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Forest fees paid to permit mining extractive operations on Turkey's forestlands & the ratio to investments

Introduction

Natural resources (petroleum, mineral) comprise exhaustible (non-renewable) sources and renewable (forests, water, and aquatic products, wildlife areas, sun, wind) resources. Natural resources must be protected because of the integrity, limitation, and recoil principles of nature, or because of the lives of future generations. Protecting resources can be defined as an effort to preserve natural resources and to provide the highest benefit today and in the future (Basol 1992). At this point, attention should be paid to the negative consequences to the environment by creating an optimum balance to ensure the sustainable management of natural resources (Elvan 2013). In order to achieve the sustainable development for a country, the mineral industry, as part of the economy, must emphasize the concept of environmental protection (Intarapravich and Clark 1994). Particularly in the late 1990s, under increasing pressure from the civil society, the mining sector started a period of change to embrace sustainable development (Boscio 2016). As a result, the mining industry plays a role in the responsible development of the world's natural resources, taking the important

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and direct social, environmental, and economic impact of its activities into account (Ghorbani and Kuan 2017). By this means, mining comes at the price of environmental and social impacts (Ziran 1999; Falck 2016). Indeed, mine production makes a vital contribution to national development and public welfare. However, it should not be ignored that meeting the mineral demand is crucial for sustainable development and social welfare (Nieć et al. 2014).

Humankind is in need of mines throughout its entire life. In global mineral consumption, a substantial increase is expected in 2060. It is expected that the metal consumption, which was 8 billion tons in 2010, will increase to 20 billion tons in 2060, the consumption of fossil fuels, which is 14 billion tons, to 24 billion tons, and the consumption of industrial raw materials and aggregate from 37 billion tons to 86 billion tons (Köse 2019; http://www.oecd.org). Based on this need, mining should be performed in a manner that is as environmentally conscious and sustainable as possible (Yıldız 2020a).

The value of metal and mine production in the mining phase is expressed as a percentage of GDP. This number gives an idea of the scale of production value according to the size of the economy. According to 2016 data, mining takes a share of 1.2% of the world's total GDP (Ericsson and Löf 2019). In the same year in Turkey, this share is 0.82% (MAPEG 2020). Today, despite having rich mineral reserves, the share that mining in Turkey takes in GDP is at the level of 1%. Today, the shares in GDP in developed countries are: 4.5% in USA, 4% in Germany, 7.5% in Canada, 8.7% in Australia, 14% in Russia, 13% in China, and 15% in India (TMA 2019b).

In the world where mining is given such importance, unlike many other lands uses, the places where mining can be extracted are limited (Wrighton et al. 2014). Additionally, the location of a mine is fixed because the mines must be where the resources are found. This characteristic results in benefits and land use overlaps. Indeed, the most common of these overlaps are with Forestland. *Forestlands* constitute 27.6% of Turkey's 78,534,470 million hectares (ha) (Yıldız 2020a) (Fig. 1).

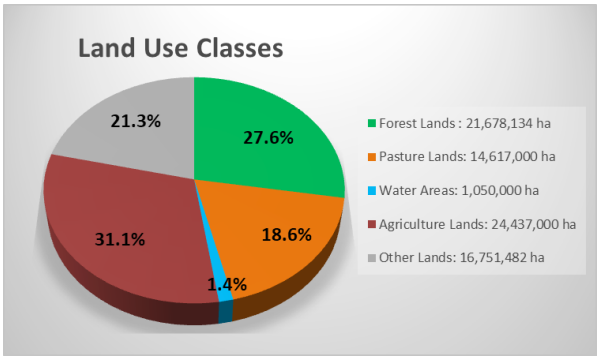

Fig. 1. Proportion of land use classes to the total surface of Turkey (MFWM 2014b; Yıldız 2020a)

Rys. 1. Proporcja klas użytkowania gruntów do całkowitej powierzchni Turcji

As of the end of 2009, the total number of permits for mining activities in forestland was 34,390 hectares (TGNA 2010). Thus, mines in these forestland cover only 0.2% of the forestland and 0.0004 of the total area of the country (Akpinar et al. 2011). According to data from the General Directorate of Forestry (GDF), in 2018, the forestland allocated temporarily to mining operations (i.e., 65,883 hectares) was approximately 0.3% of all forestland in the country (22,621,935 hectares) (GDF 2019b). The vast majority of this allocated area for mining is reported to be very degraded coppice and coppice areas (Journal of Mining Turkey 2019).

In general, the ratio of land allocated for mining activities has declined as more land has been reversed for forestry and nature protection (Intarapravich and Clark 1994). To protect the forestland, the use of the forestland should be carefully monitored against the activities conducted within the framework of sustainable development (Yıldız 2020a). Forest resources provide numerous and multi-faceted benefits to the community with functions such as wood raw material production, recreation, aesthetics, public health, hydrological, as well as conservation of wildlife and biodiversity. Thus, while the forest management provides these benefits with the forestry studies it performs, it incurs various costs (Kaya 1998). It is necessary to estimate the value of forest benefits deprived of mining caused by the allocation of forests to mining and to determine the cost value to restore the damaged forest to its former quality (Ok and Kaya 2017). In this context, certain costs are taken in exchange for the forest lands used for mining activities in forest areas worldwide. It is foreseen that these costs will be spent to realize the above-mentioned community benefits (All sectors in Turkey paid 1.639 billion TL in total for operational activities to the General Directorate of Forestry only in 2018. 295 million TL of this amount was spent on reforestation works of the whole country (GDF 2019a). It can be said that a significant part of the forest incomes is covered especially by the mining operation activities in all sectors). The determination of the amount of these costs with reasonable and objective parameters will provide an opportunity to create an optimum between mining for sustainable development and the preservation of forestlands.

Adopting the values of sustainable development means an increase in the environmental and social costs of the mining industry. This is a potential problem for an industry that already offers low returns on capital. Also, it is far from the cost savings of all spending on social and environmental issues (Humphreys 2001).

Environmental performance is also important for competition among mining enterprises as mining enterprises mostly compete on cost (Bomsel et al. 1996). In this competition, the cost structure of the company is a critical internal situation that must be taken into account (Florén et al. 2019). Cost risk in a project corresponds to exceeding the projected cost value (Aydin 2006). The negative change of laws (i.e. any change that may adversely affect an investment) is one of the most feared risks of mining investors (Pritchard 2005). In recent years, with the effect of legislative changes, forest costs taken from mining enterprises have increased for mining activities that overlap with forestlands in Turkey.

The limited resources in the economy in a country require that they be used in an efficient and maximum benefit without sacrificing extravagance, because investment projects

(raw materials, capital, workforce) are the plans for the purpose of the optimum use of limited economic resources in a manner that will provide maximum benefit. Investment is a strategic decision that is of utmost importance for the enterprises. For the investment project, which is one of the important tools in economic development, to reach the targets (minimum time, minimum cost, minimum capacity) determined in the project (Köse and Kahraman 2009); the regulations introduced later due to the legislation should not be out of expectations.

All policies to prevent environmental pollution and to protect the environment are carried out through economic and financial means. The main ones of these instruments are subsidies, taxes, fees, tax returns and incentives, various licenses and permits (Guzel 2005). The first step in the process of including environmental protection in mining projects is to identify what environmental risks are and what the costs of protection are (Smith and Naito 1998). Pre-production activities constitute the most important activity group to be considered regarding mining in terms of expenditures and risks (Yolcu and Saglam 2014). The forest permit process is also included in these activities. In the case of the overlapping of forestlands and mining activities in Turkey, it is useful to determine the share of the forest permit process costs in the MIA.

