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PROBLEMS OF TEXTILE DYEHOUSES: FROM EMPLOYEE'S PERSPECTIVE

TEKSTİL BOYAHANELERİNİN SORUNLARI: ÇALIŞAN BAKIŞ AÇISIYLA

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ABSTRACT

Basic components of the textile industry; are yarn, weaving, knitting, finishing, and clothing production technologies. Among these areas of textile, the dyehouses create big problems for both the employees and the environment. Because of in dyehouses, many aqueous processes which are prepared with chemical substances are used for bleaching, dyeing, and finishing processes of the fabric. Some of these chemicals used in these processes threaten the health of dyehouse employees. The fact that dyehouse employees cannot receive regular health care also reveals this threat ($\bar{X}$= 2.63). In addition, the damage caused by dyehouses to the environment is also very important for the future of living spaces. Despite all these disadvantages, dyehouses are indispensable areas of the textile industry. For this reason, dyehouses are places that need to be examined carefully due to their versatile importance. In this study, it is aimed to determine the current conditions of the dyehouses and to give suggestions for their problems and their solutions. For this purpose, the opinions and suggestions of 156 dyehouse employees in 10 finishing enterprises located in Gaziantep Organized Industrial Zone on the current situation were analyzed.

Keywords: Dyehouse, textile, environment, dyehouse employee, dyehouse problems, health.

ÖZET

Tekstil sektörünün temel bileşenleri; iplik, dokuma, örme, terbiye ve giyim üretim teknolojileridir. Tekstilin bu alanları içerisinde hem çalışanlara hem de çevreye büyük problem üreten boyahanelerdir. Çünkü boyahanelerde kumaşın ağartılması, boyanması ve bitim işlemleri için kimyasal maddelerle hazırlanmış çok sayıda sulu işlem yapılmaktadır. Bu işlemlerde kullanılan kimyasal maddelerin bazıları boyahane çalışanlarının sağlığını tehdit etmektedir. Boyahane çalışanlarının düzenli sağlık hizmeti alamaması da bu tehditi ortaya koymaktadır ($\bar{X}$= 2,63). Ayrıca boyahanelerin çevreye verdiği zararlar da yaşam alanlarının geleceği bakımından oldukça önemlidir. Tüm bu dezavantajlarına rağmen boyahaneler tekstil sektörünün vazgeçilmez bir alanıdır. Bu nedenle boyahaneler çok yönlü önemi nedeniyle dikkatle incelenmesi gereken yerlerdir. Bu çalışmada, boyahanelerin mevcut durumlarını tespit ederek, sorunları ve bu sorunların çözümüne yönelik öneriler verilmesi amaçlanmıştır. Bu amaç doğrultusunda, Gaziantep Organize Sanayi Bölgesinde yer alan 10 terbiye işletmesinde 156 boyahane çalışanın mevcut durumla ilgili görüşleri ve önerileri analiz edilmiştir.

Anahtar Kelimeler: Boyahane, tekstil, çevre, boyahane çalışanları, boyahanedeki sorunlar, sağlık.

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INTRODUCTION

The textile manufacturing industry is old and technologically complex among all industries. Dyehouses, which are an important branch of the textile industry, are mostly small and medium-sized enterprises and they cause many problems. These problems are caused by the chemicals used. Because these chemical processes in dyehouses mostly damage living spaces. Some of the chemical processes carried out in dyehouses are aqueous processes such as bleaching and dyeing. Chemical wastes used in these processes cause significant environmental degradation and human diseases. For example, approximately 40% of the colorants used in the world contain chlorine, which is known to be carcinogenic. In addition, it is possible to see the side effects of the colorants used, such as allergic reactions and infant deaths. (Kaur, 2016; Mia et al., 2019; Parvin, 2020)

