another.*
- ❖ ***It is estimated that the global infrastructure investment need will reach 94 trillion dollars in total up till 2040.***¹⁰³ *More than 50% of this need is composed of investments required for the transportation infrastructure.*
- ❖ *The studies addressing the economic impacts of infrastructure investments indicate that every investment worth of 100 unit increases the production in the long run at an average of 17%.*
- ❖ *The history of Public Private Partnership dates back **two thousand years, the Roman Empire.***
- ❖ *The examples of Public Private Partnership Model in the modern sense were established in France in the 18th century. The Projects of P rier Brothers¹⁰⁴ who were engaged in the water distribution in Paris in 1782 present the first examples of delivering the public services by private sector in a comprehensive way.*
- ❖ *The expansion of PPP model in the modern world and its re-use as an inspiration for other countries was materialized in association with the redefinition of “**Project Finance Initiative (PFI)**” philosophy by **Tony Blair**, as the leader of Labor Party, in the 1990s*
- ❖ *Considering the last 20 years, the use of PPP projects is gradually increasing. The model, being in use in 134 developing countries at the moment, has contributed about 15-20% total infrastructure investment. **Only in the first quarter of 2021, 133 PPP infrastructure projects were realized at 22 billion-worth investment cost.***¹⁰⁵
- ❖ *Today, **the one-third of all railway services** are operated by **private sector in Japan** which ranks top among the countries primarily using the railway as public transportation and providing the safest transportation service.*
- ❖ *The Public Private Partnership model expanded its field of implementation in 2001 in Germany during the ruling of coalition government formed by Social Democratic Party Leader Schr der with the Green Party.*
- ❖ ***The first example of Public Private Partnership Implementation in Turkey is the Galata-Beyo lu Tunnel that was put into service in 1874.** This tunnel was built in a manner to involve 42-year-operation through Build-Operate-Transfer model as the world’s second oldest underground transportation unit.*

¹⁰³ Outlook 2020, GI HUB, s.1

¹⁰⁴ Dr. Ersin Ario lu,  OK Geri Sayım G ncesi Dergi, Sayı 7, s. 20

¹⁰⁵ World Bank, Private Participation in Infrastructure, 2021 Half Year Report, s.2

- ❖ *The PPP contracts are the long-term contracts between the public and private sector, pursuant to which private sector undertakes significant risks during the construction and operation period with an aim to provide a public service or construct a public asset and the payments by the public is contingent upon to the quality-of-service performance, and which envisages the transfer of an asset cleared from any kind of commitment and debt to a public institution.*
- ❖ *The financing structure of PPP project is a “financial engineering” solution generated considering the involving risks, sources of credit and rates, tax regulations, repayment period, cash capabilities, value for money advantages for public and profitability calculations sought by private sector.*
- ❖ *The monitoring of investor’s service performance by the financiers as from the beginning of a project throughout the construction and operation stage establishes a safety shield to maintain the service quality standard provided by the PPP model at the same level.*
- ❖ *The essence of PPP projects is not the transfer of risk but **the properly sharing of risks with an intent to reach effective solutions**. The determination of a party that would best manage the risk also reduces the cost of risk.*
- ❖ *The two primary problems encountered in the infrastructure projects implemented through the conventional model is the cost overrun and long delivery dates.*
- ❖ *Despite all engineering and technical challenges, **the Eurasia Tunnel project was completed** in 3 years 11 months on December 22, 2016, **8 months prior to the scheduled date. No cost overrun occurred in the total investment value which had been determined to be 1, 245 billion dollars.***
- ❖ *To this respect, the Eurasia Tunnel possesses a rare project design which covers its own investment cost and makes revenue for the public while providing a quality service. **It is predicted to reach the minimum traffic guarantee in 2026.***
- ❖ *The revenue sharing model was applied in the Eurasia Tunnel. Once the minimum traffic guarantee is satisfied, the public **will start to receive 30% of revenue obtained from the operation.***
- ❖ *In future, public infrastructure investment will tend towards more environmentally friendly and technologically sophisticated services. For this reason, the issue of technology transfer will become quite substantial for the development of PPP projects and effective area.*

2. MODEL IMPLEMENTATION: EURASION TUNNEL PROJECT

2.1. PROJECT INFORMATION

Table 21: The Parties of Eurasia Tunnel

Project Parties	
Owner of Investment (<i>Public</i>)	<ul style="list-style-type: none"> ❖ TURKISH REPUBLIC Ministry of Transportation and Infrastructure www.uab.gov.tr ❖ General Directorate for Infrastructure Investments aygm.uab.gov.tr
Project Investor (<i>Private Sector</i>)	<ul style="list-style-type: none"> ❖ Turkish Partner: Yapı Merkezi İnşaat ve Sanayi A.Ş. www.ym.com.tr ❖ International Partner: SK Ecoplant Co. Ltd. (<i>South Korea</i>) www.skecoplant.com
Appointed Company in charge of Construction and Operation	❖ Eurasia Tunnel Operation Construction Investment Inc. www.avrasyatuneli.com
EPC Contractor	❖ Yapı Merkezi - SK E&C Joint Venture
Public Unit Responsible for the Project	❖ DLH (<i>İstanbul</i>) Marmaray Regional Directorate
Technical Consultant of Public	<ul style="list-style-type: none"> ❖ Italferr & Altınok Joint Venture Italy - www.italferr.it Türkiye - www.altinoknet.com
Financial Institutions providing Credits	<ul style="list-style-type: none"> ❖ European Investment Bank www.eib.org/en/index.htm ❖ European Bank for Reconstruction and Development www.ebrd.com/home ❖ Korean Eximbank www.koreaexim.go.kr ❖ Korean Commercial Insurance Agency www.ksure.or.kr ❖ Sumitomo Mitsui Banking Corporation (<i>Japan</i>) www.smbcgroup.com ❖ Standard Chartered Bank (<i>United Kingdom</i>) www.sc.com ❖ Mizuho Bank (<i>Japan</i>) www.mizuhogroup.com/bank ❖ Yapı ve Kredi Bankası www.yapikredi.com.tr ❖ Türkiye İş Bankası www.isbank.com.tr ❖ Garanti Bankası www.garantibbva.com.tr

Financial Institutions Technical Consultant	❖ Arup (<i>United Kingdom</i>) www.arup.com
Project Designer	❖ Parsons Brinckerhoff (<i>United States of America</i>) www.wsp.co
Independent Design Verifier	❖ HNTB (<i>United States of America</i>) www.hntb.com
Tunnel Operator	❖ Egis Tünel İşletmeciliği A.Ş. (<i>France</i>) www.egistunelisletmeciligi.com

Table 22: The Eurasia Tunnel Project Contract Summary Info

Project Contract Summary Info	
Project Investment Model	➤ Build - Operate - Transfer /PPP
Bid Termination Date	➤ December 2008
Implementation Contract Date	➤ 25.02.2011
Site Hand Over Date	➤ 30.01.2013
Contract Duration	➤ 29 years
Construction Time	➤ 3 years 11 months (<i>completed 8 months earlier</i>)
Operation Time	➤ 25 years 28 days
Operation Start Date	➤ 03.01.2017
Public Transfer Date	➤ 31.01.2042
Total Investment Cost	➤ 1.245.121.189 US Dollars
Source of Financing Structure	➤ Credit: 960 million US Dollars (%77,1) ➤ Equity: 285 million US Dollars (%22,9)

Table 23: Eurasia Tunnel Project Operation Period

Fee, Traffic and Guarantee Information during the Operation Period	
Toll valid at the Report Date	➤ Automobile : 53,0 TL (<i>between 00:00-05:00- 26,5 TL</i>) ➤ Van : 79,5 TL (<i>between 00:00-05:00 -39,75 TL</i>)
Minimum Traffic Guarantee	➤ 69.873 unit vehicle / day (<i>2021 year</i>)
Average Daily Traffic	➤ 51.202 unit vehicle / day - %73 realized (<i>December 2021 monthly average</i>)
Traffic Capacity	➤ 116.000 vehicle/day (<i>theoretical capacity: 140.000 vehicle/day</i>)
Realized Guarantee Payments	➤ 2017 year 123 million TL - 33 million dollars ➤ 2018 year 173 million TL - 33 million dollars ➤ 2019 year 245 million TL - 40 million dollars ➤ 2020 year 494 million TL - 66 million dollars (<i>pandemic effect</i>) ➤ 2021 year 498 million TL - 37 million dollars
Realized Economic Benefit (<i>Including travel time and fuel saving, emission reduction and accident cost saving related to use</i>) (<i>Annex-16</i>)	➤ 2017 year 1,7billion TL - 208 million dollars ➤ 2018 year 1,8 billion TL - 211 million dollars ➤ 2019 year 1,5 billion TL - 180 million dollars ➤ 2020 year 1,2 billion TL - 147 million dollars ➤ 2021 year 1,9 billion TL - 226 million dollars

Table 24: Eurasia Tunnel project Technical Properties

Technical Properties	
Total Length of Project	<p>A total of 14,6 km: (<i>Annex-1</i>)</p> <ul style="list-style-type: none"> ➤ Section 1 (<i>Europe</i>) Road and Intersection Arrangement: 5,4 km ➤ Section 2 (<i>Tunnel</i>): 5,0 km ➤ Section 3 (<i>Asia</i>) Road and Intersection Arrangement: 3,8 km
Structures Built within the scope of Project	<ul style="list-style-type: none"> ➤ 3,34 km double-deck TBM Tunnel ➤ 1,0 km built via New Austria Tunnelling Method (<i>NATM</i>) ➤ 1,0 km Cut-and-Cover Tunnel Passageway Structures ➤ Göztepe - Kazlıçeşme 9,2 km Road Expansion ➤ Section 1: four, Section 3: one pedestrian overpass ➤ Section 1: Kazlıçeşme U-Turn, Yenikapı Unperpass and U-Turn, Samatya U-Turn ➤ Section 3: Koşuyolu Bridge Expansion and Uzunçayır Intersection Arrangement
Tunnel Route properties	<ul style="list-style-type: none"> ➤ A total of four lane, double-deck Highway Tubular Passage for light vehicles
Maximum speed limit within Tunnel	<ul style="list-style-type: none"> ➤ 70 km/hour
Prohibited Vehicles in Tunnel	<ul style="list-style-type: none"> ➤ Vehicles with clearance height 2,80 meter and over ➤ Vehicles heavier than 5 tons ➤ Vehicles with more than two shafts ➤ Tow trucks ➤ Vehicles carrying dangerous goods ➤ Bicycle, motorcycle, autobus, lorry, truck ➤ N2, N3, O1, O2, O3, O4 type vehicles used in freight shipment

2.2. PROJECT PROPERTIES

Government Executives decide on infrastructure investments based on two primary reasons, which are:

- ❖ Infrastructure investments stimulating demand
- ❖ Infrastructure investments managing demand

The Eurasia Tunnel project is included in the second scope. The number of vehicles and mobilization between two sides in İstanbul are increasing on each passing day. The number of vehicles within İstanbul traffic has increased from 2,7 million to 4,5 million since the bidding date of project in 2008.

Although, the swift solution for growing need and combining the sides through an undersea tunnel are not brand-new ideas; it is placed on record as a significant leap requiring considerable engineering. Besides the high investment value, the fact that it bears an unprecedented engineering risk ranks among the factors which have stirred discussions for years and impeded the realization of project.

The Eurasia Tunnel project (*Innovation*) diverges from similar infrastructure projects in terms of its financing and management model.

2.2.1. Innovation

A great many benefits were gained by virtue of realizing the project through private sector instead of public sector. In technical aspects, the brand-new technologies has been employed for the first time. The Eurasia Tunnel is the **first and only double-deck highway tunnel** that combines the Asia and European continents beneath the sea floor. (Annex-3) **The tunnels are very special carrying systems that represent our civilization**, just like bridges.

The investors, agreeing on the characteristics of project on the basis of classical tunnel structures, took special care to ensure that **it is a unique, long-lasting structure that reflects the identity of İstanbul and will always have an attraction for use**. The project **has broken a great many new grounds** both at the construction and operation stages **and ushered in a new age in world tunneling**. From now on, the tunnels will be **spacious, luminous, secure** structures that are **blended with engineering and art**. The project served as the driving force for a plenty of not dared projects up till today and has launched a new tunneling movement that goes deeper and farther and has larger scale.

2.2.2. Investment Planning, Management and Control Process

The route of project, of which length is 14,6 km in total, was determined as a result of feasibility works carried out by Japan Nippon KOEI-NCC company in 2005. **Yapı Merkezi-SK Ecoplant** won the tender which was announced by AYGM through **Build-Operate-Transfer (BOT)** model and the project contract was signed on **February 25, 2011**. The **Implementation Agreement** entered into force on **January 30, 2013** after the finance had been provided and a location had been spotted.

Based on the importance of investment, companies which are renowned worldwide took part in the design and control of this very special project. (Annex-2). All the Engineering Procurement and Construction (*EPC*) Agreement of project was undertaken by the joint venture of YMSK-JV which had been established along with SK E&C under the leadership of Yapı Merkezi.

Besides, Arup undertook “technical consultancy” for the institutions which provided finance to the project, Italferr & Altinok – JV took on “consultancy” for AYGM which is the original owner and responsible public agency, and HNTB assumed “independent design control” tasks. Additionally, **companies renowned worldwide** provided service for YMSK-JV joint venture **in various forms and on different topics**:

- ❖ Parsons Brinckerhoff (*design*),
- ❖ Fugro (*underwater geotechnical research*),
- ❖ Herrenknecht AG (*TBM production*),
- ❖ MS-SAS (*slurry decomposition facility installation*),
- ❖ Yapı Merkezi Prefabrication (*precast TBM segment production*),
- ❖ Seibu (*seismic bracelet production / design: NCC*),
- ❖ Datwyler (*tunnel rings production*).

The designs prepared by the design officer were assessed in terms of the Technical Specification, relevant international standards and regulations in force and the engineering-technical risks and were approved and certificated by HNTB. Additionally, once the design works had been controlled by Italferr-Altinok as the Administration counsellor and also by Arup as the technical inspector of credit agencies (*technical-environmental-social criteria*), the project proceeded to the implementation stage upon obtaining “authorized” opinion from the Administration. The construction works were executed under the control and supervision of counsellor, technical inspector of credit agencies and the Administration within the scope of approved designs. In sum, **all designs of project** were controlled at “**four levels**” by the design checker in the first place and the counsellor, technical inspector of credit agencies and the Administration; however, the implementation started upon having received “**authorized**” opinion from each of them.

Moreover, Eurasia Tunnel Project, being subject to several control processes today, is operational:

- ❖ It is periodically under supervision of **credit agencies** by means of reporting issued in the scope of periodical site controls conducted by technical consultants and credit agreements,
- ❖ It is under supervision of AYGM through the examination and reporting of all processes related to the operation,
- ❖ It is periodically under supervision of international independent audit companies in terms of compatibility of financial tables to the international standards and tax legislations.

2.2.3. Project Construction

The project of which construction began in 2013 with the philosophy “A work of construction could only be beautiful as its design and successful as its work plan; more than this is impossible” was completed on December 22, 2016, in 3 years and 11 months, 8 months earlier than the scheduled time. The tunnel, which is 5,0 km-long in total, ranks among the exemplary structures that is completed with brain power of humans and technology of machines. The **3,4 km-long strait passage phase of which deepest point is 106,4 meter** under sea, was completed by the use of “TBM”, **tunneling machine, specifically produced for this project.** TBM ranked first in the beginning of project with its 33,3 kW/m² **cutting head power; ranked number two with its 12-bar design pressure and ranked number 6 with its excavation diameter of 10,7 meter.**

TBM tunnel construction works were completed 7m/day feed rate on average by virtue of 7/24 work pace in 476 days and in 11.243 hours (*Annex-4*). During excavation, **hyperbaric maintenance-repair operation required to be conducted four times by “specially trained divers” due to constantly changing geological conditions and all of them were completed successfully.** This success, which made a tremendous impact on an international scale, had a wide coverage in the prestigious journals of sector^{106,107}.

One of the operations, which caused 47-day-time loss in total, coincided to the roughly deepest point of tunnel. Following the successful completion of repair-maintenance operation obliged to be performed under unattempted pressure like 10,8 bar up till present day, a new ground was broken worldwide, and the excavation maintained. In conclusion, **human and machine became integrated, and a symphonic work of art came in view.** A number of 1,672 bracelets of 0,60 thickness and 2,00 m width consisted of 9 segments were used in the tunnel. Over 60.000 experiments were carried out to ensure that the segments were long-lasting, robust and impermeable, and 80.000 m³ segment concrete was produced. The daily compression resistance of segments for 28 days turned out to be 72 MPa, which is higher than the designated design goal of 50 MPa. (*Annex-5*). A high-performance precast concrete with average chlorine permeability of 280 Coulomb used in production was produced with the target of 100-year-service life. In analysis and

¹⁰⁶ Wynne Alexandra, “Under Pressure: Eurasia Mega Project Sets Bar for Complex Subsea Tunneling”, New Civil Engineer (NCE), s. 68, Şubat 2016

¹⁰⁷ Under Pressure: Crews Build Bosphorus Strait Tunnel In Complex Conditions, Engineering News Record (ENR), s.5, Aralık 2015

simulations conducted by the international certification bodies, the lifespan of segments was reported to be 127 years at least.

Among the characteristics that render the Eurasia Tunnel as one of the most special structures in Turkey is **the seismic bracelets utilized in the tunnel in order to improve the earthquake resistance**. The tunnel, situated 17 km away from the North Anatolian Fault, was supported with two seismic bracelets designed with an intent to cut stress and displacements that might arise from seismic activity to an acceptable level. (*Annex-6*). Based on the displacement levels determined as ± 50 mm for dislocation and ± 75 mm elongation/shortening, **the seismic bracelets were tested in laboratories and started to be produced once their compatibleness and success had been verified**. Considering its geometric dimensions and the seismic activity level to which it might be exposed, TBM was the first practice in Tunneling sector possessing the abovementioned features. The moment magnitude was accepted to be $M_w=7,25$ in the design concerning earthquake behavior; the tunnel was determined to behave without detriment to the “**service conditions**” vis-à-vis earthquake that might occur once in 500 years and without detriment to the “**safety conditions**” vis-à-vis earthquake that might occur once in 2500 years. Yet, **Structural Health Monitoring System** was established with an aim to instantaneously measure the behavior of Eurasia Tunnel vis-à-vis possible earthquakes in the course of operation life. The established system continues monitoring on a constant basis by means of 12 accelerators throughout the tunnel, 21 dislocation sensors making 3D surveillance and 3 accelerators established in operation building throughout the operation period. The measurements made by Structural Health Monitoring System sensors remain quite under the limits proving that the structural health was not affected.

The Eurasia Tunnel was constructed as a **rock-solid engineering structure** on the grounds of the abovementioned details that would never be visible to the actual users. Later on, it was attempted to make this art of engineering apparent for daily users through “**lightning**” and “**encolouring**”. (*Annex-7*) For this reason, in addition to the technical and thematical lightening specially chosen for tunnel and ticket offices, ceiling paint was applied within the tunnel.

The Eurasia Tunnel sets an example not just in terms of design and engineering but also in terms of its human-oriented approach. It was completed in 14 million man/hour work by a total of 700 engineers, of which %95 was Turkish, and with over 12.000 people. One of the most important gains was the fact that no accident involving death or serious injury occurred during its construction.

In such a complicated geological structure with high seismic activity, going down to a depth of 106 meter and achieving to build a “long-lasting” and “safe” “tunnel” at the diameter of 13,7 made it a unique project and attracted the attention of world. The project was deemed worthy of “**The Best Project worldwide in 2016**” award by the ENR journal steering the construction sector. All the same, the project was granted 5 awards in the international arena, notably “**The Project of Year**” award in 2015 by the International Tunnelling and Underground Space Association (*ITA*) which is considered as the leading association in the area of tunneling around the world. (*Annex-15*)

The essence of designing a project is to plan with an eye on goals, to measure the results and to maintain the initial goals by repeatedly making plans involving creative solutions based on these results. The Eurasia Tunnel has gone down in tunneling history as a well-studied significant project which attained all its goals.

2.2.4. Environmental, Cultural and Social Impact Practices

The Eurasia Tunnel is an environmentally conscious investment. The possible environmental and social impacts of project were meticulously analyzed both for the construction and operation period. The Environmental and Social Impact Assessment (“ESIA”) report was drawn in 2011 in order to assess possible impacts of project on the physical, natural, cultural, social, and socio-economic environment within the scope of best practices¹⁰⁸. The possible impacts were determined and assessed in the report as well as the ways how to avoid and mitigate the negative effects were explained. Besides, all plans and reports prepared in the scope of ESIA were made available to the public via the website of Eurasia Tunnel. The main subjects determined and addressed in the framework of ESIA are:

- ❖ The displacement of land use,
- ❖ Properties, shareholders, air quality and climate conditions, noise, and vibration,
- ❖ Archeological and cultural heritage, landscape design and visual effects, socio-economic impact,
- ❖ Public health and safety, working conditions, resources, and wastes, geology,
- ❖ Soil and land pollution, sea pollution, biological diversity, and nature conservation.

Within the scope of construction works of Eurasia Tunnel, **the pedestrian band between the city and sea in the European side was increased from 55 meter to 277 meter by improving the connection between the city and the sea and facilitated the access of İstanbul residents to the coastline.** Still, within the scope of reclamation of beach park located in the European side, **a number of 11.642 new trees were planted, the access to the coastline and beach park was facilitated through pedestrian overpasses and level crossings conforming to the disability standards.** A bicycle road of 2,7 km long and pedestrian ways were constructed, the playgrounds and training fields were reclaimed. The playgrounds for children were increased by %100 while this rate was %400 for forestation within the area of project.

All designs and construction work undertaken in the historical peninsula of İstanbul registered in the UNESCO World Heritage List **were performed pursuant to the UNESCO recommendations.** The recommendation of UNESCO related to the process of reincorporating the Marble Tower and Land Walls was carried out in coordination and the recommendation that was materialized as a result of design change was welcomed in the 41st Session Decision of UNESCO World Heritage Committee held in Krakow, Poland in 2017.

¹⁰⁸ Avrupa İmar ve Kalkınma Bankası (EBRD) Çevresel ve Sosyal Standartlara İlişkin Performans Gereklilikleri; Avrupa Yatırım Bankası Çevresel ve Sosyal Prensipler ve Standartlar; Uluslararası Finans Kuruluşu (IFC) Sosyal ve Çevresel Sürdürülebilirlik Performans Standartları; IFC Genel Çevresel, Sağlık ve Emniyet Kılavuzu; Geçiş Ücretli Yollar için IFC Çevresel, Sağlık ve Güvenlik Kılavuzu; Ekvator Prensipleri, OECD Ortak Yaklaşımlar standartlar çerçevesinde gerçekleştirilmiştir. (www.avrasyatuneli.com/_assets/pdf/csed-cilt1-teknik-olmayan-ozet.pdf)

The ornaments and drawings such as “rosette” and “passion-flower” representing the artifacts of Architect Sinan were preferred on proximity arches and portal entries in the Eurasia Tunnel with an intent to **“pay homage to the history and Architect Sinan”**. (Annex-7) Open and comfortable field of vision was ensured with the harmony of geometry, lightning and encolouring. **The beauty emerged by itself as a result of skillful application of productive ideas. Hence, a structure that is respecting to the history and texture of İstanbul, full-compatible with the environment and the historical peninsula and intertwining the engineering and art was produced.**

Special care was attached to the air quality within the scope of project. **Various tree and bush types determined to have positive contribution to the air quality** by the experts **were planted in an area of 7.300 m² around the ventilation shaft in the European side** and “biofiltration application” as a green concept was materialized for the first time in Turkey. (Annex-8) In order to maintain the sustainability of application, the maintenance of the mentioned area was planned to be performed by ATAŞ throughout the operation period. The air quality monitoring stations transferred to İstanbul Metropolitan Municipality were located next to the ventilation shafts on both sides. The air quality of region and the possible impact of tunnel are assessed on the basis of data measured in these stations. (Annex-9)

The data measured during the operation period are reported by evaluating in compliance with the Air Quality Assessment and Management Regulation, European Union Air Quality Standards and World Health Organization Air Quality Standards. **The measurements made throughout the operation process indicate that the data are below the standard limits and the impact of tunnel to the air quality is either positive or of trace amount.**¹⁰⁹ The data derived from project stations are assessed by the Turkish Republic Ministry of Environment, Urbanization and Climate Change along with İstanbul Metropolitan Municipality and the reports are shared with all shareholders via the websites of relevant institutions. (Annex-10) CO, NO₂ and air quality sensors measuring visibility which are located in both decks of tunnel monitor 7/24 the air quality in the tunnel. The assessments made in accordance with the PIARC principals **demonstrate that the in-tunnel air quality even in the busiest traffic days remain considerably under the limits set out in PIARC standards.** (Annex-11) Although still the measurements remain considerably under the limits, necessary space was allocated for filter application in ventilation shafts having regard to the unexpected climate changes in the future. Improvement works related to the ventilation modes determined at the design phase were realized; by virtue of axial fan operating mode optimized based on the results, an energy saving about 3000-36000 kW was achieved on a daily basis. This work **was granted “Maintenance and Renewal Method” award by the most prestigious engineering journal of Britain named New Civil Engineers in 2018.**

¹⁰⁹ Air Quality Impact Assessment for the Eurasia Tunnel, TO, NC, HBG, DA-S, MM, EA, Environ Monit Assess, 18 Şubat 2019, / Exterior Air Quality Monitoring for the Eurasia Tunnel in İstanbul, Turkey, HBG, EA, NC, TO, BG, Science of Total Environment, 30 Mayıs 2019

The head office of project was designed as **green building** and was entitled to obtain **LEED Gold Certificate** with the scores gained under primary topics such as **building energy conservation, recycling, and sustainability**. Wastes in the whole facility are collected separately as paper/plastic/glass/dangerous substance and disposed in line with their qualifications. The domestic waste, recyclable waste, fuel consumption, energy consumption, wastewater target was determined for each operation year and it was ensured that these targets are followed meticulously.

The project, by virtue of all these environmental approaches, **was deemed worthy of “The Best Environmental and Social Practice Award”** granted by **the European Bank for Reconstruction and Development (EBRD)**, advocating supreme environmental and social policies, for the most successful projects in terms of sustainability.

A transparent communication policy was adopted in the Eurasia Tunnel with all individual and institutional stakeholders at every step, public was perpetually kept informed, and the troubleshooting mechanism of project was constantly held open to the stakeholders. (Annex-22) The public disclosure and consultation process related to the project was launched on March 7, 2011. Open-door debriefing exhibitions for stakeholders were held on both sides of city, coordination was made with 25 neighborhood units, project information line was established, leaflets were distributed to the residents and offices in the region, draft reports were made accessible on the website and ESIA reading rooms were established for those who don't have internet access. Within the scope of Stakeholder Engagement Plan, thanks to the communication policy directed in the utmost transparent manner with all stakeholders, the processes such as the readjustment of work plans and design changes during the construction process were completed within the framework of best international practices.

The works are meticulously pursued during the operation process. In this scope, all questions, recommendations, and complaints coming from stakeholders through call center, e-mail, project website form, web-based satisfaction platform and complaint form channels in the Head Office are replied specific to the stakeholder and solution is sought, all information related to the ongoing process is transparently communicated so as to fulfil **user satisfaction**. The number of communication channels such as website, mobile applications, call center, social media channels, in-tunnel radio announcements, on-the road variable message signs have been increased so that direct information could be perpetually made to the stakeholders. Moreover, a **digital museum** was constructed in the operating and maintenance building explaining the construction process of Eurasia Tunnel in detail. Narration techniques designed with cutting-edge digital mapping technologies, interactive touch-operated tables, virtual reality glasses and interactive touch-operated surfaces were employed. TBM scraper dent, seismic bracelet, and original samples of segments as well as TBM and tunnel side section models used in the construction were exhibited in the museum which welcomed thousands of visitors. The objects specific to the project, technical drawings and source documents pertaining to the project are on display.

In the Eurasia Tunnel, since it was put to service, a number of 56 stray or injured animals have been safely taken out of tunnel road. Permanent homes could be found for the animals treated with the support of İstanbul Metropolitan Municipality Vet Services Directorate and private vet clinics in the region or stray animals were referred to the shelters through the social media accounts of Eurasia Tunnel. Every step of Eurasia Tunnel, planned considering the social-environmental impacts, is taken with a sustainable world approach and institutional citizenship mission.

2.2.5. Operation and Maintenance

The meticulous approach performed in the construction phase of Eurasia Tunnel is continuing in the operation period so as to ensure safe and productive traffic flow in line with the **lifelong measurement** principle and use of **smart systems**. The Eurasia Tunnel managed with smart road technologies possess system that would ensure the safe and healthy flow of traffic without interruption. The traffic flow in tunnel and access road is **monitored for 24 hours** by operators working in the control room. The necessary “protection” plans for all possible emergency situations were prepared looking out for “first human” principle and was identified to the SCADA System. **All systems** such as energy, ventilation, lightning, traffic signs, radio announcements and transit control **can operate automatically in harmony**. **Extraordinary situations such as accident and vehicle breakdown can be detected immediately via more than 400 cameras and automatic incident detection system.**

In emergency situations, special emergency squad intervene with firefighting equipment laden motorcycles tailored in accordance with the structure of tunnel. The **intervention time** was three minutes when the operation was first started; however, thanks to the improvements in a short time of 20 months, **it was reduced under two minutes.** (Annex-12) In the light of satisfaction survey carried out on a monthly basis between 2017 April and 2021 November with the participation of 1.170 users who were exposed to situations like breakdown or accidents, **the service satisfaction rate was determined to be 98%.** (Annex-13)

The Eurasia Tunnel Management possesses (i) **ISO-9001 Quality management System Certificate**, (ii) **ISO-14001 Environmental Management System Certificate**, (iii) **ISO-27001 Information Security Management System Certificate** and (iv) **ISO-45001 Occupational Health Safety Management System Certificate**. The operation standards pursued in the Eurasia Tunnel also comply with 2004/54/EC Directive dated April 29, 2004, and PIARC Standards (*World Highway Association*) the European Parliament and Council. (Annex-20)

The qualified staff of 200 personnel of Eurasia Tunnel worked 1.077.335 man/hour, received a total of 42.098 hour-long vocational training, 2.564 hours of which is Occupational Health and Safety Training (*basic occupational health and safety training*). During these works, no accident involving death or heavy injuries occurred. During the operation period, the occupational accident ratio is 15,5 for million man/hour, which is quite under the industrial average of 34,6.¹¹⁰

¹¹⁰ 2020 Yılı Kara Taşımacılığı ve Boru Hattı Taşımacılığı Sektörü İş Günü Kayıplı Kaza Sıklık Oranı
www.sgk.gov.tr/wps/portal/sgk/tr/kurumsal/istatistik/sgk_istatistik_yilliklari

Operational Safety Protocol was signed with government authorities responsible for emergency situation services with an eye to ensure safe and sustainable operation of Eurasia Tunnel. All extraordinary incidents that might occur within the tunnel were identified under 26 main scenario topics to be addressed by institutions based on their area of responsibility. The coordination among institutions is maintained via 8 successful drills and periodical meetings which have been held mutually up till today.