1. Scope and methodology

The studies, which started with the examination of various activities that are likely to affect the environment, including the environmental component in the economic decision processes, were first carried out by developed countries. These studies include approaches consisting of technical consistency and Cost-Benefit Analysis. In this analysis of the environmental dimension, the negative effects of a project on the environment are evaluated with monetary measures, and these are interpreted as cost elements (Bolat 2003). However, the issue of mining in forestlands is slightly different. Calculation methods of forest cost types foreseen in Turkey were predicted in the Forest Regulation. These calculation methods and cost types in Turkey differ from those of many other states in the world.

With the effect of legislative changes in recent years, the ratio of the prices of land use, such as forest fees, pasture fees (Yıldız 2019), private land permits and expropriation costs (Yıldız 2020b), for mining activities overlapping with these areas (Yıldız and Kural 2019), to MIA is quite high compared to other countries in the World (Yıldız 2020c). This situation causes Turkey to be more dependent on the outside sources for mining, and only the rich parts of the mines to be evaluated to cover the costs, and the remaining part to be left idle (Köse and Unver 2019).

According to 2019 data, Turkey is a country with only ~3.4 billion USD of mineral exports per year, whereas, if energy imports are also added, ~60.8 billion USD of mineral + + energy imports. Mining investments are at high risk with high taxes such as forest fees and bureaucracy set by the administration. This creates a major economic problem for the

mining industry. See the mine exports/imports that vary according to mineral groups in Turkey (IMMIB 2020; MAPEG 2020).

In Turkey, some costs are taken from mining enterprises in order to perform mining activities in forestlands. These are FLPF, reforestation fee, SDCE + rehabilitation costs, and other fees (such as security deposit, service and report). (Provided that it meets its environmental obligations, only the SDCE is given back to the mining enterprises). Out of all these costs, only FLPF is taken at very high prices in Turkey compared to the prices received in other countries of the world. Considering that the MIA in Turkey are low, these forest costs demanded from mining enterprises have exceeded the size that will create investment risk as a cost item.

The topics aimed in this study are shown below:

- To determine the share of each and the total of the different types of forest fees paid by mining companies in order to carry out mining operation activities in forestlands in Turkey.
- To determine whether these shares vary according to different mineral groups see the mineral groups stipulated by the Turkish mining legislation (Yıldız 2019).
- To determine whether these shares are high in mining investment and to determine whether their amount is high compared to other countries in the world.

In line with this goal, questions were asked to mining enterprises through the "Survey Monkey" program in May, June, and July 2018 to identify such legislative problems in the mining sector in Turkey and to analyze the results to be compared. Some of these questions are about the *forest fees* to be paid to carry out mining activities in forestlands.

The survey questions were answered by the relevant departments of the mining enterprises. Regardless of which companies filled in the questionnaires and what answers were given to the questions, the answers were collectively transferred to the Survey. Some of the 93 mining enterprises preferred not to answer some questions. Mostly, 80–93 mining enterprises (with different mineral groups) answered questions. It was taken into consideration that the number of mining enterprises answering all of the questions would decrease below ~35, thus making the assessment weak for different mineral groups. Thus, in the study, not only mining enterprises answered all the questions completely, but all mining enterprises were evaluated, provided that they provide data compliance.

As a result of the survey study, all forest fees paid and to be paid until the end of the operational activities (until the rehabilitation process where the forestlands used after mining are delivered to the forest administration) of mining enterprises were learned. Then, the ratios of these costs to the MIA of mining enterprises were calculated. Taking the payment of the FLPF each year into consideration, the ratio of this fee to the OC was calculated. First of all, the FLPF paid by each mining enterprise during the mining operation activity to date and the time remaining until the end of the mining operation activities were taken into consideration. Accordingly, the sum of the costs they would pay next was estimated, and an approximate value was calculated. Thus, for this type of cost, the total amount of FLPF paid and to be paid during the entire mining operation was found. This total value was proportioned to the MIA.

In the calculation, the average values of different types of forest cost ranges, which each mining company stated in the survey responses, were taken. These values were proportioned to total MIA or average OC. So, average values were calculated for each mineral group. Thus, in this study, the distribution criteria of different forest fees that are required to be paid by the mining enterprises in order to carry out mining operations in forestlands in Turkey and their distribution on the basis of mineral groups were analyzed. In this analysis, "the ratio of each forest cost type to the mineral investment amount (MIA) (%)" and the "correlation coefficient relationship between mineral groups" were also examined.

Subsequently, 'the ratio of the sum of all the amounts paid by each mining enterprise as forest fees to the sum of the (current and future) MIA during the lifetime of the mining was calculated on average for all the mineral groups. Then, the shares of different types of forest costs, within the total MIA, were calculated. In this calculation, it was suggested that all the costs in Turkey should be reduced to a more reasonable degree by suggesting solutions regarding the calculation method envisaged in the legislation, especially the FLPF, whose share is quite high.

Specifically, excessive increases in forest costs in Turkey reveals the need to compare the forest fees required in Turkey and some other countries of the world. Thus, a total annual average forest cost per ha was found for Turkey. For Turkey, these values were calculated as (USD/ha-year) and compared with the forest fees obtained from mining enterprises in some other countries of the world.

2. Legislation predicted on forest permits and fees in Turkey

Environmental regulations and administrative supervision are important for mining in forestlands (Schure et al. 2011). In Turkey, the concept of the "environment" was first included in Article 56 of the 1982 Constitution and based on this, the enactment of Environment Law No. 2872 in 1983 enabled the environmental issues to be looked at more sensitively than in the past. Then, in parallel, the "Environmental Impact Assessment" (EIA) regulations, which connect mining enterprises, came into force, and these regulations were amended several times in the following years. The rearrangement of the lands degraded in terms of the EIA should specifically be a legal obligation, and this should be taken into consideration in the mine planning phase (Yıldız et al. 2016). The main purpose of the rehabilitation of degraded areas caused by mining should be to restore the ecological, economic, and aesthetic values as much as possible and to ensure the sustainability of natural resources. Reforestation is also included in these activities (TUMMER... 2013; MFWM 2014a; Yıldız 2020a). Thus, the completed parts of the mining activities in these areas are delivered to the GDF by performing gradual rehabilitation without waiting for the activity to be completed (TMA 2019c).

In Turkey, there are mine exploration and operation activities to be carried out in state forests, and temporary facilities for these activities that are mandatory and depending on the

license period. Accordingly, it was envisaged to permit these facilities within the framework required by the Forest Law No. 6831, Forest Law Implementation Regulation and Forest Permit Regulation (Yıldız et al. 2019; Yıldız et al. 2020). According to the Implementation Regulation of Article 16 of the Forest Law, the following procedures are followed in order to obtain forest permits for mining activities:

1. First, an application is made to the GDF to obtain forest permits for mineral exploration and operation activities, and infrastructure facility works. There is no charge for the applications.
2. After the applications are evaluated, if the evaluation result is positive, a letter of undertaking and a one-time security deposit are collected from the applicant. (According to the Forest Regulation, "Security deposit" = Permitted forestland (m^2) × × [reforestation fee per unit area (TL/m^2)/10] (Yıldız 2020d). In the event that the mining investor gives up his investment, the forest permit expires, and the activity ends, the security deposit is returned provided that the obligations specified in the written contract have been fulfilled (Sarac 2019)).
3. After receiving the security deposit, a reforestation fee is charged once.
4. In the following years, only the FLPF is charged each year.

The mining enterprises also pay the following fees:

- Service Fee (to the GDF),
- Report Fee (to the GDF),
- Also, the SDCE (to the Ministry of Environment and Urbanization).
- In addition to this, the enterprises spend on rehabilitation during the lifetime of the mine.