Since the production line in dyehouses harms human life and the environment, there is a need for technological production methods that use fewer chemicals. In addition, reducing the damage caused by dyehouses to the environment should be supported by preventive laws to be adopted by countries. (Alam et al., 2020) However, these preventive laws are not effective in countries like Bangladesh, where there are many dyehouses. Because it has been determined that most of the dyehouses do not comply with the existing rules. (Kant, 2012) In recent years, under the pressure of environmental organizations, the governments of the countries have entered into new searches due to the damage caused by the dyehouses to the environment and human health. One of these pursuits is to encourage the use of natural dyes in dyeing. Natural dyes are a good alternative for dyeing processes since they are non-toxic and do not harm the environment and human health. (Kaur et al., 2017) Other advantages of natural dyes; It is cheap, easily obtained, easily decomposed in nature, and abundantly available. (Yaseen&Scholz, 2019) In addition, the wide color range of natural dyes is an advantage for dyehouses. (Ozdemir, 2014) For example, in a dyeing process with plants grown in the temperate Austrian climate, more than 60% of the fastness tests of the dyes were acceptable, and it was determined that natural dyes were ecologically advantageous when compared with dyeings made with synthetic dyes. (Prelog&Tavcer, 2017) Despite all these advantages, the use of natural dyes is very limited. The use of chemical dyes poses serious concerns in terms of sustainable eco-textiles. Because it is used in chemical dyeing; Wastewater of chemicals such as sulfur, naphthol, vat, nitrate, acetic acid, soaps, chromium, copper, arsenic, lead, cadmium, mercury, nickel, and cobalt poison the World. (Tuncel&Kaygusuz, 2014) For example, dyes such as metal complexes used in the dyeing of fibers such as wool, polyamide, and silk release heavy metal ions into the environment. (Julkapli et al., 2014) In addition, in wet processes such as pre-finishing, bleaching, and mercerization, which are pre-treatment processes before dyeing, toxic, carcinogenic, and allergic chemicals are used. (Gaeta&Fedele, 1991; Shamey&Zhao, 2014) Dyehouses are responsible for a significant part of environmental problems in the world. Therefore, environmental approaches are needed for sustainable production. One of these approaches is the cationization process of light anionic normal cotton with cationic agents. It has been experimentally investigated that clear dyeing wastewater is obtained in cationic cotton dyeing and saving from chemical substances is achieved. In another approach, cotton, polyester, polyacrylonitrile, polyamide, and wool fibers were dyed with cleaned dyehouse wastewater and positive results were obtained from dyeing processes. (Milczarek&Szczecińska, 2006)

Water is the main source of life for our world. Dyehouses are the sector that consumes this valuable resource the most and pollutes the most. Dyehouses consume large amounts of water (200 m^3/tonne) and approximately 90% of it comes out as wastewater. This situation is not sustainable. For this reason, dyehouses should take precautions regarding water conservation and pollution control. Some of these measures are the reuse of wastewater, the need to adjust both the color and pH of the wastewater. It is also possible to use some biological methods. (Bechtolda et al., 2003; Samuel et al., 2004; Choudhury, 2014; Saxena et al., 2016; Gulumser, 2016; Sözen et al., 2019; Alayunt& Tasgin, 2019)

The coloring process in the textile industry makes the product more attractive. Synthetic dyes are mostly used in the coloring process. However, the chemical structures of these dyes cause serious damage to the environment. The wastewater generated after the dyeing processes of the dyehouses with these synthetic dyes must be released to nature after the necessary procedures are carried out in the treatment plants. (Hassan&Carr, 2018; Fröse et al., 2019) In addition, automation of dye consumption according to fiber saturation value can reduce the burden of treatment plants. (Santra et al., 2019) In recent years, some innovative studies have been carried out on this subject. Significant gains have been achieved in the use of water, auxiliary chemicals, and energy in dyehouses. In these studies, energy-saving is realized in the form of reuse of hot water, and the depreciation period of the process is calculated as 18-30 months. In addition, systems in the form of specially designed membranes, physicochemical, biological, and sand filters are also used in the cleaning of wastewater. (Yıldırım et al., ; Vajnhandl&Valh, 2014) Another approach is to monitor the amount of water used in dyehouses and the amount of pollution caused by it experimentally. (Chen et

al., 2017 Dyehouse managers need to develop environmental standards and take precautions. (Khan& Malik, 2013; Santos et al., 2016)

As the welfare level rises, fiber consumption increases worldwide. Increased fiber consumption means more dyeing and more pollution. This pollution affects life in less developed countries where production is more common. (Hessel et al., 2007) To reduce this effect, it is necessary to use less or recyclable water, chemicals, and energy used in the dyeing process. (Özdemir&Bozok, 2020) For example, in 1980-1995, as a result of the increase in the consumption of textiles in the United States, environmental pollution has increased significantly. Society put pressure on the government against this increase and wanted it to take precautions. (Ilyas et al., 2019) Thus, dyehouses started to use less water, fewer chemicals, and less energy in their production. (Rahman et al., 2020)