The condition of equipment of critical importance such as ventilation system (*jet fans and axial fans*) installed in the Eurasia Tunnel and discharge system (*discharge pumps*) are constantly monitored. Thanks to the alert received via the Predictive Maintenance system before the breakdown occurs, necessary control and adjustment works could be made.

In addition to the LED lightning solution utilized in a tunnel for the first time in Turkey, it was achieved to **stabilize the speed of vehicles through Pacemaker Lightning system put into service** as of June 2020. The Pacemaker application regulating the traffic flow speed as 70 km reduced sudden speed changes by 69% in the deepest point at the end of one year. No traffic accident occurred in the area of application where the traffic efficiency increased by 8,5% while traffic congestion reduced by about 53%. The exhaust gas reduced by almost %12 contributing to the prevention of environmental pollution. This work **was granted “Innovation award in Tunnelling Systems, Maintenance and Renewal Area”** by the New Civil Engineers Journal in Britain in 2021 which has been rewarding the best tunneling practices around the world annually with its 50-year experience.

The Entrusted Company will transfer all equipment required for the Eurasia Tunnel and its operation to the public at the end of Operation period in a well-maintained, operational, and utilizable condition without any charge and cleared from any and all debts and commitments. Besides, training will be delivered to the operation personnel determined by the Administration for each of the systems used for the operation of facility and management within one year prior to its transfer. A commission composed of 10 individuals from the Entrusted Company and government officials will be established so as to carry out Handover process, the government will chair the commission. The facility will be transferred to the public upon the approval of commission members related to the preparedness of facility for handover.

2.2.6. Financing Model

The total investment cost of project is **1.245 billion US dollars. 285 million US Dollars** of this amount was provided by the investors Yapı Merkezi and SK Ecoplant as **equity capital**. The remaining **960 million US Dollars is composed of 18-year-international credits**. The mentioned finance with 18 years of maturity **stands as the longest-term loan packet among the build-operate-transfer projects realized in Turkey up till today**. Such a comprehensive and well-structured financing model led the project to receive **five different prestigious finance awards from international finance circles**. (Annex-15)

The Eurasia Tunnel project serves as a successful model for PPP projects which are of significant importance for attracting direct foreign potential in the developing countries. Additionally, all the technical and legal regulations required for the financing of infrastructure projects with high investment value for government were completed during the development phase of project. The Eurasia Tunnel has broken new ground in many aspects in Turkey, notably in finance agreements, implementation sample agreements and PPP project technical specifications. The agreements for the assumption of indebtedness were developed in the Eurasia Tunnel in Turkey. All the works performed in the Eurasia Tunnel were held up as an example in the realization of following PPP projects.

Two major innovations brought in the finance structure of PPP projects thanks to the Eurasia Tunnel are as follows:

- ❖ The inclusion of agreement for the assumption of indebtedness in the finance plan,
- ❖ The inclusion of revenue sharing in the finance plan.

The agreement for the assumption of indebtedness in PPP projects was put into practice in the Eurasia Tunnel for the first time in Turkey. This model paving the way for foreign investments facilitated the incoming liability at the amount of 1 billion. This system which will come into play in the event that the project is failed to be completed has created an essential environment of trust for foreign investors and international institutions.

Similarly, a revenue sharing model has been applied for the first time in Turkey in a PPP project. In order to ease the finance packet of project and even to optimize its borrowing rates, minimum traffic guarantee was implemented in the finance structure of project. However, as previously stated in the report, the Eurasia Tunnel is an infrastructure project materialized so as to manage an existing demand. For this reason, the existing demand was assessed on the basis of feasibility study, and it was attempted to make an approximate estimation concerning the use counts throughout the project. Accordingly, any usage fee exceeding the Minimum Traffic Guarantee (*MTG*) was stipulated to be shared among public and private sector partners. By virtue of this share model, 70% of which was allocated to the private sector while 30% was allocated to public, the government is expected to earn revenue from the Eurasia Tunnel in the aftermath of 2026. Such that, the share to be obtained from project usage revenue by government until 2041-the year envisaged to complete and transfer the project to the public- is expected to be higher than the guaranteed amount required to be paid in the whole lifecycle of project.

Considering all these aspects, the Eurasia Tunnel has broken new grounds not just in technical and engineering aspects but also in financial aspect and set an example for a successful financial engineering.

2.2.7. Economic Impact and Available Usage Data

Over 79 million safe, fast, environmentally-friendly, and comfortable journey were realized through the Eurasia Tunnel, the **average daily traffic flow with 51,202-unit vehicle reached 73% of Minimum Traffic Guarantee (“MTG”) which is 69,873-unit vehicle**. The maximum traffic flow observed since the beginning of operation is determined to be **79.495-unit vehicle** while the observed hourly lane capacity is 1.500 vehicles, and the heaviest traffic day is determined to be Thursday during the week. (Annex-14) 7% of vehicles using the Eurasia Tunnel is composed of minibus; 51,3% traveled from Europe towards Asia direction. According to the works carried out internally, **the traffic is targeted to reach MTG as of 2026**. As regards the calculations, **the guaranteed payments to be rendered by government until 2026 will be repaid in 2039 prior to the termination of contract thanks to the revenue sharing**. The works are underway in the presence of General Directorate of Infrastructure Investments (AYGM) and İstanbul Metropolitan Municipality on the D-100 improvement projects on Asian side for the fast access to MTG and solutions facilitating the access to the tunnel.

The consumer surveys reveal that **İstanbul residents accept the benefits of Eurasia Tunnel as well**. A survey conducted on 1072 individuals residing in İstanbul in September 2021 indicated that **70% of İstanbul residents believe that the Eurasia Tunnel, which was described as fast, safe, comfortable, modern, and practical, is necessary**.

As a result of analysis carried out for 2021, the Eurasia Tunnel **has derived a profit of 137 TL on average in daily two-way travels when fuel, emission and accident costs are added to daily one-hour saving of time for the users**. (Annex-16) In accordance with the calculations taking into account the Kozyatağı- Bakırköy corridor, **25 million-hour-time saving, 35 thousand tons of fuel saving, 10 thousand tons of emission reduction, accident cost saving owing to the reduction of 65 million -vehicle-km in 2021, the Eurasia Tunnel contributed to the national economy about 226 million dollars in one year**. (Table 25)

Table 25: The Summary of Total Benefits of Eurasia Tunnel in 2021 (Annex-16)

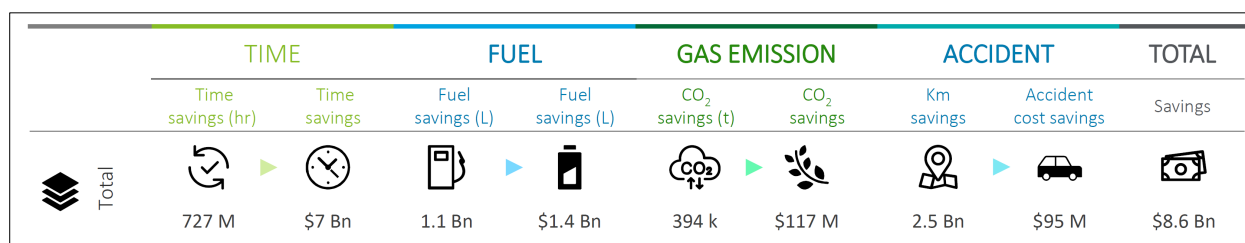
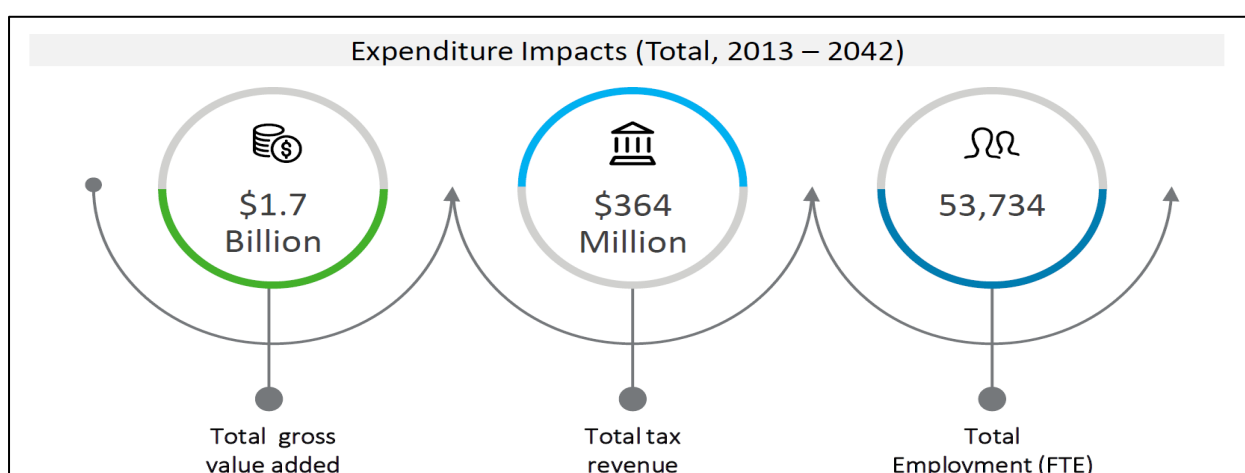
BENEFIT ELEMENT	Total Annual Benefit (Unit value, changeable)	Total Annual Benefit (Monetary value, million dollar)
Travel Time saving	25 million-hour	191
Fuel saving	35 thousand tons	30
Emission reduction	10 thousand tons	3
Cost Accident Reduction	65 million vehicle-km	2
Total		226

The Eurasia Tunnel contributed the national economy about 972 million dollars in five years in consequence of 103-million-hour time saving, 139 thousand tons of fuel saving, 50 thousand tons of emission reduction and accident cost saving owing to 325-million vehicle-km reduction. (Annex-16) (Table 26)

Table 26: The Summary of 5-year Total Benefit of Eurasia Tunnel (Annex-16)

BENEFIT ELEMENT	Total Annual Benefit (Unit Value, changeable)	Total 5-year Benefit (Monetary Value, million dollars)
Travel Time saving	103 million hours	789
Fuel saving	139 thousand tons	159
Emission reduction	50 thousand tons	15
Accident Cost reduction	325 million-vehicle -km	9
Total		972

Besides, Economic Impact and Value for Money Analysis (HGA) was performed by Deloitte in December 2021 to evaluate the impact of project throughout contract period. When the expense-induced impact of Eurasia Tunnel during construction and operation periods is calculated, a total of 8,6 billion dollars-worth public saving, 7 billion of which is accrued from efficiency revenue and 1,6 billion dollar is accrued from external savings, (Figure-6) and productivity increase equivalent to over 363 thousand annual full time are expected from the date on which the Eurasia Tunnel was put into service until the end of operation period. Additionally, the Eurasia Tunnel is estimated to contribute 1,7 billion US dollars to the gross value added, generate 364 million US dollars additional tax revenue, and provide employment opportunity for 53,734 individuals (Figure 7) between 2013 and 2042. (Annex-18)

**Figure 6:** Microeconomic Impacts/ Road & Time saving-induced Gains (Annex-18)**Figure 7:** Macroeconomic Impact / Expense-induced Impacts

2.3. SUMMARY AND EVALUATION

- ❖ *The Eurasia Tunnel is the first and only double-deck highway tunnel connecting the Asian and European continents beneath the seafloor.*
- ❖ *The Eurasia Tunnel project has broken great many fresh grounds both at construction and operation stages and ushered in a new age in world tunneling.*
- ❖ *All designs of Eurasia Tunnel were controlled at “four levels” by independent design checker, consultant, technical inspector of credit institutions and Administration.*
- ❖ *The finance of Eurasia Tunnel is the longest loan packet with 18-year-maturity among the build-operate-transfer infrastructure projects realized in Turkey up till today.*
- ❖ *The construction of Eurasia Tunnel started in 2013 in the light of “A work of construction could only be beautiful as its design and successful as its work plan; more than this is impossible” philosophy, and completed on December 22, 2016 in 3 years 11 months, 8 months earlier than the scheduled time.*
- ❖ *Another aspect that makes the Eurasia Tunnel one of the most special structures of Turkey is the use of seismic bracelets in the tunnel to reinforce the earthquake resistance. The tunnel was built in a manner to behave without detriment to “service conditions” vis-à-vis earthquake that might happen in 500 years and without detriment to “safety conditions” vis-à-vis earthquake to happen in 2500 years.*
- ❖ *At the operation stage of Eurasia Tunnel, the “lightning” and “encolouring” techniques were employed within the tunnel for the purpose of making perfect engineering behind the project visible.*
- ❖ *All design and construction work of Eurasia Tunnel were executed taking the recommendation of UNESCO into account in a way to respect the historical peninsula of İstanbul registered in the UNESCO World Heritage List.*
- ❖ *In Eurasia Tunnel project, special attention was attributed to the air quality. The trees determined to make positive contribution to the air quality by experts were planted in an area of 7.300 m² and “biofiltration application” as a green concept was materialized for the first time in Turkey.*
- ❖ *Extraordinary incidents such as possible accidents and vehicle breakdowns that might occur within the Eurasia Tunnel are monitored and detected immediately by means of more than 400 cameras and automatic incident detection system.*
- ❖ *In Eurasia Tunnel, over 79 million safe, fast, environmentally-friendly, and comfortable journeys have been made until today.*

- ❖ *In Eurasia Tunnel, daily average traffic flow on a monthly basis was determined to be 51.202-unit vehicle in December 2021, reaching 73% of Minimum Traffic Guarantee (MTG) which is 69.873-unit vehicle.*
- ❖ *“Revenue share” model was employed in the Eurasia Tunnel project for the first time in Turkey. According to this model, the government receives a share at the rate of 30% once the management returns to profitability.*
- ❖ *On the basis of tunnel crossing projections, it is expected to exceed the guaranteed numbers as of 2026. In accordance with these calculations, **all the guaranteed payments made by the government until 2026 will be repaid in 2039 through revenues to be obtained by the government thanks to the revenue share model.***
- ❖ *The government receiving the profit between 2039-2041 will take over the tunnel in a well-maintained and operational manner and cleared from debts in the aftermath of 2041, which is the contraction termination date, and after that will receive all the revenue by itself.*
- ❖ *The Eurasia Tunnel contributed **approximately an amount of 226 million dollars to the national economy in 2021 as a result of 25 million-hour- time saving, 35 thousand tons of fuel saving, 10 thousand tons of emission reduction and accident cost saving owing to 65-million-vehicle-km reduction.***
- ❖ *The facility **will be transferred to the government** at the end of operation period **in a well-maintained, operational, and utilizable condition without any charge and cleared from any and all debts and commitments.***
- ❖ *On the grounds of Economical Impact and Value for Money Analysis performed by Deloitte, from the date when the Eurasia Tunnel was put into service until the end of operation period, a total of 8,6 billion dollars-worth public saving, 7 billion dollars of which is accrued from efficiency revenue and 1,6 billion dollars is accrued from external savings, and a total of 53.734 employment opportunities are expected.*

3. RESPONSES TO THE ISSUES COMMONLY DISCUSSED BY THE PUBLIC

3.1. WHY DID STATE GUARANTEE VEHICLE PASSES FOR THE PROJECT?

Infrastructure investments are essential for national development. However, it is not rapid and easy. In general, the investment budgets of countries do not include sufficient capital stocks for infrastructure investments. For this reason, the public sector seeks ways to produce new resources to ensure sustainable development. The PPP model comes to the fore among these methods. Public guarantees have a significant place in this model which aims at leading the private sector to the infrastructures.

In general, the reasons for issuing ‘**public guarantees**’ in PPP projects are gathered under three main topics.¹¹¹

❖ **Political Reasons:**

- To declare ‘**political will**’ related to the PPP investments,
- To build up additional and ultimate confidence for lenders,
- To shorten bureaucratic processes of investment.

❖ **Financial Reasons:**

- To canalize and extend the private sector capital to the infrastructure investments,
- To reduce the cost of borrowing on behalf of public and improve the quality,
- To decrease the volatility of financial markets via foreign capital inflow,
- To minimize public expenditures or to possess new infrastructures without spending on the infrastructure straight off the bat but instead by extending payments over a period of time,
- To encourage the use of small private savings for large infrastructure investments.
- At this point, infrastructure investments are relatively large and long-term investments; the uncertainties and risks are more prevalent in the long-term compared to the short-medium term. The investors request higher risk premium so as to be safe from this situation. The long-term investments are quite riskier in countries which do not have a bright history in terms of political, economic, and other risks, has relatively low investment grade rating and portray quite fluctuant political and economic environment. The lenders either do not want to grant loans or ask for higher return in exchange for these high risks, which ultimately, increases the cost.
- At this point, public guarantee ensures to reduce the risk premium and hence the cost of borrowing or helps extend the maturity.

¹¹¹ EPEC, EIB, State Guarantees in PPP, Mart 2011

❖ **Reasons for the Risks unique to the Project:**

- The creditors, unwilling to undertake risks arising from the worst possibilities (*unprecedented natural and macroeconomic incidents/demand risks in future*) that are likely to be encountered by the investment due to the obscurity of future and exceed the capacity of private sector and, against which it is impossible to take measures, either demand interest rate higher than the average rate or retreat from making a loan. In either case, the project becomes infeasible.
- However, the basic dimension of mentioned obscurities is the possibilities irrelevant from the lack of knowledge and is rare. The fact that the public as the highest authority issues guarantees on the basis of foreign capital makes PPP investments feasible and expedites the national development.

The Eurasia Tunnel Project proves to be an essential development project in terms of infrastructure investments. Among the basic characteristics of project are:

- ❖ Urgency of investment,
- ❖ High cost of investment,
- ❖ Requirement by the investment for Master of Science in engineering,
- ❖ Need for private sector representatives having similar job experience and sufficient capability.

The project offers solution to the increasing traffic problem every passing day in İstanbul. Of total investment cost valued at **1,245 billion dollars**, the part amounting to **960 million dollar (88%)** has been supported by international financing.

Also in this project, “**public guarantee**” similar to the global examples was put into effect in order to **direct private sector to this investment, to procure the mentioned financing at relevant cost, to complete “in time” in compliance with the investment program.**

The concrete results of implementing public guarantee in the project are as follows:

- ❖ **The longest-term credit (18 years)** in transportation infrastructure investments in Turkey has been procured.
- ❖ The project **was completed 8 months earlier than the scheduled time**, in 3 years 11 months, and was put into service.
- ❖ **The revenue sharing method** has been implemented for the first time in Turkey. Accordingly, in the **operation stage of project, the obtained toll revenue will be shared with the public** when the use counts reach minimum traffic guarantee.

In Figure 8, the revenue estimated to be obtained from the guaranteed payments during the total operating cycle and revenue sharing by the public since the opening of up till today. The total amount of guaranteed payments effected up till today is: **172 million dollars** (2017 - 2020).

It is predicted to **reach minimum traffic guarantee by 2026**.

- ❖ After this year, **public will begin to generate income through revenue sharing method.**
- ❖ **By 2039, public will have received all the effected guarantees.**
- ❖ **After 2041, public will be the owner of an investment asset that is in operation, afloat and free of charge and will possess all the income.**

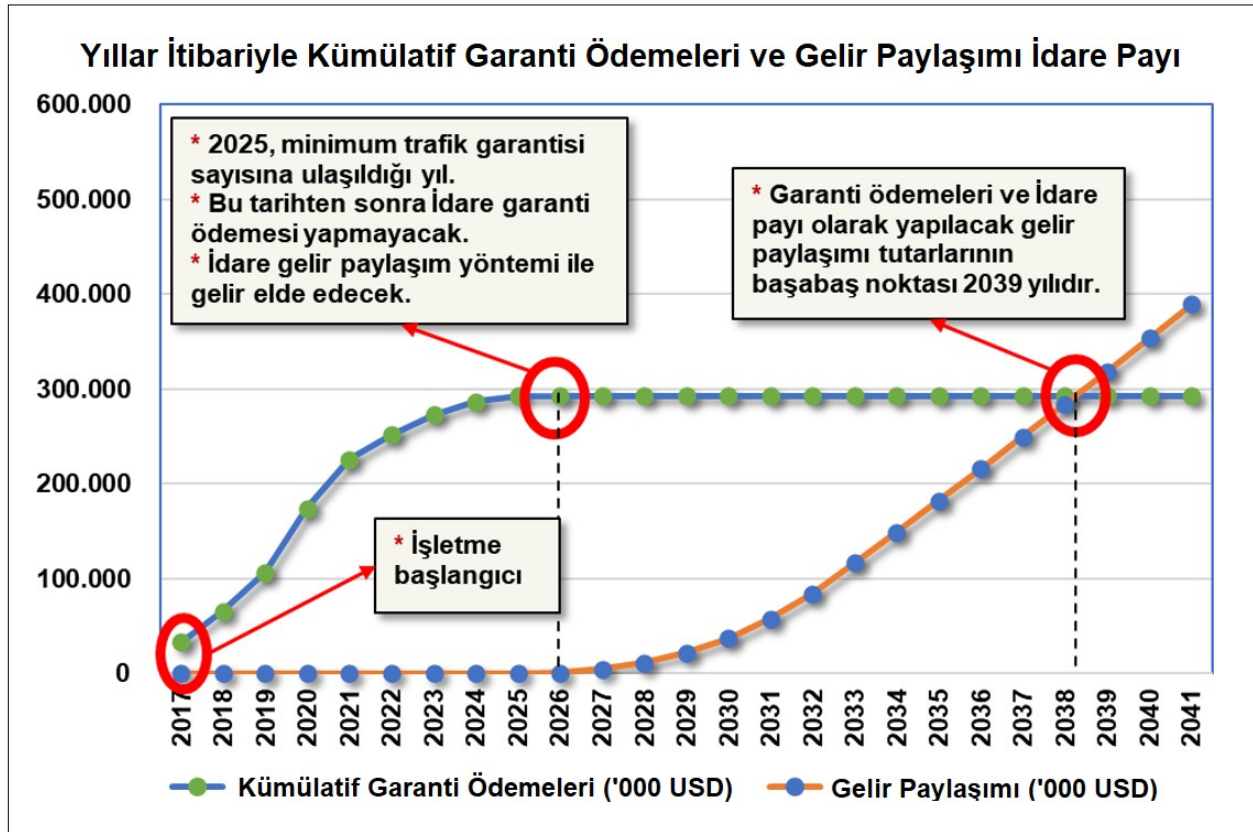


Figure 8: Guaranteed payments by years and Revenue Sharing Administration Portion

3.2. HOW ARE THE TUNNEL TOLL RATES DETERMINED?

The feasibility studies in an infrastructure project required by public are of capital importance. Within the scope of feasibility, the public sector arrives at three basic results:

- ❖ Approximate cost,
- ❖ Source of financing,
- ❖ Usage fee of asset.

In economy, the benefit/loss/return and cost to be inflicted by the asset is called “**externalities**”. These should be taken into consideration in the project assessment. The social benefit below may include this to a certain extent.

The “**generated value**” is required to exceed the “**cost**” in order to make a rational decision concerning the infrastructure investment. **Within this period, the positive externalities to be generated by investments have importance.** Among the expenditure items of project are the pre-investment interests (*capital value*), construction and operation costs, expropriation, and similar expenses. While calculating the value of an infrastructure, the engineers look out for four factors:

- ❖ Operational commercial value of investment,
- ❖ Aesthetical value,
- ❖ Social value,
- ❖ Political value.

While calculating the usage fees in particular, the globally acknowledged parameters are utilized. In reference to these parameters, **the highways based on user revenues are required to be capable of paying the construction of investment, operation/maintenance, and finance, and to have sufficient income to generate a reasonable return for the investors.**¹¹² To this respect, **different toll rates are applied for different projects on a global scale.** (Annex-17)

When the user fee revenue falls short of covering the whole project costs of private sector, public sector renders an additional payment to the private sector. The long investment periods and large investment amounts of these sorts of projects lead to the extended periods concerning the return of investments. At this stage, **it is required to find financing with a relevant term that is consonant with the return period of investment so as to balance the cash flow of project.** However, in our country, it is not easy to find long-term financing in Turkish Lira (TL) due to macroeconomic effects. Additionally, long-term foreign currency loans have been widely used in infrastructure projects since 1950.

Similarly in the Eurasia Tunnel Project, **resource in foreign currency was procured due to the magnitude of investment amount and accordingly the required long-term borrowing.** To this respect, **toll rates** constituting the initial source of loan repayments **were determined in terms of foreign exchange indexed local currency (TL) as is the case in examples of global implementation.** The toll rates in the Eurasia Tunnel are updated **annually** at the rate of initial US dollars determined for the project by using the data of U.S. Consumer Price Index for All Consumers ¹¹³. The toll rates in question **are converted into Turkish Lira** and collected from users in Turkish Lira **once or-if circumstances so require**¹¹⁴ **twice a year.**

¹¹² Federal Highway Administration (FHWA), PPP for Highway Infrastructure, US Department of Transportation, 2009

¹¹³ Consumer Price Index - (CPI) (CPI-U)

¹¹⁴ An increase of more than 5% in the exchange rate in the first six months of the relevant operating year

3.3. WHAT IS THE IMPACT OF EXCHANGE RATE FLUCTUATIONS ON THE “APPOINTED COMPANY”?

The exchange risk proves to be a significant factor in the unwillingness of development banks and investors to make investments in infrastructure projects in the developing countries. In such an environment, the exchange risk has the undermentioned components:

- ❖ **Exchange Risk:** When the income and costs of a project are in different currencies
- ❖ **Convertibility Risk:** When the public sector inhibits private sector from converting the local currency into foreign currency
- ❖ **Transfer Risk:** When the private sector could not make foreign exchange transfer out of the country.

The exchange risk is quite a complicated type of risk and there are certain special causes behind the fact that the infrastructure sector is more exposed to the exchange risks:

- ❖ The financial need exceeds the capacity of local markets.
- ❖ 20-30-year long repayment periods.
- ❖ Expansion costs of inputs in dollars.
- ❖ Assets difficult to reallocate.

In the light of this information, there is a **prevailing perception that the increase in exchange rate will serve to the interest of Appointed Company in Build-Operate-Transfer projects**. One of the allegations brought forward in the eye of public is the fact that **the investor does not bear exchange risk as the determined toll rate is indexed to foreign exchange; on the contrary, it gains profit from the increase in the exchange rate**. However, these perceptions and allegations in the public eye **do not reflect the reality** regarding the structure of Eurasia Tunnel Project and contract regulations.

In principle, in Build-Operate-Transfer projects, the toll rates determined in terms of foreign currency are converted into Turkish Lira on the basis of rate at the given date in the beginning and, if circumstances so require, in the middle of the year and collected from users in Turkish Lira. Besides, in the case that the traffic count is less than that guaranteed by the public for the given operating year, the difference shall be paid in Turkish Lira to the companies in charge in the first quarter following the relevant operating year.

In that case, **the Appointed Company shall bear the damage both related to the revenue to be earned from the realized traffic and arising from the increase in foreign exchange concerning the traffic guarantee obtained at the end of a certain period**. Within this scope, **the increase in the foreign exchange has negative effects on the cash flow balance of Appointed Company and creates need for additional operation capital within the given period**.

Hence, due to the fact that collections are made in Turkish Lira and the rates follow upward trend, **the exchange rate loss imposed upon the Appointed Company as from 2017 until the end of 2021 is approximately 47,9 million US Dollars.** (Figure 9) Out of this damage, the portion amounting to 20,5 million US Dollars stems from tunnel toll rates while 27,4 million US Dollars are due to guaranteed payments. In conclusion, **the Appointed Company shall bear the exchange rate loss at the average amount of 9,6 million US Dollars on annual basis.**

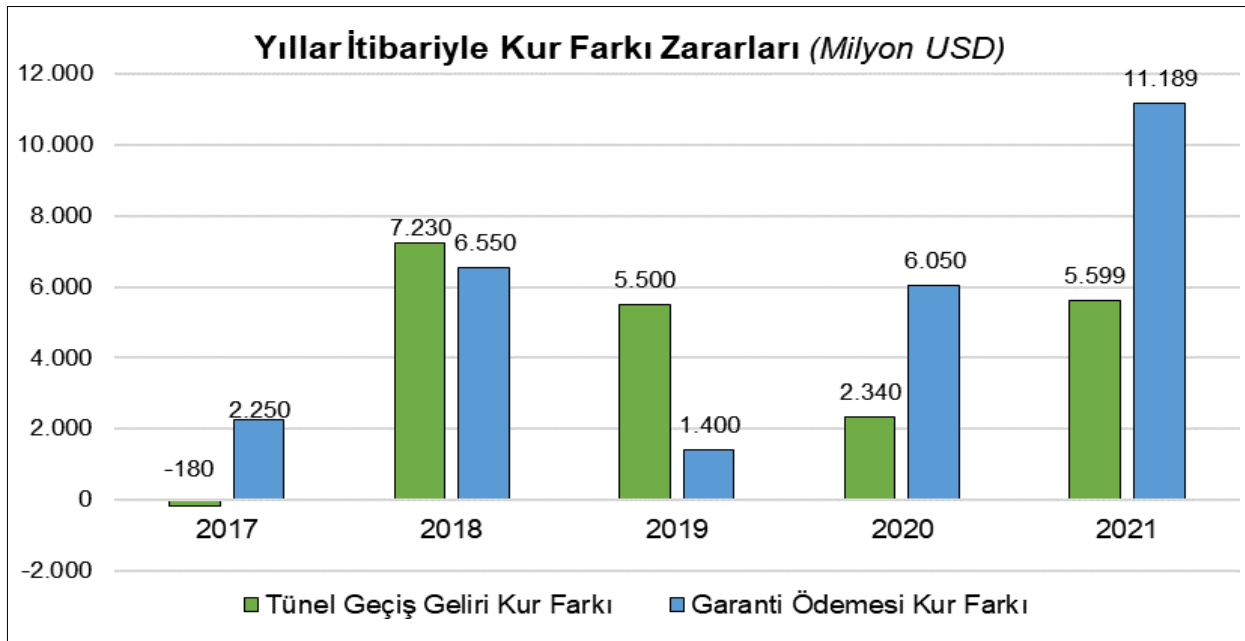


Figure 9: Exchange Difference Loss by Years

3.4. IS THE PROJECT BIDDING PROCESS TRANSPARENT? ARE THE CONTRACTS OPEN TO THE GENERAL PUBLIC?

The most common feature of PPP projects is the fact that **bids are received from the best companies for qualified tenders.** This fact creates a **real competitive environment** for tenders. For this reason, many countries have made significant developments in ensuring open and transparent tender process for PPP projects. For instance, a competitive tender was made in the UK for PPP health projects and international actors won the tenders and put signature to successful projects. The international companies have participated in PPP projects in various fields in Turkey.