Accordingly, the total of service cost, report cost, and security deposit can be evaluated within the scope of other costs. Therefore, reforestation fees and other fees are taken from the mining enterprises for once during the lifetime of the mine's operation at the beginning of the operation. In the ongoing activity years, collecting the FLPF every year (Yıldız 2020d). (The FLPF for the following years is increased in the rate of "Cost Increase Coefficient", and paid by the mining investor who obtained the forest permit. This Coefficient value is applied as much as the "Re-evaluation Rate", which is determined and announced by the Ministry of Finance every year (Ok and Kaya 2017)). SDCE is also collected regularly every year could be considered. However, the "rehabilitation cost" creates a cost for the mining enterprises within the mine operating life and for the first few years following the closure of the mine. By showing the criteria used in calculating these costs, the distribution of these fees by mining enterprises in Turkey by mineral groups and the ratio of these costs to MIA (and/or annual average OC) were analyzed in the following sections.

3. Forest fees requested from mining enterprises and their shares in MIA

3.1. Forest land permit cost

3.1.1. Evaluation of the coefficients and FLPF envisaged in the calculations

According to Article 4 of Law No. 5177 dated May 26, 2004 and Article 14 of Mining Law No. 3213, FLPF is not collected for mineral exploration, operation and facility permission areas up to 5 ha in forestlands. It is paid for the use of forestland exceeding 5 ha (For example, if the required forest area for a mining operation is 75 ha, the FLPF is calculated as 75 – 5 = 70 ha). The reforestation fee to be calculated according to the Forest Regulation on April 19, 2015 was slightly more than the previous regulation that came into force in 2010, while the significant increase was in the FLPF. In Article 20 (l) (b) of the Forest Regulations in 2015, an objective criterion seems confusing, but the criterion was introduced. Accordingly, the FLPF is calculated as the result of the multiplication of the m^2 of the permit area, the current year reforestation unit m^2 cost, the type of permit coefficient attached to this Regulation (Annex-l), the environmental balance coefficient (Annex-2), and the city coefficient (Annex-3). (FLPF (TL) = Forest permit area (m^2) × current year reforestation unit m^2 fee (TL/m^2) × Permission type coefficient × Ecological balance coefficient × × City coefficient). The "city coefficients," which are determined by the Forest Regulation for different cities on Turkey map, are shown below (Fig. 2).

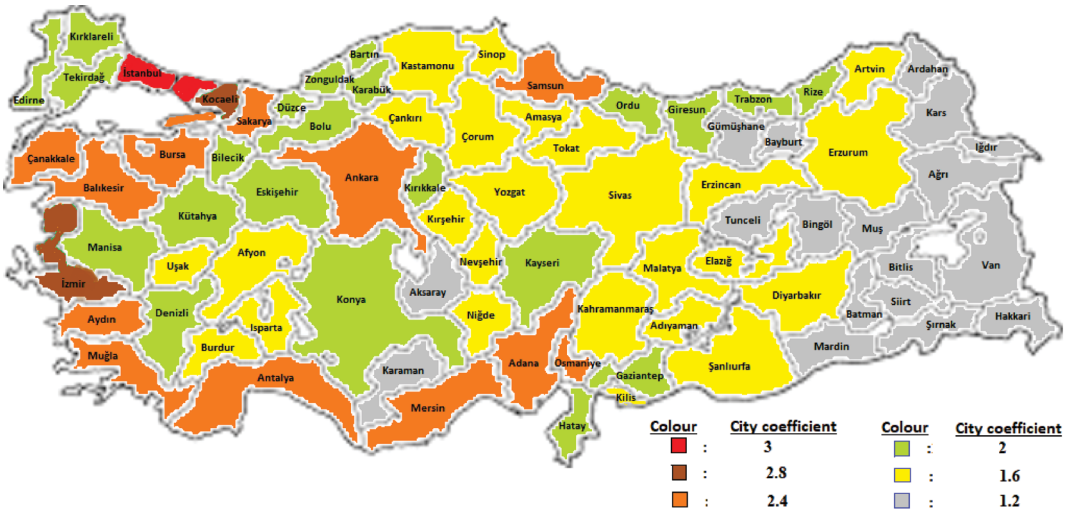

Fig. 2. Representation of city coefficients on "Turkey cities map" (Yıldız 2020a)

Rys. 2. Przedstawienie współczynników miasta na „mapie miast Turcji"

In Figure 2, the "city coefficient" increases according to the degree of social and economic development in the cities in Turkey. Accordingly, in cities with high city coefficients, forest prices received from mining enterprises for mining activities are increasing (Yıldız 2020a). In the new FLPF calculation technique introduced with the 2015 Forest Regulation, the cumulative coefficient obtained by multiplying the coefficients representing the parameters used was incomparably higher than the coefficient used in the Forest Regulation dated 2010. This led to an increase of 2 to 4 times in FLPF compared to the previous regulation (TMA 2017). The fact that not only the city coefficient was raised with the Forest Regulation dated 2015, but also the increase of other coefficients in the calculation of the FLPF played a role in the formation of this situation. With this regulation, only the permission type coefficients have been reduced.

The reforestation fees are collected by the forestry administration for the areas where mining activities are carried out. However, it is not understandable why mining investors will be asked to pay all these costs in addition to the reforestation fees. If mining enterprises are asked to pay, the FLPF should be collected only once at the start of the operation rather than annually.

As a matter of fact, this cost is paid once in Russia, Romania, and Greece (Aktan et al. 2017). Due to the heavy financial burden placed on mining enterprises, "FLPF coefficients" should be lowered, especially in order to reduce the FLPF by reevaluating them (Kömurder 2016). The different/other suggestions for lowering the FLPF are as follows:

- Removal of the city coefficient,
- In the calculation of the reforestation fee, the current year unit reforestation cost is used. Removal of this use from the FLPF account,
- Examining the FLPF amounts in other countries and taking them as examples (TMA 2017, 2019a).

Indeed, due to this increase in FLPF in the presence of other coefficients, which are the calculation criteria, the share of FLPF in the cost of one ton of mines increased significantly, affecting the entire sector negatively. In fact, this caused some enterprises to stop (TMA 2017, 2019a). In order to demonstrate this more clearly, the average annual OC of FLPF paid by mining enterprises in Turkey and their shares in total MIA are analyzed in the section below.

3.1.2. The share of FLPF within the average annual OC and MIA

In recent years, with the amendments made in the legislation, the FLPF requested from the mining operation license holder for granting the necessary forest permit before the operation of the mining operation in forestlands has become a subject that significantly affects the mining sector. The survey question, *"How much is the annual FLPF you paid/will pay?" was* asked to the mining enterprises in order to determine this situation. Eighty-two mining enterprises answered this question. The distribution of these answers, according to different mineral groups, is shown below (Fig. 3).

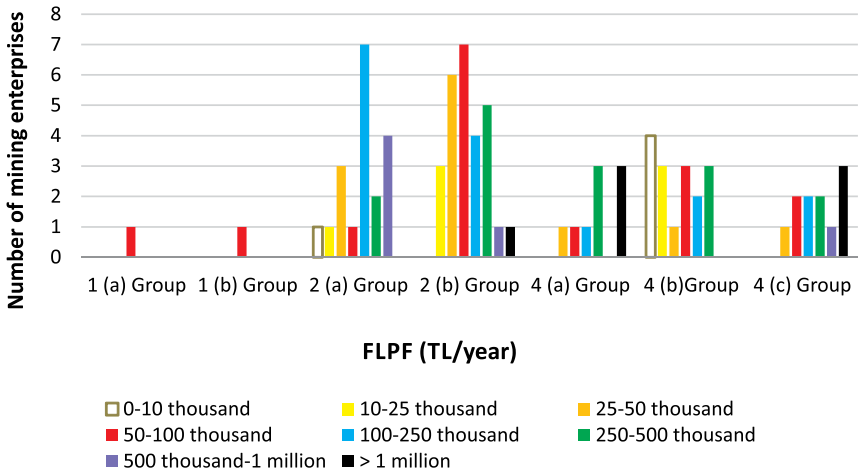

Fig. 3. FLPF paid according to mineral groups (TL/year)

Rys. 3. Płatności za zezwolenie na użytkowanie gruntów leśnych do eksploatacji górniczej (FLPF) według grup wielkości tej płatności (TL/rok)

In the figure, ">5 Million": 5–10 Million TL, i.e., the average was considered as 7.5 Million TL. 1 USD = 4.7236 Turkish Liras (TL) (18th June 2018) (Central Bank of the Republic of Turkey 2019). The FLPF that are required to be paid by the mining operating license holder to carry out mining operation activities in forestlands is given every year during the lifetime of the mine's operation. Considering the condition of giving these fees annually, the "FLPF" of each of the 71 mining enterprises, which give the "average OC" information as well as the "FLPF," were proportioned to the average annual OC. Hence, average values were found for each mineral group (Table 1).

