

EXAMINATION OF PERCEPTION DIMENSION OF ENGINEERING
TECHNOLOGY AND ERGONOMICS PRINCIPLES IN TERMS OF
HEALTHCARE PERSONNEL: A SCALE DEVELOPMENT STUDY⁽¹⁾SAĞLIK ÇALIŞANLARINDA TEKNOLOJİ KULLANIMI VE KALİTE
YÖNETİMİ: BİR ÖLÇEK GELİŞTİRME ÇALIŞMASI

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Öz: Farklı analiz teknikleri ile gerçekleştirilen bu uygulamalı çalışmamızda amaç olarak sağlık çalışanlarının teknoloji odaklı ürün kullanımı ve bu ürünlerden sağlanan fayda ile bunlara yönelik kalite kullanımı arasındaki farklılıkları belirlemeye çalıştık. Araştırmamız yaklaşık olarak 4 ay sürmüş ve farklı kamu ve özel kurumlara ait sağlık kurumlarında çalışan toplam 421 sağlık çalışanına 5'li likert ölçekten oluşan bir anket uygulanmıştır. Anketlerden elde edilen veriler SPSS 18 istatistik programı ile analiz edilmiş ve ileri teknik analiz yöntemleri kullanılarak sonuca gidilmiştir. Araştırmada kullanılan anket için geçerlilik ve güvenilirlik çalışması yapılarak Cronbach's Alpha kat sayısı olarak 0,906 değeri elde edilmiştir. Bu değer güvenilirlik geçerlilik oranı ise %91 seviyesindedir. Bu rakam uygulamada kullanılan ölçme aleti anketin oldukça yüksek güvenilirlikte olduğunu göstermektedir. Araştırma sonrasında özellikle cerrahi ve laboratuvar alanında kullanılan mühendislik ürünleri tıp cihazlarının etkin ve kaliteli kullanılması yönünde bazı kurumların yetersiz bilgi ile kalite yönetimi konusunda geri kaldığı saptanmıştır. Bazı yeni teknoloji ürünlerin kullanımı konusunda sağlık personelinin bilgi ve donanımın yetersiz olduğu, etkili ve kaliteli bir kullanım konusunda geri kaldığı da saptanan sonuçlar arasında yer almaktadır.

Anahtar Kelimeler: Sağlık, Kurum, Kalite, Yönetim, Mühendislik, Cihaz, Tıp, Ölçek, Teknoloji

Abstract: In general terms, ergonomics is the conformity of human and equipment. Unconformity between human and equipment is more likely to give harm either to the equipment or to human. This conformity may go for both daily domestic tasks and work life. Domestic furniture and equipment are designed by taking average features of individuals into consideration. For example; chairs, tables, beds and similar things are manufactured with the measurements which are accepted as standard all over the world. People spend most of their time at their homes and workplaces. Similarly, the ergonomics considered in the manufacture of domestic furniture takes an important place in working life, as well. This is highly significant in terms of both health of workers and efficiency of the work done. On the other hand, ergonomics possesses importance in terms of patients except from workers and work efficiency in health sector. Working in non-ergonomic settings may both endanger health of healthcare personnel and cause decrease in work efficiency as well as posing negative effects for recovery of the patients. From this point of view, ergonomics in health sector becomes more important in many aspects. In this study, it was aimed to develop a scale with regard to finding out perceptions of the healthcare personnel on engineering technologies and ergonomics principles.

Key Words: Health Authority, Quality, Management, Engineering, Device Type, Scale, Technology

Doi: 10.17366/UHMFD.2015514491

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Uluslararası Hakemli Mühendislik ve Fen Bilimleri Dergisi

Eylül / Ekim / Kasım / Aralık Sonbahar Kış Dönemi Sayı: 5 Yıl:2015

International Refereed Journal of Engineering And Sciences

September / October / November / December Issue Autumn Winter Period: 5 Year: 2015

ID:58 K:125

(ISO 9001-2008 Belge No / Document No: 12879 & ISO 14001-2004 Belge No / Document No: 12880)

(MARKA PATENT NO: TRADEMARK)

(2015/04066- 2015-GE-17837)

Issn Online: 2148-47-83 Online: 2149-2484

Introduction

Manufacturing systems and manufacturing amounts showed decrease with the industrialization. Meeting the needs of the world whose population has increased rapidly within the last century requires rapid, efficient and qualified manufactures. During these manufactures, people who are the most important capital source should be used as efficiently as possible. The use of qualified man power efficiently focuses on benefiting from them with the most appropriate way and for the longest possible time. Human capital needs to be used meticulously due to the fact that it is not renewable like other capital components.

At this point, the science of ergonomics attempts to bring into optimum balance among work-man-machine. However, here, it is discussed designing work and machine according to human rather than conformity of human according to work or machine. Ergonomics is necessary not only for the enterprises or sectors manufacturing goods, but also in the sectors rendering services. For instance; elements such as seat styles, corridor widths, illuminations, noise levels, etc. of the vehicles used in transportation sector which is one of the service sectors are designed in accordance with the physical and physiological comfort of people.

Another service sector which is directly connected with the health of human is healthcare services. Healthcare delivery renders services for protecting current health status of people and recuperating their lost health. On the other hand, employees working in this sector are called healthcare personnel (or professionals). Just as individuals working in other sectors, healthcare personnel also encounter with many occupational illnesses. Besides, most of these illnesses are caused by non-ergonomic conditions, tools, equipment, etc. For example, insufficient height of patient's stretcher and laboratory workbenches which are lower than normal height may cause lumbar and back aches in personnel. Apart from that, environments which are not ventilated adequately may cause various bacteria and viruses spread to the personnel. In environments where sufficient air conditioning cannot be provided; that is, too cold or too hot ambient air may cause various disorders in the personnel.

In this study, it was tried to determine the benefits of ergonomics in parallel with human as well as the problems that may occur. On the other hand, the purpose of the study is to find out application dimension and importance of ergonomics and its practices mainly by establishments as well as by personnel. Another dimension is to determine the importance and effects of ergonomics on the personnel. More-



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over, it was aimed to make the study more qualified by searching the literature regarding ergonomics dimension.

Theoretical Framework and Literature Review

The word ergonomics is composed of the terms “Ergo” meaning work and “Nomos” meaning law in Latin language and it means science of work in short (Örnek, 2013). Ergonomics can be accepted as a field of science which studies the relationship of the worker with work, equipment and environment (Baslo, 2002). Kaya (2008) has defined ergonomics as a multi-disciplinary science revealing natural and technological rules of human-machine-environment compatibility by taking biological-physiological features and capacities of the personnel into consideration. Ergonomics is matching work with human rather than matching human with work. In other words, it is matching physical environment with human (Office Ergonomics, 2015).

Applying biological information into anatomy, physiology and experimental psychology fields in order to achieve human-machine-environment system which protects health of the personnel and enables productivity by balancing work-load and work-force in optimum level is called ergonomics (Örnek 2013).

According to another definition, ergonomics is the practice of designing working and living environment in accordance with human features or “the scientific examination of the relationship between human and workplace environment” (MEGEP, 2014). Ergonomics (human engineering) is organizing work in accordance with the abilities and needs of the individuals who are going to carry out that work (Kahraman, 2014).