The **stakeholder participation in projects** is as important as the transparency of tender process. Receiving the opinion of communities affected by the project at the idea stage is of importance in terms of governance principles. The outcomes of transparency implemented in PPP projects:

- ❖ Increases the chance of success of projects,
- ❖ Builds up trust,
- ❖ Reduces the cost,
- ❖ Increases the direct foreign investment,
- ❖ Increases the social support.

In addition to these, **the transparency** of PPP tendering processes which are held open to international participation **is the primary characteristics required by the development banks and financial institutions.** In particular, the criteria set forth by multinational banks such as World Bank-IFC, European Investment Bank (*EIB*), European Bank for Reconstruction and Development (EBRD) and Islamic Development Bank for funding public private partnership projects are both quite strict and include no exception.

The Eurasia Tunnel Project of which finance package involves a number of international financial institutions including the EIB and EBRD satisfied all the above-mentioned criteria. The International financial institutions had assessed **the compliance of project documentation and tender with law, its competence, transparency and whether or not it creates competition.** The funding by these institutions for risky projects are restricted with their binding internal control procedures. Therefore, the funding of Eurasia Tunnel by the financial institutions such as EIB and EBRD could only be possible owing to the transparency and compliance of tender process with the legislative regulations.

Another discussion point concerning the transparency is to whether or not open the project contracts to the general public. Pursuant to the Right to Information Act, state institutions and organizations, without prejudice to the exceptions, shall be obliged to provide all sorts of information and documents to the applicants.¹¹⁵ Yet, project contracts without excepting the Implementation Contracts, shall include information about the financial, economic, loan and cash position of projects as well as the technical specifications related to the performance process, its cost details, and the accumulation of knowledge of investing company which requires advanced engineering and shall be subject to the protection of intellectual property rights. **The sharing of all technical data pertaining to the competing companies in tenders is against the principle of competition.** The European Commission delivered advisory opinion on the matter declaring that the contracts could be shared with the public providing that certain information is removed. For instance, the Ministry of Transportation of Federal Government of Germany published the project on its website only upon permission from the undertaking company and by blacking out the commercial and technical information and the details specified in the contract.

3.5. WHAT LAW GOVERNS PROJECT CONTRACTS?

PPP projects are contracts governed by private law. Due to the asymmetrical relationship between the public and private sector, contracts subject to the administrative law were avoided. **Law no 3996 clearly states that the Build-Operate-Transfer Model contracts would be governed by private law.**¹¹⁶ To this respect, the contracts between public and private sector concerning the projects realized by Build-Operate-Transfer Model **are concluded to provide that they shall be governed by private law.** The implementation contracts in PPP projects are subject to Turkish Law, **while only contracts of**

¹¹⁵ 4982 Sayılı Bilgi Edinme Hakkı Kanunu Madde 4 ve 5, 2004/7189 sayılı Bilgi Edinme Hakkı Kanununun Uygulanmasına İlişkin Esas ve Usuller Hakkında Yönetmelik Madde 5 ve 6

¹¹⁶ Kemal Gözler, "İdare Hukuku Cilt 2", Ekin Basım Yayın Dağıtım, 2019

assumption of debt and master loan agreements are governed by foreign law (English Law, in general).

The English Law is acknowledged as the governing law for international agreements concluded by the public relevant to the assumption of debt and for financial agreements on a similar scale concerning more than one nation across the world. As the English Law is considered to be impartial by international finance markets, it has been a universal consent that the English Law is the governing law in similar agreements.

On the other side, the contract design of PPP projects involves a lot of parties, thus a problem is likely to occur. However, considering the nature of services rendered by these projects to the national economic life, it is of capital importance to continue to offer services even if and when conflicts come up among various parties. Moreover, the settlement of disputes encountered in such large infrastructure projects completed via project financing model require serious experience and accumulation of knowledge along with similar project experiences. For this reason, independent, impartial, effective laws and methods which do not create over costs must be preferred for the settlement of disputes arising from agreements. In particular, arbitration composed of competent legal experts experienced in technique, law and project financing is preferred as the effective solution method.

Similarly in Eurasia Tunnel project, Turkish Law applies to the Implementation Contract. The disputes that may arise out of the Implementation Contracts shall be referred to the arbitration and resolved pursuant to the relevant Turkish Law. On the other side, the contract of assumption of debt and loan agreements of project shall be governed by the English Law.

3.6. WHY DID THE PAYMENT CONTINUE TO BE PAID DURING PANDEMIC?

With respect to the long-term contractual relationships such as the construction and operation of Eurasia Tunnel, the parties may encounter unpredicted incidents and situations in the course of signing the agreement. The requests for the suspension or termination of contractual obligations based on the claims that the pandemic as of 2020 constituted force majeure were brought to agenda in a number of sectors and countries.

However, **PPP projects provide public service and sustainability of services is essential.** Within this framework, the operation and maintenance of Eurasia Tunnel, which provides public service, uninterruptedly continued even when the pandemic peaked, precautions were tightened, and curfew was in effect. As a matter of fact, in the course of restrictions and quarantine, the workforce was enhanced by recruiting additional personnel for the departments fulfilling critical mission; thus, the public service could be uninterruptedly maintained.

Besides, the Eurasia Tunnel Implementation Contract does not contain any provision that removes or suspends the contractual obligations of parties due to the pandemic. Consequently, the failure of state to fulfill its guaranteed payment obligation under the pretext of pandemic as a force majeure shall neither comply with the regulations falling under the Turkish Law in general nor with the universal practices or Project agreements.

Above all, the state shall be obliged to maintain services uninterruptedly and fulfill the contractual requirements during the pandemic. The default or deferral of rental payments of leased public buildings when not used due to restrictions, or any deductions in the salaries of personnel who could not report to work due to restrictions shall be out of question. The public administration shall base any decision upon the principle of continuity in service and contracts. In the light of this understanding, the Eurasia Tunnel was kept open and maintained the operation during the entire pandemic.

3.7. WHAT KIND OF PROCEDURE IS APPLIED TO THE ILLEGAL PASSES?

Provided that the toll fee is not paid when passing through the Eurasia Tunnel, it shall be called as **“illegal pass”**. Appointed Company shall inquire for 15 days following the illegal pass until the collection of toll fee. Additionally, despite having no obligation to notify, it endeavors to ensure that the toll fee is paid before any penalty is applied by sending debt notice to the users via SMS, e-mail, or membership channel on certain days over the course of 15 days following the illegal pass in order to avoid any aggrievement on the side of users. The debt notices shall be issued through PTT for HGS users and in general through E-State Portal.

In the event of default of payment after the 15th day of pass, administrative proceedings shall be primarily started for the unpaid toll fees and penalties. In the course of administrative proceeding, debt notices continue to be sent through SMS and collection agencies with an aim to collect the debt before the initiation of execution proceeding and the emergence of supplementary charges, costs, and other burdens. Pursuant to the relevant law and regulation, the execution proceeding shall be initiated as the last resort in the event of failure to make collections in consequence of the abovementioned notifications and follow-ups.

As per the clauses 5 and 7 under the Article 30 of Law No 6001, with respect to build-operate-transfer projects, **a penalty of 4 times of toll** along with one toll fee shall be applied to the vehicle owners who pass through without paying toll fee.

However, **payments made within the first 15 days of illegal pass shall be processed without penalty.** There shall be no distinction between highways under the responsibility of General Directorate for Highways and build-operate-transfer projects in terms of practice of penalty applied for illegal passes. In case of default of toll fee payment by the end of 15th day after the illegal pass, a penalty of 4 times of toll shall be applied.

In the meantime, despite the fact that physical examination and sales ban and non-assignment clause and international travel ban for foreign plates are applied to vehicles with toll debt for the highways and roads under the responsibility of General Directorate for Highways pursuant to the above-cited law, the aforesaid bans shall not be applied for Build-Operate-Transfer projects such as the Eurasia Tunnel.

CONCLUSION

In addition to the **climate change** and **digitalization**, it is crystal clear that the **population growth** in future will increase the need for investment far more than today. According to analyses, this need will twofold in 2030.

The concentration of public investments on social fields such as health under the impact of pandemic has dramatically increased the gap between the investment need required for other infrastructure investments and the existing resources. Countries need **additional resources** to afford the investments that will deliver **qualified and appropriate and in time public service** to the users. For this reason, “**Public Private Partnership**” model is preferred by the state as a “**method of project production**” based on political, financial, economic, and technological reasons in order to deliver **more qualified, innovative, rapid, comfortable, and easily accessible public services**. Considering the last 20 years, the PPP projects are gradually increasing. The model which is in use in 134 developing countries today has contributed about 15-20% of total infrastructure investment.¹¹⁷

The interoperability culture of public and private sector dates back two thousand years to the **Roman Empire**.¹¹⁸ In conjunction with **the Industrial Revolution**, the participation of private sector has expanded in several public services such as railway transportation networks, water supply and distribution. **The expansion of model in the modern world** and its employment in a widespread manner as a source of inspiration for other countries root in 1990s when **Tony Blair as the Leader of Labor Party** redefined the “**Project Finance Initiative-PFI**” philosophy in the framework of a political program. The Blair Government in 1997¹¹⁹, pioneered the establishment of national “**Partnerships UK**” as the first example of PPP in the world.

The first implementation of Public Private Partnership in Turkey traces to the Ottoman Era. The Galata-Beyoğlu Tunnel, first put into service in 1874, was constructed under Build-Operate-Transfer model including the operation phase of 42 years as the world’s second oldest underground transportation unit¹²⁰. **During 1984 and 2020, a total of 257 PPP projects were completed in Turkey and the investment cost of these projects reached 85 billion dollars**^{121, 122}.

PPP model is an essential instrument **for government executives who aspire to provide faster and more qualified service to promote public benefit while utilizing public funding**. A properly designed model will make huge contributions, in particular to the public, the society, private sector and all relevant shareholders.

The benefits of PPP projects such as **contributing to the macroeconomic and regional development, predictable construction period and investment budget, tax equity based on the “user pays” principle, spreading economic growth to the grassroots, creating new markets, exploiting private sector’s dynamism and management skills, providing efficiency in public budget, attracting foreign investment, establishing**

¹¹⁷ World Bank, Private Participation in Infrastructure - PPI, 2021 Half Year Report, s.2

¹¹⁸ Nathan Associates, Public - Private Partnerships a Basic Introduction for Non-Specialists, EPS Peaks, DFID, Şubat 2017

¹¹⁹ www.partnershipsuk.org.uk/AboutPUK/PUKBackground.asp

¹²⁰ Zeynep Çelik, 19. Yüzyılda Osmanlı Başkenti; Değişen İstanbul, İstanbul, Tarih Vakfı Yurt Yay. 1986, s. 81

¹²¹ Bu rakamlarda işletme hakkı devri projeleri yer almamaktadır. Büyük oranda enerji, ulaştırma, sağlık sektörlerindeki yatırımları kapsamaktadır.

¹²²

effective control through multiple control mechanism, improving service quality, developing legal infrastructure, expediting technology transfer, and contributing to the principles of sustainability have been acknowledged by a number of theoreticians and practitioners working in the field.

The Eurasia Tunnel project sets a good example for infrastructure investments developed with an eye to manage an existing demand through PPP model. İstanbul, which has been cradle for five ancient civilizations, proves to be a 24-hour world city and the number of vehicles and mobilization across the two sides of İstanbul are increasing on each passing day. Since the bidding date of project in 2008 up till now, the number of vehicles in İstanbul traffic has risen from 2,7 million to 4,5 million. Besides, İstanbul is considered to step forward as key tourism and financial center in future. Based on these facts, **the Eurasia Tunnel is a successfully implemented PPP project in terms of innovation, financing, and management model.**

The Eurasia Tunnel as one of the first modern PPP projects in Turkey has the longest maturity (*18 years*) among the infrastructure investments in Turkey; and possesses a finance package which was entirely provided with external loans. The tunnel, as an artifact of engineering, which was materialized 106 meter below the sea level with the employment of multiple control mechanisms and monitoring structure as well as state-of-art technology, shines out as the manifestation of the level our civilization has reached. In the design of structure, apart from an exclusive technology such as the custom-engineered seismic bracelets to eliminate the earthquake risk, it was observed to “**pay homage to history**” by using figures that capture the historical identity of İstanbul and re-echo the Architecture Sinan and present an architecture that would not damage the silhouette of İstanbul. The Eurasian Tunnel steps forth as the future infrastructure that “**meets the criteria of Green Deal and is in tune with our times**” along with the environmental measures taken in line with the importance attached to the constantly measured air quality, the implementation of rarely seen biofiltration, afforestation works in scope of which the number of trees were quadrupled, and the head office was designed as green building with LEED Gold Certificate. The Eurasia Tunnel proves to be a “**holistic and wise**” investment that continuously improves itself thanks to its 7/24 service and transparent communication policy which is surveilled at all stages, its transparent management driven by open data understanding through website and museum, its award-winning innovative solutions that reduces the immediate response time against problems encountered in the tunnel in line with its people-oriented service understanding and lighting systems beyond the global standards. Considering all the aforesaid characteristics, we are proud to build and operate such a system that touches the daily lives of İstanbul commuters, earns them time and provides a public service on a global standard and delivers service ahead of our time.

In conclusion, this **report** has **two main objectives**: Firstly, **to cast light on scientifically unfounded statements in public about PPP projects**; secondly, **the aspiration to share the knowledge with the reader about the Eurasia Tunnel which is defined in the light of “a project could only be beautiful as its design and successful as its work plan; more than this is impossible” philosophy and stands out as the leading project contributing to today’s users, İstanbul and macro-economy in broad sense..**

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- Annex 17** : Examples of Highway Tunnels around the world and Toll Fees
- Annex 18** : Deloitte Value for Money Analysis Report, 2021 *(6 Page)*
- Annex 19** : Public Reform by the Labor Party leader Tony Blair and enlightening quotes from the biography book penned by himself on PPP model, *(The Journey, 2010)* *(1 Page)*
- Annex 20** : Operation Performance Criteria *(2 Page)*
- Annex 21** : Turkey according to the Maastricht Criteria *(1 Page)*
- Annex 22** : Transparency and Audit Principles in Eurasia Tunnel Project *(5 Page)*
- Annex 23** : Public Private Partnership – Reference Guide *(4 Page)*

ANNEX 1: EURASIA TUNNEL PROJECT ROUTE – SCOPE

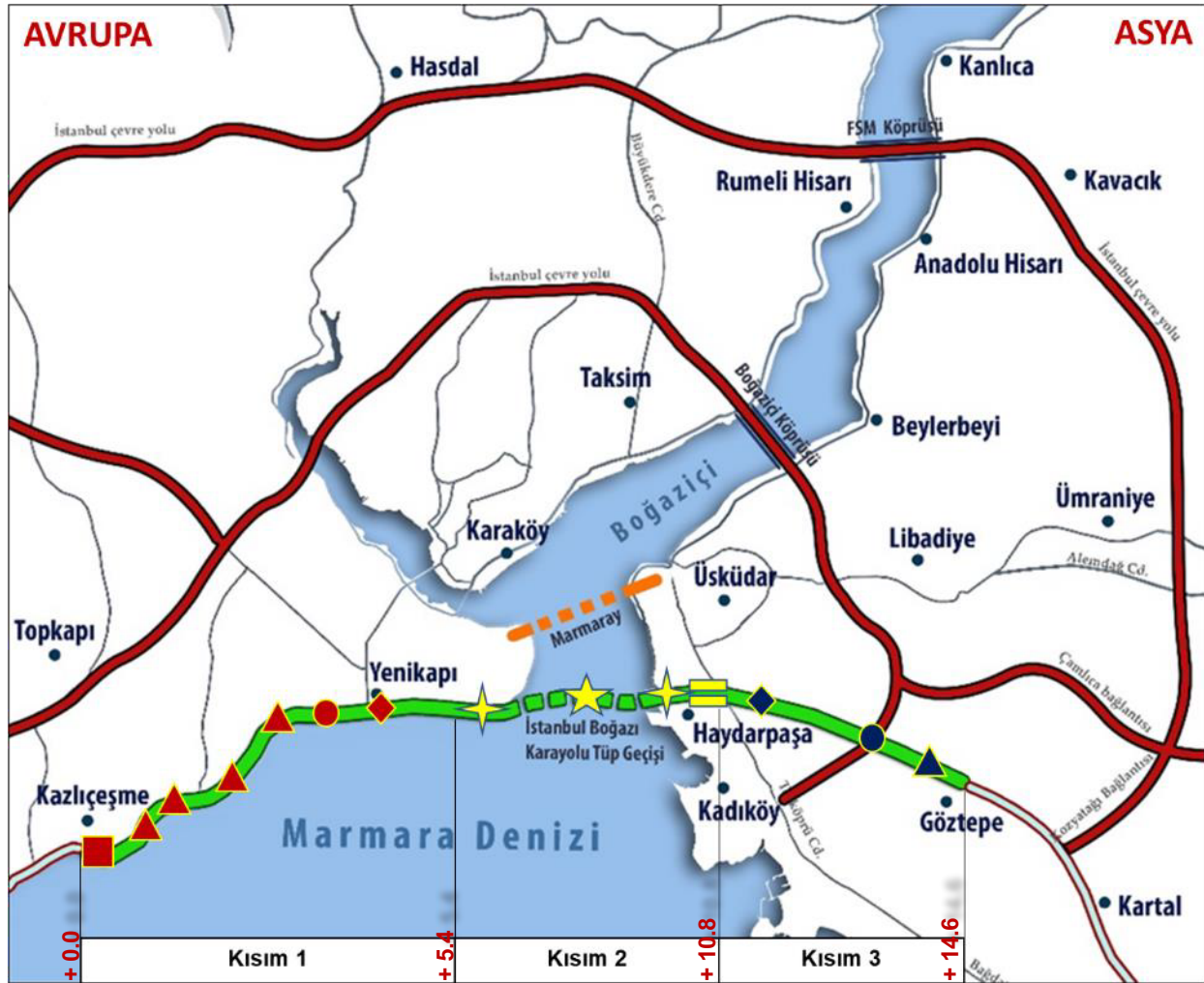


Figure 10: Eurasia Tunnel Project Route – The Shortest Route between two Continents

Table 27: The Scope of Eurasia Tunnel Project

Section 1 (Europe, 5,4 km):	Section 2 (Tunnel, 5,4 km):	Section 3 (Asia, 3,8 km):
<p>▲ Pedestrian Overpass Structure-4 Pieces</p> <p>◆ Yenikapı Underpass and U Turn</p> <p>● Samatya U Turn Structure</p> <p>● Kazlıçeşme U Turn</p>	<p>★ 3,34 km double-deck TBM Tunnel</p> <p>≡ 1 km-long bored tunnel constructed via New Austrian Tunneling Method (NATM)</p> <p>★ 1 km-long Cut-Cover Tunnel Transition Structures</p>	<p>▲ Pedestrian Overpass Structure-1 piece</p> <p>◆ Koşuyolu Bridge Expansion</p> <p>● Uzunçayır Intersection Arrangement</p>

ANNEX 2: ORGANISATION CHART

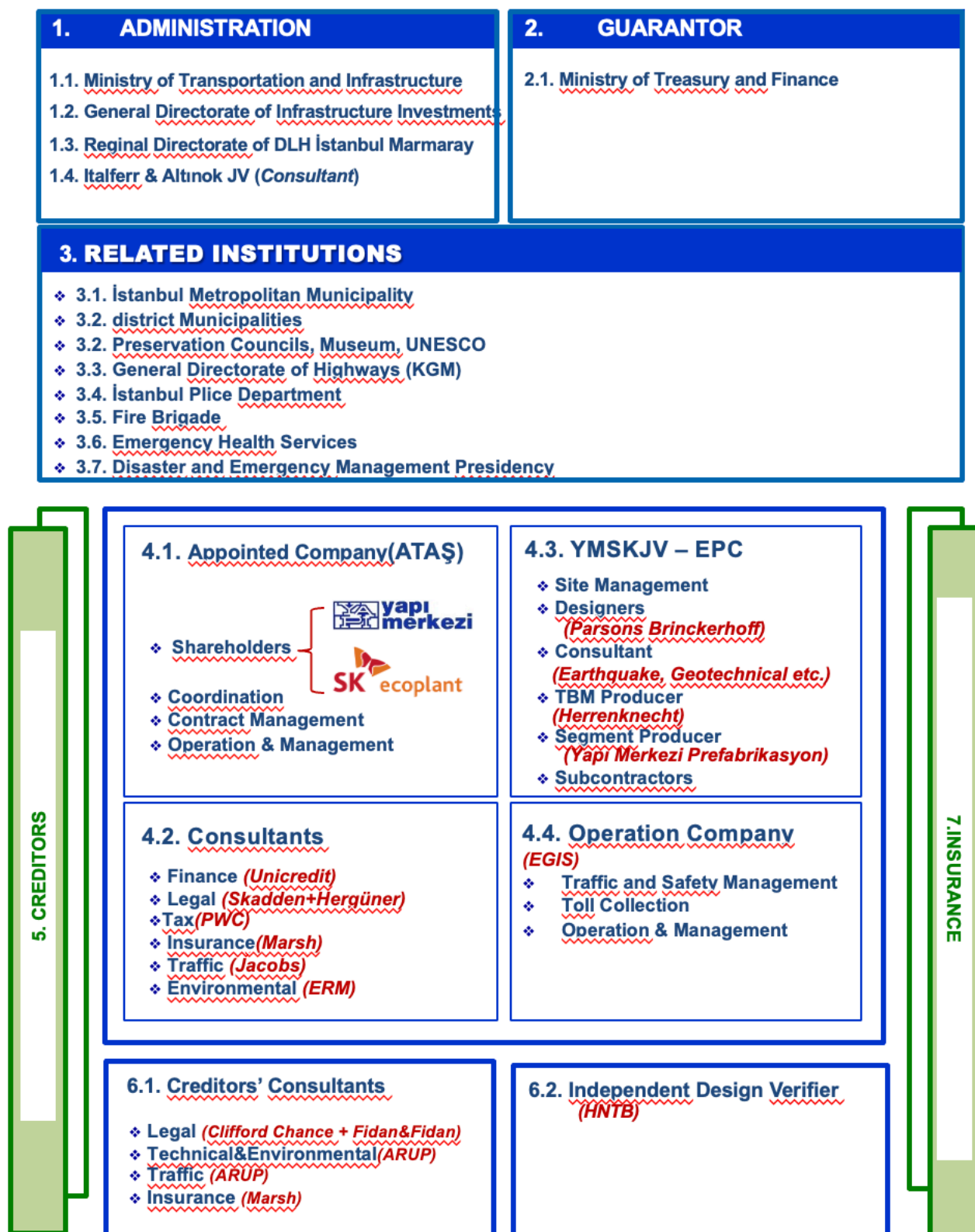
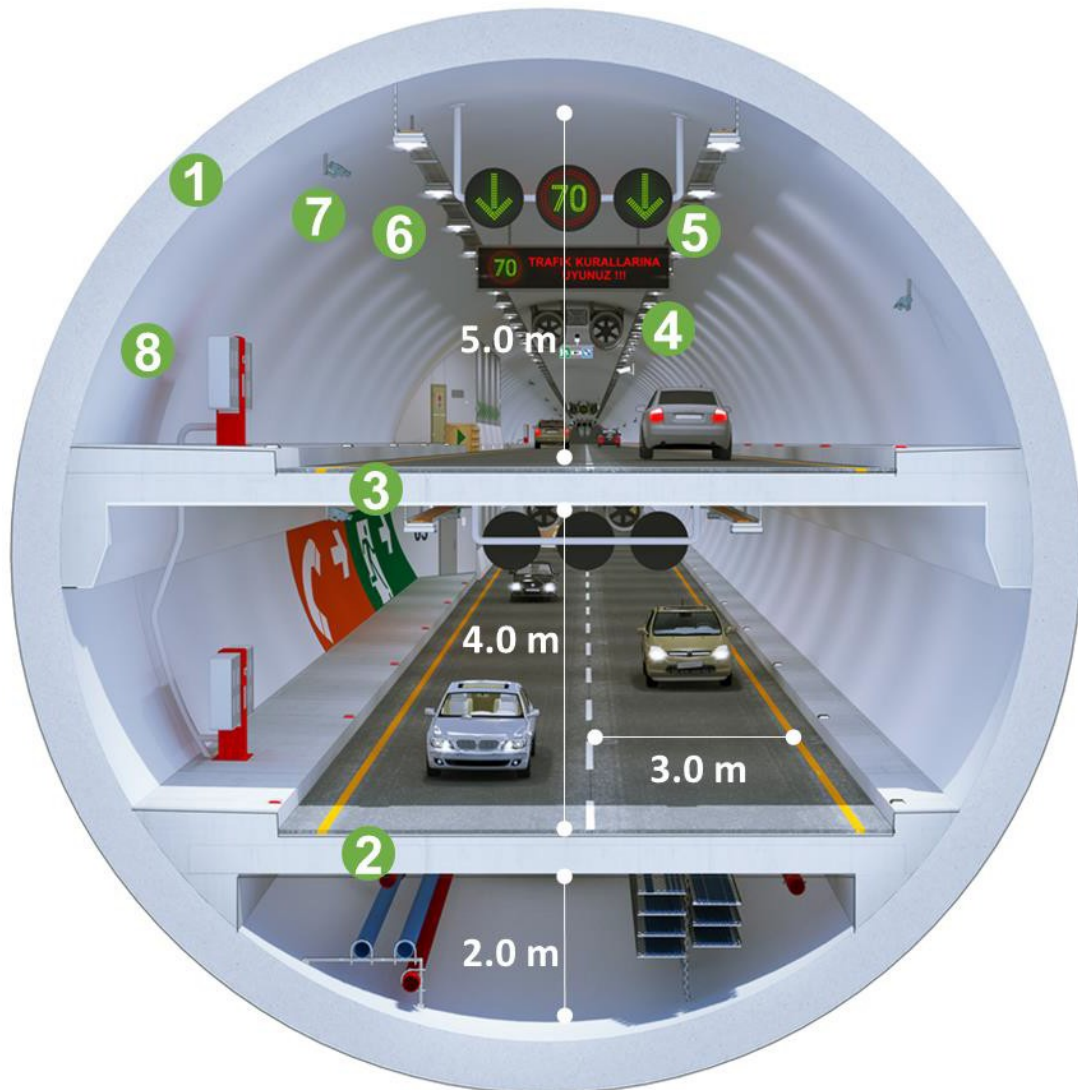


Figure 11: The Organization Chart of Eurasia Tunnel

ANNEX 3: TUNNEL SECTION DIAGRAM



- | | |
|---------------|---------------------------|
| ① Segment | ⑤ Signalization (VMS+VTS) |
| ② Lower deck | ⑥ Lighting |
| ③ Upper deck | ⑦ CCTV Cameras |
| ④ Ventilation | ⑧ Fire Cabinet |

Figure 12: Eurasia Tunnel Section Drawing

ANNEX 4: TBM TUNNEL BORING

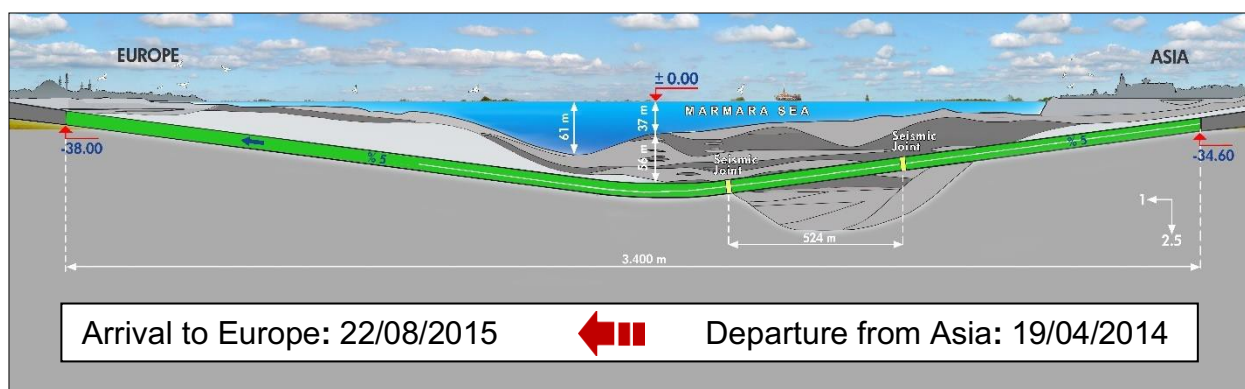


Figure 13: Eurasia Tunnel TBM Tunnel Route Profile



Image 1: Tunnel Boring Machine (TBM)

- ❖ Tunnel Boring Machine (TBM); ranks first across the world with its 33,3 kW/m² cutting head power, ranks number 2 with its 12 bar design pressure and ranks number six with its 147,3 m² cutting head area.

Table 28: Tunnel Boring Machine (TBM) Technical Properties

❖ Manufacturer	: Herrenknecht AG	❖ Face Pressure	: Pf 12 bar
❖ Type	: Slurry Mixed Shield	❖ Total Installed Power	: Pi 10.330 kW
❖ Excavation diameter	: D 13,7 m	❖ Cutting Head Power	: 14 X 350 kW=4.900 kW
❖ Cutting head span	: %31	❖ Excavation Site Cutting Head Power per Unit	: 33,3 kW/m ²
❖ Cutting Disk	: 35 pieces, 19"	❖ Rated Torque	: 23.289 kNm
❖ Cutting Tab	: 192 pieces, %25	❖ Maximum Torque	: 34.933 kNm
❖ Total Length	: 120 m	❖ Total thrust	: 247.300 kN
❖ Shield Length	: 13,5 m	❖ Excavation Site Thrust per Unit	: 1.678 kN/m ²
❖ Weight	: ~3.300 t		



Image 2: Asian TBM Entry Box

- ❖ TBM Tunnel boring started on April 19, 2004 via transition structure specially-built in Harem.