Table 1. The ratio of FLPF to yearly average OC

Tabela 1. Stosunek opłat za zezwolenie na użytkowanie gruntów leśnych do eksploatacji górniczej (FLPF) do średniej rocznej kosztów operacyjnych (OC)

Mineral group	Number of mining enterprises	Annual average OC (TL)	Average FLPF (TL)	The ratio of average FLPF to annual average OC (%)
2 (a) Group	10	3,500,000	188,000	6.51
2 (b) Group	13	11,000,000	212,500	7.08
4 (a) Group	4	35,000,000	2,000,000	5.71
4 (b) Group	7	33,000,000	2,600,000	10.40
4 (c) Group	3	20,333,333	750,000	12.33
For all mineral groups	37	16,300,000	894,333	7.79

As observed in the table, the ratio of the average FLPF to the annual average OC for all mineral groups is 7.79% on average for the mining enterprises included in the account. This result indicates that the FLPF alone has a high share in mining OC. On the other hand, the ratio of the average FLPF of the 2 (a), 2 (b) and 4 (a) mineral groups to the annual average OC (%) are lower among all mineral groups (Fig. 4).

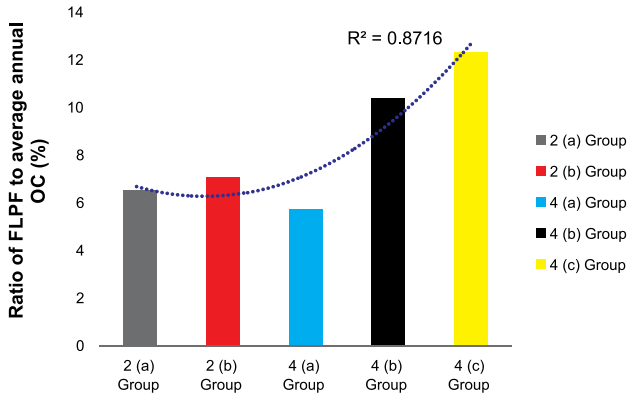

Fig. 4. The ratio of FLPF to average annual OC

Rys. 4. Stosunek opłat za zezwolenie na użytkowanie gruntów leśnych do eksploatacji górniczej (FLPF) do średniego rocznego kosztu operacyjnego (OC)

Average sale prices of mineral increase from 2nd group to 4th group to some extent. Therefore, graphs were analyzed from 2nd group to 4th group. As shown in the figure, there is a good polynomial correlation ($R^2 = 0.87$) between the ratio of FLPF to average annual OC and mineral groups. Especially for 2 (a), 2 (b) and 4 (a) mineral groups, although the FLPF seems to be a lower-cost item compared to other group minerals, it is useful to calculate the share of these costs within the MIA. Apart from this, it is not only the FLPF requested from the mining enterprises. In addition to the FLPF, the reforestation fee, SDCE + rehabilitation costs, and other fees are also paid. In order to find the ratio of the total of all forest fees to the MIA, it is firstly necessary to find the ratio of the FLPF to the MIA. Therefore, taking the that the "FLPF" is paid every year in Turkey into consideration, all FLPF payments can be calculated approximately during the operation period of the mining enterprises. Thus, these total amounts can be proportioned to the MIA of mining enterprises.

Firstly, the FLPF paid by each mining enterprise during the mining operation activity to the date and the time remaining until the end of the mining operation activities were into consideration. Then, the sum of the fees that these enterprises would pay next was estimated, and an approximate value was calculated.

In the first place, taking into account that the FLPF is given each year, the FLPF were estimated by using the calculation methods specified in the previous regulation and the

periods elapsed since the beginning of the mining operation activity (Fig. 5) to calculate the FLPF paid so far before 2018.

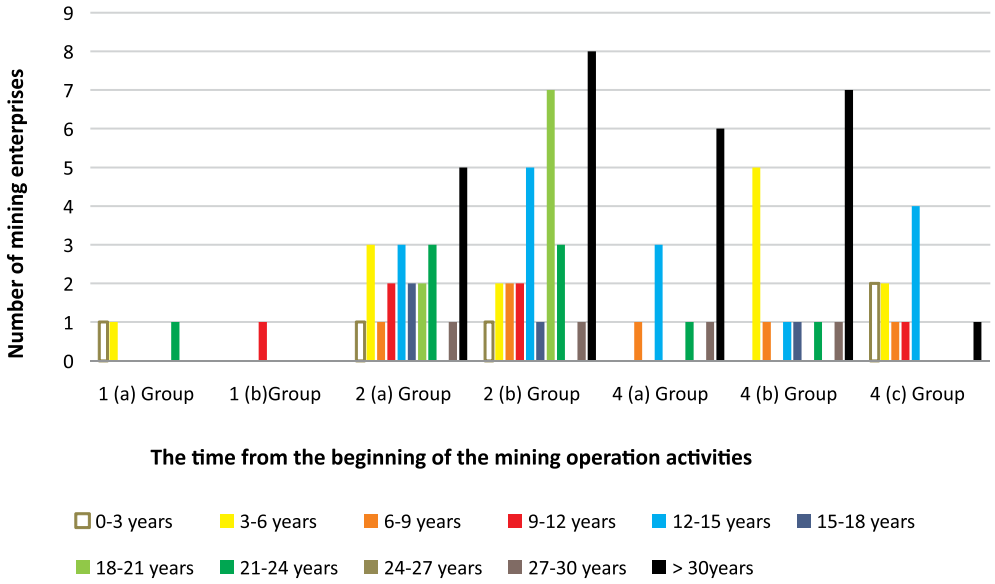

Fig. 5. Time elapsed since the beginning of the mining operation activities

Rys. 5. Czas, który upłynął od rozpoczęcia działalności wydobywczej

In the figure "30 years": 30–40 years, so the average was considered to be 35 years. The mining operation duration of each mining enterprise stated in the figure is multiplied by the values given by the mining enterprises as the average land permit value determined in accordance with the last Forest Regulation. Thus, the total amount of the FLPF paid until the end of 2017 was found. The reason for the existence of FLPF paid until the end of 2017 is that Mining Law No. 3213 was amended by Law No. 7061, which entered into force on December 5, 2017 in Turkey, and a reduction in the fees received from mining permits in forestlands. Accordingly, amendments were made in the Implementation Regulation of Article 16 of the Forest Law No. 6831 with the Regulation published on July 6, 2018. The issue of how the discount will be applied under which conditions is discussed in Article 8.

Accordingly, in all licenses, 50% of the FLPF will be charged for the first 10 years, starting from the date in which the operation permit is issued for all mineral groups. In other words, on an area whose operation permit is issued after December 5, 2017, the MAPEG (General Directorate of Mining and Petroleum Affairs) operation permit date will be taken as the start date and a 50% discount will be applied to all forest permits that will be issued for 10 years after that date. In an area where the operation permit document is issued before December 5, 2017, the operation permit date given by MAPEG will be taken as the start

date, and a discount will be applied for the period remaining after ten years after December 5, 2017 (10 years before the enforcement date of Law No. 7061).