The textile sector makes a significant contribution to the economy of developing countries. For this reason, it does not seem possible for countries to exit this sector. However, this contribution also brings with it negativities. For example, textile has an important place in the country's economy in Pakistan. However, the damage caused by the dyehouses to the environment has reached serious dimensions. This situation poses a potential health hazard not only for the environment but also for the workers working in this line of business. For example, 30 textile workers and 30 office workers aged between 18-57 in 15 textile enterprises in the Dhaka region were screened for health and it was seen that the workers were at serious risk. Again, to improve the working conditions of the workers working in textile companies operating in Poland and Sweden, training on occupational risks was provided and it was aimed to reduce occupational risks. As a result of the training, changes were made in the work organization, and occupational risks at workstations were reduced. (Rather et al., 2019; Lellis et al., 2019; Bathrinath et al., 2020) Another risk seen in dyehouse is work accidents. These accidents occur due to inadequate lighting, ventilation, high levels of noise and dust. (Hatch&Maibach, 2000)

Chemicals used in dyehouses are very harmful to human health. For example, eczema, urticaria, and respiratory tract diseases caused by reactive dyes were seen in 5 workers aged 24-52 between 1977-1987. For this reason, the structure and properties of the dyes used in dyehouses should be known and harmful dyes should not be used. (Estlander, 1988; Mondal et al., 2017)

As the damages caused by finishing enterprises both on the environment and human health have reached serious dimensions, this has made it important to examine the current status and problems of these enterprises. In this study opinions of workers employed at textile dyehouses operating in Gaziantep have been taken with regards to the current status of dyehouses, relevant problems, and solutions of these problems. Data relating to the study were analyzed with SPSS 25 statistics program. With this study, solution proposals have been presented by revealing the current status and problems of this important working area in the textile sector with regards to minimization of damages caused by enterprises on environment and solution of these problems. In addition, in this pandemic period, where environmental concerns are rapidly increasing in the world, the healthy operation of dyehouses is important in terms of providing a better environment for future generations.

METHOD

The research is a quantitative study, and it is a descriptive study using a survey model, one of the quantitative research methods. A survey researcher is the one that includes the processes of reporting the findings obtained by determining the research problem, the target audience, and data collection tools to determine the participant's views on a subject or event. (Frankel& Wallen, 2006) Therefore, this research was designed as a survey study to determine the current status of the dye houses, the problems encountered and the solution suggested for the problems in Gaziantep Industrial Zone.

Research Sample

The sample of the research consists of 156 employees of 10 dyehouses located in the Gaziantep Industrial Zone. The dyehouses included in the research sample were determined by a simple random sampling method. A total of 250 questionnaires were distributed, 156 of theirs returned.

The demographic characteristics of the participants in this study group were given in Table 1.

Table 1. Demographic Characteristics of The Participants (N=156).

Demographic characteristics		**n**	**%**
The entry year of the workplace in the sector	Between 1981-2000	43	27.6
	2001 - ---	113	72.4
Labor force	Between 0-50	39	25
	Between 51-100	24	15.4
	Between 101-200	46	29.5
	201 and higher	47	30.1
Working position	Dyehouse manager	9	5.8
	Technician	45	28,8
	Other employees	102	65.4
Daily production capacity	1-10 tonne	4	2.6
	11-20 tonne	35	22.4
	21-30 tonne	115	73.7
	31 tonne and higher	2	1.3
Dyestuff procurement	Domestic	91	58.3
	Abroad	44	28.2
	Domestic and	21	13.5
Chemical substance procurement	Domestic	136	87.2
	Abroad	9	5.8
	Domestic and Abroad	11	7.1

Data Collection Instruments

The research data were collected with a survey prepared by the researcher, which included 24 items and two open-ended questions. The prepared survey consists of 3 sections; demographic characteristics, survey items, and open-ended questions. While writing the survey items, detailed literature was reviewed and interviews were made with workers in the sector. In line with the literature review and preliminary interviews, an item pool of 30 items was prepared. For the validity and understandability of the items, 5 subject field specialists, 5 workers of the related sector read the items and gave opinions. After this process, the survey was reorganized and 24 items and two open-ended questions were included. The scaling of the survey included from 5 to 1 (5: I completely agree, 1: I do not agree at all). To determine the reliability of the prepared questionnaire, the calculation was made with the Cronbach's alpha analysis in the SPSS 25. At the end of the calculation, it was concluded that the questionnaire was reliable with a value of .91.