Image 3: Specially trained Divers in Pressure Cell (TBM)



Image 4: European TBM Exit Box

- ❖ **For the first time in the world**, Hyperbaric TBM repair was successfully performed by specially trained industrial divers under 10,8 bar pressure.
- ❖ **Hyperbaric Repair Operations:**
 - i. Absorption Grid Maintenance: 10,8 bar
 - ii. Examination of Cutting Head :10,5 bar
 - iii. Absorption Grid Maintenance: 10,1 bar
 - iv. Stone crusher Maintenance : 8,9 bar
- ❖ Tunnel excavation was completed with **± 24 mm deviation** in European Outlet Box on August 22, 2015.

ANNEX 5: SEGMENT PRODUCTION**Image 5: Segment Production**

- ❖ Special concrete concept design made out of low-permeable black cinder was finalized through tests and advanced analysis. The whole segment production was performed by **Yapı Merkezi Prefabrication** in İstanbul.
- ❖ The design life of segments resistant to the negative effects of sea water and sulphate was reported to be **at least 127 years** as a result of analysis and simulations carried out by the international certification institutions.

**Image 6: Segment Stockyard**

15.057 pieces of segment weighted at 200.000 ton was produced by using 80.000m³ concrete as a result of 247.645 man/hour work in 430 days. Thanks to these segments, **1.673-bracelet assembly was completed** in TBM tunnel.

Table 29: Segment Production Technical Properties

❖ manufacturer: Yapı Merkezi Prefabrication	❖ Bracelet Weight : ~ 127 t
❖ Bracelet Diameter (External) : 13,2 m	❖ Specification 28 day Average Pressure Resistance : 50 MPa
❖ Bracelet Diameter (Internal) : 12,0 m	❖ 28-day Average Pressure Resistance : 72 MPa
❖ Segment Width : 2m	❖ Specification Chloride Permeability : 1.000 Coulomb
❖ Segment Thickness : 0,6m	❖ Average Chloride Permeability : 280 Coulomb
❖ Bracelet Installation : 8+1 keystone	❖ Specification Segment Period : 100 years
❖ Segment Weight : ~ 15 t	❖ Estimated Minimum Service Period : 127 years

ANNEX 6: SEISMIC BRACELETS

Image 7: Seismic Bracelet Assembly

- ❖ Considering the geological, geophysical, and geotechnical properties of route; two custom-tailored flexible **seismic bracelets** were used in **TBM tunneling sector for the first time**. Thus, tunnel safety against possible earthquakes was enhanced.



Image 8: Post-Assembly Seismic Bracelets

- ❖ The assembly of seismic bracelets was completed on September 01 and November 11, 2014, respectively.

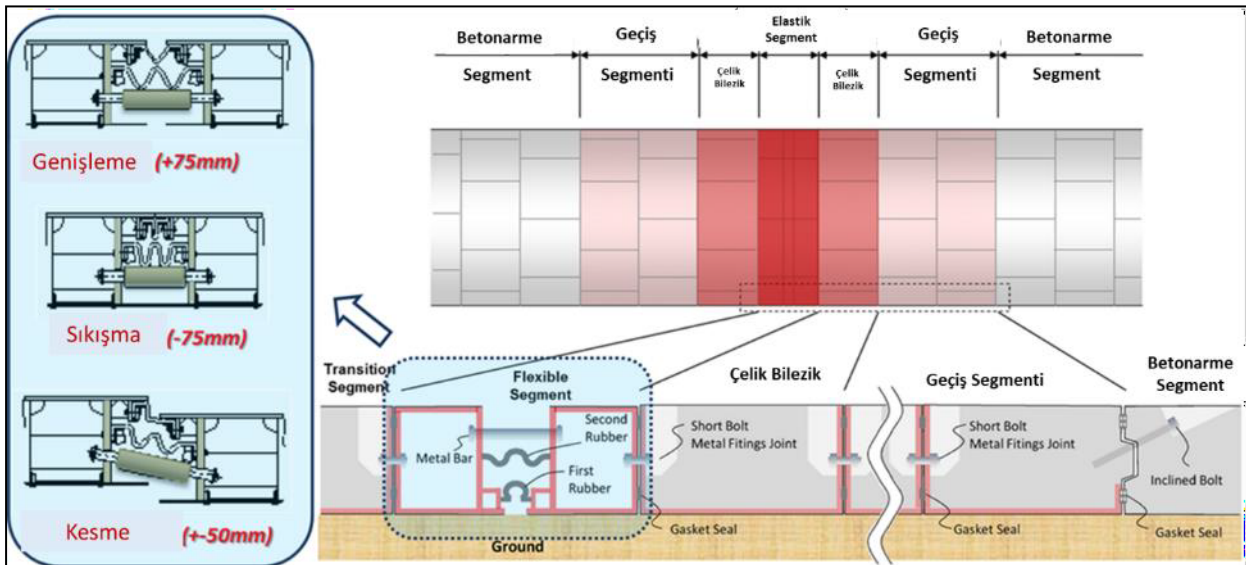


Figure 14: Working Principles of Seismic Bracelets

- ❖ The replacement limits of seismic bracelets calculated ± 50 mm for shifting, ± 75 mm for elongation/shortening were tested in laboratories and used in the Project once their compatibility and success had been established.

ANNEX 7: PROJECT IMAGES**1. Architectural Elements**

Image 9: The Architectural Elements of Eurasia Tunnel

The architectural elements such as passionflower and rosette used by the Architecture Sinan in his artifacts were presented at the entries in both sides of Eurasia Tunnel.

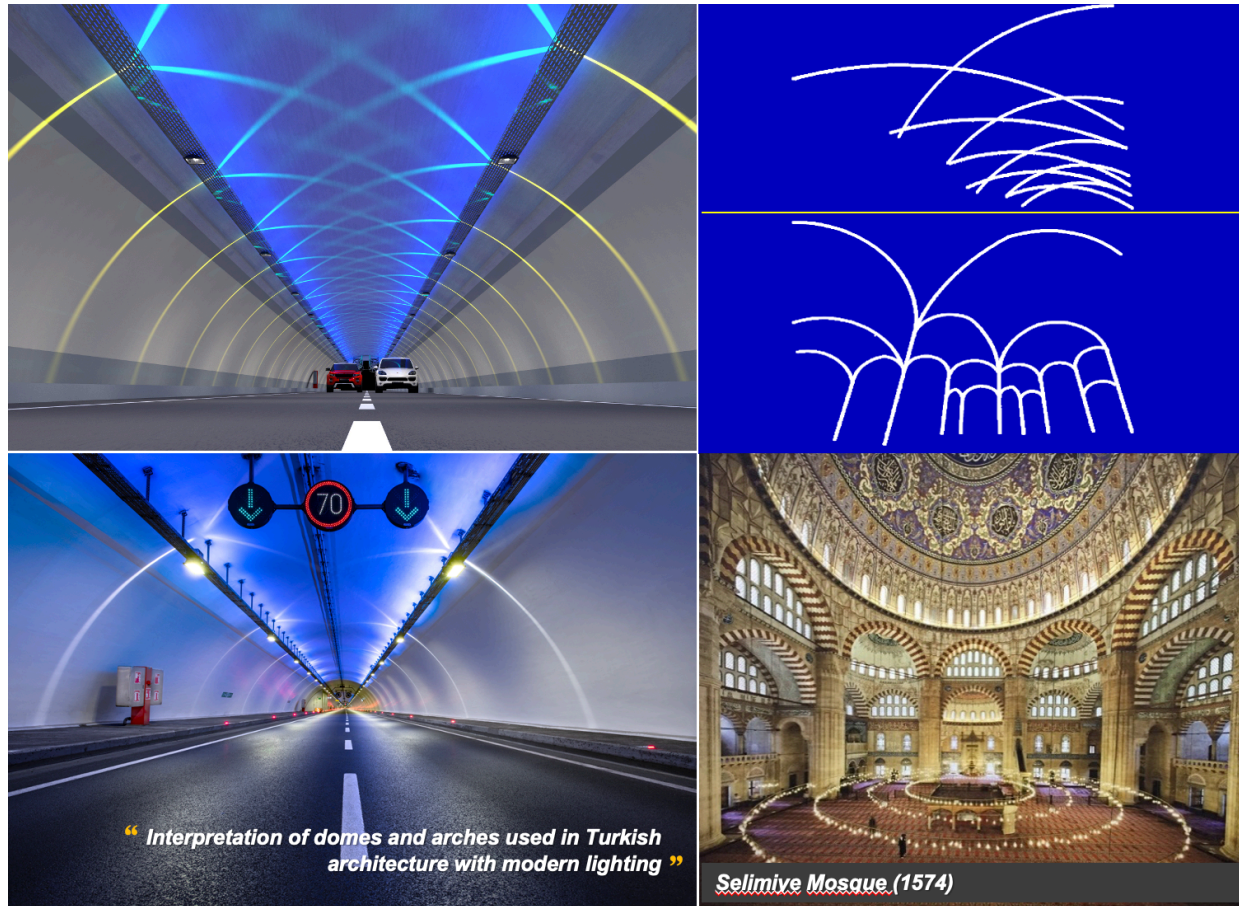


Image 10: Architectural Lightning of Eurasia Tunnel

Artistic touches inspired by the arches and domes in historical buildings were implemented in the internal lighting design of Eurasia Tunnel.

2. Asian Side Ventilation Shaft



Image 11: Asian Side Ventilation Shaft

The photos of Ventilation Shaft in the Asian Side designed to be environmentally friendly

3. Tunnel Photos



Image 12: The Photos from the Inside of Eurasia Tunnel



Image 13: The Photos from the inside of Eurasia Tunnel



Image 14: “Rosette”, “Passion-flower” and “Seagull Beam” on the Portal Entrances of Eurasia Tunnel Architectural Practices



Image 15: Ticket Office Design

4. The Photos of Operation and Maintenance Building



Image 16: Eurasia Tunnel Operation and Maintenance Building

The operation and maintenance building of project was designed as **green building** and entitled to get LEED Gold Certificate as a result of scores obtained on the basic topics such as energy conservation, recycling, sustainability.



Image 17: Eurasia Tunnel Control Centre

ANNEX 8: THE IMPLEMENTATION DETAILS OF BIOFILTRATION

An area of 7.300 m² around the ventilation shaft in European side was designated as “**biofiltration area**” for the first time.



Image 18: Location and Borders of Biofiltration Area



Image 19: Biofiltration Area

ANNEX 9: AIR QUALITY MONITORING STATIONS

Image 20: European Side Air Quality Station (Çatladıkapı) Location



Image 21: European Side Air Quality Station (Çatladıkapı) Location



Image 22: Asian Side Air Quality Station (*Selimiye*) Location



Image 23: Asian Side Air Quality Station (*Selimiye*)

ANNEX 10: İSTANBUL METROPOLITAN MUNICIPALITY AIR QUALITY REPORTS

Table 30: İBB 2021 Air Quality Report Çatladıkapi Station Data

			2016	2017	2018	2019	2020	2021
Pollutant	Target	Result	Target achieved?		Data Percent		Data > %75	
Particulate Matter 10 µm (PM₁₀)	Annual average 40 µg/m ³	24,7 µg/m ³	Yes		%94,0		Yes	
Particulate Matter 10 µm (PM₁₀)	Exceed daily 50 µg/m ³ value more than 35 times	Exceed 7 times	Yes		-		-	
Nitrogen dioxide (NO₂)	Annual average 40 µg/m ³	62,6 µg/m ³	No		%95,3		Yes	
Nitrogen dioxide (NO₂)	Exceed hourly 200 µg/m ³ value more than 18 times annually	Exceed 3 times	Yes		-		-	
Particulate Matter 2.5 µm (PM₂₅)	Annual average 25 µg/m ³	17,6 µg/m ³	Yes		%92,7		Yes	
Carbon Monoxide (CO)	Continuing 8-hour average 10 mg/m ³	Exceed 0 time	Yes		-		-	
Carbon Monoxide (CO)	Annual average 10 mg/m ³	538,9 µg/m ³	Yes		%90,4		Yes	
Ozone (O₃)	Exceed 8-hour average 120 µg/m ³ more than 25 times annually	Exceed 0 time	Yes		-		-	
Ozone (O₃)	Annual average 120 µg/m ³	31,6 µg/m ³	Yes		%95,3		Yes	

(havakalitesi.ibb.gov.tr/Pages/AirQualityDetails?id=b9709aaf-454d-4e41-af8c-ddc4302b1014)

Table 31: İBB 2021 Air Quality Report Selimiye Station Data

			2017	2018	2019	2020	2021
Pollutant	Target	Result	Target Achieved?		Data percent		Data > %75
Particulate Matter 10 µm (PM10)	Annual average 40 µg/m ³	31,5 µg/m ³	Yes		%84,1		Yes
Particulate Matter 10 µm (PM10)	Exceed daily 50 µg/m ³ value more than 35 times	Exceed 23 times	Yes		-		-
Nitrogen dioxide (NO₂)	Annual average 40 µg/m ³	46,1 µg/m ³	No		%93,9		Yes
Nitrogen dioxide (NO₂)	Exceed hourly 200 µg/m ³ more than 18 times annually	Exceed 2 times	Yes		-		-
Partikül Madde 2.5 µm (PM25)	Annual average 25 µg/m ³	18,9 µg/m ³	Yes		%94,9		Yes
Carbon Monoxide (CO)	continuing 8-hour average 10 mg/m ³	Exceed 0 time	Yes		-		-
Carbon Monoxide(CO)	Annual average 10 mg/m ³	561,8 µg/m ³	Yes		%47,5		No
Ozone (O₃)	Exceed 8-hour average 120 µg/m ³ more than 25 times annually	Exceed 5 times	Yes		-		-
Ozone (O₃)	Annual average 120 µg/m ³	25,4 µg/m ³	Yes		%96,5		Yes

(havakalitesi.ibb.gov.tr/Pages/AirQualityDetails?id=2054f684-6a42-438f-ae03-bb90445e71e6)

The results of air quality stations (*Çatladıkapi station for the European Side; Selimiye station for the Asian Side*), which were established in the scope of project and transferred to the İBB, are constantly surveilled and reported. According to the results of measurements conducted at the end of 2021, it was observed to remain within the target values in eight out of reported nine parameters. While the annual target value for Nitrogen Dioxide (NO₂) is

40,0µg/m³; the average concentration for Çatladıkapi station is 62,6µg/m³, and for Selimiye station is 44,1 µg/m³. **However, based on the results from the nearest Aksaray and Kadiköy stations (81,2µg/m³ and 47,5µg/m³, respectively), it is understood that this situation is not related to the project; but instead originates from the air quality of region.**

ANNEX 11: EURASIA TUNNEL EXTERNAL AND INTERNAL AIR QUALITY ASSESSMENT

External Air Quality Assessment

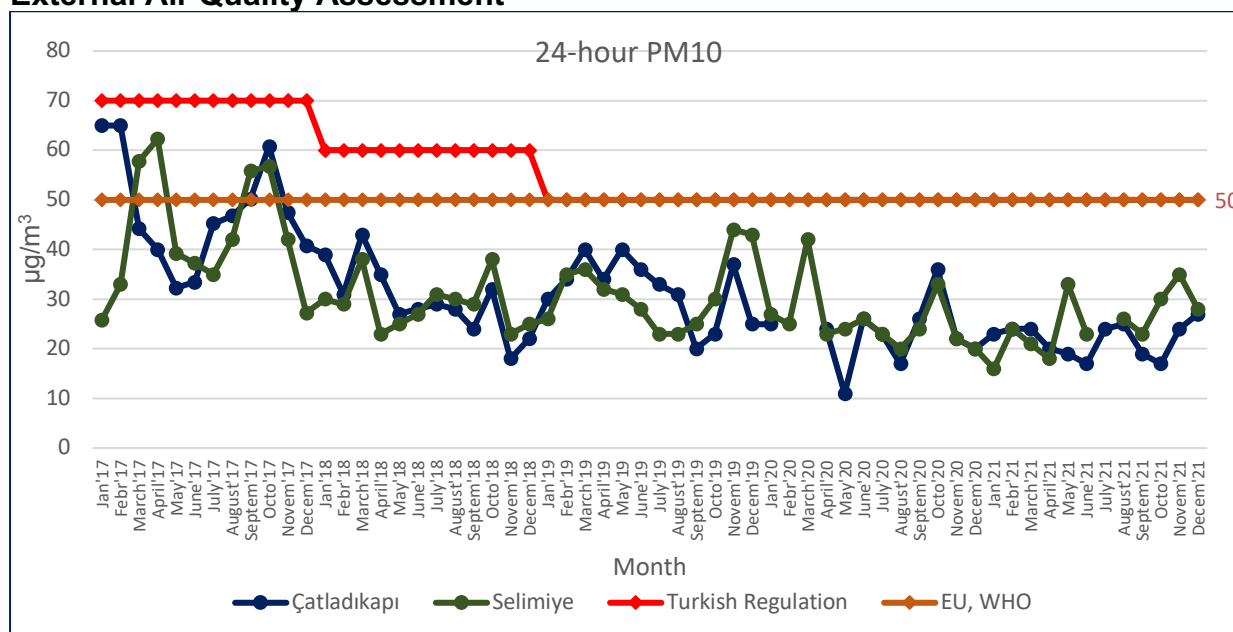


Figure 15: External Air Quality 24-hour- PM10 Analysis Results

When the 24-hour PM₁₀ analysis results were assessed for each operating year, the **PM₁₀ concentrations were determined to be below the standard limits.**

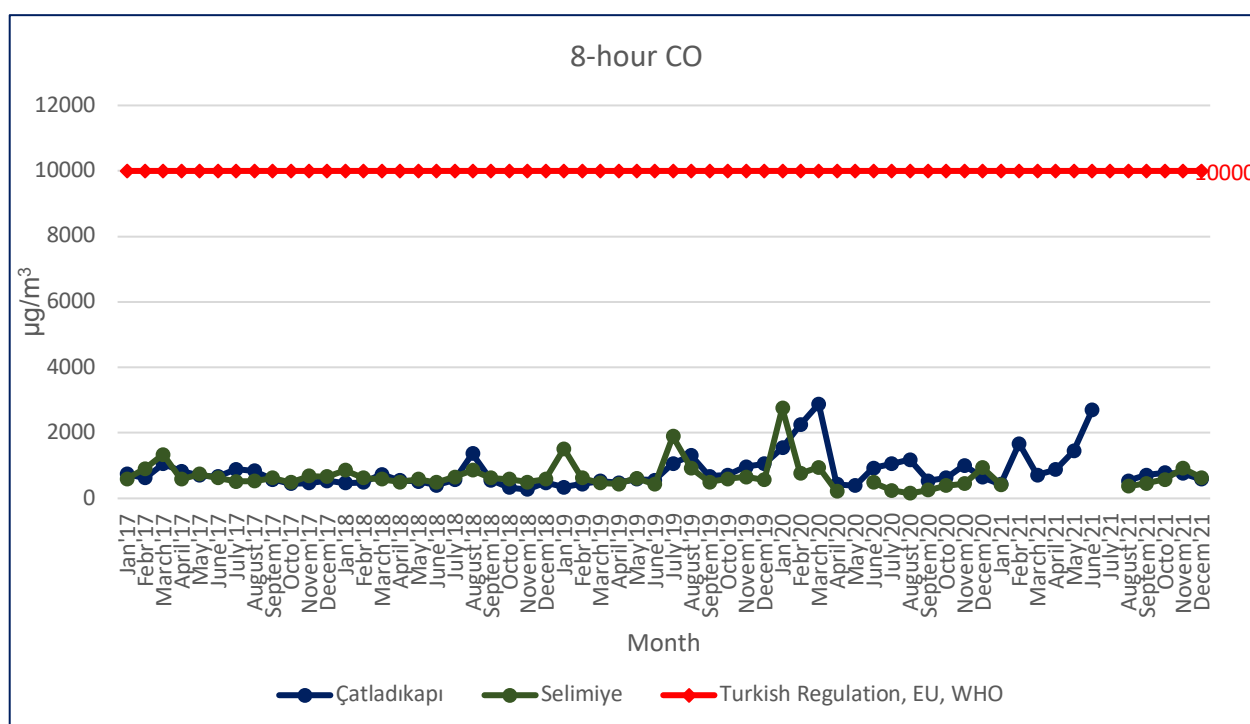


Figure 16: External Air Quality 8-hour CO Analysis Results

When the 8-hour CO analysis results were assessed for each operating period, the **CO concentrations were determined to be quite below the standard limits.**

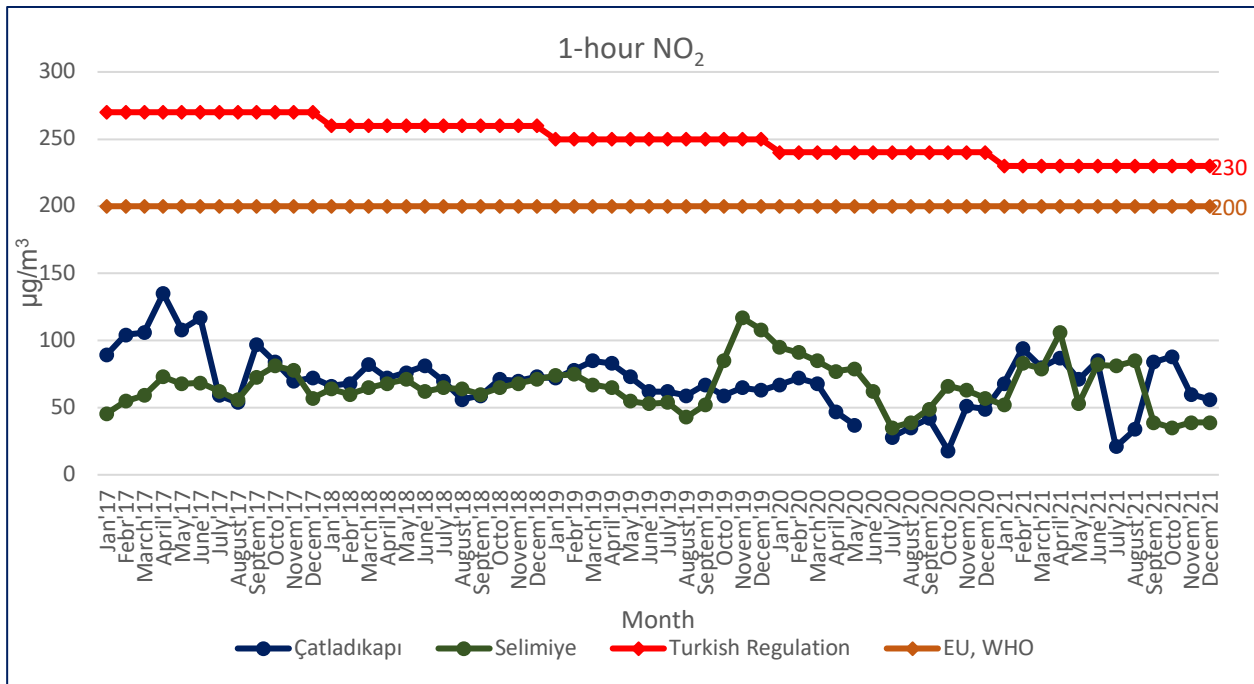


Figure 17: External Air Quality 1-hour NO₂ Analysis Results

When the 1-hour NO₂ analysis results were assessed for each operating year, **the NO₂ concentrations were determined to be below the standard limits.**

Internal Air Quality Assessment

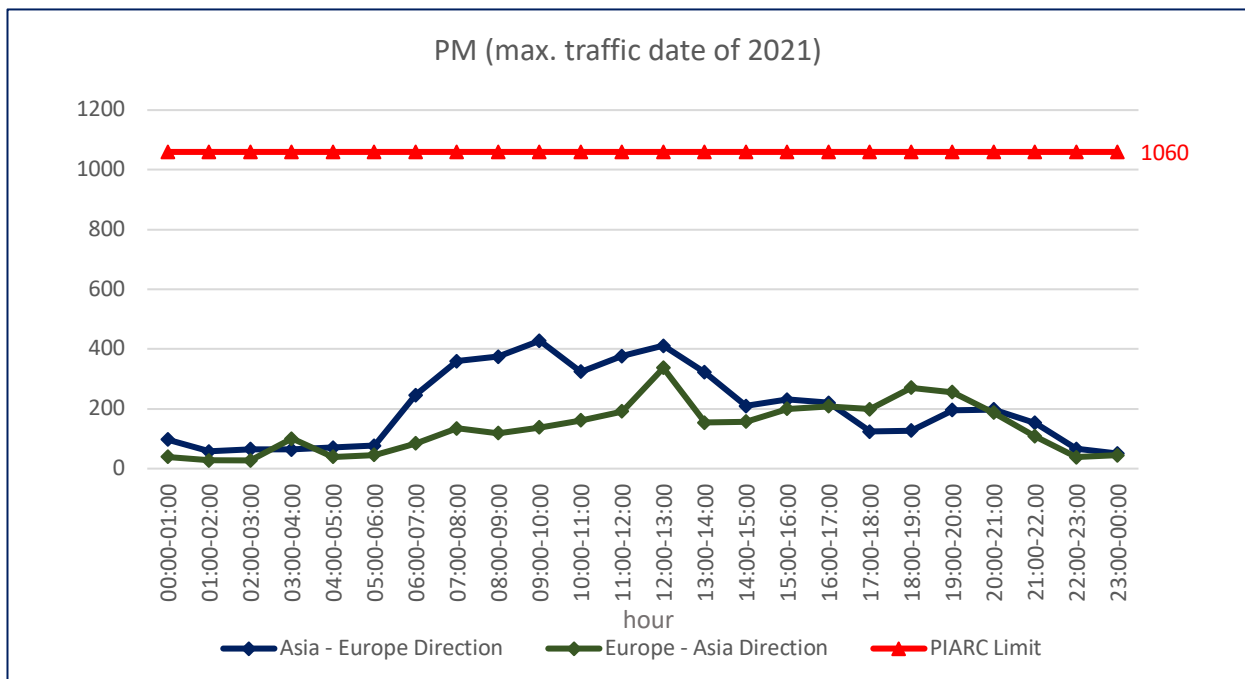


Figure 18: Internal Air PM Analysis Results (the peak traffic day in 2021)

When the analysis results of PM data obtained from the sensor group with the highest concentration on the peak traffic day for each operating year were assessed, **the concentration for both decks were determined to be below the standard limits.**

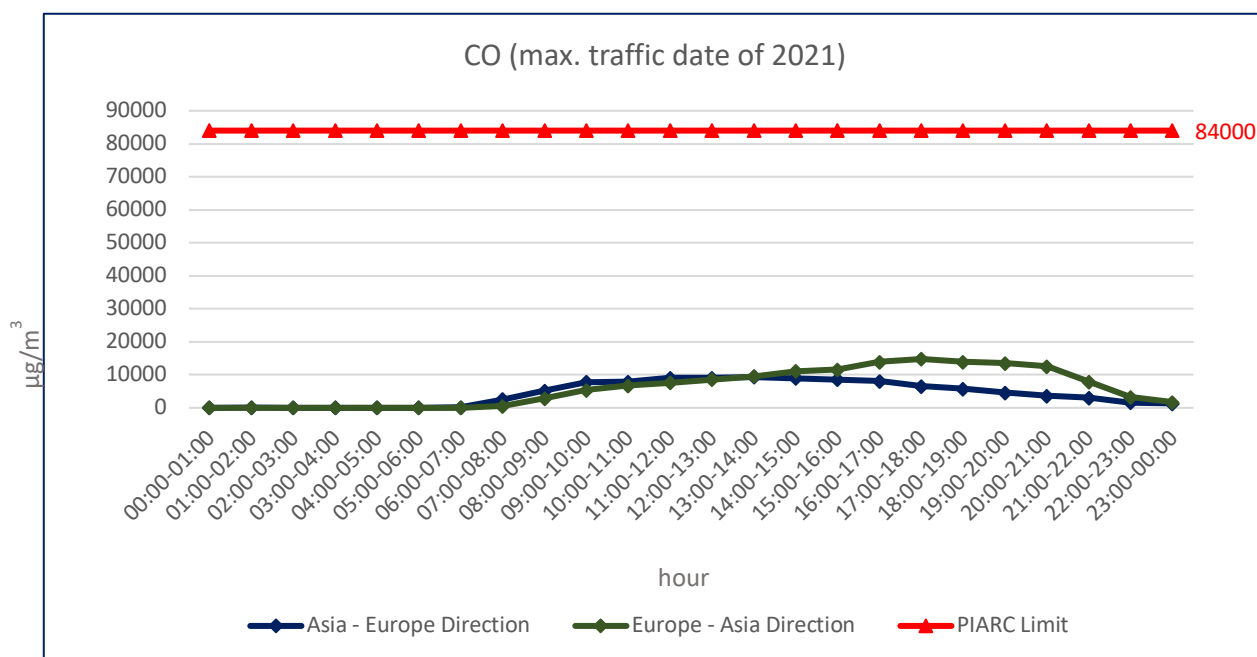


Figure 19: Internal Air Quality CO Analysis Results *(the peak traffic day in 2021)*

When the analysis results of CO data obtained from the sensor group with the highest concentration on the peak traffic day for each operating year were assessed, **the concentration for both decks were determined to be below the standard limits.**