Accordingly, the values determined according to the last Forest Regulation and the values given by the mining enterprises as the average FLPF in Table 2 were multiplied by 50% in the first 10 years to calculate the total FLPF to be paid in 2018 and beyond. After the first 10 years, if the activity were to continue, these values would be multiplied by the remaining time of the mining operation activities (Fig. 6). The values obtained for each mining operation were summed, and their averages were calculated for the mineral groups.

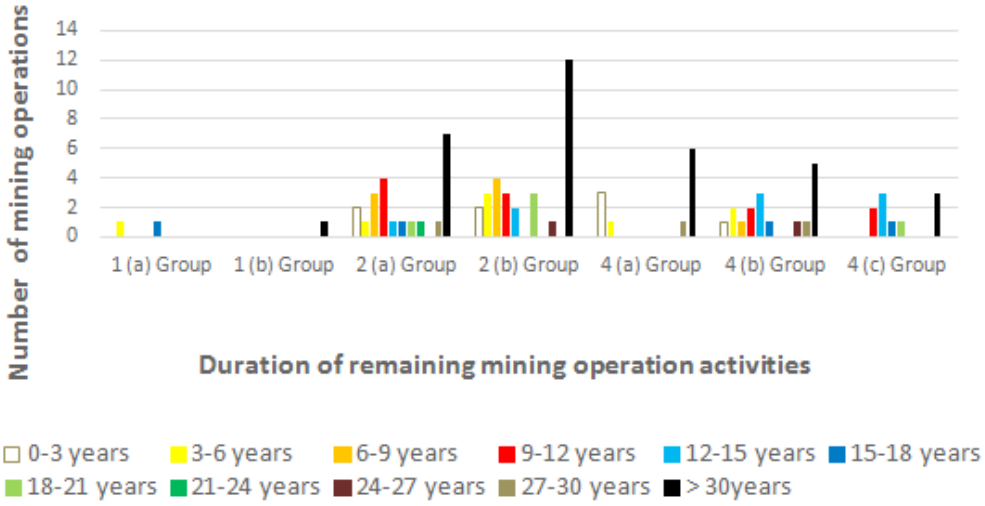

Fig. 6. Time remaining to the end of mining operation activities

Rys. 6. Pozostały czas do zakończenia działań górniczych

The current and future MIA should be known in order to find the ratio of FLPF averages to the total MIA of mining enterprises. The question of the survey *How much is the MIA of your mining enterprise (until the end of 2017)?* was asked to mining enterprises. The distribution of 91 answers given to this question according to different mineral groups is given below (Fig. 7).

In the figure " >500 Million TL": was accepted as 500 million–1 billion, namely 750 million TL on average. This distribution of investment indicates that mining enterprises in Turkey are mostly in the small and medium-sized enterprise group. This indicates that the fees required from the mining enterprises stipulated by the legislation in cost items will have a greater impact on the enterprises. Considering these answers of the mining enterprises, the amounts paid by each mining enterprise individually responding to the Survey as the

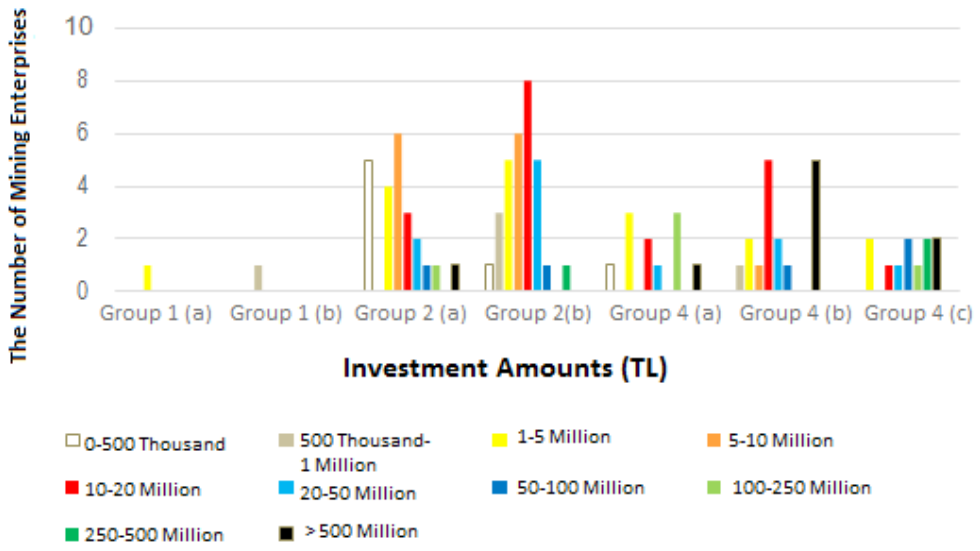

Fig. 7. MIA of mining enterprises until the end of 2017 (TL)

Rys. 7. Kwoty inwestycji górniczej (MIA) przedsiębiorstw górniczych do końca 2017 r. (TL)

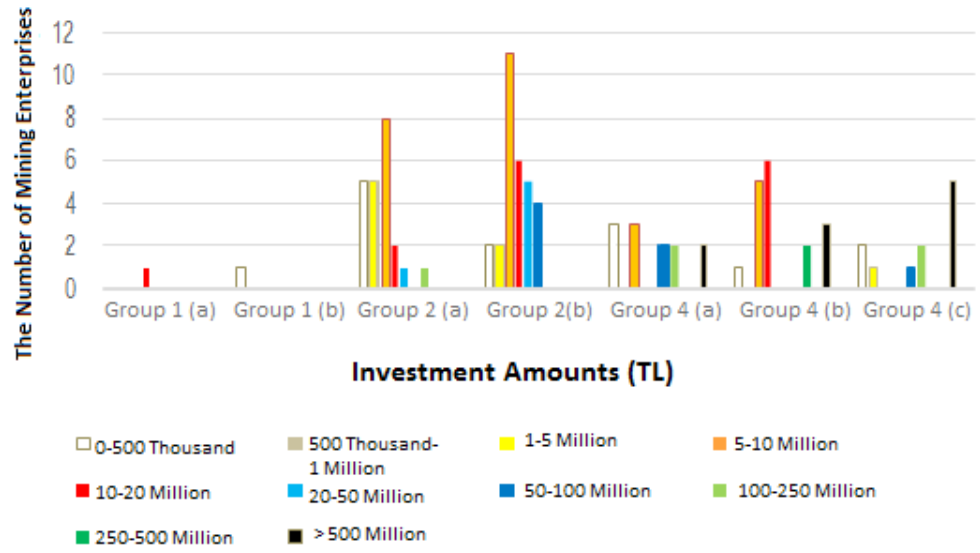

Fig. 8. New MIA aimed by mining enterprises in 2018 and after

Rys. 8. Nowe kwoty inwestycji górniczej (MIA)
ukierunkowane przez przedsiębiorstwa górnicze w 2018 r. i później

"FLPF" were proportioned to the total MIA of each mining enterprise before 2018. However, these mining enterprises have been planned to make new investments in 2018 and after. Accordingly, mining enterprises were asked how much the new MIA was targeted in their operations in 2018 and after. These answers of 92 mining enterprises to this question are presented in (Fig. 8).

The ratio of the total FLPF paid by the mining enterprises to the averages obtained by summing the new MIA targeted by each mining enterprise in 2018 and after and the total MIA before 2018 are presented in (Table 2).

