

## ANALYSIS of LABOR PROFILE in THE BRICK SECTOR

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Öz

Brick factories are enterprises with the stage production system operating with labour-intensive capital. The brick factories in our country have spread all over the country thanks to the abundance of raw materials. The objective of the research into the brick factories in the Erbaa region, which is an important centre for the production of bricks for our research, is to examine the employees in terms of gender, age, education, professional experience, absenteeism, working hours, smoking and alcohol habits. The method of our research includes interview and questionnaire. The results of the face-to-face interview with the primary sources of the study were obtained. As a result, it was determined that 95% of the workers in the brick factories were male, 84% were primary school graduates, 69% were aged 31-50 years, 62.5% were not absent from work, 6 % did not consume alcohol and 34 % were seen non-smokers.

**Anahtar Kelimeler:** Örgüt, Örgütsel destek, Örgüt temelli öz-saygı, İş tatmini.

## TUĐLA SEKTÖRÜNDE İŐGÜCÜ PROFİLİNİN ANALİZİ

Abstract

TuĐla fabrikaları safha üretim sistemine göre üretim yapan ve emek yoğun sermaye ile çalışan işletmelerdir. TuĐla fabrikalarında hammaddesi kil olan ve büyük çoĐunlukla inřaat sektörüne dolgu malzemesi olan deĐişik boyuttaki tuĐlaların üretimi yapılmaktadır. Ülkemizdeki tuĐla fabrikaları hammaddenin bolluĐuna baĐlı olarak ülkenin dört bir yanına yayılmıştır. Arařtırmamızın amacı tuĐla üretiminde önemli merkez olan Erbaa bölgesindeki tuĐla fabrikalarında çalışanların cinsiyet, yař, eğitim, mesleki deneyim, iş devamlılıĐı, çalışma süreleri, sigara ve alkol alışkanlıĐı bakımından incelemesini yapmaktır. Arařtırmanın yöntemi görüşme ve ankettir. Arařtırmanın verileri birincil kaynaklarla yüz yüze görüşme sonucu elde edilmiştir. Arařtırma ile tuĐla fabrikalarında çalışanların %95'nin erkek, %84'nün ilköĐretim mezunu, %69'nun 31-50 yař aralıĐında olduĐu, % 62,5 işe devamsızlık yapmadıĐı, %6'sının alkol ve %34'nün sigara kullanmadıkları tespit edilmiştir.

**Key Words:** TuĐla Sektörü, İşgücü Profili, TuĐla Üretimi.

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## 1. INTRODUCTION

Human resource is the most important input element of enterprises with labor-intensive capital. Technological developments affect the amount of labor use in the sectors. While the use of unqualified labor is decreasing in the sectors where technological developments are experienced, the need for qualified workforce is increasing. In automation-based businesses such as production, computer-integrated machines, robots, and automated transport systems, the use of labor is small to be avoided except from that of white and blue collars. However, the use of technological developments and businesses in each sector is not at the same level. In the enterprises where automation based production cannot be executed, many workers are employed by classical production methods.

While production based on automation in the brick sector is being made in Europe and developed countries, labor-intensive production is continuing with old technology in our country. The most important input element of production in brick factories in our country is labor force, which is the most important factor in brick factories affecting production costs, quantity of production, quality of product, amount of waste. When we look at the distribution of costs in brick production, labor cost has a significant share with 45% share (ÇSGB, 2014: 17).

According to occupational health and safety, workplaces are divided into 3 classes as less dangerous, dangerous and very dangerous. Brick factories are classified as very dangerous in terms of workplace hazard class (<http://www.resmigazete.gov.tr/eskiler/2017/02/20170227M1-1-1.pdf>). In the paper, a survey was conducted by face-to-face interviews with 120 workers to determine the gender, education, age, absenteeism, smoking and alcohol habits and work experience of the workers in the brick factories in the Erbaa region. It is aimed to investigate the status of employees in terms of gender, education, age and attendance due to the fact that brick factories are in a very dangerous class in terms of occupational health and safety. In addition, alcohol and smoking habits were asked in the questionnaire to measure the effect of the health problem caused by the alcohol and cigarette use of the employees.