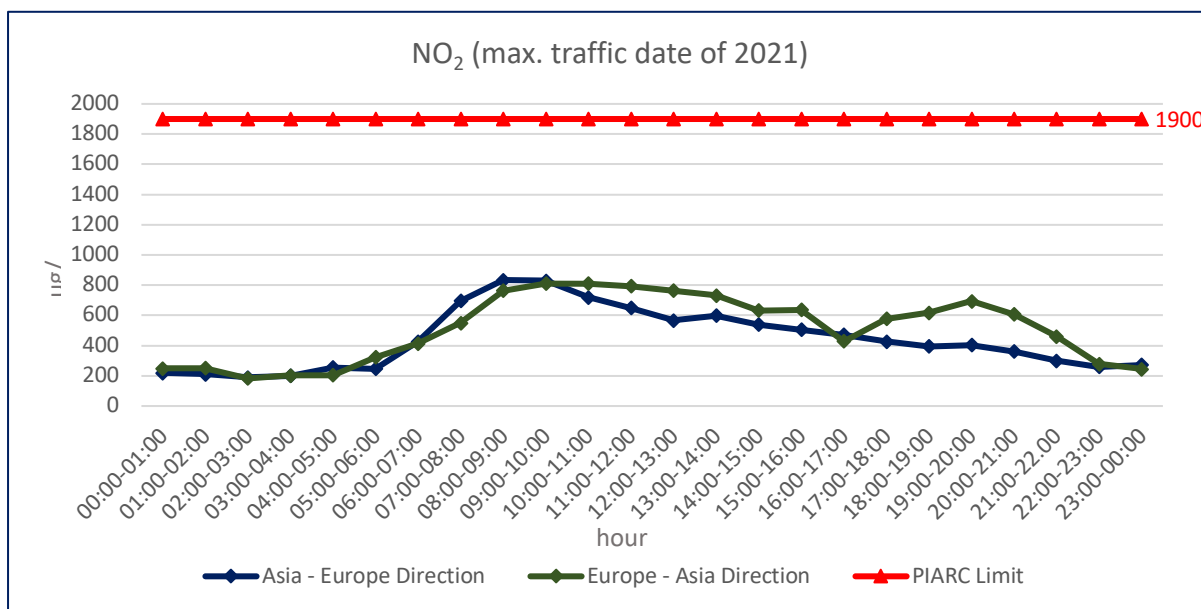
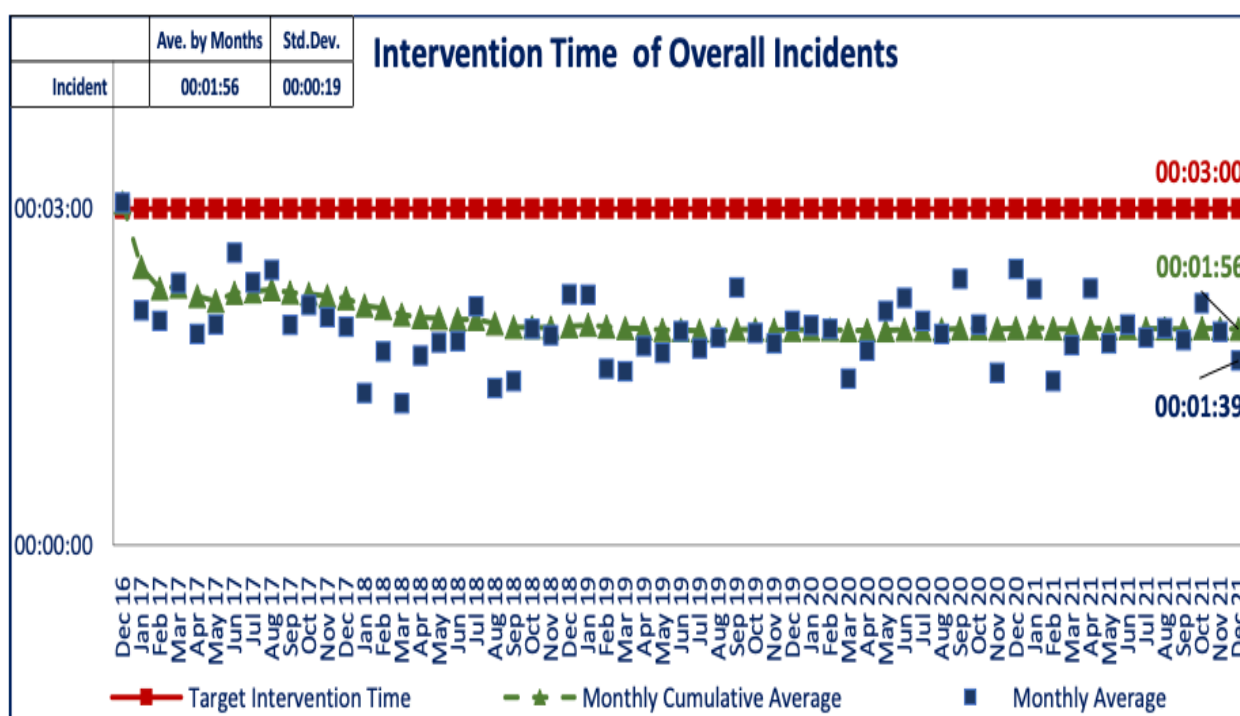
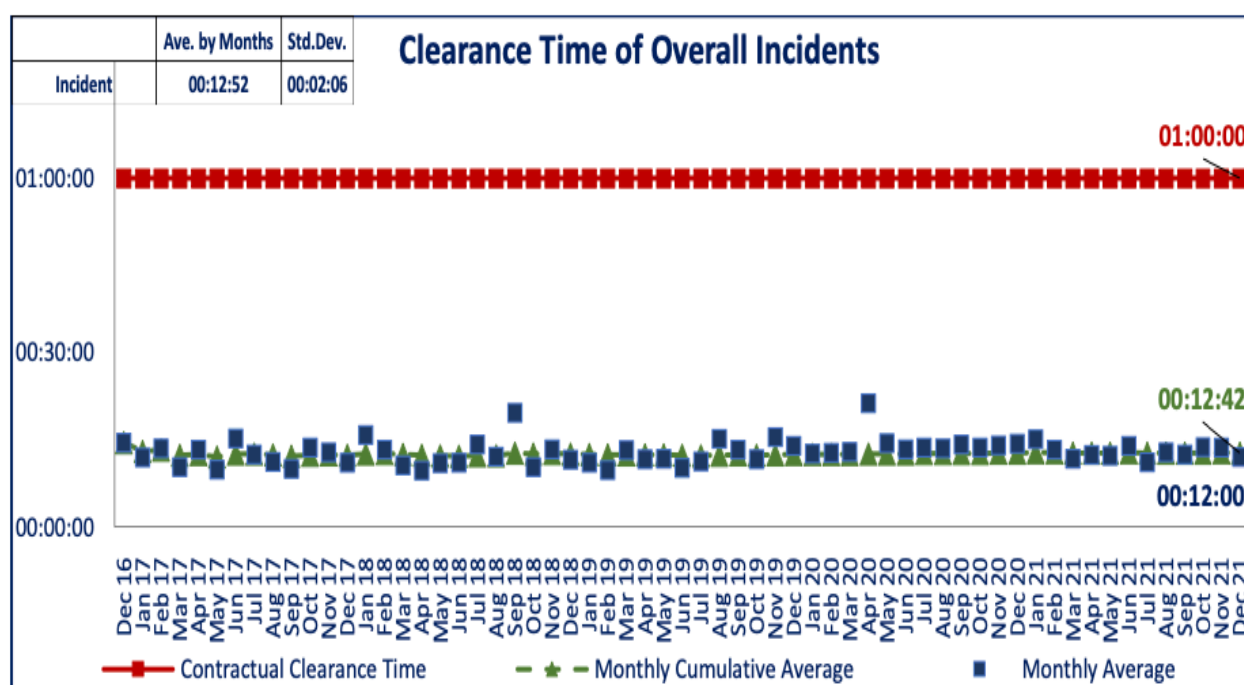


Figure 20: Internal Air Quality NO₂ Analysis Results *(the peak traffic day in 2021)*

When the analysis results of NO₂ data obtained from the sensor group with the highest concentration on the peak traffic day for each operating year were assessed, **the concentration for both decks were determined to be below the standard limits.**

ANNEX 12: RESPONSE TO AN INCIDENT AND FINALIZATION**Diagram 10:** Response Time to an Incident in Eurasia Tunnel by month and cumulative average**Diagram 11:** Finalization Time of an Incident in Eurasia Tunnel by month and cumulative average

ANNEX 13: CUSTOMER SATISFACTION SURVEY RESULTS

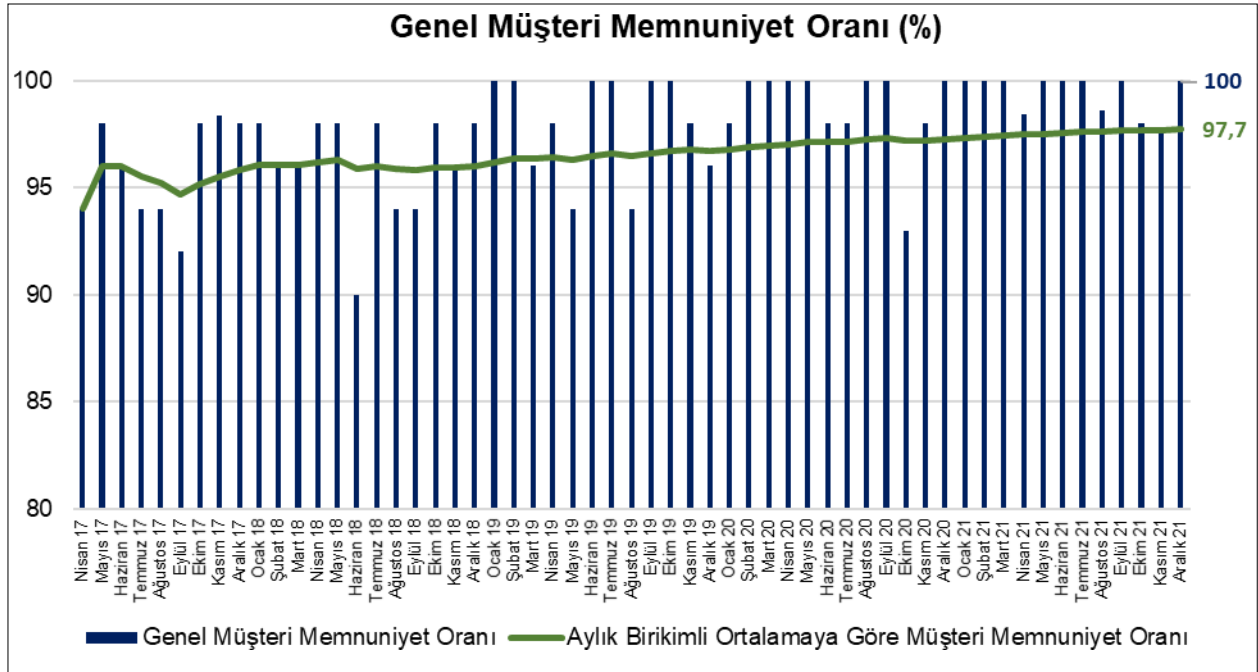


Figure 21: The Customer Satisfaction Rate in Eurasia Tunnel by months and cumulative average

Table 32: Eurasia Tunnel Customer Satisfaction Survey Results and Satisfaction Percentages

Survey Questions	Customer Satisfaction (%)
First response How would you rate your satisfaction with our team in providing service?	97,7
Are the signs and directions within the Tunnel sufficient for you to understand the safe stop point?	91,6
How fast do you think our first response teams reach to the scene?	97,0
How would rate your satisfaction with our personnel in approaching you related to your problem?	97,4
If our personnel used equipment to respond the incident, how would you rate the adequacy of equipment?	94,8
In your opinion, to what extent our personnel responded the situation correctly?	96,5

ANNEX 14: TRAFFIC DATA

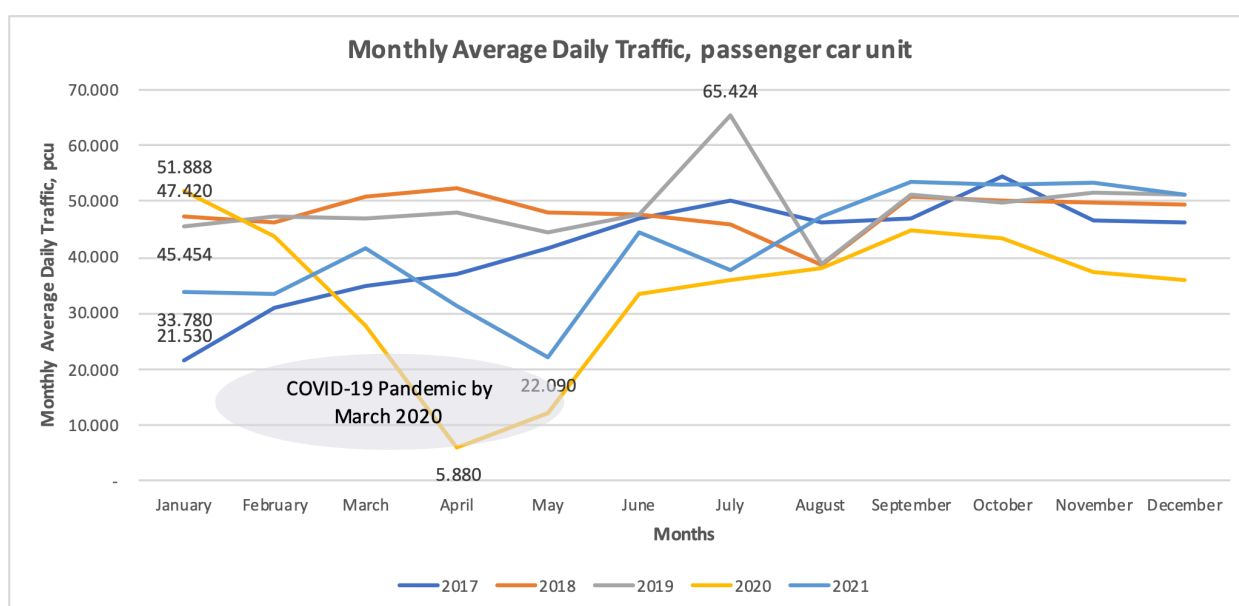


Figure 22: Average Daily Traffic by Month, Unit Vehicle

Table 33: Daily Average Vehicle Passes per month, Unit vehicle

Year	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
2017	21.530	30.913	34.723	37.198	41.545	46.897	50.178	46.288	46.861	54.488	46.601	46.413
2018	47.420	46.203	50.807	52.375	48.051	47.658	45.802	38.621	50.823	50.148	49.872	49.498
2019	45.454	47.314	47.032	48.078	44.425	47.502	65.424	38.795	51.392	49.955	51.757	51.233
2020	51.886	43.853	27.779	5.880	12.021	33.504	35.861	37.958	44.699	43.313	37.309	35.807
2021	33.780	33.365	41.477	31.158	22.090	44.481	37.710	47.391	53.511	52.906	53.494	51.202

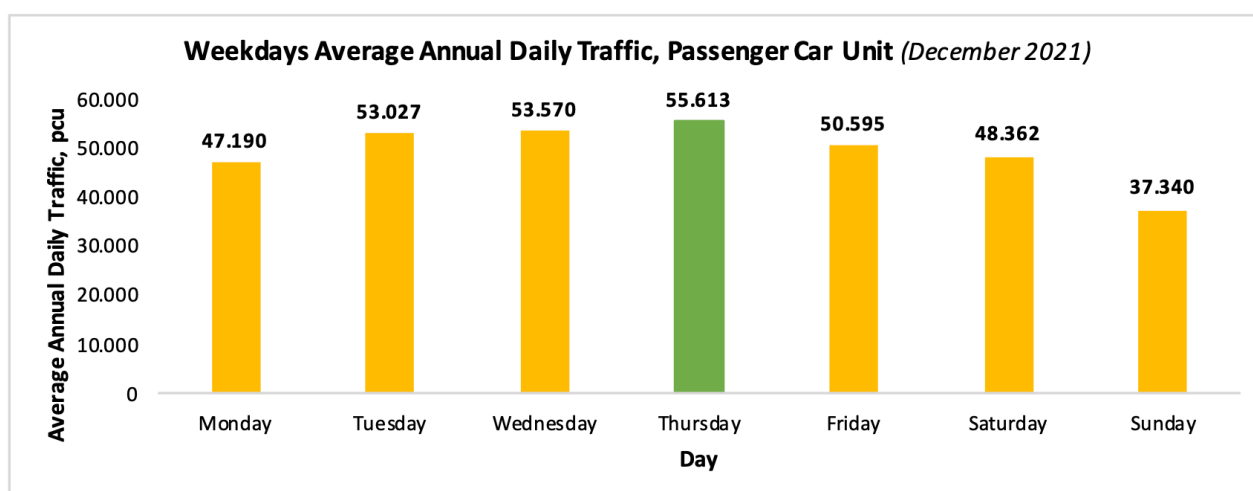


Figure 23: Week days- average traffic, passenger car unit

ANNEX 15: AWARDS GRANTED TO THE EURASIA TUNNEL PROJECT

The Eurasia Tunnel was deemed worthy of fourteen (14) awards in total; 5 awards during financial period, 5 awards during construction period, and 4 awards during operating period. Below you may find the detailed information about the awards granted to the project.

FINANCIAL PERIOD AWARDS

1) Euromoney Magazine, The Best Project Finance Agreement of Europe (2012)

The Euromoney Magazine launched in 1969 in England is one of the leading business and finance magazines in the world with a 25 thousand circulation per month which released its 628th issue in January. The Eurasia Tunnel was granted “the Best Project Finance Agreement of Europe” award by the Euromoney Magazine in 2012. The project deserved the award thanks to its finance agreement which 78% of total investment amounting to about 1,2 billion US Dollars.



2) Infrastructure Journal, The Most Innovative Transportation project (2012)

Infrastructure Journal within the structure of IJGlobal, which stands out as one of the largest infrastructure and project finance data resource, ranked the Eurasia Tunnel among the best 100 projects in 2012. The Eurasia Tunnel was selected as on the most innovative transportation projects and deemed worthy of achievement award.



3) Thomson Reuters Project Finance International, The Best Infrastructure Project Finance Agreement (2012)

Thomson Reuters Project Finance International (PFI), a bi-weekly printed and daily updated trade publication, of which 712th issue was released in January 22, takes the pulse of global project financing and business world. Within the scope international Finance Project Awards, the Eurasia Tunnel was granted “the Best Infrastructure Project Finance Agreement-2012” of the Middle East and Africa.



4) EMEA Finance Magazine, The Best Public Private Partnership (2012)



The EMEA Finance Magazine has its editorial vision to be “the independent voice”-one that speaks at the highest level of honesty and journalism ethics for the financing community, customers and suppliers in the region of Europe, Middle East, Africa (*EMEA*)-and has been published 6 times per year since 2008. The 76th issue was released in 2021. The EMEA Finance Magazine granted the Best Public-Private Partnership Implementation award to the Eurasia Tunnel in 2012.

5) International Road Federation (IRF), Project Finance and Economy Award (2019)



International Road Federation (*IRF*) headquartered in Washington DC since 1948 is a non-profit global organization supported by the regional offices across the world. The International Road Federation, which was established for the purpose of promoting and supporting the development of road networks around the world and provides service to the members of public and private sector in 118 countries, granted “the Project Finance and Economy Award” in the scope of “**Global Achievement Awards**” to the Eurasia Tunnel in 2019.

CONSTRUCTION PERIOD AWARDS

6) European Bank for Reconstruction and Development, the Best Environmental and Social Implementation (2015)



The European Bank for Reconstruction and Development (*EBRD*) granted “The Best Environmental and Social Implementation Award” deemed worthy for the best projects in terms of sustainability to the Eurasia Tunnel in 2015. **As a result of evaluation carried out by the independent jury among 28 projects**, the Eurasia Tunnel Project was granted the award on the basis of high environmental and social standards implemented during the construction period”.

7) International Tunnel and Underground Space Association, Project of the Year (2015)

The International Tunneling and Underground Space Association with 78 member countries and 310 affiliated members, founded in 1974 is a non-governmental organisation which aims at promoting the use of underground to the benefit of public, environment, and sustainable development. The Eurasia Tunnel was granted the “ITA Major Project of the Year” in 2015 under the category of “Major Projects” of ITA International Tunneling Awards held by the ITA, which is recognized as the primary association in the Tunneling world.



8) ENR Magazine, The Best Project (2016)

Engineering News Record (*ENR*) founded in 1874 in the USA, is a weekly magazine which provides news, analysis, data, and opinions about the construction sector across the world. The magazine, which is considered to be one of the leading and most trustworthy publications in the construction sector, has a 71 thousand circulation and thousands of digital magazine subscribers. The ENR selected the Eurasia Tunnel as “**The Best Project in 2016 in the World**” under the tunnel and bridge category at the awards ceremony held in New York in 2016.



9) Korean Society of Civil Engineers, Construction Award of the Year (2017)

Korean Society of Civil Engineers founded in 1951, is a non-governmental organisation aimed at providing quality service to its shareholders with the support of its 26.000 members working in various fields of civil engineering. The Eurasia Tunnel project was deemed worthy of “The Construction Award of the Year” under the “**Golden Category**” at the awards ceremony held in 2017.



10) International Road Federation (IRF), Global Achievement Award (2017)

The International Road Federation providing service to the public and private sector members in 118 countries since 1948 was founded with an objective to promote and support the development of road networks across the world. As a consequence of evaluations carried out by the jury in the scope of IRF Global Achievement Awards”, the Federation granted the major award under the “Construction Methodology” category to the Eurasia Tunnel .



OPERATING PERIOD AWARDS

11) The Illuminating Engineering Society of North America, Architectural Lighting Award (2017)



The Illuminating Engineering Society of North America founded in New York in 1906 as a non-governmental organisation with its more than 8 thousand members granted the “Architectural Lighting Award” to the Eurasia Tunnel in 2017 thanks to its contributions to the illumination designs.

12) New Civil Engineer Journal, Maintenance and Renovation Method (2018)



New Civil Engineer Journal, one of the most prestigious engineering journals launched in 1972 in England and published on a monthly basis, granted an award to the Eurasia Tunnel under “**The Maintenance and Renovation Method**” on the grounds of the project that was realized with Arup to improve the energy efficiency and sustainability.

13) Enterprise Asia Organization, International Innovation Award (2020)



Enterprise Asia is an active non-governmental organisation with more than 2 thousand members in 14 countries in search for creating a prosperous Asia in the light of sustainable economic and social development vision in the world of economic equality since 2006. The Eurasia Tunnel was granted an award under “The Service and Solution” category within the scope of International Innovation Awards 2020 held annually to award the most innovative companies by the Enterprise Asia for the *Pacemaker* .

14) New Civil Engineer Journal, Tunneling Systems, Maintenance and Renovation Innovation Award (2021)

New Civil Engineering (NCE), launched in 1972 in England and published monthly with a 50 thousand circulation, in the light of its 50-year experience, awards the best tunneling practices around the world annually. The Eurasia Tunnel was deemed worthy of “**Innovation Award in Tunnelling Systems, Maintenance and Renovation Areas**” in 2021 thanks to its *Pacemaker* materialized in 2020.



Consequently, the Eurasia Tunnel has been an exemplary project which has always attracted the attention of sectoral shareholders around the world on the basis of its **properties involving a number of groundbreaking and successful practices** in the finance, construction, and operation processes. These precious international awards granted as a result of meticulous examination of various criteria by the most prestigious institutions **have a testimonial value as regards the competency of Eurasia Tunnel Project in supreme engineering service and operation field and has manifested that the project was executed transparently.**

ANNEX 16: ECONOMIC BENEFITS OF EURASIA TUNNEL

1. INTRODUCTION

This report has been produced to determine the direct benefits of Eurasia Tunnel for the people who use it and on the grounds of the fact that it relieves the general traffic congestion in İstanbul, its indirect benefits for the drivers who use the 15th of July Martyrs' Bridge. Firstly, the estimation method related to the benefits have been specified and then the results have been shared.

2. ESTIMATION METHODS

These benefits generated by the tunnel flow from two resources:

1. Upon the materialization of Eurasia Tunnel, the users of 15th of July Martyrs' Bridge started to prefer Eurasia Tunnel, in consequence of which the following benefits; (i) reduced travel time, (ii) reduced fuel consumption, (iii) reduced green gas emission (iv) reduced accident costs were estimated.
2. The benefits that come about as a result of decrease in traffic congestion in the 15th of July Martyrs' Bridge as people prefer Eurasia Tunnel to the 15th of July Martyrs' Bridge are assessed to be the reduced travel time and thus the reduced fuel congestion.

The abovementioned benefits were assessed in terms of both round trip at the peak hours and total traffic.

2.1. Explanation of Factors Used for Estimating the Benefits

2.1.1. Time Value

The time value is calculated by dividing the Gross Domestic Products ("GDP") determined for the given city by 2,0000-work hour over a year. The below acceptances were taken into account while calculating the determined GDP value for İstanbul:

- ❖ Turkish Statistical Institute (TÜİK) calculated the realized GDP¹²³ value for Turkey for 2020 as 6,5 trillion TL by maximizing 5,1 trillion TL with the average of real growth estimation (8,3%) of the institutions such as OECD, IMF, World Bank, JP Morgan, Goldman Sachs, Moody's for the year of 2021 and then by bringing it to a nominal value with 19,3%, the expected inflation forecast for 2021 on the basis of CBRT Survey of Market Participants dated November 2021.

¹²³ TÜİK, data.tuik.gov.tr/Kategori/GetKategori?p=Ulusal-Hesaplar-113

- ❖ The GDP rate for İstanbul was obtained as 30,7% by comparing the GDP values declared by TUIK in 2019 at the provincial level and the national level to each other; it was divided by population forecast in İstanbul for 2021 (15.634.257 people; www.nufusu.com) and the GDP per capita was calculated to be 128.190 TL/capita in İstanbul.
- ❖ Hence, when the estimated GDP value is divided by 2,000-work hour, Time Value (TV) is obtained as follows:

$$TV = 64,1 \text{ TL/hour}$$

2.1.2. Fuel Consumption Rate

Chang et al (1976)¹²⁴ and Ferreira (1982)¹²⁵ in England developed the below-mentioned model to calculate the fuel consumption in urban areas:

$$f = k_1 + k_2/u$$

Provided below are the meaning of abbreviations:

f= fuel consumption value, liter/vehicle-km, k_1 = calibration constant, liter/ vehicle-km, k_2 = calibration constant, liter/ vehicle-h, u= speed km/hour.

The English model representing an average passenger car with the engine size of 1500 cc is provided hereunder:

$$f = 0,07 + 1,65/u,$$

On the grounds of the fact that the vehicle fleet in England exemplifies the vehicle fleet in Turkey better, this model was used in fuel consumption calculations.

2.1.3. Greenhouse Gas Emission Factors

The greenhouse gas emission factors¹²⁶ published by the Energy and Climate Change Department was given in Table 34 in terms of gram/vehicle-km. The weighted average of greenhouse gas emissions was obtained by using 60% and 40% for the percentages of diesel and gasoline-powered vehicles based on the data of TUIK.

The Air Pollution Cost signifies motor vehicle air pollutant damages including the human health, ecological and aesthetic disruption. The exhaust emissions are pollutants directly released through vehicle exhaust pipes. The cost of CO₂ emissions is estimated to be 300 \$/ton ¹²⁷. Therefore, the cost of emissions was calculated by using this value.

¹²⁴ M.F. Chang, et.al. "The Influence of Vehicle Characteristics, Driver Behavior, and Ambient Temperature on Gasoline Consumption in Urban Areas," General Motors Corporation, Warren, MI, 1976

¹²⁵ L.J.A. Ferreira, "Car Fuel Consumption in Urban Traffic. The Results of a Survey in Leeds using Instrumented Vehicles," Working Paper 162. Institute of Transport Studies, University of Leeds, Leeds, UK, 1982

¹²⁶ Department of Energy and Climate Change, "A review of data and methods to calculate greenhouse gas emissions from alternative fuel transport" Final report, Ocak 2014
uk-air.defra.gov.uk/assets/documents/reports/cat07/1404301317_AFV_Final_Report_11April14_FINAL.pdf

¹²⁷ Tod Litman, Victoria Transport Policy Institute, Transportation Cost and Benefit Analysis II – Air Pollution Costs," 2020, www.vtpi.org

Table 34: Greenhouse Gas Emission Factors for Cars¹²⁸

Fuel Type	Greenhouse Gas Emissions (g/vehicle-km)				
	CO ₂	N ₂ O	CH ₄	NO _x	PM
Diesel	150,94	0,009	0,001	0,48	0,027
Gasoline	160,75	0,0018	0,0013	0,05	0,001
Weighted average	154,864	0,00612	0,00112	0,308	0,0166

2.1.4. Accident Cost per Vehicle-km

The average cost and average GDP/per capita statics related to the fatal and injury accidents and accidents only resulting in material damage in various states of USA were provided in Table 35. In this table, assuming that the accident costs are proportionate to the GDP/capita, accident costs in Turkey for fatal and injury accidents and accidents only resulting in material damage were calculated by multiplying the average US values by Turkey's ratio to the US average. By using these accident values, the average value of traffic accidents per vehicle-km in Turkey were calculated to be **0,0290\$ or 0,2424 TL** (1\$=8,3572) *per vehicle-km* as given in Table 36.

Table 35: Average Accident Costs in Various Accident Categories¹²⁹

COUNTRY	GDP/capita (\$)	Fatal Accident Unit Cost (\$)	Injury Accident Unit Cost (\$)	Accidents only resulting in material damage Unit Cost(\$)
US Average	55.890	1.051.127	43.294	5.864
Turkey *	9.219	173.382	7.141	967

*The accident values for Turkey were estimated by multiplying the average US values by Turkey/Average US GDP/capita ratio.

¹²⁸ Department of Energy and Climate Change (January 2014), "A review of data and methods to calculate greenhouse gas emissions from alternative fuel transport" Final report.
uk-air.defra.gov.uk/assets/documents/reports/cat07/1404301317_AFV_Final_Report_11April14_FINAL.pdf

¹²⁹ VTPI Transport Cost and Benefit Analysis II – Safety and Health Costs, Victorian Institute of Transport Policy 2020
www.vtpi.org/tca/tca0503.pdf .