Table 2. Ratio of FLPF to the total of the current and future MIA

Tabela 2. Stosunek opłat za zezwolenie na użytkowanie gruntów leśnych do eksploatacji górniczej (FLPF) do sumy obecnej i przyszłej kwot inwestycji górniczej (MIA)

Mineral Group	Number of mining enterprises	Average FLPF (TL/year)	Total FLPF paid until the end of 2017 (TL)	Total FLPF to be paid from 2018 (TL)	Total FLPF paid and to be paid during the life of the mining operation (TL)	The ratio of total FLPF to total MIA (%)
2 (a) Group	10	188,000	3,460,000	4,356,250	7,816,250	36.58
2 (b) Group	13	212,500	2,575,000	2,603,125	5,178,125	26.98
4 (a) Group	4	2,000,000	35,625,000	27,187,500	62,812,500	15.83
4 (b) Group	7	2,600,000	57,300,000	53,700,000	111,000,000	16.03
4 (c) Group	3	750,000	16,291,667	20,666,667	36,958,333	24.17
For all mineral groups	37	894,333	17,769,167	16,866,301	34,557,083	26.58

In this calculation, the average values of the cost ranges indicated by the Survey responses of each mining enterprise as the "FLPF" are calculated according to the investment amounts. Thus, average values were calculated for each mineral group. As can be seen from the table, when the new MIA targeted for mining operations in 2018 (+ and after) are taken into account, the ratio of FLPF to total MIA before (present) and after 2018 (targeted) is 26.58% for all the mineral groups. Even this percentage indicates that mining enterprises' total FLPF during the lifetime of mining operation in Turkey have a very high share in the total of the existing and targeted MIA. (If this fee was taken only once during the lifetime of the mining operation, not every year, the ratio of FLPF to total MIA would be 1.25% on average for all mineral groups). The change of this share among the mineral groups can also be analyzed (Fig. 9).

As observed in the figure, there is a strong polynomial correlation ($R^2 = 0.96$) between the mineral groups and the FLPF to the total MIA. This shows that as the mineral groups move from Group 2 to Group 4, the share of FLPF within the total MIA has decreased to the

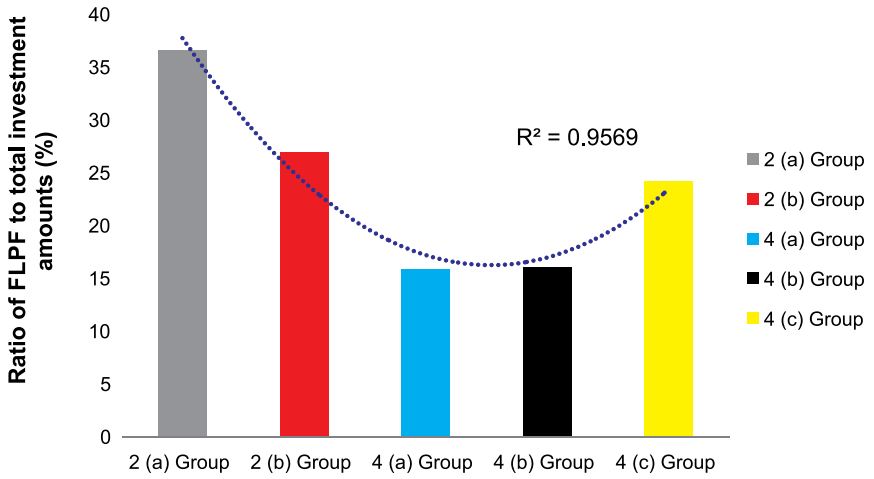

Fig. 9. Change in the ratio of FLPF to total MIA by mineral groups

Rys. 9. Zmiana stosunku opłat za zezwolenie na użytkowanie gruntów leśnych do eksploatacji górniczej (FLPF) do całkowitych kwot inwestycji górniczej (MIA) według grup wielkości płatności FLPF

specified degree. Specifically, the fact that this share is high in Group 2 minerals will force the mining enterprises operating in these groups economically and financially.

4. Total forest fees received in Turkey and its comparison with the other world countries

4.1. The share of total forest fees received in Turkey in total investment amount

When the sum of all forest fees paid by each mining enterprise that responds to the Survey is compared to the sum of investment amounts, the following summary results are obtained on average by mineral groups (Table 3).

As can be seen, the ratio of the sum of all amounts paid by each mining enterprise as forest fees to the total (current and future) investment amounts is 38.32% on average for all mineral groups. This percentage indicates that *the sum of all forest fees* received from mining enterprises in Turkey is a very high-cost item that may make mining investments risky. The change of these shares among the mineral groups is seen more clearly below (Fig. 10).

In Figure 10, the relationship between the mineral groups and the ratio of the sum of all forest costs to the sum of investment amounts shows a polynomial change as the correlation coefficient. The coefficient is $R^2 = 0.94$. Depending on this data, there is a good degree of significance between these variables. When we look from Group 2 to Group 4, we see that

Table 3. Ratio of total forest costs (current and future) to the total of investment amounts

Tabela 3. Stosunek całkowitych kosztów leśnych (bieżących i przyszłych) do sumy kwot inwestycji.

Mineral groups	Ratio to total investment amounts (%)				The ratio of the sum of all forest fees to the total of investment amounts (%)
	FLPF	reforestation costs	SDCE + rehabilitation fee	other costs	
2 (a) Group	36.58	5.40	13.28	1.09	56.35
2 (b) Group	26.98	3.21	7.26	0.77	38.22
4 (a) Group	15.83	3.43	7.03	0.82	27.11
4 (b) Group	16.03	1.22	2.82	0.16	20.23
4 (c) Group	24.17	4.00	4.42	0.74	33.33
For all mineral groups	26.58	3.44	7.58	0.72	38.32

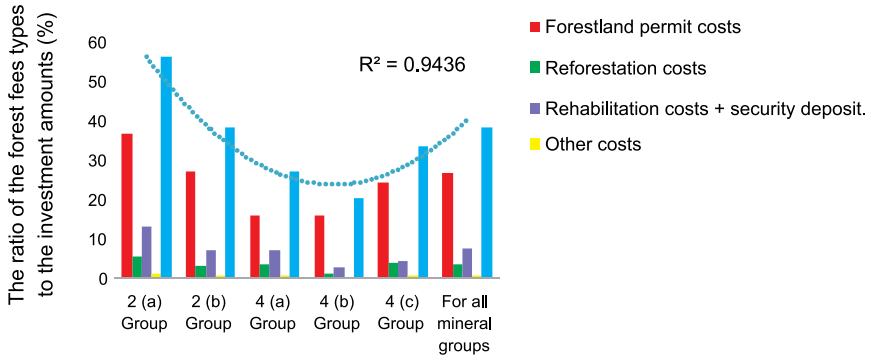

Fig. 10. Relationship between "mineral groups" and "The ratio of the different types of forest fees to the investment amounts"

Rys. 10. Zależność między „grupami wielkości płatności FLPF" a „stosunkiem różnych rodzajów opłat leśnych do kwot inwestycji"

the share of total forest fees in total investment amounts decreases. This is due to the fact that Group 2 minerals have lower investment amounts compared to Group 4 minerals.

Therefore, this shows that, compared to Group 4, in the activities of the Group 2 mining enterprises, whose investment amounts are lower, that coincide with the forestlands, as the OC item, it will be more difficult to pay the sum of all the forest fees (Natural stones, which are the 1st and 2nd mineral groups, are produced by open-pit method. This results in the fact that these mines overlap with forestlands more than underground mining operations). The shares of the different forest fees within the total investment amounts for the average of mineral groups are presented in (Fig. 11).

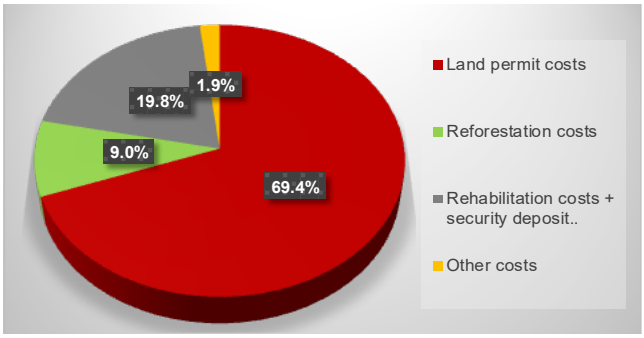

Fig. 11. Distribution of the shares of forest fee types in mining investment amounts

Rys. 11. Rozkład udziału rodzajów opłat leśnych w kwotach inwestycji górniczych

As can be seen more clearly in the figure, only FLPF takes a 69.4% share in the total of all forest fees within the mining investment amounts in Turkey. In particular, legislative amendments to be made to reduce this share will relieve mining enterprises economically and financially.

