

Changes in the Occupational Health and Safety Behavior in 21st Century Mining in Turkey

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Abstract: While striving to increase human well-being, new risks will continue to appear in return for this effort. Although, the technology offers innovations, it has also brought new challenges with it. The need for raw materials has increased, due to the effort of people to increase their luxury and quality of life. Thus, there have been revolutions in mining and mechanization has increased for more production. Although the number of employees decreased with the increase in the number of machines, people who started working with the machines met new problems. Increasing mechanization in mining has created new dangers. Every mining activity where precautions are weak has also created major problems for human health. With the emergence of the principles and increase in the application of occupational health and safety, their problems have decreased and people have achieved a healthier living environment.

Keywords: Occupational health & safety, occupational accidents, occupational diseases, mining sector.

Introduction

Mining is one of the oldest professions with its own rules and risks. It is a profession that should not be left behind with zero margin of error and constant supervision. It is one of the sectors with the highest risk of accident and death (Müftüoğlu & Taniş, 2010). When we look at mine production in Turkey, mostly surface and underground working methods are seen. There are both common and very different risks in both.

In this study, the development of occupational health and safety (OHS) in mining, which is changing with the developing technology and increasing raw material need, is explained. Thus, with the problems seen in mining in general and the development in OHS over time, the solutions to these problems were also mentioned.

Mining

In the general sense of mining, it is the whole of the techniques and methods by which the exploration, extraction/operation, preparation and enrichment of useful mineral ores found underground are carried out. It is an applied science developed for the industrial use of minerals of economic importance. Mining activities in general; exploration of the mine, project design for operation, preparation and enrichment of the acquired mine according to the need of industry.

Mining is among the oldest professions in human history. It contains a process in which it was excavated by hand in its early stages and it was not possible to recover very hard rocks. Looking at the historical background of mining, it can be regarded as equivalent to the history of humanity. The oldest known mine in history is the Lion Cave in Esvatini, a country in South Africa. It was determined that people extracted iron-containing hematite mine in this area of the mine, which was determined to be 43,000 years old by radio carbon dating

method, in the paleolithic period. In similar periods, sites where Neanderthal people used to mine flintstone for weapon production have also been found in Hungary (Wikipedia, 2021; Avşaroğlu, 2018).

Human beings first took care of and discovered stones of different colours and weights around them. According to historical records, mines were smelted and processed in Anatolia in 7000 BC. The Hittites melted iron between 2000 and 1200 BC and manufactured various hand tools (Turan, 1981).

Especially with the invention of black powder and its use in mining, its use for hard rocks has become possible. Black powder was first used in mining in 1627, during the drilling of a mine shaft in Slovakia. The world's first mining academy was established in the same region in 1762 (Wikipedia, 2021).

Over time, especially with the effect of the Industrial Revolution (18th - 19th Centuries), the need for raw materials has gradually increased and a progress has been made in the mining sector in proportion to the increase in production. Thus, a greater amount of mineral production was realized and the production (mechanization) period with machines started.

Mining in Turkey - Before and After 1923

Mining in Anatolia dates back to ancient times. In Anatolia, which has hosted many civilizations, mining activities have also been carried out in line with different civilizations and needs over time. If it is to be classified as pre-republic and post-republic, of course, with the developments in mining in the world, developments in mining in Turkey are seen more after the republic establishment in 1923.

The defining feature of the Ottoman Empire's economy is its structure, which is a raw material exporter and an

industrial semi-product and end product importer in the world economy (Boratav, 1988). In fact, if we need to define the economy of the Ottoman people; it would not be wrong to define it as an agricultural society in general. Sectors that require capital accumulation such as trade, transportation, and banking have largely been in the hands of minorities and foreign capital. Especially in the last period of the Ottoman Empire, the accumulation gained from agriculture could not be transferred to the industry and the industry that made production, albeit on a small scale, could not develop. For this reason, it has gradually decreased in foreign trade (Kepenek, 1987; Tamzok, 2008).