Table 36: Accident Cost Calculation per Vehicle / Km¹³⁰

No	COST CALCULATION PARAMETERS FOR TURKEY PER VEHICLE/KM	u	AMOUNT
1	Total vehicle -km for 2019	vehicle-km	135.485.000.000
2	Total deaths in Traffic Accidents in 2019	unit	5.473
3	Total injuries in Traffic Accidents in 2019	unit	283.234
4	Accidents only resulting in material damage in 2019	unit	993.248
5	Fatal Accident Unit Cost	\$	173.382
6	Injury Accident Unit Cost	\$	7.141
7	Accidents only resulting in material damage Unit Cost	\$	967
8	Total Cost of Fatal Accidents (2)x(5)	\$	948.304.042
9	Total Cost of Injury Accidents (3)x(6)	\$	2.021.343.211
10	Total Cost of Accidents only resulting in material damage (4)x(7)	\$	960.104.759
11	Total Cost of All Accidents (8)+(9)+(10)	\$	3.929.752.011
12	Accident Cost per vehicle-km (11)/(1)	\$	0,0290
13	Nb of fatal accident per million km (1)/(2)/1.000.000	Unit/million km	0,0403
14	Nb of injury accident per million km (1)/(3)/1.000.000	Unit/million km	2,0905
15	Nb of Accidents only resulting in material damage per million km (1)/(4)/1.000.000	Unit/million km	7,3310

¹³⁰ TÜİK: data.tuik.gov.tr/Bulten/Index?p=Road-Traffic-Accident-Statistics-2019-33628

3. BENEFITS TO THE USERS OF TUNNEL

3.1. The Estimation of Travel Time Saving

The possible routes from a typical corridor, namely Bakırköy to Kozyatağı through Eurasia Tunnel and 15th July Martyrs' Bridge are depicted in Figure 23. On the basis of IBB Management Centre data, the average travel time, traffic volume and the resulting savings observed in September 2021 are given in Table 37. **Assuming that a driver residing in the Asian side and working in the European side travels to and from work at the peak hours, the daily total travel time saving per daily vehicle will be 31+34 = 65 minutes (1,08 hour). As the time value is 64,10 TL/hour and average vehicle occupancy rate is 1,57 person/vehicle¹³¹, the monetary benefit generated from time saving per daily vehicle occupancy can be calculated as follows:**

$$\text{Travel Time saving per vehicle} = 1,08 \times 64,10 \times 1,57 = \mathbf{109 \text{ TL/day}}$$

On the grounds that the two-way toll fee difference in 2021 between the Eurasia Tunnel and 15th July Martyrs' Bridge is $2 \times 46 - 13,25 = 78,75$ TL, the travel time saving, alone, fully covers the extra toll fee paid for the tunnel.

The total annual time saving is calculated and presented in Table 37 by using the realized time saving and traffic figures realized within the relevant timeframe and assuming the values as follows: 13-hour off-peak, 2-hour in the morning and 2-hours in the evening at the peak time and 7-hour negligible time (*Due to the fact that the usage time extends to the greater part of the day in the 15th July Martyrs Bridge, these values were accepted as 2-hour each peak time, 16-hour off-peak and 4-hour negligible time*). The time saved corresponds to 8.100,078-hour travel time which accounts for **519.174.527 TL/year**.

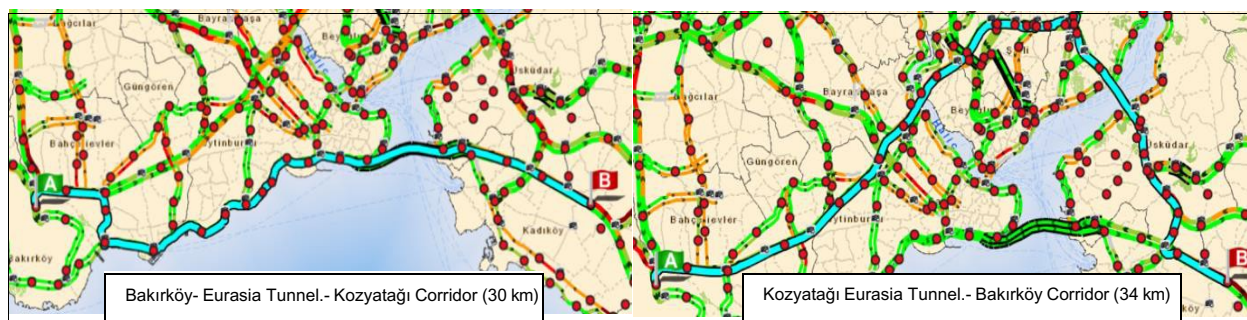


Figure 23: Typical Corridors Chosen for Eurasia Tunnel and the 15th July Martyrs Bridge

¹³¹ İstanbul Metropolitan Municipality, Transportation Planning Management, (May 2011), "İstanbul Metropolitan Area Transportation Master Plan". www.ibb.istanbul/Uploads/2017/3/iUAP-ozet-Rapor.pdf

Table 37: Average Travel Time¹³², Traffic Volumes and Travel Time Savings Observed in September 2021 in Bakırköy - D100 Kozyatağı Corridor

No	PARAMETERS RELATED TO THE EARNED TIME ^G	UNIT	MORNIN G PEAK* (A)	OFF- PEAK I* (B)	EVENING PEAK* (C)
1	Average Travel Time between Bakırköy- Eurasia Tunnel- Kozyatağı Arası in weekdays	min	39	35	57
2	Average Travel Time between Kozyatağı- Eurasia Tunnel- Bakırköy in weekdays	min	49	41	57
3	Average Travel Time between Bakırköy-15th July Martrys Bridge- Kozyatağı in weekdays	min	60	54	91
4	Average Travel Time between Kozyatağı-15th July Martrys Bridge- Bakırköy in weekdays	min	80	54	62
5	Earned Time for each vehicle between Bakırköy- Kozyatağı (3-1)	min	21	19	34
6	Earned Time for each vehicle between Kozyatağı- Bakırköy(4-2)	min	31	13	5
7	Direction wise hourly traffic between Bakırköy-Eurasia Tunnel- Kozyatağı	Vehicle/ hour/direction	1.118	1.431	2.714
8	Direction wise hourly traffic between Kozyatağı-Eurasia Tunnel- Bakırköy	Vehicle/ hour/direction	2.629	1.534	1.183
9	In-vehicle occupancy	individual	1,57		
10	Number of days during the week	day	303		
11	Time cost value for one individual	TL	64,10		
12	Annually Earned Time for All Vehicles between Bakırköy-Eurasia Tunnel- Kozyatağı $((9) \times ((7A) \times (5A) \times 2 + (7B) \times (5B) \times 13 + (7C) \times (5C) \times 2) \times (10) / 60$	Hour	4.663.604		
13	Annually Earned Time for All Vehicles between Kozyatağı- Bakırköy $((9) \times ((8A) \times (6A) \times 2 + (8B) \times (6B) \times 13 + (8C) \times (6C) \times 2) \times (10) / 60$	Hour	3.436.475		
14	Annual Total Earned Time (12+13)	Hour	8.100.078		
15	Annual Monetary Value of Saving (14x11)	TL	519.174.527		

* Peak hours in the morning: 08:00-10:00; off-peak hours: 06:00-08:00, 10:00-17:00, 19:00-22:00, peak hours in the evening:17:00-19:00

3.2. Fuel Saving

The results of the calculations regarding the fuel savings generated by the preference of Eurasia Tunnel to the 15th July Martrys Bridge are presented in Table 38.

Table 38: Fuel Consumption Saving

No	PARAMETERS RELATED TO THE FUEL CONSUMPTION	UNIT	MORNING PEAK (A)	OFF-PEAK (B)	EVENING PEAK (C)
1	Average Speed between Bakırköy-Eurasia Tunnel- Kozyatağı in weekdays	km/hour	47	54	33
2	Average Speed between Kozyatağı-Eurasia Tunnel- Bakırköy in weekdays	km/hour	39	46	36
3	Distance between Bakırköy-Eurasia Tunnel-Kozyatağı	km	30		
4	Average Speed between Bakırköy-15th July Martrys Bridge- Kozyatağı	km/hour	32	37	20
5	Average Speed between Kozyatağı-15th July Martrys Bridge- Bakırköy in weekdays	km/hour	22	33	27
6	Distance between Bakırköy-15th July Martrys Bridge-Kozyatağı	km	34		
7	Fuel Consumption per vehicle between Bakırköy-15th July Martrys Bridge-Kozyatağı u $(0,07+1,65/(1)) \times (3)$	lt.	4,151	3,899	5,191
8	Fuel Consumption per vehicle between Kozyatağı-15th July Martrys Bridge-Bakırköy $(0,07+1,65/(2)) \times (3)$	lt.	4,894	4,068	4,440
9	Fuel Consumption per vehicle between Bakırköy-Eurasia Tunnel-Kozyatağı $(0,07+1,65/(4)) \times (6)$	lt.	3,163	3,013	3,602
10	Fuel Consumption per vehicle between Kozyatağı-Eurasia Tunnel-Bakırköy $(0,07+1,65/(5)) \times (6)$	lt.	3,361	3,170	3,493
11	Fuel Consumption per vehicle between Bakırköy and Kozyatağı through Eurasia Tunnel	lt.	0,987	0,886	1,589
12	Fuel Consumption per vehicle between Kozyatağı and Bakırköy through Eurasia Tunnel	lt.	1,533	0,898	0,947
13	Direction wise hourly traffic between Bakırköy-Eurasia Tunnel-Kozyatağı	vehicle/hour/direction	1.118	1.431	2.714
14	Direction wise hourly traffic between Kozyatağı-Eurasia Tunnel- Bakırköy	vehicle/hour/direction	2.629	1.534	1.183
15	Number of days during the week	day	303		
16	Hourly Fuel Consumption for all vehicles between Bakırköy-Eurasia Tunnel-Kozyatağı $(11) \times (13)$	lt./hour	1.104	1.268	4.313
17	Hourly Fuel Consumption for all vehicles between Kozyatağı-Bakırköy $(12) \times (14)$	lt./hour	4.029	1.377	1.120
18	Daily Total Fuel Saving $((16A)+(17A)) \times 2 + ((16B)+(17B)) \times 13 + ((16C)+(17C)) \times 2$	lt./day	55.524		
19	Annually Total Fuel Saving $(18) \times (15)$	lt./year	16.823.836		
20	Fuel Litre Price	TL/lt.	7,225		
21	Annual Monetary Value of Fuel Saving $(19) \times (20)$	TL	121.554.235		

The Daily total fuel saving per day/vehicle for a driver who uses the tunnel at peak hours in the morning and evening would be = $(1,533+1,589) = 3,122$ lt.

The fuel saving per person will be **23 TL/day** on a daily basis with fuel cost in average of 7,2251 TL/lt (*7,5160 TL/lt in average for %60 diesel fuel, %40 gasoline and unleaded 95 octane, 7,0312 TL/lt pay acceptance for diesel fuel*). The annual total saving for fuel consumption will be **16.823.836 lt/year**, monetary saving will be **121.554.235 TL/year**.

3.3. The Estimation of CO₂ Emission Reductions

The decline in CO₂ emissions are calculated and presented in table 39 by using the emission factors given in Table 34 and the obtained vehicle-km estimations. **The cost of CO₂ emissions are declared to be 300 \$/ton by the Victoria Transport Policy Institute¹³³.**

Table 39: Reduction in CO₂ Emissions

No	PARAMETERS RELATED TO THE CO ₂ REDUCTION	UNIT	MORNING PEAK (A)	OFF PEAK (B)	EVENING PEAK (C)
1	CO ₂ Emission Value per vehicle-km	g/vehicle-km	154,864		
2	Distance Saving between Bakırköy-Kozyatağı through Eurasia Tunnel	km	4		
3	Direction wise hourly traffic between Bakırköy-Eurasia Tunnel-Kozyatağı	vehicle/hour/direction	1.118	1.431	2.714
4	Direction wise hourly traffic between Kozyatağı-Eurasia Tunnel- Bakırköy	vehicle/hour/direction	2.629	1.534	1.183
5	Hourly CO ₂ Reduction between Bakırköy Kozyatağı through Eurasia Tunnel (1)x(3)x(2)	kg/hour	692	887	1.681
6	Hourly CO ₂ Reduction between Kozyatağı Bakırköy through Eurasia Tunnel (1)x(4)x(2)	kg/hour	1.629	950	733
7	Daily CO ₂ Reduction in two-way through Eurasia Tunnel ((5A)x2+(5B)x13+(5C)x2+(6A)x2+(6B)x13+(6C)x2)/1000	ton/day	33,35		
8	Number of days during the week	day	303		
9	Annual CO ₂ Reduction through Eurasia Tunnel (7)x(8)	ton/year	10.104		
10	Unit Cost of CO ₂ Reduction	\$/ton	300		
11	Annual Monetary Value of CO ₂ Reduction in Dollars (9)x(10)	\$	3.031.063		
12	Dollar Exchange Rate	TL/\$	8,3572		
13	Annual Monetary Value of CO ₂ Reduction in Turkish Lira (11)x(12)	TL	25.331.202		

The distance in the chosen route is 4 km; however, in the case that Bakırköy coastline is used instead of Atatürk Airport region, then the distance increases to 9 km. **Dollar Exchange rate: 8,3572 TL/\$ (annual average as from the end of November 2021)*

Assuming that a passenger makes a roundtrip at peak hours, the reduction in CO₂ emissions will account for 3 TL/day/person.

3.4. Reducing the Accident Costs

The reduction in accident costs as stated in Table 40 are calculated by using the vehicle-km saved during the passage through the tunnel and vehicle-km accident cost values 0,0290 \$/vehicle-km (for 1\$=8,3572 TL 0,2424 TL/vehicle-km). Assuming that the commuters make roundtrip in the tunnel at peak hours, the daily total vehicle-km/day/vehicle saving will be 2x4= 8 km. Owing to the average accident cost of 0,2424 TL/vehicle-km, accident cost saving in the amount of **8x0,2424=2 TL/day** will be ensured on the basis of a daily roundtrip.

¹³³ Tod Litman, Victoria Transport Policy Institute, Transportation Cost and Benefit Analysis II – Air Pollution Cost,” 2020, www.vtpi.org.

Table 40: Reduction Accident Costs

No	CALCULATION PARAMETERS RELATED TO THE ACCIDENT COST	UNIT	MORNING PEAKE (A)	OFF- PEAK (B)	EVENING PEAK (C)
1	Accident Cost Value per Vehicle-Km	\$/km	0,029		
2	Distance Saving between Bakırköy Kozyatağı through Eurasia Tunnel	km	4		
3	Direction wise hourly traffic between Bakırköy-Eurasia Tunnel- Kozyatağı	vehicle/ hour/ direction	1.118	1.431	2.714
4	Direction wise hourly traffic between Kozyatağı-Eurasia Tunnel-Bakırköy	vehicle/ hour/ direction	2.629	1.534	1.183
5	Daily vehicle-km saving through Eurasia Tunnel $((3A)x2+(3B)x13+(3C)x2+(4A)x2+(4B)x13+(4C)x2)x(2)$	km/day	215.318		
6	The number of days during the workdays	day	303		
7	Annual Vehicle-Km Saving through Eurasia Tunnel $(5)x(6)$	km/year	65.241.401		
8	Monetary Value in Dollars of Reducing the Annual Accident Cost $(7)x(1)$	\$	1.892.331		
9	Dollar Exchange Rate	TL/\$	8,3572		
10	Monetary Value in Turkish Liras of Reducing the Annual Accident Cost $(8)x(9)$	TL	15.814.592		

Dollar exchange rate:8,3572 TL/\$ (annual average as from the end of November 2021)

Besides, as provided in Table 41, owing to the reduced vehicle-km in 2021, 3 fatal, 136 injury, **and** 478 accidents resulting only in material damage could be prevented.

Table 41: Reduction in the Number of Accidents

Traffic Accidents	Nb of Accidents/ Million -km	Nb of Prevented Incidents in 2021 (number)
Total number of death in Traffic Accidents	0,040395616	3
Total number of injury in Traffic Accidents	2,090519246	136
Number of Accidents resulting only in material damage	7,331055098	478

3.5. Benefits of Using Tunnel-Summary

The savings earned by passing through the tunnel instead of 15th July Martrys Bridge are summed up in Table 42. A total amount of **137 TL** was saved by making round-trip (*peak hours in the morning and in the evening*) through the tunnel instead of 15th July Martrys Bridge at peak hours. The daily two-way use compensates the fee difference between the tunnel and the 15th July Martrys Bridge (**2x46 - 13,25 = 79 TL/day**) **by 1,7 times**, to put it in a different way, it provides benefit in the amount of **137-79=58 TL** for passengers on each round-trip. The total saving amounting up to **589.091.040 TL/year** by using the Eurasia Tunnel instead of the 15th July Martrys Bridge demonstrates how significant is the contribution of tunnel to the welfare and economy of İstanbul.

Table2 42: Benefits of Using Eurasia Tunnel-Summary

BENEFIT ELEMENT	Round-trip Benefit at Peak Hours (TL/Day)	Total Annual Saving (TL/Year)
Travel Time Saving	109	519.174.527
Fuel Saving	23	121.554.235
Emission Reduction	3	25.331.202
Accident Cost Reduction	2	15.814.592
TOTAL BENEFIT	137	681.874.556

The annual total decline in CO₂ emissions is **10.104 ton/year** as summarized in Table 39 and leads to decrease in damages against community healthcare in the amount of **25.331.202 TL/year**. This essential benefit is a crystal-clear testament to the contribution of Eurasia Tunnel in the sustainable growth of İstanbul. Besides, owing to the reduced vehicle-km in 2021, a number of 3 fatal, 136 injury and 478 accidents resulting only in material damage could be prevented. It is predicted that the vehicle maintenance costs will drop in direct proportion to the reduced km.

4. BENEFITS FOR THE USERS OF THE 15TH JULY MARTRYS BRIDGE

This section delves into the effects of Eurasia Tunnel in eliminating the traffic congestion in the 15th July Martyrs Bridge. The report published by İstanbul Metropolitan Municipality in 2017¹³⁴ analyzes the travel time, average speed, and intercontinental changes in the number of vehicles passing through the bridges before (2016) and after (2017) the opening of Eurasia Tunnel. The percentage speed and time changes provided for the opening year of Eurasia Tunnel are given in Table 43. The situation in the absence of Eurasia Tunnel in 2021 was calculated by dividing these data observed in 2021 into these percentages. Kozyatağı-Bakırköy route was chosen as the main representative corridor for the 15th July Martyrs Bridge as is the case in the relevant studies. (Figure 24).

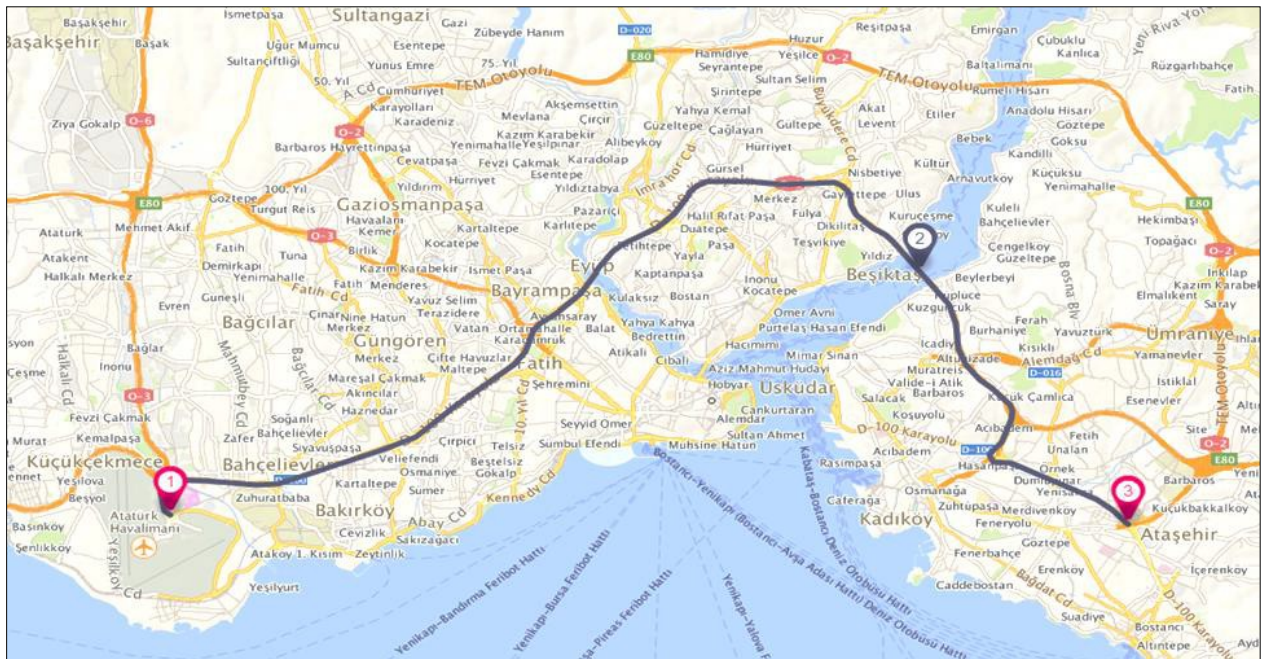


Figure 24: Kozyatağı - Bakırköy Corridor

¹³⁴ E. Dilek, Y.E. Ayözen, M. Erşahin, A. O. Atahan, The Effects of the Opening of the Eurasia Tunnel and the Removal of the Annex Lane Application on the Bridges on İstanbul Traffic 2017, [uym.ibt.gov.tr/documents/library/AvrasyaT%C3%BCneli Annex %C5%9Eerit Etkisi.pdf](http://uym.ibt.gov.tr/documents/library/AvrasyaT%C3%BCneli%20Annex%20Etkisi.pdf)

Tablo 43: The Percentage Change in Travel Speed and Time in the opening year of Eurasia Tunnel

AVERAGE SPEED CHANGE (%)	Morning Peak	Morning	Evening Peak
Kozyatağı-Bakırköy	1,08	1,14	1,43
Bakırköy-Kozyatağı	1,63	1,17	1*
AVERAGE TIME CHANGE (%)	Morning Peak	Morning	Evening Peak
Kozyatağı-Bakırköy	0,93	0,87	0,7
Bakırköy-Kozyatağı	0,62	0,84	1*

Note: On the basis of İBB study¹³⁵, as it also involves the effects of removing the additional lane in the 15th July Martyrs Bridge after the opening of Eurasia Tunnel, the unexpected negative effect in the speed and time observed through Bakırköy-Kozyatağı route at peak hours in the evening was set to zero in a prudent manner.

4.1. The Estimation of Travel Time Saving

The travel time saving generated by the decline in traffic congestion in 15th July Martyrs Bridge are calculated in Table 44. As aforementioned, the morning peak, off-peak and evening peak time are assumed to be 2, 16 and 2 hours, respectively; also, average vehicle occupancy is assumed as 1,57 person/vehicle. Additionally, due to the fact that the vehicle rate consisted of pick-up trucks and vans is only 5,7% in 2021, all vehicles were assumed to be cars. The annual total saving generated by the Eurasia Tunnel in 2021 in travel time for the users of 15th July Martyrs Bridge was estimated to be **16.743.512 hour/year** corresponding to **1.073.175.395 TL/year** in monetary value. Additionally, the analysis of HCM (Highway Capacity Manual) demonstrate that **the traffic in İstanbul would have come to a halt** as the daily traffic in 2021 would be added up to the 15th July Martyrs Bridge in the absence of Eurasia Tunnel. Consequently, it is understood that estimating the values on the basis of impact in the year of opening is a prudent approach and the main benefit is so big that it cannot be valued.

¹³⁵ E. Dilek, Y.E. Ayözen, M. Erşahin, A. O. Atahan, The Effects of the Opening of the Eurasia Tunnel and the Removal of the Annex Lane Application on the Bridges on İstanbul Traffic, 2017, [uym.ibt.gov.tr/documents/library/AvrasyaT%C3%BCneli Annex %C5%9Eerit Etkisi.pdf](http://uym.ibt.gov.tr/documents/library/AvrasyaT%C3%BCneli%20Annex%20Etkisi.pdf)

Table 44: Travel Time Saving in 15th July Martrys Bridge after the opening of Eurasia Tunnel

No	PARAMETERS RELATED TO THE EARNED TIME	UNIT	MORNING PEAK (A)	OFF PEAK (B)	EVENING PEAK (C)
1	Average Travel Time between Bakırköy-15th July Martrys Bridge- Kozyatağı during workdays in the absence of Eurasia Tunnel	min	96	64	91
2	Average Travel Time between Kozyatağı- 15th July Martrys Bridge- Bakırköy during workdays in the absence of Eurasia Tunnel	min	86	62	88
3	Average Travel Time between Bakırköy-15th July Martrys Bridge- Kozyatağı during workdays in the current situation	min	60	54	91
4	Average Travel Time between Kozyatağı-15th July Martrys Bridge- Bakırköy during workdays in the current situation	min	80	54	62
5	Time earned for each vehicle between Bakırköy-Kozyatağı (3-1)	min	37	10	-
6	Time earned for each vehicle between Kozyatağı-Bakırköy (4-2)	min	6	8	26
7	Direction wise Hourly traffic between Bakırköy-Eurasia Tunnel-Kozyatağı	vehicle/hour/direction	4.854	4.753	5.126
8	Direction wise Hourly traffic between Kozyatağı-Eurasia Tunnel-Bakırköy	vehicle/hour/direction	5.311	4.976	5.090
9	In-vehicle occupancy	individual	1,57		
10	Number of days during the workdays	day	303		
11	Time cost value for one individual	TL	64,10		
12	Annual earned time for all vehicles between Bakırköy-Kozyatağı $((9) \times ((7A) \times (5A) \times 2 + (7B) \times (5B) \times 16 + (7C) \times (5C) \times 2) \times (10)) / 60$	hour	9.005.222		
13	Annual earned time for all vehicles between Kozyatağı-Bakırköy $((9) \times ((8A) \times (6A) \times 2 + (8B) \times (6B) \times 16 + (8C) \times (6C) \times 2) \times (10)) / 60$	hour	7.738.290		
14	Annual total earned time (12+13)	hour	16.743.512		
15	Annual monetary value of earned time (14x11)	TL	1.073.175.395		

4.2. Fuel Saving

The fuel saving estimations based on the decline of traffic congestion on the 15th July Bridge and the acceleration of speed after the opening of Eurasia Tunnel are presented in Table 45. A total of **18.315.869 lt.** fuel saving was generated corresponding to **132.334.350 TL** in monetary terms owing to the decline of congestion on the 15th July Martrys Bridge after the opening of Eurasia Tunnel.

Table 45: Fuel Saving on the 15th July Bridge after the opening of Eurasia Tunnel

No	PARAMETERS RELATED TO THE FUEL SAVING	UNIT	MORNING PEAK (A)	OFF-PEAK (B)	EVENING PEAK (C)
1	Average Speed between Bakırköy- 15th July Martrys Bridge-Kozyatağı during the workdays in the absence of Eurasia Tunnel	km/hour	19	32	20
2	Average Speed between Kozyatağı- 15th July Martrys Bridge-Bakırköy during the workdays in the absence of Eurasia Tunnel	km/hour	21	29	19
3	Average Speed between Bakırköy-15th July Martrys Bridge- Kozyatağı during the workdays in the current situation	km/hour	32	37	20
4	Average Speed between Kozyatağı-15th July Martrys Bridge- Bakırköy in the current situation	km/hour	22	33	27
5	Distance between Kozyatağı-15th July Martrys Bridge-Bakırköy	km	34		
5	Fuel consumption per vehicle between Bakırköy- 15th July Martrys Bridge-Kozyatağı in the absence of Eurasia Tunnel ($0,07+1,65/(1) \times 5$)	lt./vehicle	5,266	4,158	5,191
6	Fuel consumption per vehicle between Kozyatağı- 15th July Martrys Bridge-Bakırköy in the absence of Eurasia Tunnel ($0,07+1,65/(2) \times 5$)	Lt./vehicle	5,095	4,304	5,326
7	Fuel consumption per vehicle between Bakırköy- 15th July Martrys Bridge- Kozyatağı in the absence of Eurasia Tunnel ($0,07+1,65/(3) \times 5$)	Lt./vehicle	4,151	3,899	5,191
8	Fuel consumption per vehicle between Kozyatağı- 15th July Martrys Bridge- Bakırköy in the absence of Eurasia Tunnel ($0,07+1,65/(4) \times 5$)	Lt./vehicle	4,894	4,068	4,440

No	PARAMETERS RELATED TO THE FUEL SAVING	UNIT	MORNING PEAK (A)	OFF PEAK (B)	EVENING PEAK (C)
9	Fuel saving per vehicle between Bakırköy-Kozyatağı (5)-(7)	Lt./vehicle	1,116	0,258	-
10	Fuel saving per vehicle between Kozyatağı Bakırköy (6)-(8)	Lt./vehicle	0,201	0,236	0,886
11	Direction wise hourly traffic between Bakırköy-15th July Martrys Bridge- Kozyatağı	vehicle/hour-direction	4.854	4.753	5.126
12	Direction wise hourly traffic between Kozyatağı-15th July Martrys Bridge- Bakırköy	vehicle/hour-direction	5.311	4.976	5.090
13	Number of days during workdays	day	303		
14	Hourly fuel saving for all vehicles between Bakırköy-15th July Martrys Bridge- Kozyatağı (9)x(11)	lt./hour	5.415	1.228	-
15	Hourly fuel saving for all vehicles between Kozyatağı- 15th July Martrys Bridge-Bakırköy (10)x(12)	lt./hour	1.068	1.176	4.510
16	Daily total fuel saving ((14A)+(15A))x2+((14B)+(15B))x16+((14C)+(15C))x2	lt./day	60.448		
17	Annual total fuel saving (13)x(16)	lt./year	18.315.869		
18	Fuel litre priceı	TL/lt.	7,225		
19	Annual monetary value of fuel saving (17)x(18)	TL	132.334.350		

5. CONSEQUENCES

The opening of Eurasia Tunnel has contributed to the city traffic, residents, and the environment in two ways. Compared to the 15th July Martrys Bridge, the shortening of travel times, acceleration of speed and less distance to be covered rank among half of the benefits delivered by the Eurasia Tunnel. The other half of benefits is related to the decline in traffic congestion after the opening of tunnel. These benefits are summarized in Table 46 and Table 47. **As a consequence, the contribution of Eurasia Tunnel to the national economy has reached approximately 226 million Dollars (1.89 billion TL) in one year owing to accident cost saving involving the 25-million-hour time saving, 35-thousand-ton fuel saving, 10-thousand-ton emission reduction and 65-million-decrease in vehicle-km.**

Table 46: Total Benefits of Eurasia Tunnel in 2021-Summary (*in terms of relevant units*)

BENEFIT ELEMENT	Unit	Peak Hour Use Daily Benefit	Direct Annual Benefit	Indirect Annual Benefit	Total Benefit
Travel Time Saving	hour	1,08	8.100.078	16.743.512	24.843.590
Fuel Saving	Lt	3,122	16.823.836	18.315.869	35.139.705
Emission Reduction	Ton	0,0012	10.104	-*	10.104
Accident Cost Reduction	vehicle-km	8,00	65.241.401	-*	65.241.401

*These savings were calculated as part of the tunnel savings.