Data Analysis

The research data was analysed using SPSS 25 statistics program. Frequency analysis, which is among the descriptive statistics, was used in the analysis of demographic variables. The mean and standard deviation values of the answers given to the questionnaire items were calculated. Normality distribution analysis was performed to analyse whether the statistical analysis to be applied to the data set was parametric or non-parametric tests. As a result of the normality distribution analysis, it was concluded that the skewness (-.315) and kurtosis (.158) coefficients were between ±1 values. The normality distribution curve for the analysis result is shown in Figure 1. According to the results of the normality test, independent samples t-test was used for two-group comparisons of independent variables, and one-way ANOVA test was used for comparisons between more than two groups. The answers to the open-ended questions were analysed with the use of content analysis and the results were presented with visuals. Content analysis is a type of analysis that focuses on the variety, frequency, or repetition of the answers given to the research questions (İşçi and Öztekin, 2018). In this context, the frequency of repetition of the words or phrases was specified while presenting the data.

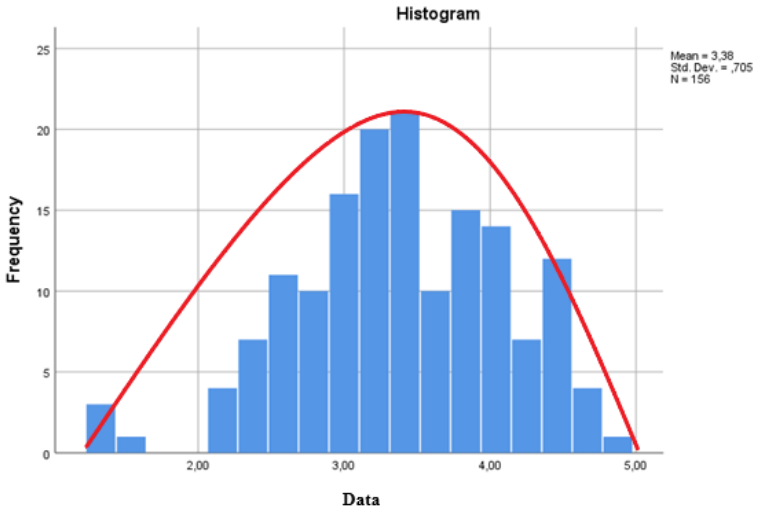

Figure 1. Normality Distribution Curve.

RESULTS AND DISCUSSION

Findings Regarding the Questionnaire Items

While Turkey has a very long history with regards to the dye industry, it is seen that studies relating to the current status of dyehouses and their problems are limited and even very few as being insignificant. Based on the fact that human sources, being the most important basic inputs in enterprises, would provide the most reliable information about work and work conditions, an average of answers given by dyehouse workers to questionnaire items relating to the current status of dyehouses is given in Table 2.

Table 2. Questionnaire Items Score an Average of Participants.

Item no	Items	n	$\bar{X}$	Ss
1	The dyehouse department is technologically sufficient.	156	3.19	1.12
2	The ventilation conditions of the dyehouse department are sufficient for human health	156	2.90	1.33
3	The ventilation conditions of the dyehouse department are sufficient for work.	156	2.95	1.11
4	Dyehouse department employees are provided with adequate training regarding their work.	156	2.69	1.01
5	The number of people working in the dyehouse department is sufficient for the job.	156	3.32	1.11
6	The working capacity of the dyehouse department is sufficient	156	3.07	1.24
7	The wastes of the dyehouse department are handled appropriately.	156	3.68	1.14
8	The chemicals used in the dyehouse department are suitable for eco-textile.	156	3.60	1.23
9	Qualified personnel is employed in the dyehouse department.	156	3.39	1.18
10	Necessary inspections are carried out on time and by the procedure in the dyehouse department.	156	3.30	1.29
11	The dyehouse department uses raw materials that threaten human and environmental health.	156	3.29	1.30
12	The physical conditions of the dyehouse department are sufficient (floor, working area size, etc.)	156	3.32	1.08