## 2. BRICK INDUSTRY

### 2.1. Definition

The brick industry is a subcategory of baked clay and cement industry equipment. In brick sector, materials from clay are produced which are commonly used in construction sector. Various construction and ornamental bricks are also within the products of brick industry (Tukder, 2007: 3). Bricks are one of the oldest building materials used as filling material in the buildings (Syed et al., 2016: 29). The baked brick first began to be used in BC 4th century (Görçiz, 2000: 26). The first building systematically and regularly constructed using baked bricks was the Tower of Babel. Historians calculated that 85 million bricks were used in the tower (Doğan Tuğla, 2017: 1). The brick produced as the first building material in the world history has been one

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of the basic building blocks of the construction industry since the day it was produced. The brick sector has been one of the oldest sectors of our country (<http://www.tokihaber.com.tr/harihteki-en-eski-yapi-malzemeleri-tugla>).

### 2.2. Distribution of Brick Factories

In Turkey, brick and tile sector is a big production industry with a large number of units, scattered across the country (ÇSGB, 2014: 16). There were 78 brick and tile factories in 30 provinces of Turkey in 1955. In these factories, as of 1955, 101,999,670 tiles and 50,496,192 bricks have been produced. The number of workers in the factories is 8 136 (Şahin, 2001: 23).

Brick and tile production is closely related to construction activities. For this reason, the more construction is developed, the more brick and tile production is needed. With cooperatives and bank's lending policies in the housing industry after 1986, the brick and tile production in Turkey has increased rapidly (Sahin, 2001, 23).

According to Tukder's 2017 report on the industry, 417 brick and tile factories in Turkey continues its production activities (the Tukder, 2007: 5-6). Of these 417 factories, 49 are tile producers (8 of them are both bricks and tiles), and the remaining 368 produce a variety of standard bricks. Distribution of the brick and tile factories across Turkey is shown in Table 1.

**Table 1.** Brick and Tile Factories by Region

Regions	Provinces	F.S.	Regions	Provinces	F.S.	Regions	Provinces	F.S.
Marmara	İstanbul	1	Central Anatolia	Afyon	22	Eastern and South- Eastern Anatolia	Mardin	2
	Tekirdağ	14		Ankara	13		Batman	6
	Edirne	3		Polatlı	5		Urfa	1
	İzmit	7		Eskişehir	6		Diyarbakır	11
	Çanakkale	2		Kütahya	7		Bingöl	1
	Balıkesir	2		Konya	13		Erzincan	2
Blacksea	Düzce	1	Aegean	Aksaray	2		Elazığ	5
	Kavak	5		Yozgat	14		K.Maraş	3
	Trabzon	1		Avanos	8		Malatya	2
	Boyabat	25		Bilecik	2		Tunceli	1
	Bartın	3		İzmir	8		Iğdır	1
	Tosya	9		Turgutlu	50		Erzurum	1
	Çankırı	2		Salihli	31		Adıyaman	1
	Amasya	6		Akhisar	1		Ağrı	1
	Çorum	35		Aydın	6	Sivas	3	
	Osmancık	12		Ortaklar	6	Islahiye	2	
Mediterranean	Erbaa	18	Denizli	1				
	Turhal	8	Banaz	2				
	Antakya	4	Muğla	3				
	Adana	5						
	Antalya	3						
	Burdur	7						
	Mersin	4						

Source : Tukder, 2007: 5-6

As seen in Table 1, brick and tile factories are located in every region of Turkey. In our country, brick and tile factories seem to be dense in certain regions. The regions where it has been dense have become brick and tile production centers. Tekirdağ, Turgutlu, Salihli, Burdur, Afyon, Çorum, Boyabat, Erbaa, Yozgat and Osmancık provinces and districts such as Avanos are important brick and tile production centers in Turkey. Clustering of industries in certain provinces and regions is because of easier access to the main source of raw material. Apart from this, the fact that the climate is suitable for natural drying, infrastructure facilities and proximity to the market is also important (ÇSGB, 2014: 16).