While this is the case, it can be said that the mining of the Ottoman Empire period was not well developed (Tamzok, 2008). In the mining sector, it has been preferred to trade acquired mining rights rather than production for business purposes. In 1994, in his study by Eldem; "The person who seized the mining licence handed over it to someone else at a price he could achieve, and the transferee waited for a suitable time and sold the right he earned to a third party with a price difference. In this way, buying and selling the mining right in the country became a profitable trade" (Eldem, 1994). The mining license trade has actually been seen as profitable within the state. Regardless of production, it is aimed to earn fees and taxes from this kind of trade. In the General Directorate of Mineral Research and Explorations of Turkey (MRE) records; "The situation at that time will prove that the mines were not considered to be operated for the benefit of the country and were used as a means of speculation is the following: The number of mines owned by the mine administration in the land transferred to the Republic of Turkey is 735. Whereas, their functioning was so few that they could be counted by finger" (MRE, 1936). As it can be seen from these studies and documents, mining before the republic is very weak and production is almost negligible. The important changes made in the Ottoman Empire in terms of mining legislation in the second half of the 19th century is directly related to the Empire's becoming an open market for Europe.

The Mining Regulations of 1861 were adapted from the French Law of 1810. With this law, the license trade in mines was tried to be limited and a "mining right" independent of land ownership was introduced. In addition, it has been accepted by the Regulations that foreigners can only become shareholders in mining companies. However, since it was foreseen that foreigners could acquire immovable property in the Ottoman Empire under certain conditions with the Reform Decree of 1856, the Regulation was naturally changed in 1870 and the principle that citizens of the states participating in the 1867 Protocol could "produce mines themselves or jointly" was accepted (Ökçün, 1969; Tamzok, 2008). Thus, the French Ereğli Company and some other foreign capital owners could easily and officially enter the Zonguldak Coal Basin, and foreigners dominated many mines as a result of this law change. With the Mining Regulations dated 1906,

99-year operating rights were granted to foreign capital. In these circumstances, despite the large number of licenses and concessions granted, the mining sector could not show a progress in proportion to the mining potential in the country. Eldem determined the share of mining in national income as 7.7 per thousand and 4.7 per thousand in 1913 and 1914, respectively (Eldem, 1994). Looking at the ownership structure of mine production in the Ottoman Empire, it is seen that the production was largely in the hands of foreign and minority capital. While this rate was 57.30% in 1902, it increased to 81.14% in 1911 (Ökçün, 1969; Tamzok, 2008).

Just before the proclamation of the Republic; On March 1, 1922, Gazi Mustafa Kemal Atatürk also explained his first thoughts about how the economy and mining policies would be in the Republic Period in the opening speech of the 3rd Legislative Year of the First Period of the Grand National Assembly of Turkey:

"One of the important aims of our economic policy is that the institutions and economic enterprises that will directly concern the general benefit are nationalized in accordance with the permission of our financial power and technology. In summary, it is possible to operate the mineral treasures that remain unused under our lands in a short time and offer them for the benefit of our nation. However, only economically. It is undoubted that our Government will provide all kinds of convenience to the capital owners who want to work in our mines and other economic matters, in public works. "(The Grand National Assembly of Turkey (GNAT) web page, 2021)

The changes in the economic, social and technological fields in the world have also shown their effect in Turkey and have created an increasing consumption. With this demand, the need for raw materials has also increased in parallel and a rapid increase in mining activities has been achieved. The fundamental breakthroughs in industrialization in Turkey started with the Republic period. It is possible to say that the regulations on OHS actually intensified in this period.

Development of OHS in Mining in Turkey

With the Mining Regulation, which came into force in 1869, more place was given to the rules on occupational safety. Thus, the deficiencies of the previous Dilaver Pasha Regulation were tried to be remedied. Along with the Mining Regulations; Engineers working in mines have been given the right to take the necessary precautions to prevent accidents and to request the materials needed for this purpose from the employer. A number of regulations have also been made, such as reporting occupational accidents to the authorities, keeping both health-related materials and experts (doctors, etc.) in mines, paying compensation to workers and their families who have suffered from work accidents, and punishing the employer with fines. Considering the conditions of that day, it can be seen that with the enactment of the Mining Regulation,

regulations that can be considered very important in the field of OHS were made (Talas, 1992; Arıcı, 1999; Makal, 1997; Çiçek & Öçal, 2016).

In Mecelle, which was the first civil law enacted in 1876 by the Ottoman Empire, the employer was obliged to compensate in case the employee suffers damage due to the employer's fault in the field of OHS. In addition, provisions have been introduced regarding the regulation of employee wages (Arici, 1999; Altan, 2004; Çiçek & Öçal, 2016).

