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Deregulation of Turkish State Railways Based on Public-Private Partnership Approaches

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***Abstract*—**The railway network is one of the major components of a transportation system in a country which may be an indicator of the country's level of economic improvement. Since 2000s on, revival of national railways and development of High Speed Rail (HSR) lines are one of the most remarkable policies of Turkish government in railway sector. Within this trend, the railway age is to be revived and coming decades will be a golden opportunity. Indubitably, major infrastructures such as road and railway networks require sizeable investment capital, precise maintenance and reparation. Traditionally, governments are held responsible for funding, operating and maintaining these infrastructures. However, lack or shortage of financial resources, risk responsibilities (particularly cost and time overrun), and in some cases inefficacy in constructional, operational and management phases persuade governments to find alternative options. Financial power, efficient experiences and background of private sector are the factors convincing the governments to make a collaboration with private parties to develop infrastructures. Public-Private Partnerships (PPP or 3P or P3) and related regulatory issues are born considering these collaborations. In Turkey, PPP approaches have attracted attention particularly during last decade and these types of investments have been accelerated by government to overcome budget limitations and cope with inefficacy of public sector in improving transportation network and its operation. This study mainly tends to present a comprehensive overview of PPP concept, evaluate the regulatory procedure in Europe and propose a general framework for Turkish State Railways (TCDD) as an outlook on privatization, liberalization and deregulation of railway network.

***Keywords*—**Deregulation, high-speed rail, liberalization, privatization, public-private partnership.

I. Introduction

DESPITE the Turkish government's remarkable acceleration in enhancing infrastructures such as transportation network since early 2000s, it is clear that there is still long way to be proceeded in order to fill the nationwide gap in this field. Indubitably, railway network is one of the key components of a well-developed transportation network of a country. Around 180 years ago, new rail technology in the UK commenced a new era in transportation, railway age. However, over the last 100 years, the railway system has depreciated in the total transport network. As for final stage, HSR initiated a new trend named "railway renaissance" which revived the importance of railway [1]. Abramovitz believes that it is not exaggeration to state that the activity engendered by railway finance paved the way for transition from the capital markets of the early 19th century to the complex, organized and highly specialized markets of 20th century industry [2]. In particular, minimizing the negative environmental impacts of transport, triggering continual growth, development of the economy and social and political interrelations are of potentials of railways in modern societies [3].

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A. The Context

Turkey, a transcontinental country in Eurasia, has a growing economy and incessantly increasing population, which is relatively younger, compared to the average of Europe. As is the trend worldwide, Turkey has also faced similar ups and downs during its history of railways, as follow:

1) Pre-republic period (Ottoman Empire)
2) Republic period between 1923 and 1950
3) 1950-2000
4) After 2000

In general, British, German and French authorities were granted privileges by Ottoman Empire to develop railway network in their realm of influence and tracks constructed by those powers in the Ottoman Empire territory were shaped up in coordination with their own political and economic goals. Immediately after the formation of Republic of Turkey and during railway dominant period (1923-1950), the railways were structured to serve national interests aiming at creating a self-sufficient national economy. In subsequent stage, after 1950s, the highways became prevalent and railways were gradually being depreciated in value for both passenger and freight (see Table I) [4]. This trend continued for almost half a century where in 2000s and following years, the government tended to allocate more budget and accelerate investment in railway sector. This not only leaded to the formation of a more developed railway network in the country, but also is in parallel with the target of a successful integration of Turkey to the European Union (EU). In addition, having considered the national and international positioning of TCDD, it may be concluded that the coming decades will be an excellent opportunity for railway sector to be revived.

TABLE I
SHARE OF RAILWAY IN NATIONAL TRANSPORTATION (1950-2010) [4]

Years/ Share %	Passenger	Freight
1950	42.2	68.2
1960	24.3	52.9
1970	7.6	24.3
1980	4.6	11.8
1990	2.5	9.8
2000	2.2	5.4
2010	1.6	5.3

B. Monopoly

In a classification introduced by Knieps, the layers in railway network sectors can be summarized as [5]:

1) Network infrastructure: construction of tracks and other fixed infrastructure
2) Infrastructure management: railway traffic control and track management
3) Network services: rail transport services

For decades, government-based TCDD has had monopoly over all above-mentioned layers for both freight and passenger. In this case, the amount of goods in ton or number of passengers to be carried accounts for the output, while the amount in Turkish Lira (TRY) charged for each ton/passenger accounts for price. In case the incumbent monopoly firm tends to increase the number of goods or passengers transported, the charged price must be reduced to appeal more customers. This leads to a price decrease in every ton or passenger it carries. This implies a decrease in total revenue in the existing amount of goods/passengers it was already receiving and with supposition of the inelasticity of demand, the monopoly may have no incentive to do so. Consequently, the marginal revenue of a monopoly is less than the price and the demand curve lies above the marginal revenue curve (see Fig. 1).