Ergonomics started to develop as the application of accumulation of knowledge which is in quite different qualities and which could show efficiency of human performance in different directions during the World War II. Within the post-war period, ergonomics developed almost in all industrial fields. Then, it was seen in agriculture field and it dealt with the studies regarding optimum conditions in human-machine-work interaction in terms of providing efficiency perspective by decreasing burden of various work forms gradually. In time, it developed through working conditions and socio-technical interaction direction and transportation before business sector and then in the direction of environmental living conditions (Alkan, 1982).

According to Atasoy, Keskin, Başkesen and Tekingündüz (2010), purposes of ergonomics forming the balance between abilities of the worker and job specifications, enhancing



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worker safety, health and efficiency and increasing the quality of working life.

Purposes of ergonomics can be summarized as follows (Güler, 1997):

1. By increasing efficiency of use of equipment and machinery utilized by people,
2. By designing everything that is open to the use and interaction of people in daily life in accordance with human;
 - a. Increasing human performance
 - b. Providing human security
 - c. Protecting and enhancing human health
 - d. Enabling human happiness and satisfaction.

On the other hand, primary objectives of ergonomics can be listed as follows (Kaya, 2008);

- **Humanism and Economy:** Knowing features, information, abilities and skills as well as lower and upper limits belonging to these elements by taking purposes into

consideration is the most important criteria of a job engineering which is decent for human.

- **Protecting Health:** In general terms, it means preventing or mitigating diseases caused by working conditions.
- **Social Conformity of the Work:** It means suitability of the work with human socially, providing an environment in which an individual will maintain his/her life within social norms and encouraging interpersonal relations.
- **Technical Economy:** It means regulating human-machine system functionally in a correct way, maintaining sustainability of the performances of these kinds of systems and designating individuals within the system in the most correct way economically.

Ergonomics is a discipline working in connection with many science fields. Güler (2015) has tabulated the disciplines which are connected with field of study of ergonomics as follows.



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Table 1. Field of Study of Ergonomics and Contributing Disciplines

Field of Study of Ergonomics	Contributing Disciplines
Physical size and form	Anthropometry, bio-mechanic
Physical needs	Physiology, biology
Body Rhythms	Chronobiology
Human input characteristics	Physiology, emotional psychology, physics
Information and decision	Psychology, information sciences
Human output characteristics	Bio-mechanic, physiology, psychology, communication studies
Environmental tolerances	Physiology, biology, psychology, forensic medicine
Providing, collecting and analyzing data	Statistics, management methods
Workplaces and working life	Design, management, working psychology
Organizational restructuring	Organizational theory
Culture and Motivation	Psychology, sociology
System design	Systems, engineering principles, disaster studies, accident assessments
Physical needs	Physiology, biology

Güler, Ç. (2015), Halk Sağlığı Açısından Ergonomi, <http://www.hisam.hacettepe.edu.tr/modulegt/halksagligiacisindanergonomi.pdf>, (Citing Date: 02.11.2015).

Working in a healthy and safe environment is a social need. The concept of occupational health and safety, which can be defined as annihilating or decreasing occupational risks and health problems which are encountered by the workers because of physical environmental conditions of the workplace while conducting the work, is one of the most important problems parallel with the industri-

alization of countries (Mollamahmutoğlu, 2005).

Today, ergonomics is a discipline which deals with almost all sectors. Therefore, equipment suitable with the work done is designed in a way that employee can perform his/her work comfortably. Height of sitting place, height of worktables, illumination and air-conditioning of the setting, using various tools for prevention of noise or minimizing its effects, etc. can be shown as the examples of ergonomics practices. One of the fields in which ergonomics is closely related is health sector. As it is known, health sector is composed of



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(2015/04066- 2015-GE-17837)

Issn Online: 2148-47-83 Online: 2149-2484

protecting health of people, recovering their health if they get sick and preventing them from diseases. Recently, many studies were made regarding health sector and ergonomics fields. Both dimensions of ergonomics in health sector and the studies carried out in this field are addressed below.

Babayiğit and Kurt (2013) suggested in their study titled “Hospital Ergonomics” that posture and prevention principles should be taken into consideration in the appearance of occupational pains and diseases as well as specifying that ergonomics factors also had great role; therefore there should be an ergonomic patient care system suitable with physical, social and physiological characteristics of patients and healthcare personnel in order to increase their living quality in hospital setting and the suitability of quality warranty, psychology, sociology and communication sciences which are related with human factors with health system should be developed.

İlçe (2007) carried out his/her doctorate thesis titled “Examination of Ergonomic Factors in Intensive Care Units” with 201 nurses in total who were working in 12 intensive care units. According to the writer, personnel of intensive care unit may encounter with biological, chemical, physical, psychosocial and biomechanical risks depending on the nature of their services. In intensive care units, ergonomic factors such as easily adjustable beds,

auxiliary lifting and carrying tools and taking anthropometric measurements into account possess a great significance in preventing musculoskeletal disorders. As a result of the study performed by İlçe (2007), it was determined that 20% of the nurses working in intensive care units were diagnosed to have musculoskeletal disorder and 21.1% of them had backache during the last working week. Furthermore, it was found that nurses experienced moderately nagging foot ache, backache, neck ache and shoulder ache during the last working week and those who felt pain, ache or disorder had a too little decrease in working capacity. A significant difference was found between those not getting help from other personnel while carrying patients and working 142 hours standing and the frequency of the musculoskeletal disorder statistically. It was found that 6.96% (14/201) of the nurses suffering from diagnosed musculoskeletal disorder used annual leave or medical report and there had been 0.02 workday-loss. It was detected that intensive care units are risky in terms of individual, psychosocial and physical ergonomic factors. Worker of weak or bad ergonomics may be affected psychologically, psychosocially and physically in a negative way and at the same time it may cause musculoskeletal disorders.

In a study performed by Atasoy et al. (2010), it was specified that it was necessary to pro-



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tect physical, mental and social health of the laboratory personnel, to prevent loss of job resulting from disorders of working environment conditions, to take all kinds of protective measures against harmful factors for health in working settings and to provide suitable working setting conditions (heat, dampness, air-conditioning, illumination, noise, cleaning and care, etc.) in terms of personnel's health and safety.

Özel (2005) listed risk factors being effective in terms of ergonomics at hospitals:

Chemical Risk Factors: Some of the numerous chemicals to which nurses and other healthcare personnel are exposed are: anti-neoplastics, anesthetic gases, cleaning and sterilization solutions, insecticides, medicines, soaps, solvents, tissue paints.

Physical Risk Factors: Pinpricks, scalpel cuts, hitting tools and equipment, being exposed to electric shock and burns from devices like cables and defibrillator.

Biomechanical Risk Factors: Vibration, recurrent moves, lifting heavy things, etc.

Environmental Risk Factors: It includes materials which clearly pose inadequate or unhealthy situations for the personnel. In this category, there are conditions such as slippery grounds, bad designs, inadequate or deficient

tools, improper acclimatization, disorganization of illumination and general environment.

Except from these, there are also two groups of risk factors causing musculoskeletal disorder. These are:

1. Risk factors depending on job

- a. Lifting heavy objects
- b. Lifting objects by rotating
- c. Pushing and recurrent lifting move

2. Psychosocial risk factors

- a. Dissatisfaction in job
- b. Having been experienced musculoskeletal pains
- c. Low or different level of education
- d. Expectancy for compensation.