The law regulating the prohibition of employing those under the age of 18, limiting the daily working time to 8 hours, paying twice as much in case of working for more than 8 hours and performing this work with the consent of the parties; It is "Law of Ereğli Hard Coal Basin Mine Worker, Law No. 151 and dated 10.09.1921". In the law; Employers are obliged to treat workers who are sick or have an accident. Also, around the mine; they must have a hospital, pharmacy and physician. In deaths resulting from work accidents, the inheritors of the deceased have been given the right to file damages against the employer. There is also a provision that the licenses and privileges of mining enterprises that do not provide health and safety conditions in the working environment can be revoked (Arici, 1999; Çiçek & Öçal, 2016).

In 1921, GNAT enacted the "Law on Export Fees to be taken from Hard Coals" regarding the law of miners. Many laws have been passed about mines until today. Many of these laws have been in the form of changing some of the articles of the existing laws. The Mining Law No. 6309, enacted in 1954, is one of the first laws put forward in detail about mines (Mining Law (1): 1954). This law is a very detailed law and occupational safety has been outlined in this law. In addition, it is stated that the safety of workers must be ensured in this law and the issues of stopping the work in case of work accidents are also included. The Mining Law No. 3213, enacted in 1985, also brought some changes. However, the issue of occupational safety was again very limited (Mining Law (2): 1985). In the meantime, laws that amended the law numbered 3213 on mining were enacted. The latest law numbered 7164 (Law on the Amendment of the Mining Law, Certain Laws and Decree Law), "General Directorate", "Discovery", "Declaration", "Specialized State Establishment" included in Article 3 of Law No. 3213, The definitions of "Mining Rights", "State Right", "License Fee", "Authorized Legal Entities" and the definition of "Certificate" have been changed to "License", the definitions of "Terminated" and "Board" have been abolished and the following "Mining Operation Activities "Mining Activities", "Right to Visible Reserve Development" and "Technical Staff" definitions have been added (Law No. 7164, 2019). With this law, improvements have been made in OHS.

The Regulation on the Use of Electrical Energy in Coal Mines with Methane explosion Risk published in the

Official Gazette of Turkey dated 11.3.1997 and numbered 22930 with the publication of the Regulation on OHS in Mining Workplaces (19.09.2013, Number: 28770), Regulation on Work in Mines Under the Sea, River and Lake, Regulation on the Use of Electric Locomotives in Underground Mines published in the Official Gazette of Turkey dated 28.5.1997 and numbered 23002, Regulation on Health and Safety Conditions in Underground and Surface Mines published in the Official Gazette of Turkey dated 21.2.2004 and numbered 25380, Regulation on Health and Safety Conditions in Mines published in the Official Gazette of Turkey dated 2004 and numbered 25381 has been abolished. The purpose of the Regulation on OHS in Mining Workplaces is to determine the minimum requirements to be followed in order to protect the health and safety of employees in workplaces where mining is carried out by drilling and underground and surface mining works. Revisions were made in the regulation after the accident that occurred in Soma District of Manisa Province, Turkey on May 13, 2014, which caused great suffering and resulted in 301 loss of lives. Coal mining has been included more in the regulation.

However, it is not enough to just look at the history of OHS related to mining. It is also necessary to examine the laws that have an impact on the current state of OHS. Especially recently, laws have begun to change and new ones to emerge in Turkey.

Izmir Economy Congress (1923) is very important in this sense. During the congress, some decisions were taken to protect workers' rights. As a result of these decisions, the Weekend Holiday Law (1924 and number 394) and the Law on National Holidays and General Holidays (1925 and 2739) entered into force.

With the enactment of the Code of Obligations (dated 1926 and numbered 818), there were provisions regarding OHS. In the law, it is stipulated that the employer must take the necessary measures against the dangers that the worker may be exposed to, otherwise the employer will compensate the losses suffered (Çiçek & Öçal, 2016).

On the other hand, the Public Health Law of Turkey (dated 1930 and numbered 1593) stipulated the protection of working women and children, and the obligation to have a doctor in workplaces employing at least 50 workers. Also; the law has contributed to occupational health and safety with its provisions regarding the obligation to establish an infirmary or hospital in workplaces of certain sizes (Gerek, 2008; Arıcı, 1999).

Provisions regarding OHS in the Public Health Law of Turkey are between articles 173-180. Prohibition of employment of children under the age of 12 in factories and workshops, prohibition of night shift for children between the ages of 12 and 16 after 20 o'clock, prohibition of attending more than 8 hours in a 24-hour

period in work that should be performed underground with night shifts, prohibition of employment of children under the age of 18 in coffee house, casino, etc., prohibiting pregnant women from taking part in heavy services for 3 months before childbirth, and granting women giving birth to breastfeeding for half an hour during working hours during the first 6 months (Çiçek & Öçal, 2016).