4.2. Comparison of forest fees received in Turkey with other world countries

In order to carry out mining operations in forestlands, one or more types of fees are requested such as "FLPF", "reforestation fees", "rehabilitation fees", "timber fees" and "other fees" varying according to the countries. There are also countries in the world that receive very low or no fees for mining activities in forestlands.

For example, in Canada, Germany, Australia, and the United States, low costs are charged for forest permit applications. For example, in Canada, for years after which mining activities are carried out, a symbolic cost of approximately USD 3 per ha is collected, and mining activities are encouraged. (See also the forest fees and applications for mining activities in Canada (Haley and Luckert 1990; Uhler 1991; Berry 2006; Government of Yukon 2015; Aktan et al. 2017; Cuhadar 2017). In Germany, the permits for mining activities (exploration, operation, infrastructure facility) in forestlands are not subject to any form of application fee, reforestation fee, etc. In addition, annual land use fees are taken at very low values for mining activities in forestlands (Aktan et al. 2017; Cuhadar 2017; BMVJ 2019). In Maryland, special reclamation fee is USD 75 for each acre (1 acre = 0.4047 ha) of land affected by open-pit mining (Franchot 2018). See about differentiating reclamation charges for states in the USA (Baker 2008). In Australia and South Africa, there is no additional payment for mining in forestlands, such as reforestation fee or FLPF, as in Turkey. Only security deposit is required for mine closure project. When the mining investor completes the rehabilitation project, the security deposit obligation ends (Mining Sector Organization 2016).

FLPF are taken annually in some other countries and are very low. For instance, in Russia, an annual FLPF of USD 0.02/m^2 is charged (Aktan et al. 2017). Although it varies according to the protected forestland or open-pit/underground mining operations in Indonesia, approximately USD 150 of a forest cost per ha per year is taken (min. USD 114, max. USD 190) (Wahyudi 2012). In Indonesia, "Timber/Forest Utilization (Business) Permit Fee", "Reforestation Fund", "Forest Resource Tax" and other fees are charged. For different information on forest fees, see (Muttaqin 2006; Lawrence et al. 2007; Ardiansyah et al. 2015; Irawan and Tacconi 2016; Samsudin 2016). See the fees of forest administrations for reforestation in different countries of the world and the different applications of these administrations in budget use (Kenneth and Jonathan 2001; Lawrence et al. 2007; Spratt et al. 2018). The total forest fees for some countries in the world are presented in (as an ~/average) (Table 4).

As observed in the table, high increases have been brought to the requested forest fees in recent years to perform mining activities in Turkey. As a result, the total forest fees received in Turkey are quite high compared to other countries mentioned. The calculation for Turkey

Table 4. Total forest fees received in some countries

Tabela 4. Całkowite opłaty ponoszone za zezwolenie na użytkowanie gruntów leśnych do eksploatacji górniczej w niektórych krajach

Countries	Forest fees
Canada	USD 25 (security deposit) + USD 6.16/ha-year + USD 3.08/m^3 fee received on the tree to be cut (TMA 2017; Aktan et al. 2017)
USA	(No application fee is charged) USD 155 (For each 8 ha) + arrangement fee USD 20 (For each 8 ha-year) + FLPF USD 37 (For each 8 ha-year) + Special reclamation fee USD 75/acre (U.S. Land Management 2019; Lawrence et al. 2007)
Bolivia	Land rental fee USD 1/ha-year (Lawrence et al. 2007; Contreras-Hermosilla 2002)
Australia	Only USD 200 (security deposit) (Aktan et al. 2017)
Norway	USD 10.5/ha-year (FLPF) (Norway State Information Source 2019)
Czech Republic	USD 83 for 2 ha + USD 4.11/ha-year (EU Evaluation Report 2019)
Wales	USD 6.5/ha-year (+ rehabilitation fee) (NSW Government 2019)
Cameroon	USD 0.17–4.17 /ha-year (Sieböck 2002; Comar et al. 2000) + USD 1.17/m^3 of logged timber (Sieböck 2002; Van den Berg 2001). Also see (Essama-Nssah et al. 2002)
Liberia	Land rental fee USD 1.25–2.5/ha-year + other fees (Blundell 2008)
Indonesia	~ USD 150/ha-year (FLPF) (Wahyudi 2012)
Lao PDR	~ USD 200-300/ha-year (FLPF) (Schumann et al. 2011)
Russia	(No application fee is charged) ~ USD 200/ha-year (FLPF) (Aktan et al. 2017; Cuhadar 2017)
Turkey	Reforestation fees + FLPF + other fees + SDCE + rehabilitation cost (total ~ USD 1796 /ha-year)*

was made as follows: Firstly, the average of forest fees during the operation period was taken into account for all minerals in Turkey (Table 5).

Table 5. Forest fees during the lifetime of the mine's operation for all mineral groups in Turkey

Tabela 5. Opłaty leśne w okresie eksploatacji kopalń dla wszystkich grup wielkości płatności FLPF w Turcji

For enterprises that answered to survey	FLPF (TL)	Reforestation fee (TL)	SDCE + Rehabilitation fee (TL)	Other fees (TL)	Total of all forest fees (TL)
Average values for all mineral groups	34,557,083	2,715,086	2,229,099	356,762	39,520,362

Primarily; the totals of the all forest fees during the lifetime of the mine's operations were divided into the total of mining operation permit areas and mining infrastructure permit areas in the forestlands (~112.1 ha). (The total number of mining operation permit areas and mine infrastructure permit areas of the mining enterprises responding to the survey were found one by one and averaged according to the mineral groups. Then the average of all was calculated as 112.1 hectares). Then, the result was divided by the average of the lifetime of the mine's operation activity years (~40.55 years) of all mineral groups. Thus, an average, the total annual forest fee per ha for Turkey was found. This cost is [(TL 39,520,362/112.1 ha)/40.55 year] = TL 8694 /ha-year (~USD 1796 /ha-year)* for all mineral groups (on average).

As a result, when compared with the limited number of studies worldwide, it has been revealed that the total of all forest permit costs given within the scope of mining activities in Turkey is quite high. In fact, these fees are at a very high level compared to these developing countries, such as the Czech Republic and Wales (the level of development is close to Turkey), and also compared to other underdeveloped/developing countries such as Indonesia, Lao PDR, Bolivia, Liberia, Cameroon from Asia, South America and Africa as well as developed countries such as Canada, Australia, USA, Russia, Norway, which are indicated in the table.

5. Discussion

The most important goal of each company is to make maximum profit. The profit or loss of the company depends on two factors. The first is the cost it will incur for the number of goods it will produce and sell. The second one is the income it receives from the products it sells (Unay 2000). The second factor depends on the mineral prices determined by the stock exchanges according to the mineral demand in the world. The first and more important factor in terms of investment risk is that mining enterprises may be exposed to the effects of mining policies and legislation in the country.

In many countries where the mining sector is developing all over the world, all property permits, including forest permits paid for mining activities during the project, do not exceed 2% of the total mining investment amounts (Aydin 2018; TMA 2018). However, there are concrete examples in Turkey where this rate exceeds 40–45% only in forestlands with the effect of legislative changes.