In a natural manner, just like any other neoclassical firm, the monopoly will select the output level where marginal revenue (M_R) equals marginal cost (M_C). Thus, the amount of goods/passengers to be carried is Q_M and the price to be charged is P_M.

If the transport market were perfectly competitive, again an output level where M_R equals M_C would be selected in which with less price, P_C, larger total number of goods/passengers, Q_C, would be carried compared to that of monopoly. This socially efficient price-quantity combination is reached when marginal revenue curve is identical to the firm's demand curve in a perfectly competitive market. Furthermore, no deadweight loss is incurred under efficient equilibrium (Q_M, P_M) which is socially desirable [6]. Deadweight loss indicates a social cost of economic inefficacy. To cope with this problem, the government seeks to regulate and limit markets with monopoly power to maximize efficiency and to reduce deadweight loss-related social costs. Besides, since the global economic crisis of 2008, the fiscal space in Turkey has become seriously constrained, thus limiting public funds for new investments in infrastructure [7]. With regard to the mentioned matters, the only viable option for the expansion of infrastructure seems to be the mobilization of private finance.

II. Overview of PPP

Fundamentally, PPP is a long-term contract between private party such as private sub-contractors, financiers, investors and insurers and a government entity such as national or regional authorities, state-owned entities and governmental agencies for the provision of public services and/or development of public infrastructure in which responsibilities and rewards are shared [8]. On the other hand, some scholars consider PPP as nothing more than a "language game" and rhetoric use of the government for privatization and outsourcing in order to avoid their negative appearance among citizens [9].

The transformation process during a PPP project has been generally accomplished within two broad approaches in terms of mission. The first approach is "Greenfield" projects where the private sector develops a new infrastructure. The second one, "Brownfield", is related to projects in which private sector operate, maintain, preserve or improve existing infrastructures [10].

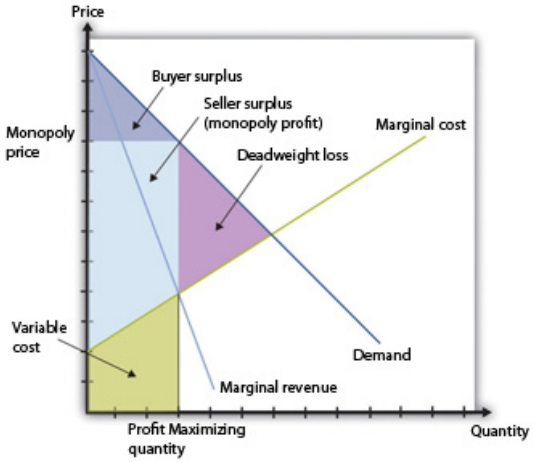

Fig. 1 Market conditions under monopoly and competition

A. Typical Characteristics of PPP

PPPs have a number of characteristics which differentiate them from conventional Project approaches. Reference [11] presents these differentiations as follow: The first parameter to be mentioned is the funding sources. In traditional approaches, infrastructure projects are financed by the national budget of the country. To build infrastructure in this manner, the contractor would be selected by public authority and upfront payments to the contractor are based on the project construction progress. In contrast, for PPP projects, private investors are mainly responsible for financing the project. Undoubtedly, private contractor tends to remunerate its investment and generate profits out of it where payments to private sector are spread over the project lifetime.

Projects concern duration is another key difference between conventional and PPP projects. As for conventional procurement, the relationship between the public authority and the private contractor ends once the construction phase is over. However, in a PPP project the relationship between private partner(s) and the government continues far beyond the completion of the construction since private sector is generally responsible for operating and managing the infrastructure for a number of years, typically more than 20 years.