According to the activity report of the building sector in 2015, TOBB registered 258 bricks and 53 tile factories where the amount of employment is 14,969 workers (<http://www.yapi.com.tr/TurkYapiSektoruRaporu2016>). The research was carried out in Erbaa province in 2017 with 15 brick factories where 1200 people work.

### 2.3. Brick Production

Brick factories use phase production system. Brick production is formed through interconnected stages. Processes and machines used at each stage vary. Brick factories are divided into two as labor-intensive and technology-intensive factories in terms of production technology (Temel, 2017: 38). Since automation in production is not used in brick factories, work force is used intensively until the raw soil becomes brick. In technology-intensive factories, automation-related production is being made between the production stages of the bricks and the phases. Automated brick factories use robots, automatic transport systems and tunnel type furnaces in their production processes. Most of the factories in our country produce labor-intensive technology. The production of brick factories in Erbaa, where we are conducting research, is labor-intensive.

Although there are differences according to the region and the product produced in the factories where brick production is done with traditional labor-intensive system, "one man, thousand bricks" is calculated. Approximately 100 workers work in the factory where 100,000 pieces of 13,5 bricks are produced per day (Bacıoğlu and Bacıoğlu, 18). In the Erbaa region, the factories we examine are producing with 10-20% more employees. The production is carried out by using 112 workers in the brick factory that produces 100 000 bricks, 89 workers in the brick factory that produces 80 000 bricks, 63 workers in the brick factory that produces 50 000 bricks and 59 workers in the brick factory that produces 50 000 bricks. Production costs incurred in brick factories 7% of the consist of direct raw materials and materials, 42% of direct labor and 51% of general production costs (Temel, 2017: 118).

The production stages of the brick and tile factories according to the phase production system are as follows (The Brick Industry, 2006: 2);

- Removal and Stocking of raw materials
- Preparation of raw material
- Shaping

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- Drying
- Baking

The brick production process is shown in Fig 1. As seen in Figure 1, the brick production begins with the soil extraction and continues at the factory.

For the brick and tile industry, many an analysis is carried out for the soil to be used in the production because "production starts on the soil extraction site" and the suitable soil for production is extracted to factory (Bacioğlu and Bacioğlu, 2013: 43).

During the preparation of raw material, a series of preparations are followed so that the soil used in brick production can have appropriate characteristics in terms of size and composition. In this stage, various machines such as crusher, stone separator, crushing rollers and mixer are used in order to (Şişman et al., 2006: 33) give the soil processibility, homogeneity, plasticity and cohesion properties (Temel, 2017: 40).

In the shaping phase, the soil, which has become suitable for shaping at the end of the raw material preparation phase, is passed through the presses and given brick shape. Pressed soil is vacuumed. Thanks to the molds at the exit of the press, semi-finished bricks are obtained in different sizes. By means of the cutter located at the exit of the press, the bricks are cut to dimensions appropriate to the standards (Temel, 2017: 41).

Shaped bricks need to gain some strength before baking and must be dried to prevent deformation and cracking during baking. Drying can be done naturally under normal atmospheric conditions or in special drying rooms where temperature and humidity can be controlled (Öneş, 1988: 67). Drying time varies between 24 and 48 hours depending on the season and soil characteristics (The Brick Industry, 2006: 3)

Baking is the final stage in brick and tile production. Soil products must be baked in order to become insoluble with water, to obtain hardness and to have physical and chemical resistance (Bacioğlu and Bacioğlu, 2013: 126). Furnaces are used for baking. There are two types of furnaces; Hoffman and Tunnel.