These amounts, which are paid every year as a forest cost in Turkey, exceed the approximate average land purchase costs of the lands on which it is located (Aydin 2015). In the vicinity of the forestland, ha of a privately owned land can be purchased for about USD 9,000–18,000, depending on whether it is wet or barren land. Thus there will be no more hire (Köse and Unver 2019). Due to the ever-increasing forest permit fees in Turkey, for example, during a 20-year mining project, the hire purchase paid for the forest may increase up to 50–70 times more than the total purchase price of the private property in the region (Journal of Mining Turkey 2018). In the case that mining operations are in non-forest properties (e. agriculture, pasture, public/private land, etc.), there may be more than 20 times the differences in the prices to be paid. This makes it a critical factor that affects whether these mining projects are implemented or not (TMA 2019a). In this case, it is not possible for domestic and foreign mining investors to provide economic operability in their mining investments.

At the beginning of the 20th century, the minimum operable grade was 30 g/t for gold, 3% for copper, and 12% for zinc (Priester et al. 2019). Today, as a result of the increasing demand and prices for minerals, gold mines below 0.5–1 g/ton, copper mines with a 0.5% cut-off grade, zinc mines with 2% cut-off grade have become economically operable in time (Journal of Mining Turkey 2012). However, the more the costs of the mining enterprises increase, the minimum operable grade of the mining ore it will produce will also be in an upward trend in parallel with the cost increase (see Cetin 2018; Liu et al. 2019). This means that some mining enterprises will turn out of economic operability. Therefore, it is the expectation of mining enterprises to reduce the forest costs demanded from the mining enterprises against the environmental expectations to a degree that does not create investment risk.

Conclusion and suggestions

For sustainable development, forestlands around the world should be protected. On the other hand, mining activities must also be carried out in order to increase the level of income as a result of the development and to protect the environment more consciously.

As observed in this study, forest permits in Turkey are not given to mining enterprises free of charge or with very low costs, as in other countries of the world, on the contrary, significant amounts are charged. The most important reason why the demand of forest fees received from mining enterprises in Turkey is so high is the calculation criteria of forest fee types determined by the Ministry of Agriculture and Forestry. Forest costs increased

significantly due to the legislative amendments made in these criteria, especially in 2015. Mining enterprises give back to the GDF as the forest fee for a few times of all the money spent by the GDF for reforestation throughout the country.

In Turkey, the average value of the sum of all total forest fees in the mineral groups to the total investment amount increases from Group 4 minerals to Group 2 minerals. This shows that the sum of forest fees taken from mining enterprises in Turkey will force all group mining enterprises to different degrees economically, especially from Group 4 minerals to Group 2 minerals.

In Turkey, the total of all forest fees to be given by mining enterprises during the mining operation period constitutes an average of 38.32% of the total project investment amount (for all mineral groups). Requesting such costs from mining enterprises can make mining economically difficult.

In order not to cause investment losses in the mining sector in Turkey, the following changes can be made in the forest fees for all mining groups:

Only FLPF from the forest fees for all mineral groups receives a 69.4% share in the total forest fees within the mineral investment amounts in Turkey. In particular, the legislative amendments to be made to reduce this share will ease the mining enterprises economically and financially. FLPF should be taken once at the beginning of the operation, instead of every year, within all forest fees, like all other fees specified. Indeed, without changing the FLPF calculation coefficients, the ratio of FLPF to the total investment amount will be 1.25% for all mineral groups, if this type of fee is taken only once (one year), not every year for the lifetime of mine's operation. In this case, the ratio of the sum of all forest costs to the investment amounts will be 12.99% on average.

In addition to this change, if the reforestation fees are reduced by 50%, the ratio of the sum of all forest fees to the investment amount will be 11.27%. Thus, these fee reductions can reduce mining investment risks. Even these percentages may affect mining enterprises economically and financially. However, in the framework of sustainable natural resource use, making at least these changes in forest fee types in Turkey, both for the production of mines and the protection of forests, will benefit this sustainability.

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FOREST FEES PAID TO PERMIT MINING EXTRACTIVE OPERATIONS ON TURKEY'S FORESTLANDS & THE RATIO TO INVESTMENTS

Keywords

cost, fee, investment, mining, operation

Abstract

The fact that mines have to be established at the place where they are located without having a chance to choose a location brings out area usage conflicts with areas that need to be protected. In fact, forestlands are most common in these overlapping areas in Turkey. In order to perform mining activities in this overlapping forestlands, mining enterprises in Turkey receive forest land permit fees (FLPF), reforestation fees, rehabilitation fees + security deposit of conformity to the environment (SDCE), and other fees. In order to determine the share of these costs in mining investments and operating costs (OC) and to bring a solution proposal so that these costs do not pose a risk of loss of the investment in the mining enterprises, questions have been asked to mining enterprises within Turkey using the "Survey Monkey" program. The averages of all forest fees determined from the answers are proportioned to the mining investment amounts (MIA) and the annual average OC of each mining company responding to the Survey.

Thus, the distribution criteria of different forest fees that are required to be paid by the mining enterprises in order to carry out mining operations in the forestlands in Turkey and their distribution on the basis of mineral groups were analyzed. In this calculation, it was suggested that all the fees in Turkey should be reduced to a more reasonable degree by suggesting solutions regarding the calculation method envisaged by the FLPF, which has a very high share. Otherwise, the result of these rates shows that the costs of forest land-use for mining stipulated by the legislation in Turkey are quite high compared to other countries, and that the current mining investments can have difficulty in maintaining their economic operability in the presence of these required costs.

OPŁATY LEŚNE PONOSZONE ZA ZEZWOLENIE NA EKSPLOATACJĘ GÓRNICZĄ NA TERENACH LEŚNYCH TURCJI I ICH UDZIAŁ W INWESTYCJACH GÓRNICZYCH

Słowa kluczowe

koszty, opłata, inwestycja, wydobycie, eksploatacja

Streszczenie

Fakt, że kopalnie muszą być zakładane w miejscu, w którym się znajdują, bez możliwości wyboru lokalizacji, powoduje konflikty użytkowania obszaru z obszarami chronionymi. W rzeczywistości tereny leśne w Turcji występują najczęściej na obszarach eksploatacji górniczej. W celu prowadzenia działalności wydobywczej na tych obszarach leśnych przedsiębiorstwa górnicze w Turcji ponoszą

opłaty za zezwolenie na użytkowanie gruntów leśnych (FLPF), opłaty za ponowne zalesianie, opłaty rewitalizacyjne + depozyt środków finansowych zabezpieczający zgodność ze środowiskiem (SDCE) i inne opłaty. Aby określić udział tych kosztów w inwestycjach górniczych i kosztach operacyjnych (OC) oraz przedstawić propozycję rozwiązania, aby koszty te nie stanowiły ryzyka utraty inwestycji w przedsiębiorstwach wydobywczych, zadawano pytania przedsiębiorstwom wydobywczym w Turcji za pomocą programu „Survey Monkey". Średnie wartości wszystkich opłat leśnych ustalonych na podstawie odpowiedzi są proporcjonalne do kwot inwestycji górniczych (MIA) i średniej rocznej kosztów operacyjnych (OC) każdej firmy wydobywczej odpowiadającej na badanie.

W związku z tym przeanalizowano kryteria dystrybucji różnych opłat leśnych, które przedsiębiorstwa górnicze muszą uiścić w celu prowadzenia działalności wydobywczej na terenach leśnych w Turcji, a także przeanalizowano ich rozkład na podstawie grup wielkości płatności FLPF. W tych obliczeniach zasugerowano, że wszystkie opłaty w Turcji należy obniżyć w bardziej rozsądnym stopniu poprzez zastosowanie rozwiązań dotyczących metody obliczania przewidzianej przez FLPF, której udział jest znaczący. W przeciwnym razie wynik tych stawek pokazuje, że koszty użytkowania gruntów leśnych w górnictwie określone przez ustawodawstwo w Turcji są dość wysokie w porównaniu z innymi krajami oraz, że obecne inwestycje górnicze mogą mieć trudności z utrzymaniem ich efektywności ekonomicznej.