13	The temperature conditions of the dyehouse department will not disturb the employee, so the air conditioning conditions should be ideal.	156	2.78	1.31
14	The lighting conditions of the dyehouse department are as they should be.	156	3.66	1.22
15	The dyeing place and the sample workplace are separated from each other and are not negatively affecting employee productivity.	156	3.58	1.34
16	The machinery and equipment used in the dyehouse department are sufficient.	156	3.51	1.22
17	Necessary protective measures have been taken for the employee in the dyehouse department.	156	3.66	1.25
18	It is suitable for settlement work in the dyehouse department.	156	3.80	1.10
19	The electrical accent in the dyehouse department is structured in a way that does not threaten work safety.	156	**3.98***	1.13
20	All kinds of materials used in the dyehouse department are stored under suitable conditions.	156	3.88	1.08
21	The order and cleanliness of the dyehouse department are sufficient.	156	3.42	1.23
22	Warning and warning signs in the dyehouse department are sufficient.	156	3.96	1.12
23	The maintenance and repair of the work equipment in the dyehouse department are carried out regularly.	156	3.50	1.30
24	Health services are regularly provided to employees of the dyehouse department.	156	**2.63***	1.25

As it is seen in Table 1, arithmetical averages of answers given to each item relating to the current status of dyehouses by participants give the lowest value regarding expression in the 24th item stating "Regular health services are provided to workers at dyehouse department." ($\bar{X}$= 2.63) and it gives the highest value regarding expression in 19th item stating "Electrical fixtures in dyehouse department have been structured in a way not to threaten occupational safety." ($\bar{X}$=3.98).

Quantitative Findings Relating to The Variable of Entrance Year of The Workplace in The Sector

Entrance year in the sector bears importance as it is the indicator of how many years enterprises are operating in the sector and it is important to ensure settled organizations of enterprises and hence, findings of whether opinions of participants regarding the current status of textile dyehouses showed a significant difference concerning entrance years of enterprises in the sector or not have been analyzed. Analysis results are given in Table 3.

Table 3. T-test Results About The Relationship Between Opinion Scores Relating to the Current Status of Dyehouses and Variable of the Entry Year of The Place Of Work in The Sector.

Variable	**Entrance year in the sector**	**n**	**$\bar{X}$**	**Ss**	**Sd**	**t**	**p**	***d***
Current status of dyehouses	Between 1981-2000	43	3.20	.70	154	2.22	.02*	.03
	The year 2001 and afterward	113	3.57	.69				

*p<0,05

According to Table 3, there is a statistically meaningful difference between participant opinions and variable of entrance year of enterprises to the sector ($t_{(154)}$=,2.22, p<.05), and it is seen that this difference coming out is in favor of enterprises starting to operate after the year 2001. ($\bar{X}$=3.20, $\bar{X}$=3.57). While this result shows that there is a statistically significant difference, it does not provide information about the size of the difference. The effect size for the independent sample t-test has been calculated with Cohen's *d* formula. (Green& Salkind, 2005) They purported that *d* value between .02-.05 points to a small level of effect size, while those between .05-.08 to medium level effect

and .08 and above to the high level of effect sizes. Based on these expressions, it was reached to the conclusion that the effect which occurred (*d=.03*) had a small level of effect.

Quantitative Findings Relating to Total Labor Force Variable

The importance of the workforce, which is among the human factors, is very important for job simplification and operational efficiency. The findings regarding whether the opinions of textile dyehouses regarding their current situation show a significant difference according to the labor force variable are included in Table 4.

Table 4. Variance Analysis (ANOVA) Results Regarding the Relationship Between Opinions Scores About the Current Status of Dyehouses and Total Labor Force Variable.

Variable	Labor force	n	$\bar{X}$	Ss	Variance source	KT	Df	KO	F	p
Current status of dyehouses	0-50	39	3.37	.56	**Between groups**	3.05	3	1.01	2.09	.10
	51-100	24	3.46	.60						
	101-200	46	3.53	.70						
	201 and higher	47	3.18	.82	**Within-group**	73.87	152	.48		
Total		156	3.37	.70		76.93	155			

*p<0,05

According to Table 4, there is no significant difference between the opinions of participants regarding the current status of textile dyehouses and the labor force variable ($F_{(3-152)}$=2.09; p>.05)

Quantitative Findings Relating to Working Position Variable

Based on the opinion that work positions of people working at enterprises can affect their perceptions relating to the work, finding of whether opinions relating with the current status of textile dyehouses showed a significant difference concerning working position variable or not has been analyzed. Analysis results are given in Table 5.

Table 5. Variance Analysis (ANOVA) Results Relate to the Relationship Between Opinion Scores About The Current Status of Dyehouses and the Working Position Variable.