The Hoffman type furnace was invented by Friedrich Hoffman in 1858 (Bacioglu and Bacioglu, 2013: 14). It is the type of furnace that brick factories in our country use most. In the Hoffman type furnace, the fire moves and the products remain fixed. The working principle of Hoffman furnace is that it fires the bricks from the above and the air flowing through the furnace gets heated by contact with the baked material and flows through the furnace. Fuel is sprayed from the holes in the top of the furnace, and as the baking phase progresses, the spraying proceeds along the holes (DPT, 2008: 271).

A new tunnel type furnace was developed to reduce heat loss and labor costs (Syed et al., 2016: 32). In 1877, the first tunnel furnaces were started to be used in production by Otto Boch (Bacioglu and Bacioglu, 2013: 15). The main principle of the operation of the tunnel furnace is that the products move, the fire remains stable. There is a long tunnel and moving furnace wagons. Semi-finished products are stacked outside of the furnace at furnace wagons one after another and the wagons are pushed into the furnace at a certain speed (DPT, 2008: 271). The bricks in the completed wagons are taken outside the furnace and transported to the stock area.

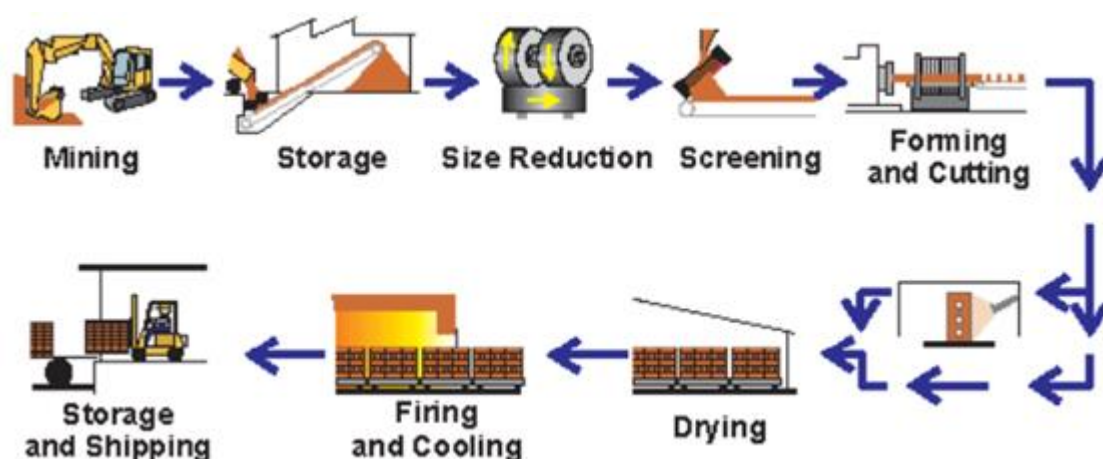


Figure 1. Brick production process  
Source: The Brick Industry, 2006: 2.

### 3. ANALYSIS OF THE LABOR PROFILE IN THE BRICK SECTOR

#### 3.1. Purpose

The aim of this paper is to assess the age, gender, educational background, occupational experience, absenteeism, smoking and alcohol habits of the workers at labor-intensive brick factories of Erbaa.

#### 3.2. Method

Interviews and questionnaires were used in the study. A survey was conducted by face-to-face interview with 120 out of 1200 workers by random sampling method. In the questionnaire design, general information about the purpose of the questionnaire was provided. Survey participants were asked questions about age, gender, education status, working hours, alcohol and cigarette use, working departments and absenteeism. The sample size of the study was 10%. The use of face-to-face interviewing increased the reliability of the survey results.

#### 3.3. Limitations

The research was carried out in the brick factories in the Erbaa district of Tokat province. Surveys were applied to 120 employees in 4 brick factories with different capacities and number of employees.