Table 47: Total Benefits of Eurasia Tunnel in 2021-Summary (*in TL terms*)

BENEFIT ELEMENT	Peak Hour Use Daily Benefit, TL/Day	Direct Annual Benefit, TL/Year	Indirect Annual Benefit, TL/Year	Total Benefit (TL/Year)
Travel Time Saving	109,01	519.174.527	1.073.175.395	1.592.349.922
Fuel Saving	22,56	121.554.235	132.334.350	253.888.585
Emission Reduction	3,11	25.331.202	-*	25.331.202
Accident Cost Reduction	1,94	15.814.592	-*	15.814.592
TOTAL BENEFIT	137	681.874.556	1.205.509.745	1.887.384.301

* These savings were calculated as part of the tunnel savings.

The annual total drop in greenhouse gas emissions reach up to **10.104 ton/year** providing a benefit in the amount of **25.331.202 TL/year**. Besides, by virtue of reduction in vehicle-km, 3 fatal, 136 injury and 478 accidents resulting only in material damage were prevented. The vehicle maintenance and depreciation costs in direct proportion to the reduced km were not take into consideration in this study. They should be considered as an additional benefit.

Calculations have been made employing the same method for five years up till today since the Eurasia Tunnel was put into operation; the contribution of tunnel to the national economy has reached approximately 972 million dollars in five years owing to the accident cost reduction involving 103-million-time saving, 139-thousand fuel saving, 50-thousand emission reduction and 325-million vehicle-km decline. The abovementioned calculation was made by carrying the revenues of 2017,2018,2019 and 2020 in TL terms to 2021 on the basis of today's net value calculations and dividing them into the average dollar exchange rate of 2021.

Table 48: 5-Year Benefits of Eurasia Tunnel in Unit Values

FAYDA ÖĞESİ	2017 Annual Benefit	2018 Annual Benefit	2019 Annual Benefit	2020 Annual Benefit	2021 Annual Benefit	5-Year Total Benefit
Travel Time Saving (<i>million hours</i>)	22	23	17	16	25	103
Fuel Saving (<i>thousand tons</i>)	27	27	27	23	35	139
Emission Reduction (<i>thousand tons</i>)	10	10	9	11	10	50
Accident Cost Reduction (<i>million vehicle-km</i>)	68	63	59	70	65	325

Table 49: 5-Year Benefits of Eurasia Tunnel in Monetary Values

BENEFIT ELEMENT (monetary value/million dollars)	2017 Annual Benefit	2018 Annual Benefit	2019 Annual Benefit	2020 Annual Benefit	2021 Annual Benefit	5-Year Total Benefit
Travel Time Saving	168	172	143	115	191	789
Fuel Saving	36	34	33	26	30	159
Emission Reduction	3	3	3	3	3	15
Accident Cost Reduction	1	2	2	2	2	9
Total	208	211	181	146	226	972

ANNEX 17: WORLD EXAMPLES OF HIGHWAY TUNNELS AND TOLL FEES

Table 50: Highway Tunnels put into operation and their Properties between 1996 - 2021

#	Project Name	County	Toll Fee/ km ¹ (\$/km)	Toll Fee (\$)	Length (m)	Open ing Year	Cost (million \$)	Cost/ km (million \$/km)	R- Cost (million \$)	R- Cost/km (million \$/km)
1	Warnow Tunnel	Germany	\$6,48	\$5,12	790	2003	\$304	\$385	\$448	\$567
2	Eastern Distributor Tunnel	Australia	\$4,99	\$8,48	1.700	1999	\$730	\$429	\$1.187	\$698
3	Western Harbour Crossing	Hong Kong	\$4,87	\$9,62	1.975	1997	\$900	\$456	\$1.519	\$769
4	Domain Tunnel	Australia	\$3,89	\$6,23	1.600	2000	\$450	\$281	\$708	\$443
5	Rya Tunnel	Norway	\$3,81	\$10,20	2.675	2011	\$44	\$16	\$53	\$20
6	Negron Tunnel	Spain	\$3,79	\$15,72	4.144	1997	\$53	\$13	\$89	\$22
7	Envalira Tunnel	Andorra	\$3,61	\$7,40	2.050	2002	\$80	\$39	\$120	\$59
8	Limerick Tunnel	Ireland	\$3,26	\$2,20	675	2010	\$931	\$1.379	\$1.157	\$1.714
9	Vagar Tunnel	Fareo Islands	\$3,17	\$15,65	4.940	2002	\$44	\$9	\$66	\$13
10	Herren Tunnel	Germany	\$2,82	\$2,20	780	2005	\$208	\$267	\$289	\$370
11	Sydney Cross City Tunnel	Australia	\$2,62	\$5,77	2.200	2005	\$680	\$309	\$943	\$429
12	The Northern Isles Tunnel	Fareo Islands	\$2,53	\$15,65	6.186	2006	\$62	\$10	\$83	\$13
13	Dublin Tunnel	Ireland	\$2,52	\$11,60	4.600	2006	\$875	\$190	\$1.176	\$256
14	Eysturoy Tunnel	Denmark	\$2,44	\$27,40	11.240	2020	\$177	\$16	\$185	\$16
15	Aktio-Preveza Denizaltı Tunnel	Greece	\$2,23	\$3,50	1.570	2002	\$90	\$57	\$136	\$86
16	Prado Carénage Sud Tunnel	France	\$2,13	\$3,20	1.500	2013	\$255	\$170	\$297	\$198
17	Vaðlaheiði Tunnel	Iceland	\$1,57	\$11,62	7.400	2019	\$170	\$23	\$180	\$24
18	Tyne Tunnel	United Kingdom	\$1,53	\$2,60	1.700	2011	\$357	\$210	\$430	\$253
19	Tai Lam Tunnel	Hong Kong	\$1,75	\$6,66	3.800	1998	\$810	\$213	\$1.347	\$354
20	Duplex A86 Tunnel	France	\$1,50	\$15,00	10.000	2011	\$2.200	\$220	\$2.650	\$265
21	The Gleinalm Tunnel	Austria	\$1,32	\$11,00	8.320	2019	\$260	\$31	\$276	\$33
22	M5 East Tunnel	Australia	\$1,29	\$5,03	3.900	2001	\$800	\$205	\$1.224	\$314
23	Vestfjarðagöng Tunnel	Iceland	\$1,27	\$11,62	9.120	1996	\$48	\$5	\$82	\$9
24	Legacy Tunnel	Australia	\$1,26	\$5,79	4.600	2015	\$1.500	\$326	\$1.715	\$373
25	Ryfylke Tunnel	Norway	\$1,16	\$16,76	14.400	2019	\$495	\$34	\$525	\$36
26	Tauern Tunnel	Austria	\$1,16	\$7,60	6.546	2010	\$181	\$28	\$225	\$34
27	Eurasia Tunnel ²	Türkiye	\$1,15	\$6,20	5.400	2016	\$970	\$180	\$1.096	\$203
28	Clem Jones Tunnel	Australia	\$1,12	\$5,37	4.800	2010	\$3.200	\$667	\$3.977	\$828
29	Lane Cove Tunnel	Australia	\$0,97	\$3,49	3.600	2007	\$1.100	\$306	\$1.438	\$399
30	Airport Link Tunnel	Australia	\$0,93	\$5,30	5.700	2012	\$4.800	\$842	\$5.665	\$994
31	North Connex Tunnel	Australia	\$0,89	\$7,99	9.000	2020	\$3.000	\$333	\$3.141	\$349
32	Westerschelde Tunnel	Netherlands	\$0,88	\$5,82	6.600	2003	\$845	\$128	\$1.244	\$189

#	Project Name	Country	Toll Fee/ km ¹ (\$/km)	Toll Fee (\$)	Length (m)	Opening Year	Cost (million \$)	Cost/ km (million \$/km)	R- Cost (million \$)	R- Cost/km (million \$/km)
33	Burnley Tunnel	Australia	\$0,81	\$2,77	3.400	2000	\$500	\$147	\$787	\$231
34	Alaskan Way S 99	USA	\$0,80	\$2,25	2.830	2019	\$3.350	\$1.184	\$3.551	\$1.255
35	M4 East Tunnel	Australia	\$0,79	\$4,40	5.600	2019	\$3.800	\$679	\$3.979	\$720
36	Hai Van Tunnel	Vietnam	\$0,77	\$4,84	6.280	2016	\$310	\$49	\$350	\$56
37	Sozina Tunnel	Montenegro	\$0,69	\$2,91	4.189	2005	\$86	\$21	\$119	\$28
38	Qingdao Jiaozhou Bay Tunnel	China	\$0,56	\$3,13	5.550	2011	\$485	\$87	\$584	\$105
39	Kohat Dostluk Tunnel	Pakistan	\$0,49	\$0,93	1.890	2003	\$138	\$73	\$203	\$108
40	Yamate Tunnel	Japan	\$0,45	\$8,20	18.200	2007	\$5.500	\$302	\$7.188	\$395
41	Atal Tunnel	India	\$0,30	\$2,67	9.020	2020	\$440	\$49	\$461	\$51
42	Soojungsan Tunnel	South Korea	\$0,30	\$0,68	2.300	2001	\$40	\$17	\$61	\$27
43	Banihal Qazigund Tunnel	India	\$0,21	\$1,74	8.450	2021	\$287	\$34	\$287	\$34
44	SMART Tunnel	Malaysia	\$0,18	\$0,72	4.000	2007	\$514	\$129	\$672	\$168
45	Chenani-Nashri Tunnel	India	\$0,08	\$0,73	9.200	2017	\$333	\$36	\$368	\$40
Average			\$1,81	\$6,97	5.209	2009	\$942	\$235	\$1.162	\$301
σ (Standard Deviation)			\$1,46	\$5,46	3.704	7,61	\$1.307	\$301	\$1.553	\$363
Minimum			\$0,08	\$0,68	675	1996	\$40	\$5	\$53	\$9
Maximum			\$6,48	\$27,40	18.200	2021	\$5.500	\$1.379	\$7.188	\$1.714

¹ The Table was drawn by ranking the highway tunnel toll fees per km

² In calculating the investment amount of Eurasia Tunnel, only the amount corresponding to (Section 2) tunnel part was taken into consideration to ensure the comparison of Eurasia Tunnel with the world examples (1.245 billion \$ x %78 = 970 million\$).

³ It indicates today's cost calculated in line with the R-Cost CPI Ratio Index

⁴ Tunnels, being the part of any highway whatsoever or of which access roads are charged, were left out of the scope.

It was intended to highlight the place of Eurasia Tunnel among the similar world examples by comparing the opening years of highway tunnels which have been completed in the last 25 years and put into service with toll fees, the length of tunnel, cost on the date of construction, present value of cost, toll fee and the ratios of these values to the tunnel length. All information concerning these tunnels were compiled with reference to the open sources such as the official websites of tunnel enterprises and investors, newspapers, or academic journal articles.

The Eurasia Tunnel was built by digging deep down to 106 m in 13,7 m diameter under 12 bar pressure on a complex geological area with intensive seismic activity. Despite the fact that it ranks number 2 in the world in terms of difficulty because of the abovementioned facts, owing to its cutting-edge technology and innovations and contrary to the ongoing statements in the public, **it stands out as an investment of which cost/km could be completed at 2/3 of world average.** On the other side, it provides service to the users by applying a toll fee in the amount of 1,15\$ per km which corresponds to 64% of similar tunnel toll fee averages in the world.

Comparison Diagrams

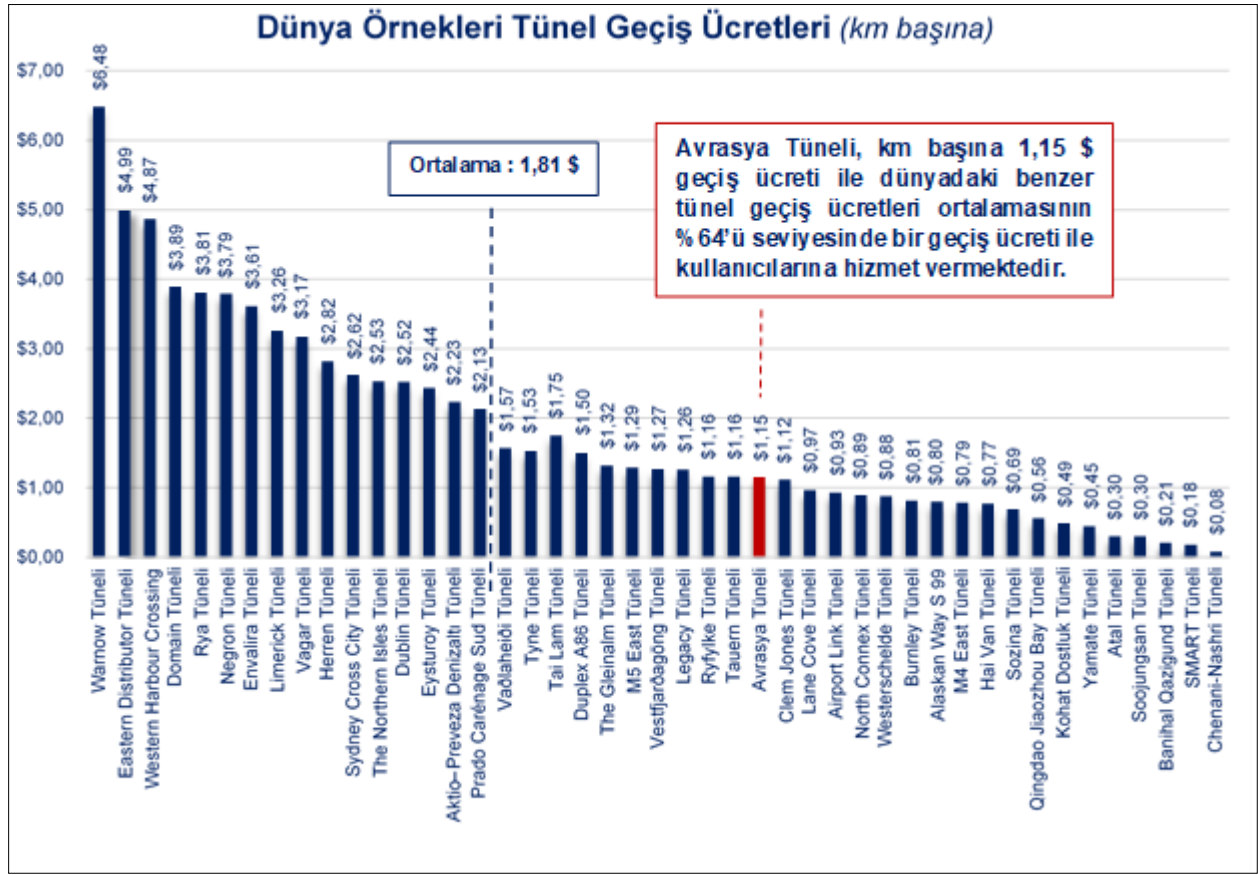


Figure 25: Tunnel Toll Fees per km of World Examples (US\$ / km)

ANNEX 18: DELOITTE VALUE FOR MONEY ANALYSIS REPORT, 2021

Executive Summary

Eurasia Tunnel is the first and only two-deck highway tunnel that connects the Asian and European continents underneath the seabed.

The infrastructure deficit is gradually increasing due to the pandemics, sustainability, and climate warming as a result of which an increase is expected in the amount of 1,5 trillion dollars in the infrastructure need in Europe between 2020 and 2030.

Istanbul, in this era which witnesses the highest urbanization rates in history, ranks 14 among the other cities around the world when the population density is compared; and ranks 5 in terms of traffic density. **Istanbul, which embraces 18% of the population of Turkey and over 30% of national economy, is of high importance for national economy.** Such that, the developments in the transportation infrastructure contributes to the national economy as much as it does to the mobilization within the city. For this reason, it is required to find rationalist and lasting solutions for the transportation infrastructure of İstanbul and put them into practice as swiftly as possible.

The finalization of significant infrastructure investments in time and within the devised budget is essential for the expected social and economic impacts. **One of the alternative methods preferred in the recent years so as to be able complete projects in time and within the devised budget is Public Private Partnership (PPP) model.**

This model is designed by the long-term contracts between the public and private sector for the purpose of delivering a public service or building a public asset, which envisages the transfer of asset to the public institution free from all sorts of commitments and debts and in the scope of which private sector undertakes crucial risks in the construction and operation process and the payments to be made by the public depends on the quality-of-service performance.

Eurasia Tunnel Project was planned to facilitate the daily flow between the two sides of İstanbul and also to relieve the traffic on the strait. In order to manage the current traffic, the Public Private Partnership model was preferred for the tunnel investment with an aim to satisfy the abovementioned need and it was put into practice successfully. The investment of Eurasia Tunnel was completed in 47 months, 8 months earlier than the scheduled. The tunnel has broken a fresh ground with its technical properties.

Eurasia Tunnel, which delivers benefits for the national economy and environment, was completed with public private partnership as an efficient implementation method.

This report, on one hand, assesses the benefit of realization of Eurasia Tunnel through Public Private Partnership method with regard to the public interest within the scope of “**value for money**” (VFM); on the other hand, examines the economic impacts arisen during the construction and operation periods of project in terms of expenditures and savings.

The first part of study demonstrates that the project could be completed more rapidly and efficiently by reducing the risks undertaken by the public thanks to the Public Private Partnership (PPP) method executed in the Eurasia Tunnel. As a result of analysis made by using the value for money method, it was calculated that **30% saving was made in costs by implementing PPP compared to the conventional method.** Besides, the PPP models, apart from the public saving, are considered to be more effective for certain reasons such as the transfer knowledge and technology, swiftness, and productivity of private sector

The second part of study examines the impacts of Eurasia Tunnel to the national economy from two aspects: (i) the positive effects on the added value and employment related to the construction, operation, and maintenance activities through local **expenditures** in the scope of **macroeconomic** impacts; (ii) **saving calculations** such as time saving, less fuel consumption, reduced emission rate and safer drive in the scope of **microeconomic** impacts.

The value for money analysis and the economic impact model employed in the study were presented in the section of “**Summary Findings**”.

Summary Findings: The Value for Money Assessment

The Value for Money indicates the acquirement of optimal benefit and cost combination while delivering the services demanded by the users. The costs of value for money method and the alternative delivery methods can be compared.

The primary goal of public sector is to optimize risks and maximize the public interest. The construction methods, which optimize the risks and public interest in the execution of large-scaled projects, bring the optimal benefit-cost rate in favor of public. To this respect, the value for money analysis is a frequently preferred instrument by the public authorities in order to determine the optimal procurement system by comparing the traditional construction models and the PPP model. This analysis scrutinizes whether or not it would be more economic and rational to execute the projects included with in the public investment plans through Public Private Partnership model or “**traditional**” public procurement method.

In the traditional procurement method, public undertakes the infrastructure projects by leaning on its own resources. In this method, public undertakes all sorts of risks associated to the project planning, designing, financing, construction, operation, and maintenance processes. On the other side, public authority can transfer certain risks related to the investment to the private sector by preferring PPP model. As a matter of fact, several studies in the literature indicate that **the investments can be finalized more rapidly and efficiently through PPP model and more effective results can be achieved thanks to the knowledge-technology transfer, the swiftness, and productivity of private sector.** In addition, public can purchase a product free from risks and in conformity with the criteria when the projects are completed via PPP model and put into service.

Within the scope of value for money analysis employed in this study with an aim to respond to the similar concerns for Eurasia Tunnel, the traditional method in which the public undertakes the implementation of project and the PPP method realized by private sector are compared in terms of “adjusted budget on the basis of risk undertaking” criteria. The analysis, having regard to the costs undertaken by public in both methods, presents a comparison by taking into account all costs and risks to be realized beginning from the project design period until the end of operation period

The VfM analysis made within the scope of study proves that the current implementation model of Euraisa Tunnel has brought more value for money compared to the traditional method.

According to the results of this report, the most effective factor that renders the PPP model cost effective for the State is the amount of risks undertaken by the State in both models. Within the scope of study, risk items that may increase the project cost in terms of design, field, construction, operation, politics, economic and demand topics. While all the above-mentioned risks are undertaken by the State in the traditional model; design, economic and demand risks are shared with the private sector, political risks are undertaken by the State, and the construction and operation risks assumed to have the biggest impact are undertaken by the private sector.

Through the discussions made with experts from public and private sector, answers were sought for the questions concerning the possibility of risks to come true and the size of their impacts, and in consequence, the impacts of risks on increasing the total budget of project were calculated in monetary value. In the VfM study, **when the predicted possibilities of risk to come true and their impacts were compared with the global examples, similar results were obtained to a great extent, excluding certain risks which were predominantly related to the dynamics of given country (exchange rate fluctuation, inflation, etc.).** For instance, the study envisaged that in the traditional model the State would exceed the cost budget by 14%, which bears a striking resemblance to the comprehensive studies conducted on a global scale. Additionally, it is estimated that the construction cost would increase by 11% due to the fact that the construction period lasts longer than expected in the traditional model.

When the monetary values of risks undertaken by the State in the traditional and PPP model are compared, it is predicted that the State transferred the risk cost corresponding to the amount of \$540 million at 2021 price to the private sector by employing PPP model. As a result of all these analysis, the completion of Eurasia Tunnel by PPP model brought 30% less cost to public compared to the traditional method. Such that, the financial value of this saving was calculated as \$769 million at 2021 price.

On the basis of estimation that the State made \$769 million saving through PPP model, it becomes evident that 70% of this amount was realized by means of risks transferred to the private sector. This situation proves that the greatest advantage of PPP model, along with all the associated advantages and cost benefits, is the fact that it reduces the risks undertaken by the State.

The completion of Eurasia Tunnel project by PPP model compared to the traditional method earned \$769 million saving.

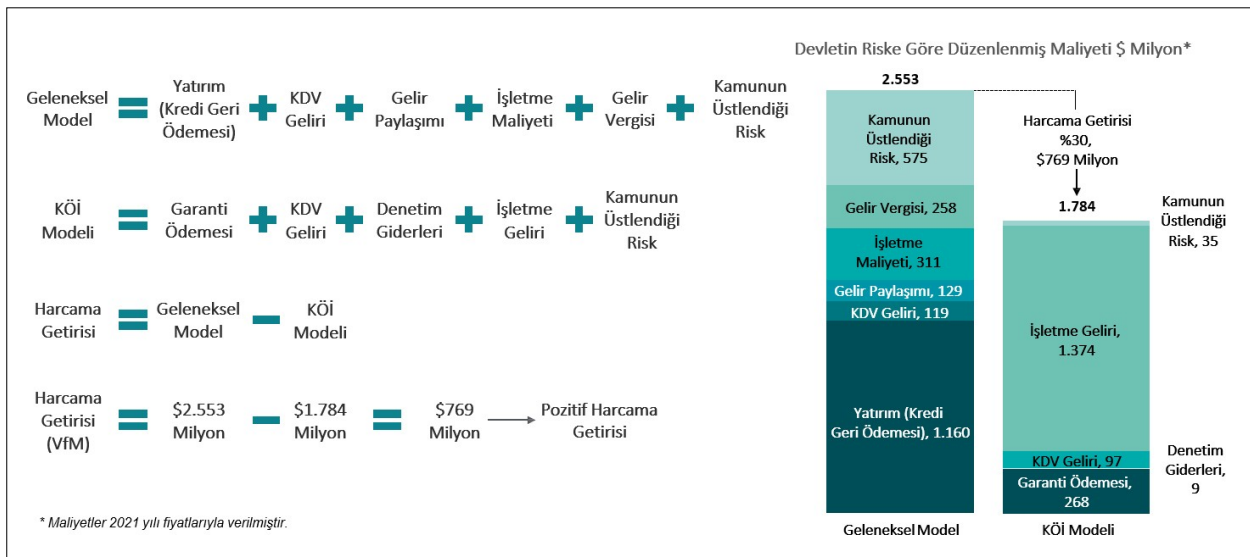


Figure 26: Eurasia Tunnel Value for Money Analysis Results

The Macroeconomic Impacts of Eurasia Tunnel

The impacts of Eurasia Tunnel to the national economy are examined from two aspects: (i) the positive effects on the added value and employment related to the construction, operation, and maintenance activities through local **expenditures** in the scope of **macroeconomic** impacts; (ii) **saving calculations** such as time saving, less fuel consumption, reduced emission rate and safer drive in the scope of **microeconomic** impacts.

All the calculations are made on the basis of 2021 prices. The definitions of impacts are provided hereinafter:

1. Macroeconomic Impacts/Spending related Impacts; involves macroeconomic impacts on the economy induced by money flow through construction and operation periods.

- i) Direct Impacts; direct changes in the economic activities due to the cost increase in the construction, workforce, consultancy, and other measurable components of project.
- ii) Indirect Impacts: impacts arising from demands for products and services within the supply chain during the construction, operation and maintenance activities of tunnel.
- iii) Induced Impacts; impacts related to the product and service expenses spent in a broader economy from the part of their income by the workers employed in directly affected industries and suppliers.

It is envisaged that Eurasia Tunnel will contribute \$1,7 billion to gross value added between 2013 – 2042, will generate \$364 million additional tax revenue and will provide employment for 53.734 people (Figure 27). In other words, the tunnel will earn \$57 million in average to the economy on an annual basis and will promote the creation of employment for over 1800 people. (In the report, employment data are calculated on the basis of full-time working. For instance, the average work time for an employee in terms of full-time working is considered to be 9 hours per day and 2000 hours per year. By external impacts, the positive/negative impacts are meant in terms of benefit or cost inflicted on other persons/institutions due to the production or consumption activities of natural/legal persons.)

2. Microeconomic Impacts /Gains related to the saving on road and time; occur as a result of impacts created by productivity increase and external benefits (*fuel, gas emission and accident cost saving*).

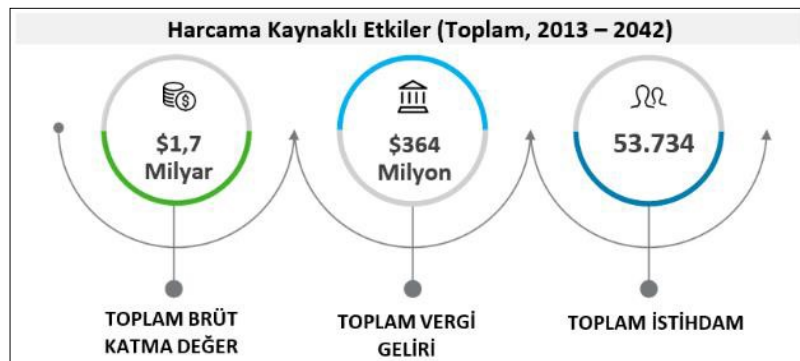
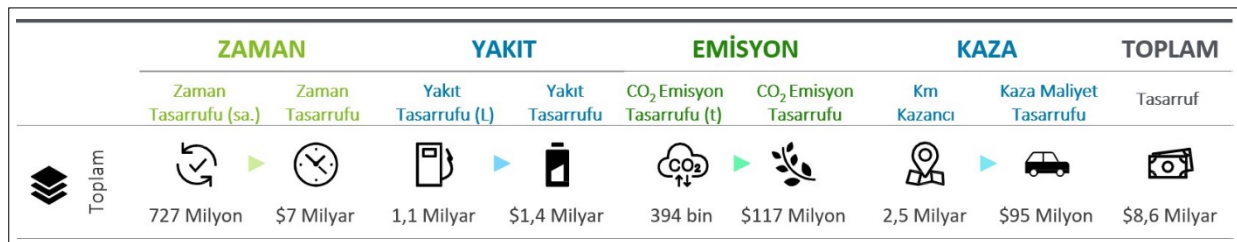
- i) Productivity increase is achieved by saving on time through the tunnel and 15th July Martrys Bridge owing to the reduced distance and traffic volume.
- ii) External gains are achieved by cost savings such as fuel saving, decrease in traffic accidents, and the decline in carbon dioxide emission owing to the reduced distances thanks to the use of tunnel and 15th Jul Martrys Bridge..

On the basis of data pertaining to 2021, the users **would save 137 TL** for a round-trip through the tunnel during the peak hours. Considering the difference in the amount of 79 TL between the Eurasia Tunnel and 15th Martrys Bridge in terms of round-trip costs, **the cost-benefit rate of Tunnel reaches 1,7.**

Table 52: Benefits of the Use of Eurasia Tunnel-Summary (Daily)

BENEFIT ELEMENT	Round-trip benefit at Peak Hours* (TL/Day)
Travel Time saving	109
Fuel Saving	23
Emission Reduction	3
Accident-Cost Reduction	2
TOTAL BENEFIT	137

Within the period from the day the Eurasia Tunnel was put into service until the end of operation period, a total of public saving in the amount of 8,6 billion dollars, of which 7 billion dollars flow from productivity gain and 1,6 billion dollars come from external savings, and a productivity increase equivalent to full-time more than 363 thousand on annual basis are expected (Figure 28). The Eurasia Tunnel provides numerous benefits for individuals and environment, which brings forward significant economic gains.

**Figure 27: Macroeconomic Impacts / Spending related Impacts****Figure 28: Microeconomic Impacts / Gains related to the Saving on Road and Time**

**ANNEX 19: ENLIGHTENING QUOTES FROM THE BIOGRAPHY
BOOK PENNED BY LABOUR PARTY LEADER TONY BLAIR ON
PUBLIC REFORM AND PPP MODEL,
(THE JOURNEY, 2010)**

Tony Blair states: “**I won 3 general elections.** By that time, the Labour Party could not come into power successively even twice. The longest-term the Labour Party stayed in power was 6 years. **If the vision of New Labour Party had been preserved, it would have held the power for a longer time...** Above all, **I had been a modernization advocate** rather than a traditional right or left-winger politician. We have to develop our public services and make reforms in order to ensure that our people live in alignment with the world of 2005 rather than 1945.”, in the biography book named “**The Journey**” published in 2010 on public reforms involving PPP projects materialized by himself as the leader of Labour Party when he was in power.

The accession of Blair to the power does not necessarily mean that the orbit of public services altered completely; only the preferences regarding the private sector solutions were replaced by partnership discourse. (*Pollitt and Bouckaert, 2004: 101*) To this respect, he modelled the prevalence of partnership between the (State) public, which adopts the role and flexibility of markets on the basis of customer-oriented public service provision, and the private sector. (*Bevir- O’Brien, 2001: 543*)

Blair explained the reasons of need for public reform in the study document titled “**Europe: 3rd Way and New Centre**” co-penned with the German Chancellor Gerhard Schroeder in 1998 as follows: “The ratio of public spending to the national income has almost reached to the acceptable limit. **The restrictions on taxes and spending necessitate reforms in public services in order to ensure a radical modernization in public sector and to obtain better value for money.** The public sector must de facto provide service to the citizens: we do not hesitate to promote productivity, competition, and high performance.”