The first labour law, which was formed to regulate working life in Turkey, was enacted in 1936. It has also introduced some regulations on OHS issues. After the enactment of the law, the Ministry of Labour was established with the Law No. 4763 in 1945. The Workers Insurance Institution numbered 4792 was established in 1945. The Law No. 4772 on Work Accidents, Occupational Diseases and Maternity Insurance has entered into force. The Social Insurance Law dated 1964 and numbered 506 entered into force. In the same year (1964), the Occupational Health and Safety Inspectorate Organization and later the OHS Centre (OHSC) were established. In 1971, a new Labour Law No. 1475 was enacted. With the enactment of this law, many regulations and legislations in terms of OHS have also come into force. This law has brought detailed regulations in a wider sense than the previous labour law. In this law, the articles related to OHS are included between the articles 73 - 82 in the 5th chapter. With the 73rd article of Labour Law numbered 1475, the employer is obliged to fulfil the necessary requirements in order to ensure the health and safety of the employee and to provide the conditions related to this issue. In addition, it has been stipulated that employees have to comply with the procedures and conditions regarding OHS. Again, within the scope of this law, the circular requiring the employment of occupational physicians and workplace safety personnel was adopted in 1973 (Çiçek & Öçal, 2016).

In 2003, the Labour Law numbered 4857 was published in the Official Gazette of Turkey. Many regulations in the field of OHS have been issued based on the Labour Law No. 4857. Afterwards, the Social Insurance and General Health Insurance Law dated 2006 and numbered 5510 entered into force gradually in 2008.

Finally, the OHS Law No. 6331 and dated 20.06.2012 was adopted and some articles of the Law No. 4857 were repealed within 6 months from the publication of the law. With the enactment of Law No. 6331, some regulations were made and published again. Some of these regulations are;

- Regulation on the Procedures and Principles of Employing Child and Young Workers (06.04.2004, No: 25425),
- Heavy and Dangerous Works Regulation (16.06.2004, Number: 25494),
- OHS Services Regulation (29.12.2012, Number: 28512),

- Regulation on Duties, Authorities, Responsibilities and Training of Occupational Safety Specialists (29.12.2012, Number: 28512),
- OHS Signs Regulation (11.09.2013, Number: 28762),
- Regulation on OHS in Construction Works (05.10.2013, Number: 28786),
- Regulation on the Protection of Employees from the Dangers of Explosive Environments (30.04.2013, Number: 28633),
- Regulation on OHS Measures in Working with Chemical Substances (12.08.2013, Number: 28733),
- Regulation on OHS Measures in Working with Asbestos (25.01.2013, Number: 28539),
- Regulation on OHS Measures to be Taken in Workplace Building and Extensions (17.07.2013, No: 28710),
- Regulation on the Use of Personal Protective Equipment in Workplaces (02.07.2013, Number: 28695),
- Regulation on OHS Conditions in the Use of Work Equipment (25.04.2013, Number: 28628),
- Regulation on OHS in Mining Workplaces (19.09.2013, Number: 28770),
- Regulation on OHS Boards (18.01.2013, Number: 28532),
- Regulation on the Procedures and Principles of Employees' OHS Training (15.05.2013, No: 28648),
- Regulation on OHS in Temporary or Definite Term Jobs (23.08.2013, Number: 28744),
- Regulation on Duties, Authorities, Responsibilities and Training of Workplace Physicians and Other Health Personnel (20.07.2013, Number: 28713),
- Personal Protective Equipment Regulation (01.05.2019, No: 30761).