#### 3.4. Findings

The results of the analysis of in Erbaa region are as follows;

##### 3.4.1. Gender

In Turkey, Depending on the low labor force participation rate of women, employment rates are also low. Women's employment rate was over 50% in many countries while it is around 40% in Turkey (Kamaci, 2016, 19). It has been determined

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by the Black Sea Industrialists and Businessmen Association in the framework of the Direct Activity Support Program by the Central Black Sea Development Agency (OKA) that Samsun and its provinces consist of 83% of men and 17% of women in the Samsun Labor Market Analysis project (OKA, 2012: 33). The majority of workers are male due to the heavy working conditions in brick making. The distribution of the employees in the brick factories by gender is shown in figure 2. In Figure 2, 95% of the brick factories are male and 5% are female workers. Due to the difficulty of brick production conditions, the working rate of female workers in brick factories is lower. Female workers were found to work most in pressing phase where the physical working conditions are not harsh.

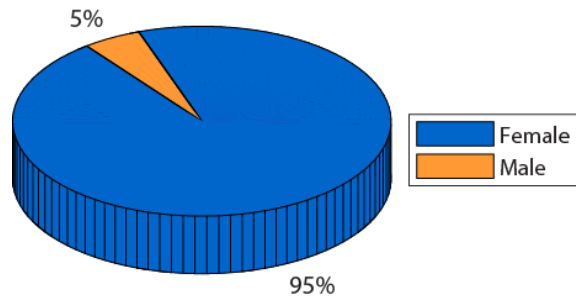


Figure 2. Distribution of Labor by Gender

### 3.4.2. Age

The heavy working conditions in the brick factories affect the age group of employees. The results based on the age of the workers in the brick factories are shown in Fig. It shows that 14% of the workers in the brick factories are 20-30 years, 40% are 31-40 years, 29% are 41-50 years, 13% are 51-60 years, and 4% above 61 years.

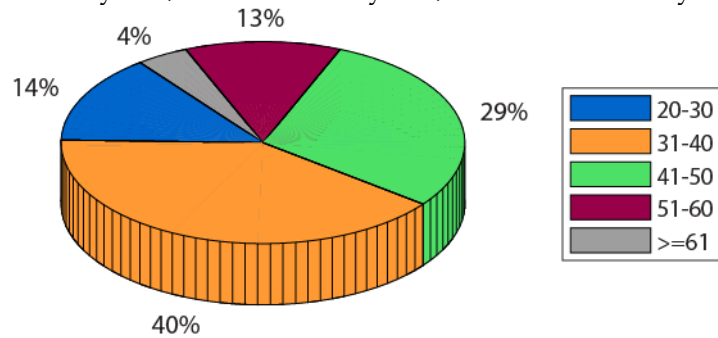


Figure 3. Distribution of Labor by Age

In the study conducted by OKA for Samsun and its provinces, 53.7% of the employees were in the age group 25-34, 30.4% were in the age group 35-44, 12.6% were 15-24, 2.2% were 45-54 and 1 % were above 55 years (OKA, 2012: 36).

The results of the survey on the age distribution of the workers in terms of working places are shown in table 2. As seen in Table 2, 80% of workers in raw material preparation are between 20-30 years and 20% are 31-40 years. 27% of the workers in the press are aged 41-50, 20% are aged 20-30, 31-40, 51-60, 13% are above 61

years. 40% of drying phase workers are 41-50 years, 30% are 51-60, 20% are 20-30, and 10% are 31-40 years. In baking phase, 56% are 31-40 years, 31% are 41-50 years, 9% are 51-60 years and 4% are 20-30 years. 40% of workers in the factory are 20-30 years, 20% are aged 31-40, 41-50, 61 and over.

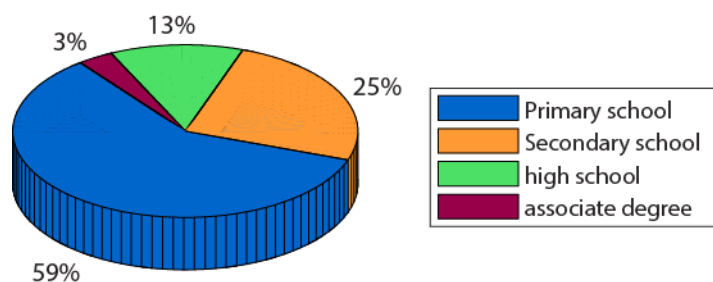
As the most difficult stage of production process is the furnace, 87% of the working workers are 31-50 years. Where the production process is not harder, workers at the age of 51 and above and 20-30 are employed. It is determined that 83% of factory employees are in the age range of 31-50 years. Table 2 also shows that hard conditions of brick factories heavily affect age range.