According to Serdaroğlu Tigrel (2013), equipment, furniture and tools used in health sector are naturally designed and produced to eliminate firstly health problems of the patient; ease and comfort of use are trying to be enhanced within the process of practice. Deficiency in design threatens health of operators in long term and indirectly it also affects health of the patient. Deficient equipment in terms of ergonomic design or not using ergonomic practices in placing this equipment



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may cause standing disorders and musculo-skeletal disorder in operators in the long term.

In the postgraduate thesis titled “The Effect of Ergonomic Design of Workplace Environments on the Efficiency of Academic Personnel (Gazi University Faculty of Dentistry Sample)” by Düşüngülü (2014), it was determined that there was a positive and low level relationship between views about physical environment and efficiency levels depending on physical environment, a positive and low level relationship between views about tools and equipment and efficiency levels depending on tools and equipment, a positive medium level relationship between views about working environment and efficiency levels depending on working environment, a positive medium level relationship between views about research environment and efficiency levels depending on research environment.

Kisner and Colby (2007) stated that wrong ergonomic structure caused wrong posture and wrong posture caused myofascial pains, waist-neck disorders, osteoarthritis, tendinitis, impingement syndromes, headaches and similar problems.

Alp, Bozkurt and Başçiftçi (2014) carried out their study on 80 individuals working in Isparta Public Hospital. RULA (Rapid Upper Limb Assessment) job evaluation form was used in order to assess working posture.

When the RULA results were evaluated, RULA score was found to be 6 for laboratory personnel and physicians performing extremity examination. That score was 4 for other unit personnel. On the other hand, head anterior tilt was 35%, kyphosis was 20%, lordosis was 13%, shoulder asymmetry was 15%, pelvic tilt was 9% and round shoulder was 8% in static posture analysis. When hospital materials were organized, ergonomic regulations were not taken into account. As a result, although some materials are convenient in terms of ergonomic situation, ergonomic inconsistency among materials and unawareness of the healthcare personnel about ergonomics as well as not paying attention to posture while working cause problems in static posture.

In an article titled “Effect of Emotional Ergonomics and Administrative Dimension to Human Performance” carried out by Aytaç (2011), it is stated that emotional ergonomics is a field which should certainly be taken into account along with psychosocial and cognitive ergonomics, it is possible to bring human-machine performance into the desired level as long as we pay the necessary importance to this field, in this sense the administration should support the personnel with training and development activities in order to increase their emotional intelligence and develop their emotional skills.



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Çeliker (2015) states in his article titled “Spine Health and Ergonomics” that 35% of occupational diseases are composed of muscle and skeleton system diseases. In the same article, it is specified that one of the main reasons of these diseases most of which can be prevented are increase in physical inactivity and time spent before screens in busy times as well as decrease in break numbers and time.

Aim: In this research, we have conducted an applied study on defining the potential problems likely to occur with the benefits generated by ergonomics on human parallel. The purpose of the study is to reveal the importance of ergonomics with regard to its implementation by enterprises particularly by the employees. Another aspect is to define the importance and effects of the ergonomics on employees. Furthermore, literature review about ergonomics concept has been conducted in order to make the study more qualified.

Method: In this research, a measurement instrument which has never been used previously was used. This measurement instrument is for developing scales. In determining the scale, we have benefitted from the views of the experts. Information has been provided from an expert team who has active roles particularly in the production phase and in the following fields; machine, electronics, electricity, computer, chemistry, work safety, public health, infections, radiology, agricul-

ture, physics, architecture and other fields of engineering. In line with the information provided, the structures of various production enterprises and views and expectations of the employees have been revealed. A questionnaire has been designed in accordance with the information provided with two aspects. The designed questionnaire was subjected to a preliminary test. The preliminary test was applied to 278 staff working in the enterprises located in various industrial zones of Kocaeli and İstanbul. The data derived from the outcomes of the questionnaire was analyzed with the statistics software SPSS 19. After the analysis, we have determined the Cronbach’s Alpha as 0,629. As this value was under our expectation, we eliminated 13 scaled questions which had decreased the index value and then remade the analysis. After this second analysis, we have obtained 0,793 as the reliability index. This shows that the measurement instrument we have used in this research is reliable. Necessary permissions for the questionnaire used in the research were taken from the Faculty of Letters Deanship of Cumhuriyet University.

Analysis: For the analysis, we have benefited from descriptive statistics, reliability analysis, factor analysis and from Kolmogorov Smirnov, Man Whitney U, Kruskal Wallis and Jonckheere-Terpstra Testa, Correlation, Anova and Regression analyses. In the anal-



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ysis of the research the packaged software PASW 18.0 has been used. 1378 production enterprise workers and managers participated in our actual research. The research continued for approximately 5 months. Within this time period, the questionnaire forms have been delivered to the participants via e-mail, mail or by face to face meeting. No participant has been asked to provide official or personal identifying information during the research. All of the participants were selected randomly by simple random method. After the actual research, we obtained 0,912 as the Cronbach's Alpha index. After this value, the reliability of the questionnaire and measurement instrument used in the research was provided with validation. In the relations and gaps between variables, a significance level of 0.05 was taken into consideration. Scaled questions used in the questionnaire were developed by dividing them in factors and sub-dimensions.

Hypotheses of the Research

H1: Ergonomics factors do not differ by age.

H2: Ergonomics factors do not differ by gender.

H3: Ergonomics factors do not differ by education.

H4: Ergonomics factors do not differ by income.

H5: Ergonomics factors do not differ by job type.

H6: Ergonomics factors do not differ by total working hours.

H7: There is not a relationship between experiencing health problems and physical disorders.

H8: Ergonomics factors do not differ by loss of limb.

H9: Concern for the future and having private health insurance are independent from each other.

Implementation and Analyses

Reliability Analysis

Table1. Reliability Analysis

Cronbach's Alpha	Item Number
,912	98

When the reliability analysis results were observed, it was found that 98 items included to the analysis had very high reliability level.

Demographical and Descriptive Statistics

Demographic and descriptive statistics of the participants are shown below;



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Table 2. Demographic Descriptive Statistics		Frequency	Column N %
1. AGE	18-25	359	26%
	26-35	640	46%
	36-45	234	17%
	46-55	92	7%
	56-65	53	4%
2. GENDER	Male	849	62%
	Female	529	38%
3. MARITAL STATUS	Married	368	27%
	Single	1010	73%
4. EDUCATION	Primary/elementary	377	27%
	high	649	47%
	college	161	12%
	university	141	10%
	Post-graduate and over	50	4%
5. DO YOU HAVE PRIVATE HEALTH INSURANCE?	Yes	292	21%
	no	1086	79%
6. INCOME	1000-1300	311	23%
	1301-1500	561	41%
	1501-2000	217	16%
	2001-2500	83	6%
	2501-3000	171	12%
	3001+	35	3%
7. DO YOU SMOKE OR TAKE ALCOHOL?	yes	1150	83%
	no	228	17%
8. HAVE YOU EXPERIENCED ANY OCCUPATIONAL ACCIDENT?	yes	628	46%
	no	750	54%
9. HAVE YOU ENCOUNTERED WITH A PHYSICAL PROBLEM RESULTING IN LOSS OF LOMB?	yes	65	5%
	no	1313	95%