The third factor making PPP projects different from a traditional procurement is that requirements are defined in terms of outputs in PPPs where the matter to be discussed is what we want to achieve. Basically, traditional approaches are input-based ones. For instance, in a traditional perspective for a project, building an airport on a definite area with desired

terminals, apron and etc. is the only matter to be considered; while in PPP the target is to give service and reach a transport value of a definite number such as 20 million passengers per year.

The final and a very crucial differentiating aspect is risk allocation. Risks are basically encompassing cost and time overruns in construction and operational phases. In traditional procurement, most risks are borne by the public sector and the financial risks are almost solely placed on government's shoulders. In contrast, in a PPP project, risks are mainly on the shoulders of private sector which is responsible for construction and operation of the project. In this context, the project is structured to allocate risks to the private partner who is best equipped to manage them.

B. Pros and Cons

Attraction of private capital is a viable means to finance infrastructure projects that would not be feasible only based on national budget. This accounts for increasingly preference of governments over PPP projects. However, private partners expect to make benefit of their investment throughout applying user fees, governmental payments and side activities such as developing hotels, shops, car parks, etc. in vicinity of the asset. Realization of efficiency is a second motivator for application of PPPs. It has been observed that the efficiency in PPP is far better through project delivery, operation, management and access to technology compared to conventional approaches. The third item, which puts forward a PPP project, is involvement of long-term solutions for the provision of public infrastructure. If a private partner is responsible for operating an asset for 20-30 years, it has to be sure that the asset is constructed properly. Besides, this factor incents private sector to reduce life-cycle costs of assets. The final benefit of a PPP project is the transfer of risk to the private sector. In this way, government finances are protected against potential cost overruns that are very significant in mega projects.

Beside the benefits of the PPP projects, this kind of projects may have a number of limitations for application. The first matter is that the PPP is not suitable for all project types. Even in developed countries with successful experiences in PPPs, only a limited share of public projects has been pursued following this model. Particularly, in the fields, which face rapid changes such as Information Technology (IT), PPP does not work well. Indeed, it works better for long-term and somehow predictable infrastructure services. The second limitation is PPPs' structural complexity and high transaction costs. Thus, the project must be big enough to justify such procurement costs. With this in mind, some countries only consider a PPP project for projects with budgets above a certain threshold. Shortage or lack of local companies' capacity might be another limitation for PPP applications. Such companies might not be equipped to manage the risks caused by PPP projects. In addition, PPPs are highly dependent on political issues. First of all, the government must try not to be very generous to private sponsors in public perception. In light of this, strong political support is critical for the success of a PPP project. Finally, PPPs can be relatively inflexible and poor at accommodating changes. Therefore, it might be costly for the public entity to modify project specifications once the project has been awarded.

C. Risks

While providing a variety of advantages, using PPPs for transportation projects such as railway infrastructures may also have risks. Reference [12] suggests that any factor, event or influence threatening the successful completion of a project in terms of cost, time and quality can be defined as risk. Reference [13] identifies transport PPP risks in four primary domains, namely "technical", "commercial", "political", and "economic and financial" risks. Time and cost overruns beside the risks in the design of the tender specification or contractor design fault are covered under technical risks task. For instance, the actual costs of a transport investment after realization may be on average 28% more than forecasted values [14]. Commercial risks arise due to the uncertainty in the marketplace, such as a change in traffic demand. In reality, demand may differ from the forecasts by 20-30% [15], [16]. Regulatory and political risks emerge due to the actions taken by government which affect the private sector's ability to make benefit. These risks encompass the actions terminating the concession, factors restricting the ability to collect/raise tariffs and imposing regulatory revisions and taxes which may reduce the value to investor. Change of government and even lack of consistency in government may generate severe risks to private investors. Finally, uncertainties related to economic growth, rates of inflation, exchange rates and currency convertibility may account for emanation of financial and economic risks. Particularly, transferability and inconvertibility risks may be trouble-making obstacles to the private sector to convert local currency revenues into foreign exchange and to transfer without restriction out of the host country [17]. Railway investments are highly vulnerable to government actions since they are immobile, sunk and long-term. This matter shows up especially in host countries with a long history of nationally-owned transport infrastructures and price subsidies.

Risk allocation among the agents in PPP projects follows two main discriminative criteria [18]:

1) The agent which may have the control over the risk and have impression on risky outcome should bear the risk and take action.
2) The risk should be beaten at the lowest cost and the agent which is able to do so should bear the risk.