**Table 2.** Age Distribution of Employees by Production Location

Age Groups	Raw Material Preparation	Pressing	Drying	Baking	Factory in General	Total
20-30	4 (%80)	6 (%20)	2 (%20)	3 (%4)	2 (%40)	17 (%14)
31-40	1 (%20)	6 (%20)	1 (%10)	39 (%56)	1 (%20)	48 (%40)
41-50	-	8 (%27)	4 (%40)	22 (%31)	1 (%20)	35 (%29)
51-60	-	6 (%20)	3 (%30)	6 (%9)	-	15 (%13)
61-+	-	4 (%13)	-	-	1 (%20)	5 (%4)
<b>Total</b>	<b>5 (%100)</b>	<b>30 (%100)</b>	<b>10 (%100)</b>	<b>70 (%100)</b>	<b>5 (%100)</b>	<b>120 (%100)</b>

### 3.4.3. Education

In terms of educational status of the employees, they were evaluated according to their graduate status like primary, secondary, high school, associate degree and bachelor degree. The results obtained are shown in Figure 4 are that 59% of workers are primary school graduates, 25% are secondary school graduates, 13% are high school graduates and 3% have associate degree.



**Figure 4.** Distribution of Employees by Educational Status

In the study conducted by the Ministry of Labor and Social Security on the study of working conditions in brick and tile factories, it is seen that 15.9% of the 12.850 workers were literate, 65.5% of them were primary school graduates, 15% were high



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school graduates and 3.3% were at the undergraduate / graduate level (ÇBGB, 2014: 28).

When the two studies are compared, it appears that the education levels of workers in the brick and tile industry are parallel. More than 80% of employees in the sector are at the primary education level.

It has been determined by OKA that 45,4% of the employees working in the Samsun region graduated from general high school, 32,3% did not complete high school education and 13,4% were undergraduates (OKA, 2012: 35).

According to the survey conducted by OKA on the educational levels of employees in the brick and tile sectors were observed to be at a low level.

### 3.4.4. Operating Unit

The questionnaire was also evaluated in terms of the working units of the workers in the factory. The proportions of workers in the brick factories are shown in Figure 5. Figure 5 shows that 58.33% of the workers are in the baking department, 25% are in the pressing department, 8.33% are in the drying department, 4,17% are in the raw material preparation. In labor-intensive brick factories, most workers are employed in baking phase, then pressing, drying, raw material preparation and other respectively.

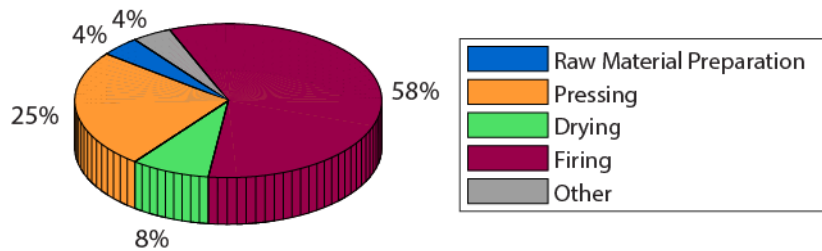


Figure 5. Distribution by Operating Units

### 3.4.5. Alcohol Use

In the survey study, the alcohol use rate of the workers was also examined. This is because is the measure the effect of alcohol use on workers' absenteeism. The rate of alcohol use by workers is shown in Figure 6, showing that 94% of workers in brick factories do not use alcohol and 6% use alcohol.