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(ISO 9001-2008 Belge No / Document No: 12879 & ISO 14001-2004 Belge No / Document No: 12880)

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10. DO YOU WORK OVERTIME INSTEAD OF NORMAL REGULAR WORK HOURS?	yes	290	21%
	no	1088	79%
11. ARE YOU PROVIDED WITH ALL KIND OF SOCIAL ACTIVITY, SOCIAL SECURITY AND OTHER ISSUES COMPLETELY-PRECISELY?	yes	430	31%
	no	948	69%
12. WHAT TYPE OF JOB ARE YOU PERFORMING?	office	193	14%
	workshop	493	36%
	factory	332	24%
	hospital	125	9%
	mine	130	9%
	School-education	60	4%
	other	45	3%
13. ARE YOU PROVIDED WITH ANNUAL LEAVE AND OTHER SOCIAL RIGHTS FULLY AND IN TIME?	yes	1285	93%
	no	93	7%
14. DO YOU HAVE CONCERN FOR THE FUTURE?	yes	1168	85%
	no	210	15%
15. DO YOU HAVE SUFFICIENT INFORMATION ABOUT JOB SAFETY AND WORKERS' HEALTH?	yes	833	60%
	no	545	40%
16. DO YOU HAVE SUFFICIENT INFORMATION ABOUT ENVIRONMENTAL SAFETY AND ENVIRONMENTAL HEALTH?	yes	1220	89%
	no	158	11%
17. DO YOU HAVE TROUBLES WITH YOUR FAMILY OR SURROUNDINGS BECAUSE OF DIFFERENT PROBLEMS YOU EXPERIENCE IN THE WORKPLACE?	yes	807	59%
	no	566	41%
18. DO YOU FEEL COMPETENT AND RESPONSIBLE FOR THE JOB YOU PERFORM?	yes	629	46%
	no	744	54%
19. HAVE YOU HAD A TECHNICAL TRAINING REGARDING YOUR WORK OR JOB?	yes	777	56%
	no	601	44%



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20. WHAT IS YOUR DUTY IN THE ESTABLISHMENT YOU ARE WORKING?	unqualified employee	353	26%
	worker	710	52%
	civil servant	178	13%
	chief	82	6%
	senior manager	55	4%
21. WHAT IS YOUR TOTAL WORKING HOURS?	1-5	328	24%
	6-10	567	41%
	11-18	273	20%
	19-25	112	8%
	26+	98	7%
22. DO YOU SUFFER FROM WAIST, NECK AND DIFFERENT HERNIA TYPE MEDICAL DISORDER?	yes	260	19%
	no	1118	81%
23. DO YOU SUFFER FROM A PERMANENT HEALTH PROBLEM DEPENDING ON YOUR JOB WHICH AFFECTS YOUR PHYSICAL ACTIVITY?	yes	1128	82%
	no	250	18%
24. ARE THERE ANY EMPLOYEE FROM DIFFERENT CULTURE AND NATIONALITY IN YOUR WORKING ENVIRONMENT?	yes	230	17%
	no	1148	83%

FACTOR ANALYSIS

Factor analysis was performed by evaluating the answers given by the participants. The following results were acquired as a result of the analysis.

After total 98 items of factor analysis composed of ergonomics and answers given by

the participants, the remaining 4 factorials were loaded to sub-dimension.

1. JOB SATISFACTION and MOTIVATION
2. WORKING TOOLS USED AND OTHER MATERIALS
3. ENVIRONMENTAL CONDITIONS
4. PERSONAL ERGONOMICS



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Table 4. Factor Analysis	Components			
	1	2	3	4
JOB SATISFACTION and MOTIVATION	,812			
JOB SATISFACTION and MOTIVATION	,730			
JOB SATISFACTION and MOTIVATION	,723			
JOB SATISFACTION and MOTIVATION	,722			
JOB SATISFACTION and MOTIVATION	,709			
JOB SATISFACTION and MOTIVATION	,709			
JOB SATISFACTION and MOTIVATION	,702			
JOB SATISFACTION and MOTIVATION	,695			
JOB SATISFACTION and MOTIVATION	,666			
JOB SATISFACTION and MOTIVATION	,647			
JOB SATISFACTION and MOTIVATION	,646			
JOB SATISFACTION and MOTIVATION	,645			
JOB SATISFACTION and MOTIVATION	,644			
JOB SATISFACTION and MOTIVATION	,638			
JOB SATISFACTION and MOTIVATION	,638			
JOB SATISFACTION and MOTIVATION	,637			
JOB SATISFACTION and MOTIVATION	,631			
JOB SATISFACTION and MOTIVATION	,630			
JOB SATISFACTION and MOTIVATION	,627			
JOB SATISFACTION and MOTIVATION	,627			
JOB SATISFACTION and MOTIVATION	,625			
JOB SATISFACTION and MOTIVATION	,606			
JOB SATISFACTION and MOTIVATION	,595			
JOB SATISFACTION and MOTIVATION	,594			
JOB SATISFACTION and MOTIVATION	,590			
JOB SATISFACTION and MOTIVATION	,588			
JOB SATISFACTION and MOTIVATION	,588			
JOB SATISFACTION and MOTIVATION	,588			



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JOB SATISFACTION and MOTIVATION	,585			
WORKING TOOLS USED AND OTHER MATERIALS		-,068		
WORKING TOOLS USED AND OTHER MATERIALS		-,031		
WORKING TOOLS USED AND OTHER MATERIALS		,084		
WORKING TOOLS USED AND OTHER MATERIALS		-,063		
WORKING TOOLS USED AND OTHER MATERIALS		,144		
WORKING TOOLS USED AND OTHER MATERIALS		,043		
WORKING TOOLS USED AND OTHER MATERIALS		,053		
WORKING TOOLS USED AND OTHER MATERIALS		,118		
WORKING TOOLS USED AND OTHER MATERIALS		-,022		
WORKING TOOLS USED AND OTHER MATERIALS		,023		
WORKING TOOLS USED AND OTHER MATERIALS		,006		
WORKING TOOLS USED AND OTHER MATERIALS		,244		
WORKING TOOLS USED AND OTHER MATERIALS		,036		
WORKING TOOLS USED AND OTHER MATERIALS		,032		
WORKING TOOLS USED AND OTHER MATERIALS		,021		
WORKING TOOLS USED AND OTHER MATERIALS		-,092		
WORKING TOOLS USED AND OTHER MATERIALS		,827		
WORKING TOOLS USED AND OTHER MATERIALS		,827		
WORKING TOOLS USED AND OTHER MATERIALS		,827		
WORKING TOOLS USED AND OTHER MATERIALS		,478		
WORKING TOOLS USED AND OTHER MATERIALS		,478		
WORKING TOOLS USED AND OTHER MATERIALS		,471		
WORKING TOOLS USED AND OTHER MATERIALS		,471		
WORKING TOOLS USED AND OTHER MATERIALS		,369		
WORKING TOOLS USED AND OTHER MATERIALS		,344		
WORKING TOOLS USED AND OTHER MATERIALS		,336		
WORKING TOOLS USED AND OTHER MATERIALS		,306		
WORKING TOOLS USED AND OTHER MATERIALS		,283		
WORKING TOOLS USED AND OTHER MATERIALS		,255		