Value	Working position	n	$\bar{X}$	Ss	Variance source	KT	Df	KO	F	p	Scheffe	η^2
Current status of dyehouses	Dyehouse manager (A)	9	3.87	.50	**Between groups**	6.13	2	3.15	6.84	.001	A-B B-C	.07
	Technician (B)	45	3.59	.58								
	Other employee (C)	102	3.23	.72	**Within-group**	70.61	153	.46				
Total		156	3.37	.70		76.93	155					

*p<0,05

According to Table 5, there is a significant difference between the opinions of participants about the current status of textile dyehouses and the working position variable ($F_{(2-153}$=6.84; p<.05). According to analysis results of the Scheffe test conducted to find the source of this difference, it is seen that this difference is between dyehouse managers and other workers and technicians and other workers. The effect size of this difference coming out statistically in single directional variance analysis is calculated with the eta-square (η^2) formula. Effect size calculated as a result of the test shows that this difference is at the medium level (η^2=.07).

Quantitative Findings of Daily Production Capacity Variable

For enterprises, to increase sales amount, it is also required to increase daily production capacity. Increasing daily production capacity in an unplanned way causes various negative situations to come out. In this regard, the finding of whether opinions regarding the current status of textile dyehouses showed a significant difference with regards to the daily production capacity variable or not has been analyzed. Analysis results are shown in Table 6.

Table 6. Variance Analysis (ANOVA) Results About The Relationship Between Opinion Scores Relating To The Current Status of Dyehouses and Daily Production Capacity Variable.

Value	Daily production	n	$\bar{X}$	Ss	Variance source	KT	Df	KO	F	p	Scheffe	η^2
Current status of dyehouses	1-10 tonne (A)	4	4.02	.18								
	11-20 tonne (B)	35	3.47	.74	**Between groups**	6.37	3	2.12	4.57	.004	A-D B-D	
	21-30 tonne (C)	115	3.35	.66	**Within-group**	70.55	152	.46			C-D	.08
	31 tonne and higher (D)	2	1.91	.82								
Total		156	3.37	.70		76.93	155					

*p<0,05

According to Table 6, there is a significant difference between the opinions of participants about the current status of dyehouses and the daily production capacity variable ($F_{(3-152}$=4.57; p<.05). According to analysis results of Scheffe test conducted to find the source of this difference coming out, it is seen that this difference is seen between 1-10 ton and 31 ton and above, 11-20 ton and 31 ton and above, 21-30 ton and 31 ton and above. The effect size of difference coming out statistically in single directional variance analysis is calculated with the eta-square (η^2) formula. Effect size calculated as a result of the test shows that this difference is at a high level (η^2=.08).

Quantitative Findings of Dyestuff Procurement Place Variable

At the workplaces dealing with dyes, the probability that the dyestuff being used will endanger human health is higher concerning those working in other types of enterprises. This situation can be reflected positively or negatively in the evaluation opinions of people working at dyehouses with regard to their working environments. Finding of whether opinions about the current status of textile dyehouses showed a significant difference concerning dye procurement place variable of enterprises or not has been analyzed. Analysis results are shown in Table 7.

Table 7. Variance Analysis (ANOVA) Results About The Relationship Between Opinion Scores Relating to the Current Status of Dyehouses and the Dyestuff Procurement Place Variable.

Variable	Dyestuff procurement	n	X̄	Ss	Variance source	KT	Df	KO	F	p
Current status of dyehouses	Domestic	91	3.37	.65	**Between groups**	.305	2	.15	.30	.73
	Abroad	44	3.42	.80						
	Domestic + Abroad	21	3.48	.71	**Within-group**	76.62	153	.50		
Total		156	3.37	.70		76.93	155			

*p<0,05

According to Table 7, there is no significant difference between the opinions of participants about the current status of textile dyehouses and the dyestuff procurement place variable ($F_{(2-153)}$=.30; p>.05).

Quantitative Findings Regarding Chemical Substance Procurement Place Variable

Textile finishing is the most important actor in the Turkish Textile and Garment Industry and the dye industry being the underlying one has an indispensable value. In addition to being environmentally sensitive and making energy and water savings within the frame of sustainable competition terms, it is required for textile dye enterprises to use less harmful chemical substances and to realize waste load mitigation studies. Finding of whether opinions relating with the current status of textile dyehouses show the difference concerning variable of chemical substance procurement place of enterprises or not has been analyzed. Analysis results are shown in Table 8

Table 8. Variance Analysis (ANOVA) Results About The Relationship Between Opinion Scores Relating To The Current Status of Dyehouses and Variable of Chemical Substance Procurement Place.