When the International Labour Organization (ILO) Convention No. 176 is examined, the similarity between the Turkish Regulation on OHS in Mining Workplaces and the obligations part draws attention. It is clearly stated in both ILO 170 and regulations that the employer is the first responsible for job safety. The employer is obliged to evaluate the risks and to eliminate these risks that are thought to arise. Employees' obligation is to ensure their health and safety by working in accordance with OHS rules. With the Law No. 6645 enacted after the mining accidents in Ermenek (flooding) and Soma (mine fire) (the Law on the Amendment of OHS Law and Certain Laws and Decree Laws), many regulations

have been made in the field of mining. If we look at them in a general sense;

- The licences may be suspended as a result of faulty actions of the workplace doctor and occupational safety experts
- In the event that the employer cancels the work contracts as a result of the notification made by the workplace doctor and occupational safety specialists, they are entitled to compensation provided that they are not less than the one-year contract fee,
- Imprisonment of the employer who makes a cautious increase in production plans and causes an occupational accident,
- To impose a 2-year restriction on participation in public tenders for employers whose defects in fatal accidents have been confirmed,
- Establishing mine rescue chamber,
- Increasing the penalties in cases of lack of OHS trainings and personal protective equipment that should be given at workplaces,
- The provision that the wage to be received by coal mine workers cannot be less than twice the minimum wage,
- Determining the working hours in mines as 37.5 hours,
- Reducing the age limit of miners from 55 to 50.

Coal mining is an important employment ensuring sector in Turkey. However, the main reason for the increase in employment is the increase in production. With this increase in production, occupational accidents in both open and underground coal mining have increased over the years. The disasters experienced in the lignite coal mines operated in Manisa-Soma and Karaman-Ermenek regions in 2014, brought the mining sector to the first place among the sectors where fatal occupational accidents were experienced.

In the study of the Ministry of Labour and Social Security - General Directorate of OHS named OHS Outlook of Turkey with Statistics; According to the rate of occupational accidents per hundred thousand, the first 5 sectors are; Mine and Quarrying (a), Water Supply ((b) Sewerage, waste management and improvement activities), Manufacturing (c), Construction (d), Accommodation and Food services activities €. When the sectors with the highest number of occupational accidents are examined, it is seen that the highest accident probability rate is in the mining sector (GDOHS, 2020). These data are illustrated in Table 1;

Table 1. Sectors with High Accident Probability Rates in Turkey

Sectors	Number of Injured Workers	Number of Occupational Disease	Number of Fatal Occupational Injuries	Rate of Work Injuries per 100,000	Fatal Accident Rate per 100,000
a	13.771	108	57	10.027,5	41,5
b	6.890	0	20	5.970,8	17,3
c	183.396	510	300	5.049,6	8.3
d	77.194	30	591	4.821,1	36,9
e	35.512	14	45	3.998,0	25,6

Results and Discussion

OHS is a science that aims to ensure that employees are in a full well-being not only in physical but also mental and social aspects, and that employees work in a happy, peaceful and high-performance manner. Considering the progress of the health and safety conditions of the employees since the existence of humanity, the effect of the change of technology in work life and the development in the production areas can be seen on this process. In fact, the industrial revolution, in which the increase in demand is on the rise, is the most obvious effect on this development process. While the needs started to increase very rapidly, the measures taken in the field of OHS and the legal regulations regarding the work could not keep up with this speed in the first place. Of course, this rapid increase in production in the mining industry was felt immediately in terms of providing raw materials. Especially with the increase in the need for energy, the number of underground coal mines has started to increase rapidly and unfortunately, work accidents and occupational diseases have also started to increase.

Turkey tried to keep up with this change that started in the world, especially with the declaration of the Republic, and productions started rapidly in many industries. The increase in the need for raw materials and energy has caused a rapid increase in mineral production in Turkey. With this increase, there has been an increase in occupational accidents. Due to the increasing need, legal regulations started to be made; Efforts have been made to enact mining laws, regulations and legislations. With the enactment of the OHS Law No. 6331, these laws and regulations have been revised.

In the mining sector of Turkey, there has not been a decrease in occupational accidents and occupational diseases at the desired levels despite the newly issued / regulated laws and regulations. Soma and Ermenek accidents are vivid examples of this. There are many reasons for occupational accidents and occupational diseases not to decrease to desired levels. Of course, some of these are reasons related to mineral deposits / geology in Turkey. However, the establishment of the OHS culture, the institutionalization of all mining companies and of course, the timely and complete

investments to improve OHS conditions will result in a reduction in occupational accidents and diseases. Especially the increase in mechanization, the termination of human work in risky areas and the start of production with machines should be seen as a solution (Dündar et al. 2018).

Conclusion

Occupational diseases and occupational accidents may decrease significantly with the increase in the efforts of the state, employers, employees and all stakeholders to establish the OHS culture and to take all necessary measures. While the mining sector has such an important role in providing employment and in the Turkish economy, measures to be taken and studies on OHS should be rapidly developed and necessary steps should be taken in parallel with this importance.

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