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WORKING TOOLS USED AND OTHER MATERIALS		,236		
ENVIRONMENTAL CONDITIONS			,122	
ENVIRONMENTAL CONDITIONS			,106	
ENVIRONMENTAL CONDITIONS			-,044	
ENVIRONMENTAL CONDITIONS			,058	
ENVIRONMENTAL CONDITIONS			-,112	
ENVIRONMENTAL CONDITIONS			,009	
ENVIRONMENTAL CONDITIONS			-,039	
ENVIRONMENTAL CONDITIONS			,746	
ENVIRONMENTAL CONDITIONS			,746	
ENVIRONMENTAL CONDITIONS			,746	
ENVIRONMENTAL CONDITIONS			,701	
ENVIRONMENTAL CONDITIONS			,701	
ENVIRONMENTAL CONDITIONS			,701	
ENVIRONMENTAL CONDITIONS			,485	
ENVIRONMENTAL CONDITIONS			,485	
ENVIRONMENTAL CONDITIONS			,475	
ENVIRONMENTAL CONDITIONS			,257	
ENVIRONMENTAL CONDITIONS			,227	
ENVIRONMENTAL CONDITIONS			,145	
PERSONAL ERGONOMICS				,080
PERSONAL ERGONOMICS				-,052
PERSONAL ERGONOMICS				,670
PERSONAL ERGONOMICS				,670
PERSONAL ERGONOMICS				,670
PERSONAL ERGONOMICS				,616
PERSONAL ERGONOMICS				,616
PERSONAL ERGONOMICS				,522
PERSONAL ERGONOMICS				,522
PERSONAL ERGONOMICS				,520



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PERSONAL ERGONOMICS				,520
PERSONAL ERGONOMICS				,464
PERSONAL ERGONOMICS				,384
PERSONAL ERGONOMICS				,357
PERSONAL ERGONOMICS				-,194
PERSONAL ERGONOMICS				,176
PERSONAL ERGONOMICS				,156
PERSONAL ERGONOMICS				-,147
PERSONAL ERGONOMICS				-,126
PERSONAL ERGONOMICS				-,094

H1: Ergonomics factors do not differ by age.

When ergonomics factors by age were observed, significance values regarding working tools used and other materials and personal ergonomics factors were found to be lower than 0.05; therefore hypotheses of these factors will be rejected. Accordingly,

1. Job satisfaction and motivation do not differ by age.
2. Working tools used and other materials differ by age. The highest average belongs to 18-25 age group.
3. Environmental conditions do not differ by age.
4. Personal ergonomics differs by age. The highest average belongs to 26-35 age group.



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Table 5. Factors by Age

	JOB SATISFAC- TION and MOTI- VATION	WORKING TOOLS USED AND OTHER MATERIALS	ENVIRONMENTAL CONDITIONS	PERSONAL ERGONOM- ICS
Mann-Whitney U	105478,000	95444,000	105659,000	98128,000
Wilcoxon W	166204,000	156170,000	293850,000	286319,000
Z	-,286	-2,713	-,243	-2,064
Asymp. Sig. (2-tailed)	,775	,007	,808	,039

a. Grouping Variable: 1. AGE

H2: Ergonomics factors do not differ by gender.

When ergonomics factors by gender were observed, significance values regarding job satisfaction and motivation and personal ergonomics factors were found to be lower than 0.05; therefore hypotheses of these factors will be rejected. Accordingly,

1. Job satisfaction and motivation differs by age. The highest average belongs to male.
2. Working tools used and other materials do not differ by age.
3. Environmental conditions differ by age. The highest average belongs to female.
4. Personal ergonomics does not differ by age.

Table 6. Factors by Gender

		JOB SATISFAC- TION and MOTIVA- TION	WORKING TOOLS USED AND OTHER MATERIALS	ENVIRON- MENTAL CON- DITIONS	PERSONAL ERGONOM- ICS
Most Extreme Differences	Absolute	,080	,074	,117	,043
	Positive	,080	,070	,048	,043
	Negative	-,072	-,074	-,117	-,035
Kolmogorov-Smirnov Z		1,421	1,315	2,065	,761
Asymp. Sig. (2-tailed)		,035	,063	,000	,609

a. Grouping Variable: 2. GENDER

H3: Ergonomics factors do not differ by education.

When ergonomics factors by education were observed, significance values regarding job satisfaction and motivation, working tools



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used and other materials and environmental conditions factors were found to be lower than 0.05; therefore hypotheses of these factors will be rejected. Accordingly,

1. Job satisfaction and motivation differ by age. The highest average belongs to high school group.

2. Working tools used and other materials differ by age. The highest average belongs to post-graduate and over group.

3. Environmental conditions differ by age. The highest average belongs to high school group.

4. Personal ergonomics does not differ by age.

Table 7. Factors by Education

	JOB SATISFACTION and MOTIVATION	WORKING TOOLS USED AND OTHER MATERIALS	ENVIRONMENTAL CONDITIONS	PERSONAL ERGONOMICS
Chi-square	20,083	17,324	9,863	4,393
df	4	4	4	4
Asymp. Sig.	,000	,002	,043	,355

a. Kruskal Wallis Test

b. Grouping Variable: 4. EDUCATION

H4: Ergonomics factors do not differ by income.

When ergonomics factors by income were observed, significance value regarding environmental conditions factor was found to be lower than 0.05; therefore hypothesis of this factor will be rejected. Accordingly,

1. Job satisfaction and motivation do not differ by age.

2. Working tools used and other materials do not differ by age.

3. Environmental conditions differ by age. The highest average belongs to 1000-1300 Turkish Liras group.

4. Personal ergonomics does not differ by age.



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Table 8. Factors by Income

	JOB SATISFAC- TION and MOTI- VATION	WORKING TOOLS USED AND OTHER MA- TERIALS	ENVIRONMEN- TAL CONDI- TIONS	PERSONAL ERGONOM- ICS
Number of Levels in 6. IN- COME	6	6	6	6
N	1324	1324	1324	1324
Observed J-T Statistic	336703,000	309360,000	304282,000	328789,000
Mean J-T Statistic	321794,500	321794,500	321794,500	321794,500
Std. Deviation of J-T Statistic	7672,541	7672,541	7672,541	7672,541
Std. J-T Statistic	1,943	-1,621	-2,282	,912
Asymp. Sig. (2-tailed)	,052	,105	,022	,362

a. Grouping Variable: 6. INCOME

H5: Ergonomics factors do not differ by job type.