At this point, the politics of Tony Blair attributed special importance to the performance management and reinforcement of strategic approach in public administration. To this respect, he held the Performance and Innovative Unit established under the Prime Ministry responsible for identifying and defining the social difficulties of strategic importance and public policy problems, evaluating the performance of current policies, programs, and service delivery mechanisms, suggesting, and developing innovative initiatives that will increase the service quality and ensure that the public activities respond better to the needs of users. (*Horton - Farnham, 1999: 48*)

Blair supported Private Finance Initiative within the Public Private Partnership materialized during its Major term. He established an institution called “The Institute for Associates” in Britain with an aim to promote the Private Finance Initiative in 1998. By Private Finance Initiative, it is aimed at performing public services on the basis of profitability. After his power embracing all the above-mentioned reform efforts, Blair ends his biography as follows: “It is true that I have a conservationist mind concerning issues such as security and economy; however, my heart always beats as that of a progressivist and I have a soul of rebellion, which will always be so.”¹³⁶

¹³⁶ Bir Yolculuk, Tony Blair, Pegasus Yayınları, 2010

ANNEX 20: OPERATING PERFORMANCE CRITERIA

Table 52: Operating Performance Criteria for Eurasia Tunnel

#	Operation Criteria	Contractual Operation Performance Criteria	Eurasia Tunnel Realized Performance	
1	Conformity with the International Operation Standards	<ul style="list-style-type: none"> ➤ “European Parliament and Council Directive no 2004/54/EC dated April 29,2004” on minimum safety requirements in Road Networks within Trans-Europe” ➤ PIARC Standards <ul style="list-style-type: none"> • Good practice in 2005 regarding operation and maintenance. • 2007R04, Guide related to the personnel organization, employment, and training. • 2007R07, integrated approach standards regarding the tunnel safety, • 2008R03, interface management guide for operating and emergency teams in the tunnels. • Standards dated 2004 related to the traffic case management 	✓	Compatible.
2.	Response Standards	The time between the activation of alarm and the necessary response shall not exceed 2 minutes in average.	✓	14 seconds
		The presence of first responder team in the scene of incident shall not exceed 10 minutes in average.	✓	1 minute 56 seconds (See: Annex-12)
		The removal of broken vehicles and small-scale collisions and opening of road to traffic shall not exceed 2 hours in average.	✓	12 minutes 42 seconds (See: Annex-12)
3.	Air Quality Inside the Tunnel	Below values must not be exceeded in the course of successive 15 minutes: <ul style="list-style-type: none"> ➤ Visibility 1.060 µg/m³ (traffic speed > 50km/s); ➤ Carbon monoxide (CO) amount ≤ 120.000 µg/m³; ➤ Nitrogen dioxide (NO₂) ≤ 1.900 µg/m³ 	✓	(See: Annex-11)
4.	Ambient Air Quality	<ul style="list-style-type: none"> ➤ European Union Standard 2008/50/EC ➤ World Health Organization Standards (<i>WHO Air Quality Guidelines, 2005</i>) 	✓	The ambient air quality is monitored through 2 air quality monitoring stations installed in the scope of project; the measurements remain below the standard limits. (See: Annex-9,10 and 11)
5.	Winter Maintenance	There will be no snow or ice in the facility so as to ensure the safe flow of traffic (toll booths in European and Asian sides). It will be ensured to respond in 2 hours at the most.	✓	(Simultaneously, immediate response)
6.	Tunnel Control Room	At least 2 qualified and fully trained tunnel control room operators will always be on duty.	✓	3 operator + 1 team leader guard - manager
7.	Attendant Patrol Car	At least 1 patrol car will always be on duty.	✓	2 tow truck (+1 spare) patrol car and 5 patrol motorcycle 7/24 attendant

#	Operation Criteria	Contractual Operation Performance Criteria	Eurasia Tunnel Realized Performance	
8.	Coordination with the State of Emergency Services regarding the Operation safety of Tunnel	EGM, AFAD, İBB (<i>Fire brigade, Road Maintenance Directorates etc.</i>) and Provincial Health Directorates (<i>Ambulance</i>) and periodic coordination meetings and drills will be conducted.	✓	Within the framework of 2 protocols and Emergency Action Plan signed by the Parties, the coordination details were defined, 8 successful drills and periodical meetings were conducted until the report date.
9.	Guides and Procedures on Operation & Maintenance	Will be prepared in detail and put into effect throughout the operation.	✓	Operation and maintenance guides and procedures and maintenance-repair plans were prepared and approved, are being followed throughout the operation. (420 Pages).
10.	Water analysis	-	✓	Samples are taken from the water that may be gathered in the tunnel drainage every 6 months on a periodical basis and analysis on environment and structure health are conducted in accredited laboratories.
11.	Earthquake and Structure Health Monitoring System	Earthquake and Structure Health Surveillance System will be established and within this scope, the structure health will be monitored prior to, at the moment of and after the earthquake, and necessary controls and traffic management will be performed.	✓	Earthquake and Structure Health Monitoring System containing 15 acceleration gauges and 21 displacement gauges was established, “Tunnel Operation Guide in case of Earthquake” Was prepared and it was ensured to perform traffic controls in line with the guide
		<ul style="list-style-type: none"> ➤ Design acceleration criteria = 1,45 g (1.422,9 gal) ➤ Acceleration criteria requiring operational control = 0.25 g (245,2 gal) 	✓	A total of 14 earthquake with an acceleration value of 1 gal or over were recorded by the system until the report date; the highest acceleration value was measured as 0.03g (33,8 gal), remaining below the criteria.

ANNEX 21: TURKEY ACCORDING TO THE MAASTRICHT CRITERIA

Table 53: Turkey's Profile According to the Maastricht Criteria

Explanation	Unit	Maastricht Criteria	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Public Gross Total Debt Stock	Milyar \$	-	285,7	298,4	269,0	236,6	243,7	241,0	234,8	248,7	286,6	265,3
Budget Deficit ⁽¹⁾	Milyar \$	-	12,1	17,7	15,4	7,9	10,1	13,0	13,8	14,4	20,0	27,8
GDP ⁽²⁾	Milyar \$	-	882,4	958,0	939,8	864,6	870,3	859,9	778,2	761,4	720,6	726,2
Public Gross Total Debt Stock / GDP	%	%60	32,4	31,1	28,6	27,4	28,0	28,0	30,2	32,7	39,8	36,5
Budget Deficit GDP	%	<%3	1,4	1,9	1,6	0,9	1,2	1,5	1,8	1,9	2,8	3,8
Inflation Rate	%	<%2,8	6,2	7,4	8,2	8,8	8,5	11,9	20,3	11,8	14,6	36,1
Long-term Interest Rate ⁽³⁾	%	<%4,9	8,4	7,4	8,8	8,7	9,6	10,5	14,3	14,2	11,5	16,2

⁽¹⁾ 2021 budget deficit amount based on 12-month indefinite data

⁽²⁾ 2021 GDP data were explained for the 3rd quarter of year. (the data for the 4th quarter had not been announced by the report date.)

⁽³⁾ Long term interest rates source: tr.investing.com

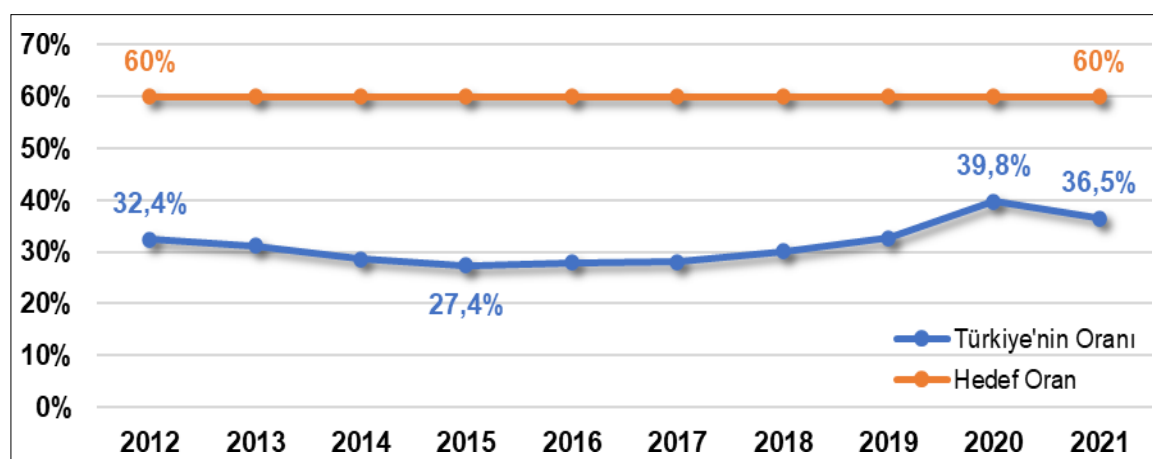


Figure 29: Public Gross Debt Stock in Turkey / GDP Rate

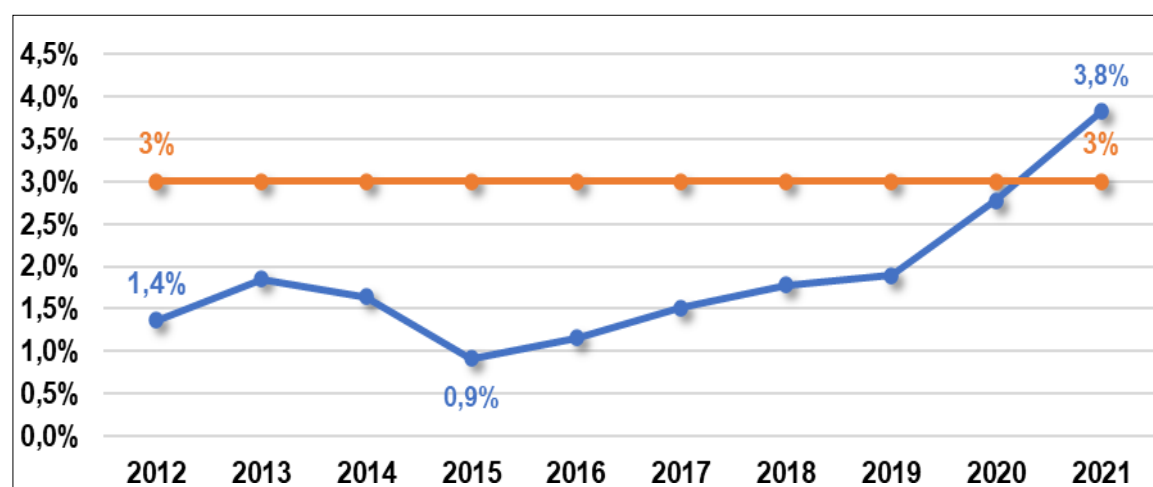


Figure 30: Budget Deficit in Turkey / GDP Rate

ANNEX 22: THE PRINCIPLES OF TRANSPARENCY AND INSPECTION IN THE EURASIA TUNNEL PROJECT

The issue of transparency in PPP projects in all countries are feverishly discussed by several academicians, bankers, finance and tax experts, legal experts, engineers, and similar experts. Some of them address the bidding processes while the others discuss the implementation, construction, or financial transparency issues. This situation gives rise to the contradiction in terms.

PPP projects are composed of 4 basic stages, which are funding, construction-investment, and operation. The transparency issues for each component were summed up specific to the Eurasia Tunnel Project.

1. Bidding

The bidding for the project, which attracted international interest, was promulgated in the Official Gazette on December 29, 2006, and January 5, 2007. Besides, **a number of 7 tender notices were issued by the Administration in the national newspapers with high circulation** in December 2006 and January 2007. To this respect, a total of **18 companies**, of which 10 were local and 8 were foreign companies, **obtained the tender documents** (*including the Implementation Contract*); pursuant to the regulation and as stated in the tender notices, all documents were submitted to the examination of bidders without charge in the Administration. 2 consortia could place a bid for this uphill project from a technological aspect.

The bidding processes of PPP model are performed by receiving tenders from the most competent companies and thus conducted in quite a competitive environment; the criteria set out by the multinational development banks and finance institutions are very strict and bear no exceptions and **the primary requisite put forth was the transparency**. Thanks to the execution of bidding process in an open and a transparent manner, the international finance institutions considered the Eurasia Tunnel as “credit viable”. In the website of European Investment Bank where information related to the project were shared, it was emphasized that “the bidding process and procurement procedures were approved by the European Investment Bank”.¹³⁷ In particular, the funding of whole project by means of external loans and the involvement of creditors composed of financial providers such as European Investment Bank, European Bank for Reconstruction and Development and Korea Exim bank which inspect the conformity of all processes to the international standards provide a cogent evidence about the transparency during the bidding process.

2. Funding

The most crucial issue with respect to the international funding is the possible impacts of project on physical, natural, cultural, social, and socio-economic environment during the construction and operation period within the framework of international good practices.

¹³⁷ www.eib.org/en/projects/pipelines/all/20090678

In this scope, the Environmental and Social Impact Assessment (‘ÇSED’) report involving the identification and assessment of impacts, the solutions for avoiding and mitigating the negative effects was prepared and followed the below mentioned stages¹³⁸:

- ❖ The first draft of ÇSED report was drawn up on March 7, 2011, and **the consultancy process with shareholders** was launched, and the participation of shareholders in the process was ensured throughout 9 weeks until May 8, 2011.
- ❖ A number of 25 neighborhood representatives located on the project route were visited; leaflets and banners were provided to be displayed and distributed.
- ❖ A letter defining the process and inviting to the meetings was written addressing a total of 104 shareholders composed of government institutions and non-governmental organizations likely to become the shareholders of project and meetings were held.
- ❖ A number of 10.000 project posters were distributed to the dwelling units and the sensitive shareholders located on the project route.
- ❖ Project **helpline** was put into service (0216 700 14 14).
- ❖ An announcement for Consultancy with Public and Shareholders was released in two separate national newspapers on March 7, 2011, and March 15, 2011, and notices were posted on the project route.
- ❖ Project exhibitions were organized, and public information meetings were held in Eminönü Public Education Centre on 18-19 March 2011 and 3-4 April 2011 and in Bağlarbaşı IETT Culture Center on 25-26 March 2011.
- ❖ ÇSED Reading Rooms come into service in Samatya in the European side and in Bağlarbaşı in Asian side on March 7 and May 8 2011, for shareholders without internet access and/or who want to receive information face-to-face.
- ❖ The project website was opened for use in Turkish and English languages. The “ÇSED Report on the Consultancy Process with Public and Shareholders” explaining the ÇSED process in a transparent manner was published on the project website on September 30, 2011; all reports prepared within the scope of ÇSED were updated in the light of comments received from shareholders at the end of consultancy period and were opened to the access of public.

The ÇSED study along with the non-technical Summary report was also published on the websites of international financing institutions which financed the project.^{139,140} Thanks to the process summarized above, the route, technical information, environmental and social impacts of the project were shared with the public in a transparent manner.

¹³⁸ www.avrasyatuneli.com/kurumsal/sosyal-sorumluluk-ve-cevre/cevresel-ve-sosyal-dokumanlar

¹³⁹ www.ebrd.com/english/pages/project/eia/42163nts.pdf

¹⁴⁰ www.eib.org/attachments/pipeline/20090678_esia_en.pdf

3. Construction – Investment

Within the transparent and open communication framework of project, the Shareholder Participation Plan was prepared in May 2012 containing the results of consultancy process carried out with the shareholders.¹⁴¹ Pursuant to this plan:

- ❖ On the project route, People Affected by the Project (*a number of 77*) were identified, individual plans were made and executed so as to avoid and/or mitigate the project impacts for each of them.
- ❖ The significant progress stages in construction period, important changes and updates in the project plans, posters, visits to the neighborhood representatives and the project are shared through the project website.
- ❖ ÇSED Reading Rooms came into service in Haydarpaşa Head Office for shareholders without internet access and/or who want to take information face-to-face.
- ❖ Hundreds of national and international university, governmental institutions and private company representatives visited the construction site; tens of national and international conference invitations were accepted, meetings were held with the NGOs such as local community organizations, trade associations and UNESCO World Heritage Centre (DMM).
- ❖ Upon the request of **UNESCO World Heritage Committee**, Cultural Heritage Impact Assessment was prepared in 2014 in line with the ICOMOS Guide and submitted to the UNESCO.
- ❖ In accordance with the opinion of Cultural Heritage Impact Assessment and UNESCO World Heritage Committee, the project design was changed, **the castle walls on the Historical Peninsula and Mermer Kule (Marble Tower) were pieced together again**, which had been tunneled through in the project previously.¹⁴² (*This improvement was welcomed at the 41st Session Decision of UNESCO World Heritage Committee convened in 2017 in Krakow-Poland.*)
- ❖ Independent experts performed air quality modelling studies in order to assess the possible impacts of tunnel to the air quality; the prepared reports were shared with the shareholders.
- ❖ Yaşar Kemal Statue and Turk–Turkmenistan Peace Monument located on the project route were moved to the Yenikapı City Park by consulting to the cultural circle, NGOs, and the competent authorities.
- ❖ All excavation works of project in the European side were carried out under the control of the relevant Cultural Heritage Conservation Board and the Archeology Museum of İstanbul. The relevant banner was shared on the project website in February 2018.¹⁴³

Upon the completion of construction, the Shareholder Participation Plan Closing Report for the Design and Construction Period was published on the project website in April 2017.¹⁴⁴

¹⁴¹ www.avrasyatuneli.com/kurumsal/sosyal-sorumluluk-ve-cevre/paydaslarla-iletisim

¹⁴² www.avrasyatuneli.com/assets/pdf/mermer_kule_tasarim_degisikligi.pdf

¹⁴³ www.avrasyatuneli.com/assets/pdf/avrasya-arkeoloji-ozeti.pdf

¹⁴⁴ www.avrasyatuneli.com/assets/pdf/p_k_p_tasarim_ve_insaat_donemi_kapanis_raporu.pdf

Also, all processes were subject to the effective multi-actor control structure, and the globally recognized firms took charge in the control of project. A complicated multi-control structure was in effect from the beginning of project development until the end of construction. The below-mentioned audit firms took part in the project which was implemented in a transparent manner:

- ❖ **Arup** took charge as the auditor of creditors. (*Arup, founded in London in 1946, provides engineering service to 140 countries with more than 16.000 employees. **The National Olympic Stadium in the 2008 Beijing Olympics and the Oresund Bridge between Denmark and Switzerland are among the projects it participated in.***¹⁴⁵)
- ❖ **Italferr & Altinok-JV**, took charge in as an Adviser Firm on behalf of Administration and inspected all construction processes during the investment period on behalf of AYGM. (*Italferr, founded in 1984 as an engineering firm under the Italian State Railway Group, provides engineering service in Italian and international markets with its 1.758 employees. Trun Lyon High Speed Train in France and California High Speed Train in the USA are some of the projects it participated in.*¹⁴⁶ *Altinok, founded in 1963 in Türkiye, provides engineering service with its 478 employees. **It took charge in projects such as İstanbul Airport subway and Ankara-Niğde Highway Projects.***¹⁴⁷)
- ❖ **HNTB**, took charge as an independent design inspector. (*HNTB, **founded in** 1914 in the USA, provides engineering service with its 3.400 employees. The Alaskan Way Tunnel and Blennerhassett Bridge in the USA are some of the projects it participated in.*¹⁴⁸)

4. Operation

The Shareholder Participation Plan prepared for the operation period of project was published on the project website in 2019;

- ❖ The data obtained from the air quality monitoring stations established within the scope of Project are assessed by the TR Ministry of Environment, Urbanization and Climate Change and İstanbul Metropolitan Municipality, and the prepared reports are shared with public through the websites of relevant institutions on a periodical basis.^{150,151}
- ❖ The possible questions were determined, and the answers were meticulously prepared in detail and shared on the project website.¹⁵²
- ❖ All questions, recommendations and complaints received through complaint forms available in the call center (0850 222 80 20), e-mail (*bilgi@avrasyatuneli.com*), Project website form¹⁵³, web-based satisfaction platform¹⁵⁴ and the Operation Building (*Eurasia Tunnel Operation and Maintenance Building - Barbaros Mahallesi Dr. Eyüp Aksoy Caddesi No: 9 34662 Üsküdar, İstanbul, Türkiye*) are diligently evaluated, answered specific to the shareholder, solution is generated, and by communicating all information related to the process transparently, it is aimed at ensuring the user satisfaction.

¹⁴⁵ www.arup.com/

¹⁴⁶ www.italferr.it/

¹⁴⁷ www.altinoknet.com/

¹⁴⁸ www.hntb.com/

¹⁴⁹ www.avrasyatuneli.com/assets/pdf/Paydas_Katilim_Plani.pdf

¹⁵⁰ sim.csb.gov.tr/SERVICES/airquality

¹⁵¹ havakalitesi.ibb.gov.tr

¹⁵² www.avrasyatuneli.com/sss/

¹⁵³ www.avrasyatuneli.com/iletisim

¹⁵⁴ www.sikayetvar.com

- ❖ The updated information regarding the project is constantly shared through the communication channels such as the project website, mobile applications, call center, social media channels, radio announcement within the tunnel, variable message signs on the road.
- ❖ Membership system was launched for the users who would like to receive information about the passes.¹⁵⁵
 - ❖ In the operation and maintenance building, the museum explaining all the stages of project through the latest digital mapping technologies, interactive touch screens, virtual reality glasses and interactive touch surfaces and harboring certain parts used in the construction and resources/reference documents hosted thousands of visitors; and the video of museum was prepared and opened to access on internet for those who did not have an opportunity to visit the museum.¹⁵⁶ After the pandemic, it is planned to schedule museum visits for school children in groups.

In the operation phase, the project is subject to the supervision by the AYGM, Arup (*auditor of creditors*) and international independent audit firms on a periodical basis. Additionally, **the road safety control** to establish that it is operated in conformity with the international operation safety standards, 2004/54/EC Directive dated April 29, 2004, of European Parliament and Council, NFPA 502&101 and PIARC standards was performed by Arup in 3 stages and successfully completed in March 2017.

In sum, Eurasia Tunnel Project has adopted a transparent communication policy with all individual and institutional shareholders during all the processes at every stage of project, has constantly informed the public and has kept and is keeping the troubleshooting mechanism of project open to the shareholders.

¹⁵⁵ www.avrasyatuneli.com/uyelik/bireysel-uyelik

¹⁵⁶ www.youtube.com/watch?v=TozdJoMa1R0&t=599s

ANNEX 23: PUBLIC PRIVATE PARTNERSHIP – GUIDELINES FOR APPLICANTS

(Version 3, 2017, World Bank)

The PPP Reference Guide was prepared by the **PPP Information Centre** established in the leadership of World Bank. The Guide brings together the relevant and authorized sources on PPP projects in one place. The main objective of PPP Information Centre is to help governments and advisers **decide whether the PPP project is the best option to deliver infrastructure service** and if so, **design the best PPP model**.

PPP Information Centre **was launched in 2015** with the cooperation of the African Development Bank (*AFDB*), Asian Development Bank (*ADB*), European Bank for Reconstruction and Development (*EBRD*), Inter-American Development Bank (*IADB*), Islamic Development Bank (*IsDB*) and the World Bank. With the support of Public Private Partnership Infrastructure Consultancy Services (*PPIAF*), it **serves to the needs of both governments and operators by filling the gap for credible information about the public private partnership**. In the postlaunch process, five new partners participated in the PPP Information Centre: European Investment Bank (*EIB*), Global Partnership on Output-based Aid (*GPOBA*), Organisation for Economic Co-operation and Development (*OECD*), Economic and Social Commission for Asia and the Pacific (*ESCAP*) and United Nations Economic Commission for Europe (*UNECE*).

In the Financing for International Development Conference, the governments agreed on the fact that the approved Sustainable Development Goals **and the public financing alone would not be enough to provide necessary infrastructure required to eliminate the severe poverty**. The government officials and the various institutions **increasingly seek for more innovative ways to mobilize the contribution of private sector, to blend the public and private sector financing for the to enhance the infrastructure investments, and to improve the productivity and quality of public service delivery**. **The PPP model stands right in the center of this effort**. The main objective of World Bank and other institutions, which have contributed to this guide, is to help government **make well-informed decisions in proportion with the macroeconomic goals and institutional capabilities based on robust analysis** regarding the infrastructure programs and **extend the good practices** related to the infrastructure and PPP policies and their implementations.

The third print of PPP Reference Guide concentrates particularly on **the determination and selection of PPP projects by the governments, the development of effective legal and institutional frameworks that would facilitate the procurement and the structuring of economic, sustainable PPP contracts which provides the services needed by the communities**. Besides, this Guide especially covers new subject areas such as **Shareholder Communication and Participation, Environmental and Social Impact Studies and Climate Change**. In the annexes, issues such as the municipality led PPP projects, climate change related problems, private sector participation in the sensitive areas and the areas affected by the conflict of interests are explained.

Below you may find some quotes from the Introduction of this Guide:

The Definition of PPP according to the World Bank:

“A long-term contract concluded between the private sector and a public institution to provide a public asset or service, as per which private sector undertakes significant risks and management responsibility and the payments depend upon the performance.”

This definition.

- ❖ Encompasses PPPs that provide and realize **both new and existing assets and services.**
- ❖ Involves PPP projects in which private sector payments are completely **covered by the users** and a **public institution makes a part of or all the payment.**
- ❖ Encompasses **various service contracts from several different sectors** for the realization of services and projects with long-term assets that serve to public benefit.

The project functions transferred to the private sector- for instance; design, construction, financing, operation, and maintenance- may vary from contract to contract; however, the **private sector shall be responsible for the performance of project under any circumstances and holds significant risk and management responsibility.** PPP projects, typically, **assign “every risk” to the party that will manage and overcome the risk in the best manner.** The transfer of risk to the private sector is a means rather than an end to align the private interests with public interest for the full transfer of management responsibility.

The **"infrastructure"** term in the Guide was used in a manner to encompass sectors and services in which PPP projects are implemented. In this context, it **covers** social and public infrastructure, to say, **“basic physical and organizational structures” required to enable macroeconomic, social, and public activities.**

A PPP model **involves a long-term commitment to provide infrastructure services** in minimum-this means **the design and construction of infrastructure or the renewal and long-term maintenance of existing assets.** The majority of PPP projects involves additional services, including the complete operation of infrastructure, in cases where the special operator could guarantee service quality and performance and the procurement authority in public could identify the quality and performance. These additional services have to be realized in the long-term.

If the projects are well chosen and the PPPs are carefully structured, the implementers can design and implement projects that ensure cost effectiveness and optimize social reforms by aligning the profit goals of private sector partners with the goals of public sector which support the public benefit.

A considerable amount of qualified information about the Public Private Partnership across the world was compiled **by a wide range of implementers** encompassing public and private sector, international development institutions, university circles and senior consultants. This Reference Guide helps readers benefit from this accumulation of knowledge. It introduces basic issues about PPP, determines the alternatives and refers the readers to further examples and references to deepen on the subject.

An increasing number of governments give priority to establish partnership with private sector so as to provide public infrastructure assets and services. This Reference Guide aims at assisting all relevant parties. It aims at assisting government officials and other relevant parties to answer to the following questions:

- ❖ What is PPP and why is it used?
- ❖ What kind of policies, legal and institutional frameworks are required to ensure that PPPs achieve the designed goals effectively and efficiently?
- ❖ What is the process for developing and implementing a PPP project?

The Reference Guide is divided into three modules:

- ❖ **Module 1: The Fundamentals of PPP – What and Why?** Provides a general overview about the Public Private Partnership model. What are they, how are they used to provide infrastructure assets and services, their benefits, and risks/threats.
- ❖ **Module 2: The Establishment of PPP Framework.** Defines the components of a robust legal and institutional PPP framework. The policies, processes, institutions, and rules supporting the good management of PPP programs.
- ❖ **Module 3: The Implementation of PPP Projects.** Provides guidance for each step of developing and implementing a PPP project.

Below you may find some examples from this Guide:

BOX 1.2 – VALUES CREATED BY THE PPP MODEL

The values created by PPP model are the mechanisms that may be employed to increase the value (investment) for money in the presentation of infrastructures. It includes the following:

- ❖ **Life-long Cost** – The complete integration of constant service delivery, operation, maintenance, and renewal along with pre-design and construction under the responsibility of a single party may reduce the project costs. The complete integration encourages the responsible party to complete each stage of project (*design, construction, operation, maintenance*) in a manner to minimize the total costs and maximize the productivity.

- ❖ **Risk Transfer** – The possession of infrastructure by the public and the risks in the course of operation bear typically important and mostly undetermined, and disguised costs. The transfer of part of risk to a private sector institution which is capable of managing it better may reduce the total cost of project incumbent on the State and minimize the risk of taxpayer.
- ❖ **Maintenance Commitment, Predictability of Life-long Costs and Transparency** – A PPP projects requires the private sector operator to make a prior commitment for the payment of life-long costs necessitated to provide adequate maintenance throughout the lifecycle of given asset. This commitment strengthens the life-long budgetary predictability of infrastructure and reduces the risk of not finding the necessary finance for the maintenance after the construction is completed.
- ❖ **Focus on Service Delivery** – It guarantees that the private sector operator makes a long-term commitment to provide services in the required time and as required. The private sector in charge can focus on delivering services without being obliged to take into consideration the other goals and restrictions typical to the public sector.
- ❖ **Innovation** – Determining the outputs in the contract rather than listing the inputs provides a wider area for opportunity for a private sector partner. This situation ensures the competitive purchasing of contracts and promotes the bidders to develop innovative solutions to meet the specifications stipulated in the contract.
- ❖ **Use of Assets** – It enables to optimize the use of assets to provide additional services that will create multiple income stream. For instance, the allocation of areas for private sellers in the bus terminals or allocation of proper areas for advertisement.
- ❖ **Mobilization of Additional Finance** – Charging a fee to the users may create more funding and it can be made more easily by special operators compared to the public sector. Additionally, PPP projects may provide alternative financing sources for infrastructure projects about which governments encounter finance restrictions.
- ❖ **Accountability** – Public payments are bound up with the private sector operator who decides certain outputs and provides them in the framework of quality, amount time. Unless the performance requirements are fulfilled, the service payments effected to the private sector may be reduced.

You can access to the full version of Reference Guide, which is partly quoted here, via the following link: [ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/documents/PPP Reference Guide Version 3.pdf](http://ppp.worldbank.org/public-private-partnership/sites/ppp.worldbank.org/files/documents/PPP%20Reference%20Guide%20Version%203.pdf)



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