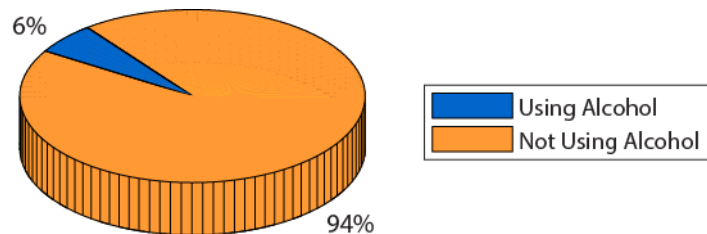
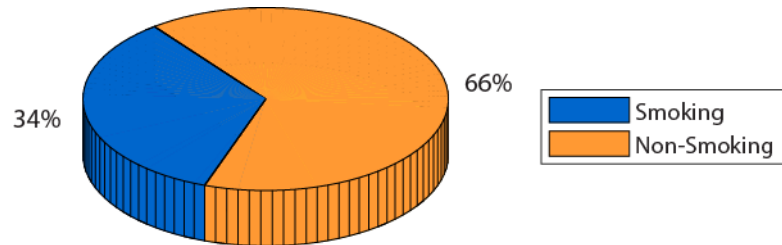


Figure 6. Distribution by Alcohol Use

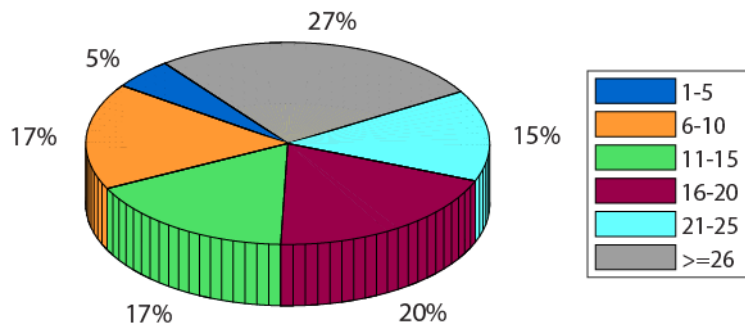
**3.4.6. Smoking**

In the questionnaire study, the rate of smoking among workers was examined. The rate of cigarette use by workers is shown in Figure 7 that 66% of workers in brick factories do not smoke and 34% use cigarettes.



**Figure 7.** Distribution by Smoking Rates

Smoking duration was also studied. The answers given by smokers to their smoking durations are shown in Figure 8. Figure 8 shows that 27% were smokers for 26 years and above, 20% were 16-20 years, 17% were between 6-10 and 11-15 years, 5% were 1-5 years.

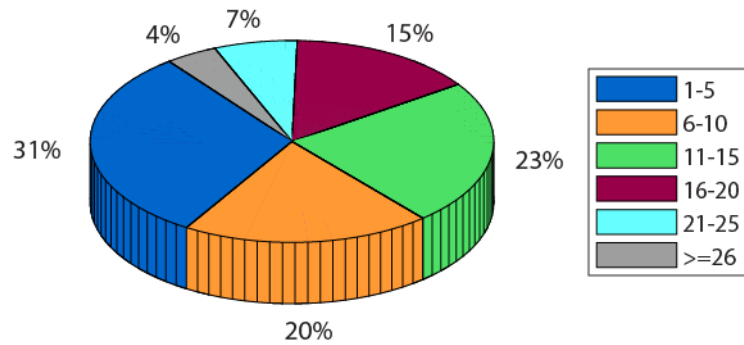


**Figure 8.** Distribution by Smoking Durations

**3.4.7. Work Duration (Work Experience)**

The questionnaire surveyed workers' working durations (by years) in brick factories. The results obtained are shown in figure 9. Figure 9 shows that 31% of workers were between 1-5 years, 20% 6-10 years, 23% 11-15 years, 15% 16-20 years, 7% 21-25 years, 5% 26 years and above. The most striking aspect of working duration is the reduction in the number of employees working at a later age due to the heavy workload. 23% of the worked in the brick factories for 15 years and they would show a decrease for another 15 years.