When ergonomics factors by job type were observed, significance values regarding all factors found to be lower than 0.05; therefore hypotheses of these factors will be rejected. Accordingly,

1. Job satisfaction and motivation differ by age. The highest average belongs to school-education group.

2. Working tools used and other materials differ by age. The highest average belongs to factory group.

3. Environmental conditions differ by age. The highest average belongs to mine group.

4. Personal ergonomics differs by age. The highest average belongs to school-education group.



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Table 9. Factors by Job Type

		Sum of Squares	df	Mean Square	F	Sig.
JOB SATISFACTION and MOTIVATION	Between Groups	51,392	6	8,565	8,871	,000
	Within Groups	1271,608	1317	,966		
	Total	1323,000	1323			
WORKING TOOLS USED AND OTHER MATERIALS	Between Groups	103,122	6	17,187	18,555	,000
	Within Groups	1219,878	1317	,926		
	Total	1323,000	1323			
ENVIRONMENTAL CONDITIONS	Between Groups	32,697	6	5,449	5,562	,000
	Within Groups	1290,303	1317	,980		
	Total	1323,000	1323			
PERSONAL ERGONOMICS	Between Groups	16,245	6	2,708	2,729	,012
	Within Groups	1306,755	1317	,992		
	Total	1323,000	1323			

H6: Ergonomics factors do not differ by total working hours.

According to the results of regression analysis:

1. One unit of increase in total working hours causes 0.46 unit of decrease in job satisfaction and motivation factor.
2. One unit of increase in total working hours causes 0.34 unit of increase in working tools used and other materials factor.

3. One unit of increase in total working hours causes 0.48 unit of decrease in environmental conditions factor.

4. One unit of increase in total working hours causes 0.17 unit of decrease in personal ergonomics factor.



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Table 10. Job Motivation Regression

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 21. WHAT IS YOUR TOTAL WORKING HOURS?	-,018	,011	-,046	-1,677	,094

a. Dependent Variable: Job satisfaction and motivation

b. Linear Regression through the Origin

Table 11. Working Tools Regression

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 21. WHAT IS YOUR TOTAL WORKING HOURS?	,013	,011	,034	1,247	,213

a. Dependent Variable: Working tools used and other materials

b. Linear Regression through the Origin

Table 12. Environmental Conditions Regression

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 21. WHAT IS YOUR TOTAL WORKING HOURS?	-,018	,011	-,048	-1,758	,079

a. Dependent Variable: Environmental conditions

b. Linear Regression through the Origin



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Table 13. Personal Ergonomics Regression

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 21. WHAT IS YOUR TOTAL WORKING HOURS?	-,007	,011	-,017	-,636	,525

a. Dependent Variable: Personal ergonomics

b. Linear Regression through the Origin

H7: There is not a relationship between experiencing health problems and physical disorders.

According to the correlation analysis, there is positive low correlation between a health problem being experienced and physical disorders.

Table 14: Health problem correlation		22. DO YOU SUFFER FROM WAIST, NECK AND DIFFERENT HERNIA TYPE MEDICAL DISORDER?
23. DO YOU SUFFER FROM A PERMANENT HEALTH PROBLEM DEPENDING ON YOUR JOB WHICH AFFECTS YOUR PHYSICAL ACTIVITY?	Pearson Correlation	,134**
	Sig. (2-tailed)	,000
	N	1378

H8: Ergonomics factors do not differ by loss of limb.

When ergonomics factors by loss of limb were observed, significance value regarding working tools used and other materials and personal ergonomics factors was found to be lower than 0.05; therefore hypothesis of this factor will be rejected. Accordingly,

1. Job satisfaction and motivation do not differ by loss of limb.
2. Working tools used and other materials differ by loss of limb. The highest average belongs to the group having loss of limb.
3. Environmental conditions do not differ by loss of limb.



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4. Personal ergonomics differ by loss of limb.

The highest average belongs to the group having loss of limb.

Table 15. Factors by Loss of Limb

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
JOB SATISFACTION and MOTIVATION	Equal variances assumed	,319	,572	,091	1322	,928
	Equal variances not assumed			,092	70,874	,927
WORKING TOOLS USED AND OTHER MATERIALS	Equal variances assumed	1,029	,311	-6,248	1322	,000
	Equal variances not assumed			-6,243	70,756	,000
ENVIRONMENTAL CONDITIONS	Equal variances assumed	,002	,965	-,797	1322	,426
	Equal variances not assumed			-,814	71,105	,418
PERSONAL ERGONOMICS	Equal variances assumed	,838	,360	-2,992	1322	,003
	Equal variances not assumed			-3,291	72,403	,002

H9: Concern for the future and having private health insurance are independent from each other.

When the situation of concern for the future and having private health insurance was observed, significance value was found to be

lower than 0.05; therefore hypothesis of this factor will be rejected. Accordingly, there is not a relationship between concern for the future and private health insurance.



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Table 15. Concern for the Future x Private Health Insurance

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	14,139 ^a	1	,000		
Continuity Correction ^b	13,457	1	,000		
Likelihood Ratio	13,109	1	,000		
Fisher's Exact Test				,000	,000
Linear-by-Linear Association	14,128	1	,000		
N of Valid Cases	1378				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 44,50.

b. Computed only for a 2x2 table

CONCLUSION and ASSESSMENT

- After total 98 items of factor analysis composed of ergonomics and answers given by the participants, the remaining 4 factorials were loaded to sub-dimension.

1. JOB SATISFACTION and MOTIVATION

2. WORKING TOOLS USED AND OTHER MATERIALS

3. ENVIRONMENTAL CONDITIONS

4. PERSONAL ERGONOMICS

- Job satisfaction and motivation do not differ by age. Working tools used and other materials differ by age. The highest average belongs to 18-25 age group. Environmental conditions do not differ by age. Personal

ergonomics differs by age. The highest average belongs to 26-35 age group.

- Job satisfaction and motivation differs by age. The highest average belongs to male. Working tools used and other materials do not differ by age. Environmental conditions differ by age. The highest average belongs to female. Personal ergonomics does not differ by age.
- Job satisfaction and motivation differ by age. The highest average belongs to high school group. Working tools used and other materials differ by age. The highest average belongs to post-graduate and over group. Environmental conditions differ by age. The highest average belongs to high school group. Personal ergonomics does not differ by age.



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Issn Online: 2148-47-83 Online: 2149-2484

- Job satisfaction and motivation do not differ by age. Working tools used and other materials do not differ by age. Environmental conditions differ by age. The highest average belongs to 1000-1300 Turkish Liras group. Personal ergonomics does not differ by age.
- Job satisfaction and motivation differ by age. The highest average belongs to school-education group. Working tools used and other materials differ by age. The highest average belongs to factory group. Environmental conditions differ by age. The highest average belongs to mine group. Personal ergonomics differs by age. The highest average belongs to school-education group.
- One unit of increase in total working hours causes 0.46 unit of decrease in job satisfaction and motivation factor. One unit of increase in total working hours causes 0.34 unit of increase in working tools used and other materials factor. One unit of increase in total working hours causes 0.48 unit of decrease in environmental conditions factor. One unit of increase in total working hours causes 0.17 unit of decrease in personal ergonomics factor.
- There is positive low correlation between a chronic health problem being experienced and physical disorders.

- Job satisfaction and motivation do not differ by loss of limb. Working tools used and other materials differ by loss of limb. The highest average belongs to the group having loss of limb. Environmental conditions do not differ by loss of limb. Personal ergonomics differ by loss of limb. The highest average belongs to the group having loss of limb.
- There is not a relationship between concern for the future and private health insurance.

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Author's Note: This paper is the extended version of the verbal notice presented in the 1st International Congress on Engineering, Architecture and Design held in Kocaeli Wellborn Hotel on 13th/14th November 2015.