These two criteria often have contrasting consequences in the risk allocation context. By taking into consideration both criteria, it may be impossible to select the same risk-allocated agent. This implies that the agent which is emanator of the risk and accordingly is best able to control it, may not be able to do so in the most efficient manner and at the lowest cost. Furthermore, intervention of the private sector in public provision has certainly a radical change of thinking and operating within the public sector. Within this framework, attention should be directed towards conduct that is more

flexible so that private sector leaves behind the rigid structure of governmental procedures and rules. In conclusion, risk allocation in infrastructure projects is an uncertain task and the identification of the risks and their correct allocation is complex to determine [19]-[20].

III. Characteristics of TCDD and Future Outlook

TCDD, whose history dates back to the Ottoman Empire, is a public corporation functioning under the Ministry of Transport, Maritime Affairs and Communications. Title, responsibilities and authorities of this institution have faced several alterations where at final step in 1953, pursuant to law No: 6186, the title has been accepted as "Turkish State Railways", TCDD [4].

Construction of conventional and HSR lines, beside the operation, improvement, renewal and any other supplementary activity of these lines and harbors have been under the authority of TCDD. The 11th Forum of the Transportation, Maritime Affairs and Communication held in September 2013 defines and classifies the national train operation/services as follows [4]:

1) Conventional Trains: Speed is less than 160 km/hr
2) Speed Trains: Speed is equal to or higher than 160 km/hr and less than 250 km/hr
3) High Speed Trains: Speed is equal to or higher than 250 km/hr and less than 350 km/hr
4) Very High Speed Trains: Speed is equal to or higher than 350 km/hr.

The above definition/classification applies to the lines and train operations if the noted speed ranges are achieved more than 50% of the line between the start and end points.

The TCDD has also a partnership with three government-owned corporations (TULOMSAS, TUDEMSAS, and TUVASAS) to supply, maintain and repair locomotives and wagons.

In general, the existing tracks in Turkey have two aspects to be improved. First, the share of single-track lines is seriously high. As for maintenance and repair work of these lines, the common experience is to close the line during the mentioned operations which leads to a lower performance of the system. However, the same problem is not true for double-track lines in which complete closure of the line is not necessarily required during maintenance and repair activities. The other matter is the high share of non-electrified lines. However, electrification and signalization work are under progress and a number of renewal plans are targeted.

Another feature of TCDD, which is a matter of paramount importance, is its international positioning. Within this context, important international positioning and location of Turkey should be analyzed in detail from the points of international rail network development and operation. Turkey has membership to a number of international organizations such as UIC, TAR, TER, TRACECA, EUROFIMA, FTE, CIT, SERG and CER. To keep the pace with developed rail network in the world and to improve its rail system standards up to European level, Turkey has taken crucial steps in recent years such as construction of Marmaray rail line and HSR lines and yet, several HSR lines are to be constructed. Upon completion of the HSR lines that are currently under construction, the central government declares that Turkey will be one of the leading countries in Europe with its HSR network. "Marmaray" not only serves for the urban and inter-urban freight and passenger services, but also will play a crucial role in international connection of Asia and Europe. Therefore, it has a significant and strategic role for Euro-Asian rail operation in the future.

Modal shift after realization of existing HSR lines implies that public tendency towards it is remarkably high and this may be a strong motivator to plan and construct new HSR lines (see Tables II-IV) [4].

TABLE II
MODAL SHIFT AFTER ANKARA-ESKISEHIR HSR

	Before	After
Bus	55%	10%
Private vehicle	37%	18%
Conventional train	8%	2%
HSR	-	70%

TABLE III
MODAL SHIFT AFTER ANKARA-KONYA HSR

	Before	After
Bus	70%	17%
Private vehicle	29%	17%
Airway	1%	-
HSR	-	66%

TABLE IV
MODAL SHIFT AFTER ESKISEHIR-KONYA HSR

	Before	After
Bus	70%	32%
Private vehicle	30%	13%
HSR	-	55%

In general, TCDD sets out the development and investment targets for 2023 (2023 is the 100th anniversary year for the establishment of Turkish Republic) as follows [4]:

1) Reorganization of TCDD throughout developing PPP schemes
2) Signalization and electrification of all tracks
3) Improvement and renewal of rolling stock fleet
4) Network improvements: Approximately 1,000 km of new conventional lines, and total 13,000 km of HSR and speed lines and improvement of the inter-urban rail network system to reach a total length of approximately 25,000 km
5) Renewal of existing lines
6) Introduction of new legislations to facilitate international freight transport
7) Completion and effective operation of Marmaray line both in local and regional scale
8) Efficient integration of railways and highways to logistic centers

To recapitulate, TCDD plans to renew its existing tracks and rolling stock, introduce novel management and operational perspectives, expand the conventional network and construct a number of HSR tracks. Taking into consideration the inefficacy of public sector from the points of construction and financial matters, participation of private sector

throughout both green-field and brown-field projects seems inevitable to reach the 2023 goals.

IV. PPP Enabling Legislations

In the 1980s, railway companies became seriously dependent on public funding with regard to their incessantly increasing loss of ridership and European governments were under pressure to reform the heavily subsidized national railway networks [21]. Sweden was the first place in which transport liberalization took place in 1988. Subsequent to the introduced vertical separation between infrastructure management and service operations legislation, the Swedish government formed Banvekert, the national infrastructure manager and from that point on former incumbent monopoly, SJ AB, became a service operator, paying infrastructure usage fees to Banvekert [22]. The successful Swedish experience in railway liberalization and improvement of competition in some other member states paved the way for provision of an EU-wide regulatory reform to liberalize national railway networks in Europe.

The foremost step of European Union Council in liberalizing the railway markets in member states was the EU Directive 91/440 focusing on establishing distinct organizations to break down rail networks' vertical integration. In subsequent step, two key regulations took place in 1995. Directive 95/18/EC introduced a universal licensing process in which a train service operator who has obtained a valid license from one EU member state has right to freely compete in all other EU markets. Besides, the framework for fair allocation and infrastructure capacity charging for railway undertakings was provided by Directive 95/19/EC. Directive 2001/12/EC was enacted in support of initial Directive 91/440 to break down the vertical ties. Additional licensing requirements concentrating on safety and service quality criteria were introduced by Directive 2001/13/EC. Furthermore, Directive 2001/14/EC focused on providing a framework for non-discriminatory allocation and charging of infrastructure presented in Directive 95/19/EC. In upcoming years, Directive 2004/49/EC targeted greater harmonization of interoperability and safety requirements of new railway undertakings across member states. Further enhancement of interoperability was taken in Directive 2004/50/EC, which developed common requirements for international HSR services. A very important act was Directive 2004/51/EC, which opened up the international and domestic cargo markets and brought a new level to the process of liberalization by introducing free freight transport market. Free access to the passenger transport market in the international scale was allowed by Directive 2007/58/EC. One of the final major steps that would maximize the degree of market opening is liberalizing domestic passenger transport. With this trend, both international and domestic networks for passenger and freight would be fully opened for competition [6]. Suggested by Railway Journal, transferring rolling stock authorization to the European Railway Agency may be a crucial approach. This would reduce the market entry time and cost for new role players by 20% and save the EU railway industry 500 million Euros by 2025 [23].

Turkey has been endeavoring to join the EU since decades ago and its strategic location together with the restructuring of state railways and market development in this field shall well contribute to the negotiations with EU. Indeed, there is an accumulated experience in developing highway, airport and bridge utilizing PPP/BOT models in recent years, whereas there is yet to have any experience or model project for a PPP type of railway operation/development in Turkey (see Table V) [4].

TABLE V
Build-Operate-Transfer (BOT) Model Transport Infrastructure Projects in Turkey

Project	Type
Northern Marmara motorway	Bridge & Highway
Izmit Bay bridge Crossing	Bridge & Highway
The Istanbul (Bosporus)strait road tunnel (Avrasya Tunnel)	Tunnel & Highway
Istanbul 3rd airport	Airport

The PPP award process is currently based on a patchwork of legal and institutional structures in Turkey, encompassing a number of laws and several institutions [24]. This fragmented structure is mainly due to the struggle between politicians and judiciary on the one hand and among key stakeholders of PPPs on the other hand. Another key struggling factor is that line ministries introduce different legislations for the use of identical PPP models in their respective sectors in order not to lose their influences in their sectors and responsibilities. Table III presents some PPP enabling laws in Turkey in chronological order [4]. In case a new rail line to be developed as a PPP/BOT model, both laws 3996 and 6461 are expected to be implemented. Table VI shows the major regulations about deregulation/privatization in Turkey.