Value	Chemical substance procurement	n	X̄	Ss	Variance source	KT	Df	KO	F	p	Scheffe	η^2
Current status of dyehouses	Domestic (A)	136	3.31	.69	**Between groups**	4.53	2	2.26	4,79	.01	A-B	.05
	Abroad (B)	9	3.83	.66								
	Domestic + Abroad (C)	11	3.80	.55	**Within-group**	72.39	153	.47				
Total		156	3.37	.70		76.93	155					

*p<0,05

According to Table 8, there is a significant difference between the opinions of participants regarding the current status of textile dyehouses and variable of chemical substance procurement place ($F_{(2-153}$=4.79; p<.05). According to analysis results of Scheffe test conducted to find the source of this difference emerging, it is seen that this difference is between groups whose chemical substance procurement place is in domestic country and abroad. In single directional variance analysis, the effect size of statistically significant difference is calculated with the eta-square (η^2) formula. Effect size calculated as a result of the test shows that this difference is at the medium level (η^2=.05).

Findings Relating to Problems and Solutions Faced at the Dyehouse

The textile finishing industry is a private industrial branch aiming to change and develop features of textile products according to the area of usage, gaining quality and value addition to the product, being constituted of dyeing, printing, and finishing processes. Our company is the biggest textile finishing industry in Europe with its production capacity.(ISO report, 2020) While the Covid-19 pandemic which has influenced all the world has negatively affected various sectors throughout the world, finishing enterprises were also affected by this negativity. However, we can state that Turkey is in a better position concerning production capacity and export opportunities when compared with other world countries. Opinions of those working in this business branch having an important place in Europe concerning the production capacity concerning problems experienced in working places and their solutions are given in Figure 2 and Figure 3.

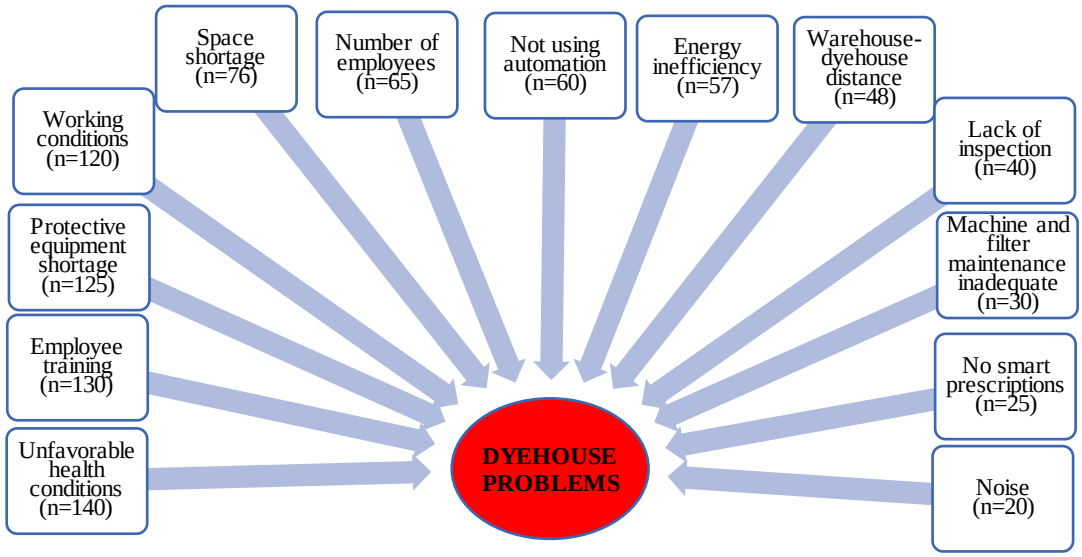

Figure 2. Problems According to Dyehouse Employees.