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ANNEXED TABLES:

QUESTIONS REGARDING JOB SATISFACTION and MOTIVATION	Totally disagree	Disagree	Neither agree nor disagree	Agree	Totally agree
1. A great majority of the people within my environment are encountering with problems because of workplace environment and problems.	49,10%	16,00%	11,90%	16,40%	6,60%
2. I think I am competent regarding work safety and necessities of my job.	45,00%	15,70%	16,50%	15,00%	7,70%
3. I frequently experience occupational accidents or problems that prevent me from performing my "duty".	50,40%	14,90%	12,80%	15,30%	6,60%
4. I feel like belonging to or convenient for the job we are doing.	45,20%	21,90%	15,90%	12,80%	4,20%
5. I am performing my job, duty or occupation fondly and willingly.	43,90%	24,60%	13,60%	11,00%	7,00%
6. The responsibilities of my job and duty are too much for me to handle them.	44,40%	25,40%	15,40%	9,20%	5,60%
7. If I had the opportunity to work in another job, I would not do this work and job.	39,40%	20,90%	19,40%	12,50%	7,80%
8. I am concerned about my future.	41,40%	22,10%	16,40%	15,10%	4,80%
9. I am experiencing mental problems because of my job.	44,30%	16,50%	17,60%	17,60%	4,10%
10. I am doing a highly stressful and tiring job physically.	41,60%	18,80%	14,70%	13,90%	10,90%
11. I do not feel as I belong to my job and duty.	43,80%	21,30%	13,60%	14,70%	6,60%
12. I am having problems with my surrounding and family because of my job.	39,20%	22,20%	13,90%	19,40%	5,30%
13. I do not recommend anyone around me to do a job like mine.	44,10%	21,00%	14,00%	13,90%	7,00%
14. I see my job as the last job type that may be done.	45,80%	19,20%	11,50%	15,30%	8,10%



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15. I am concerned about my life and mental health.	47,00%	16,50%	15,50%	15,10%	6,00%
16. I am doing a job unwillingly and aimlessly.	43,30%	17,30%	17,30%	13,90%	8,20%
17. I feel like belonging to or convenient for the job I am doing. I am proud of myself about this situation.	44,80%	15,70%	17,50%	16,90%	5,20%
18. I have respect for my job. Thus, I internalize it and try to do my best for my job.	44,60%	16,50%	17,60%	14,90%	6,20%
19. I do not think that my job provides benefit to my organization and enterprise.	47,00%	18,40%	14,30%	12,50%	7,90%
20. It makes me unhappy for the enterprise administration to benefit from my opinions and thoughts.	44,60%	17,80%	18,80%	14,10%	4,80%
21. I think I do not get along well with my managers.	51,60%	17,40%	15,90%	10,60%	4,50%
22. I do not feel like I am suitable for team and organizational work.	46,20%	22,70%	16,50%	10,30%	4,40%
23. I think my motivation and performance are insufficient because of my thought of not belonging to my job.	46,30%	24,50%	15,90%	9,90%	3,40%
24. I find my job tiring and boring.	41,50%	24,90%	18,60%	9,90%	5,00%
25. My job is monotone and not enjoyable.	41,90%	20,70%	17,50%	12,80%	7,20%
26. I do my job just because I have to.	49,10%	17,50%	14,80%	15,70%	3,00%
27. I am permanently experiencing stress about my job.	46,90%	16,00%	16,20%	15,00%	5,90%
28. I am always having troubles with my seniors and managers.	45,70%	16,70%	11,00%	16,40%	10,20%
29. There is not any operational information about our job. This situation obliges us to act personally.	47,20%	23,30%	15,10%	11,80%	2,70%



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QUESTIONS REGARDING WORKING TOOLS USED AND OTHER MATERIALS	Totally disagree	Disagree	Neither agree nor disagree	Agree	Totally agree
1. I do not have any information about the working tools and materials I use.	41,70%	25,70%	11,40%	14,20%	7,00%
2. I am always having accidents with the working tools I use.	42,10%	25,10%	13,60%	12,50%	6,70%
3. I have to use working tools dangerously and without any safety measures.	38,20%	21,60%	17,20%	14,90%	8,10%
4. I think the working tools used in my working environment pose threat for me and other personnel.	42,60%	20,20%	18,10%	15,40%	3,70%
5. I do not think that any job safety precautions are taken in my working environment.	42,50%	18,70%	19,40%	14,70%	4,80%
6. I always have a feeling that I may encounter with a risk factor.	42,10%	17,80%	16,20%	15,10%	8,80%
7. I never believe that job safety and precautions are adequate. I always take personal precautions in order to protect myself.	41,90%	22,10%	15,70%	14,40%	5,90%
8. I have physiological problems because of job accidents and problems around me.	33,00%	25,50%	15,40%	20,80%	5,30%
9. I have to do my job with different working methods, because there is not enough materials and equipment.	36,10%	23,10%	16,20%	17,50%	7,00%
10. I cannot benefit from the ease and opportunities of technology.	34,90%	24,30%	13,40%	20,00%	7,40%
11. There are not any caution plates and warning signs in my workplace and organization.	35,30%	23,10%	17,60%	18,00%	6,00%



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12. I do not think that other employees possess adequate information and experience about the work they are performing.	36,00%	20,50%	18,10%	18,70%	6,70%
13. It seems like a fire or other serious problems may occur in my workplace at any time.	37,10%	18,60%	21,10%	17,30%	5,90%
14. Lack of inspection is relatively high by the senior management about job safety and necessities in my workplace.	34,10%	19,80%	20,50%	18,60%	7,00%
15. Trainings are not provided about workers' health, job safety and some other issues in our organization.	33,90%	26,00%	17,90%	14,70%	7,50%
16. Precautions to protect employees' safety are not taken.	35,50%	24,70%	20,30%	15,80%	3,70%
17. There are frequently job accidents.	10,40%	18,90%	37,60%	26,90%	6,20%
18. The equipment used is not suitable with the technology.	4,40%	33,70%	37,90%	18,50%	5,50%
19. The equipment I use is old and may risk workers' safety.	3,30%	25,80%	45,80%	20,70%	4,50%
20. Machines and tools are checked and maintained periodically.	11,30%	27,90%	34,00%	22,20%	4,60%
21. I do not work with equipment suitable for my job.	6,00%	30,50%	36,90%	18,90%	7,80%
22. Negative information and complaints that I gave to senior management about the equipment I use are not being taken into account.	11,90%	26,40%	37,20%	20,10%	4,40%
23. Maintenance of working tools and other materials are performed periodically.	9,40%	34,20%	31,80%	18,40%	6,20%
24. Sharp, drilling, crushing and other types of tools are kept on counters in a clean and regular way.	12,50%	24,20%	37,10%	22,40%	3,80%



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25. All the equipment used is composed of cutting-edge technology products in terms of job safety and production quality.	8,60%	28,00%	37,70%	21,70%	4,10%
26. Warning information about all the equipment we use is kept in places where it is easy to read and see.	9,70%	31,30%	32,90%	20,50%	5,40%
27. Remote controls, warning caution lamps and information regarding other materials used in safety dashboards are prepared as friendly-use in terms of color, surface features and moving ergonomics.	10,20%	29,20%	31,40%	24,10%	5,00%
28. My work uniforms and other personal protecting materials are relatively human-friendly and they increase my responsibility for my job.	10,70%	18,10%	38,60%	24,80%	7,80%
29. I go through medical examination periodically because of the necessity of my job and legal responsibility.	6,40%	28,50%	32,40%	24,80%	7,90%
30. Table, chair, computer and all kind of other tools and materials I use in my office are prepared in accordance with ergonomic conditions.	10,80%	26,30%	34,30%	20,60%	7,90%