First and foremost, public agency who is planning to award a PPP/BOT project applies to the Supreme Planning Board with regard to Law No: 3996, having a preliminary feasibility study and after receiving official approval, it may undertake and tender planned BOT project. A subtle attention should be paid to the feasibility studies since inadequate attention may result in serious time/cost overruns, which can remarkably affect the success of the project. Subsequently, the contract shall be awarded and signed with private investor(s) upon receipt of approval from relevant ministries. Law 3996 together with law 4875 (Foreign Direct Investment Law, dated 2003) incites foreign investors to take part in PPP/BOT projects in Turkey and provides an atmosphere in which foreigner investors are being treated equally with domestic ones. Due to the law, Supreme Planning Board determines the principals on the demand guarantees by the government and the risk sharing among the public and private parties. It also urges the public authorities to announce the project through newspapers at least 30 days before closure of initial application to the tender to ensure the transparency and fairness throughout the process. The law also allows for operation/concession period by the private sector up to 49 years where at the end of the contract, the asset should be transferred to the government. In case of any struggle between

involved sides, international arbitration and related rules may be implemented.

TABLE VI
PPP ENABLING TRANSPORT LAWS IN TURKEY

Law No	Law title	Effective since
3464	Appointment of institutions other than the General Directorate of Highways for the construction, maintenance and operation of access-controlled highways	28 May 1988
3996	Realization of certain projects under the BOT model Associated Council of Ministers Decision No: 2011/1087	18 June 1994
4046	Privatization Law	24 November 1994
5335	State Airports Authority to totally or partially transfer its airports to the private sector through long term leasing or transfer of operation rights methods	21 April 2005
655	Ministry of Transport, Maritime Affairs and Communications Structure and Duties	1 November 2011
6461	Deregulation/privatization of the TCDD	1 May 2013

Law 6461 directly deals with deregulation and privatization of TCDD. With regard to this law, public and private corporations would be authorized by the Ministry of Transport, Maritime Affairs and Communications to construct and operate railway infrastructures and services. In PPP/BOT models, the expropriation costs shall be carried out by private sector due to law 6461; whereas law 3996 stipulates such costs should be taken by public agency. Another conflicting point between laws 6461 and 3996 may be the matter of demand guarantee. These may lead to some conflicts, which require rearrangement of law 6461.

V. CONCLUDING REMARKS

Although Turkish government has taken remarkable steps in developing new HSR/conventional lines and improving existing lines since 2000s on, there is still a long way to be proceeded to fill the gap to reach the 2023 goals (100th anniversary of establishment of Republic of Turkey) in railway sector. For decades, TCDD has had monopoly over all sector layers namely, "network infrastructure", "infrastructure management", and "network services" for both passenger and freight network. In this case, deadweight loss, which is a social cost of economic inefficacy, is highly probable, due to the lack of a competitive market. Besides, global crisis of 2008 has seriously constrained fiscal space in Turkey and limited public funds for new infrastructural investments. Mentioned matters trigger the mobilization of private finance as a viable option for the expansion of infrastructure throughout Public-Private Partnerships in Turkey. On the other hand, unique global positioning of Turkey together with its attempts to join EU necessitates acceleration of such approaches. However, PPPs have their own pros and cons and to reach a successful PPP project, very detailed and subtle analysis is required by all sides involved in the process. Subsequent to the successful deregulation of railways in Sweden and some other member states in Europe, a general regulatory framework has been presenting to develop PPP railway projects in Europe. In recent years, Turkey has developed a number of infrastructures such as highways, airports and bridges using PPP approaches. However, railway sector has no share in PPP developments up to the moment and a comprehensive regulatory framework is needed. Indeed, laws No: 3996 and No: 6461 are the ones to be utilized predominantly, in case a PPP railway project to be constructed. However, these laws have some contrasting details in essence to be reviewed and a more comprehensive framework is required. This comprehensive framework may be obtained by evaluating analogous (un)successful regulatory frameworks, analyzing conflicts in applied projects and adapt them for TCDD with regard to characteristics of Turkish market.

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