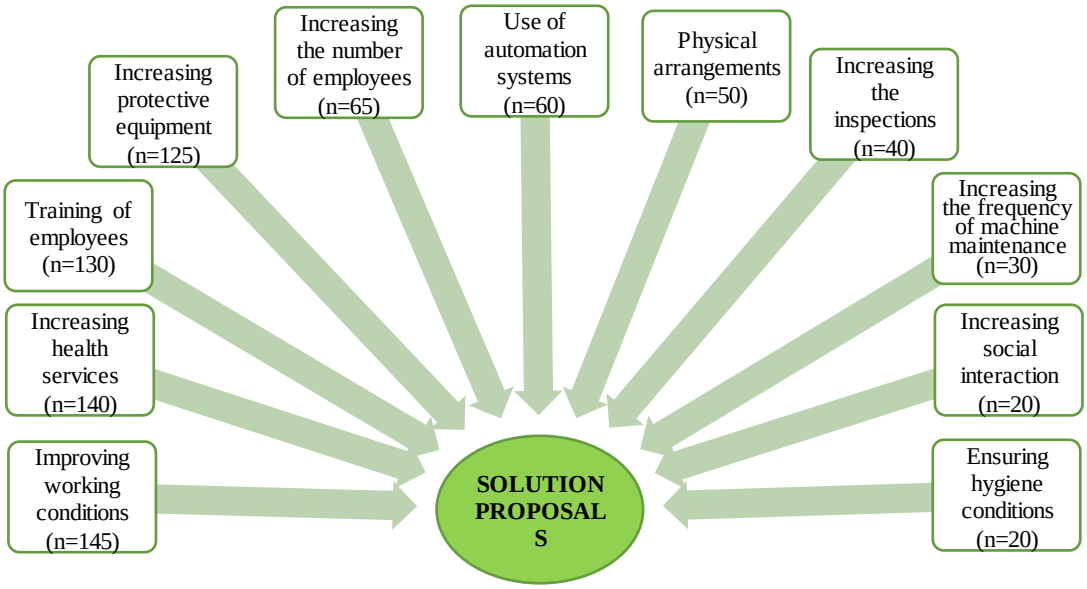

Figure 3. Solution Suggestions of Dyehouse Employees.

CONCLUSION

There are various problems in textile dyehouses. While these problems can arise from the nature of processes realized in dyehouses, they can also arise from the system. Chemical wet processes that are used quite significantly at textile dyehouses and waste coming out constitute a serious problem. As per the general conclusion obtained from answers given to items in the questionnaire, workers have stated that regular health service is not provided to them concerning chemicals and relevant processes and they have mentioned the insufficiency of training relating to the work. Another result obtained from the research is that the perception of workers concerning settlement orders in dyehouses is higher than other questionnaire items.

When research results are reviewed, it is seen that there is a significant difference between variables of entrance year of enterprises in the sector, working position of worker, daily production capacity and chemical substance procurement place and the opinions of participants.

As per the answers given by participants to the open-ended question of "What kind of problems are there at your workplace, apart from those stated in questionnaire items?", in a way to support answers given to questionnaire items, it was mentioned about problems such as unhealthy working conditions, the inadequacy of training given to workers during recruitment and working process, insufficiency of protective equipment, non-usage of automation systems, physical organization deficiency originating from distances between warehouse and dyehouse, and non-existence of smart receipt application. Again as per the answers given to open-ended questions, it was determined that problems involved by workers in dyehouse were related to the inadequacy of health conditions and that those with which dyehouse manager and technicians were involved were related with work realization processes and worker training. The fact that participants did not make emphasis on damages given to the environment, reveals that workers are not interested in damages given to the environment by dyehouse. According to the research outcome,

It is seen that there is a deficiency of systematic working organization starting from machine settlement plan until production processing plan. It is seen that workers were neither informed about the structure of chemical substances nor the risks associated with the unwanted reaction occurring as a result of usage. Storage of chemical substances and they're being carried during usage in textile dyehouses bear big risks. It is important to realize periodical health controls of workers and to make it become a standard to use protective equipment while working. Dyehouses have a big amount of wastewaters. Although purification of these wastewaters is highly costly, it is required to be done with the enterprise's means or through a central facility.

The major amount of the problems observed in textile dyehouses in high numbers can be resolved with training and low costs. Training of workers can be done with notification meetings to be realized periodically. Dyehouse working conditions can be improved by creating an organizational scheme and applying it. It can be ensured for the facility to operate efficiently as a result of periodical maintenance works of the repair and maintenance team at the machine park.

Dyehouses are departments requiring special interest in the textile industry. Problems in these departments involve both workers and living areas. For production to be sustainable, it is required for traditional production methods to be supported with technological and ecological alternatives. Studies relating to the usage of natural dyes as an alternative to synthetic dyes and the application of dyeing processes realized in low-temperature levels by using less amount of water should be emphasized.

AUTHOR CONTRIBUTION STATEMENT

Author 1 contributed to the creation of the idea, to collect data to carry out analyzes, review the literature, evaluate the results, and examine the results.

ETHICS COMMITTEE APPROVAL

To make the study within the scope of research ethics, Gaziantep University Social and Human Sciences Ethics Committee gave the necessary permission at its first meeting on 23.12. 2020.

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