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ENVIRONMENTAL CONDITIONS	Totally disagree	Disagree	Neither agree nor disagree	Agree	Totally agree
1. I do not think that my environmental conditions are convenient in terms of human health and job safety.	9,40%	34,20%	31,80%	18,40%	6,20%
2. Sufficient opportunities are not provided about illumination and lights of the setting.	12,50%	24,20%	37,10%	22,40%	3,80%
3. There is a permanent loss of heat in my environment.	8,60%	28,00%	37,70%	21,70%	4,10%
4. Rates of dampness and humidity are relatively high in my environment.	9,70%	31,30%	32,90%	20,50%	5,40%
5. Necessary illumination and chances are not provided for my working table, counter and other materials.	10,20%	29,20%	31,40%	24,10%	5,00%
6. High level of noise is creating problems in terms of my mental, physical and occupation condition.	10,70%	18,10%	38,60%	24,80%	7,80%
7. No any improvement is made regarding heating and physical conditions of the personnel in my environment.	6,40%	28,50%	32,40%	24,80%	7,90%
8. There are permanent negative factors such as poisonous gas, vapor, smoke and dust in my environment.	10,80%	26,30%	34,30%	20,60%	7,90%
9. My working environment is sterilized from mechanical vibrations.	7,80%	31,20%	35,30%	21,30%	4,40%
10. My environment conditions constitute a burden on me.	11,90%	28,20%	39,60%	15,00%	5,30%
11. I am working in an environment which decreases my job performance and causes physiological and physical disturbance on me.	10,10%	25,30%	35,60%	25,30%	3,80%
12. I do not feel like I belong to my job because of the factors threatening my job safety and health.	5,50%	25,70%	38,40%	25,90%	4,50%



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13. I am working in an environment which enables it for me to get information, understand easily and to increase my job comfort as well as providing all optimum conditions.	5,60%	26,30%	37,80%	26,10%	4,20%
14. Insulations regarding heat, noise, gas, vibration, floor and other materials are made properly in my environment.	6,00%	30,50%	36,90%	18,90%	7,80%
15. Factors regarding illumination such as light speed, load, source of the light, its reflection and saving are provided for our use completely and functionally.	11,90%	26,40%	37,20%	20,10%	4,40%
16. All kinds of precautions regarding the materials such as fire, gas, polluted air, smoke, dust, etc. have been taken in accordance with the technological conditions of today.	9,40%	34,20%	31,80%	18,40%	6,20%
17. Changing rooms, bathroom, toilet, kitchen, living room and all other necessary conditions are provided by the enterprise management.	8,60%	28,00%	37,70%	21,70%	4,10%
18. Shuttle, health services, "Infirmary", job physician, nurse and services in other dimensions are provided by the enterprise management.	9,70%	31,30%	32,90%	20,50%	5,40%
19. Continuous improvements are being made regarding environmental safety and health.	10,20%	29,20%	31,40%	24,10%	5,00%



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PERSONAL INFORMATION REGARDING ERGONOMICS	Totally disagree	Disagree	Neither agree nor disagree	Agree	Totally agree
1. I have all kind of information about the products I use.	7,00%	29,40%	33,80%	26,10%	3,70%
2. I feel like I belong to my job; because I have had the information about the needs of my job and all kinds of tools I use.	8,40%	16,20%	44,70%	23,90%	6,80%
3. I think I have sufficient knowledge level and I possess high education level about my job.	4,00%	27,00%	31,10%	30,70%	7,20%
4. All kinds of negative situations physically and mentally will affect my health, other things and they will make me unproductive in my job.	7,50%	27,70%	33,00%	26,60%	5,20%
5. I beware of all kinds of operations threatening me and my environment.	6,20%	21,60%	44,00%	24,20%	4,10%
6. I rapidly inform the department or the responsible person about all kinds of possible problems.	7,80%	26,00%	34,30%	26,00%	5,90%
7. I feel like I belong to my job after getting enough knowledge the nature and needs of my job in all kind of team work.	7,30%	20,30%	44,80%	20,50%	7,10%
8. I permanently follow developments, technology and other information regarding my job and I keep the benefit I may provide at top level in terms of ergonomics.	3,60%	28,40%	37,70%	27,20%	3,10%
9. I beware of all kind of work environment which is not suitable for my physical features or which may threaten me physically and mentally.	6,20%	24,70%	42,70%	19,20%	7,00%
10. I do not carry out any work before feeling safe about tools, materials, equipment, machines and devices which may pose physical threat.	9,10%	23,60%	33,50%	29,10%	4,70%



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Uluslararası Hakemli Mühendislik ve Fen Bilimleri Dergisi

Eylül / Ekim / Kasım / Aralık Sonbahar Kış Dönemi Sayı: 5 Yıl:2015

International Refereed Journal of Engineering And Sciences

September / October / November / December Issue Autumn Winter Period: 5 Year: 2015

ID:58 K:125

(ISO 9001-2008 Belge No / Document No: 12879 & ISO 14001-2004 Belge No / Document No: 12880)

(MARKA PATENT NO: TRADEMARK)

(2015/04066- 2015-GE-17837)

Issn Online: 2148-47-83 Online: 2149-2484

11. I believe that job efficiency and performance may be provided with ergonomic superiority.	2,60%	21,20%	44,30%	25,50%	6,50%
12. I inform my employers or managers about providing all necessary conditions such as working space, illumination, heat, light and other things.	3,30%	25,30%	36,00%	30,70%	4,70%
13. I set the pace for myself and environment with my works regarding job safety and health.	8,50%	18,90%	45,10%	24,90%	2,60%
14. I perform all kinds of necessities regarding working place privacy.	5,90%	29,50%	34,60%	23,00%	7,00%
15. I have knowledge and ability about how to use my legal rights in case of a problem that I may encounter with result from inconvenient conditions in my workplace.	5,50%	26,00%	45,40%	18,90%	4,20%
16. I think it is more convenient to use products and materials which possess international quality certificates and ISO, TSE (Turkish Standards Institution), TSEK (Association of Turkish Standards Institution) brand certificates.	8,80%	28,20%	35,70%	22,50%	4,90%
17. I beware of environments and situations which may cause infection, cancer and other serious diseases and I promptly inform the situation to the “competent” authorities.	5,10%	23,50%	37,70%	28,60%	5,20%
18. I believe that products, materials and equipment should certainly have been prepared in accordance with the satisfaction of employees as well as providing environmental health and safety and keeping work quality and performance at the top level.	6,20%	24,60%	41,00%	22,60%	5,60%
19. I think problems occurring as a result of ergonomic problems cause an economic loss.	8,20%	21,20%	37,30%	29,20%	4,10%
20. Ergonomic problems cause serious economic and social problems for the enterprise and country.	5,20%	24,30%	36,30%	28,90%	5,30%