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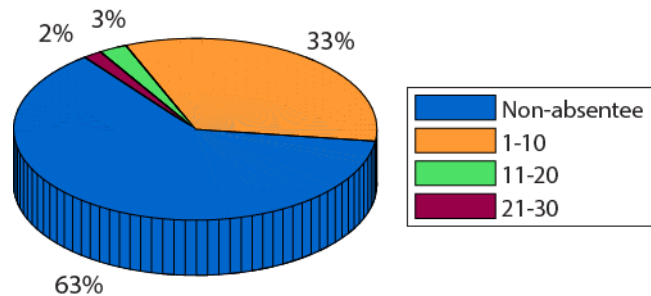


**Figure 9.** Distribution by Working Durations

In the study conducted by the Ministry of Labor and Social Security on the examination of the working conditions in the brick and tile factories, distribution of seniority is as follows; 31% of workers were classified as seniors for less than 6 months, 19% were for 6 months-1.5 years, 16% for 1.5-3 years, 13% for 3 - 5 years, 14% 5 - 10 years and 7% were for more than 10 years (ÇBGB, 2014: 29).

### 3.4.8. Absenteeism

The brick factories in Erbaa operate for 10-11 months a year. Factories work 5 days a week. Workers do not work on a weekday but work on Saturdays. Since brick production is a “seasonal” job, they are not allowed to take paid leave (ÇBGB, 2014: 66). The results in Figure 10 as to the continuity of the employees to the work shows that 63% of workers in the brick factories do not attend work, 33% are absent from 1-10 days, and 5% are workers who do not come to work on an excuse over 10 days. In the interview with the workers, they stated that the reasons for absenteeism were diseases of spouse and children, special days such as weddings and their upper respiratory tract diseases. No direct effect of alcohol and cigarette smoking on absenteeism.



**Figure 10.** Distribution by Absenteeism

## 4. RESULT

Brick factories, one of the oldest production sectors of our country, still continue to labor intensively in most regions today. In labor-intensive technology sector, labor force has a significant share. In areas where brick factories are located, the sector has an important place in the development of the regional economy. When considered in terms of production costs, the share of labor costs is around 45%.

The hard-working conditions of the brick factories decreased the rate of female workers compared to other sectors. According to the research in very dangerous class brick factories, it was found that 95% of the workers in the brick factories were men and 5% were women. It was concluded that the working conditions were severe and also effective in the age range of the employees. The difficulty levels of the production sites within the factory also affected the age range. 83% of the employees were found to be under 50 years old. It was found that 87% of the employees in the cooking part, which is the most difficult place of production, are in the 30-50 age range. It has been determined that the employees working in raw material preparation, pressing and drying places are between 20-30 years old and over 40 years old, and it was also determined that those who are aged above 61 worked in pressing and factory-wide chores.

In terms of education, 59% were primary school graduates and 25% were secondary school graduates. It has also been found that the level of education is low because it does not require special knowledge. As a result of the study, the brick sector operating in our country is working with labor intensive capital, so it has been determined that the education level was at primary and secondary school level and even illiterate people were employed. While it appears to be a capital-intensive disadvantage in the sector, the level of education appears to be an advantage in creating employment for those at primary school level. Alcohol use has been found to be at a very low level of 6%, with 34% of cigarette use. It has been found that 42% smoked longer than 20 years. It could not be concluded that due to alcohol and smoking habits absenteeism. The study of alcohol and cigarette use as a health problem with brick and coal dust in the working environment may be another research topic. When the working durations of employees in brick factories was examined, 51% worked in the sector for 1-10 years. Due to the heavy working conditions in the industry, the total working time in the factories was short. It has been determined that the intensity of the working age range is between 20-40 years. The number of employees working below the age of 20 and the age of 40 is decreasing. When the absenteeism was examined, it was found that 62.5% had no absenteeism, 33% were at maximum 10 days absent and no employees were absent for more than 30 days. It was found that the workers who cannot continue their work are on special occasions such as discomfort of their spouses and children, weddings or they get permission due to illness such as influenza infection. Finally, it has been determined that the employees working in brick factories do not have paid annual leave.

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