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AGILE OCCUPATIONAL SAFETY MANAGEMENT SYSTEM MODEL AND EVALUATION OF THE PROPOSED MODEL IN AN AUTOMOTIVE COMPANY[1]

ÇEVİK İŞ GÜVENLİĞİ YÖNETİM SİSTEMİ MODELİ VE BİR OTOMOTİV ŞİRKETİNDE ÖNERİLEN MODELİN DEĞERLENDİRİLMESİ

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ABSTRACT

Increased industrial accidents and accelerated industrial accidents forced businesses to take precautions. This is important not only for businesses to continue their operations smoothly, but also for the human element; the only valuable, rare, inimitable and substitutable resource of the enterprise. In this study, a new occupational safety management system was designed according to Axiomatic Design principles with agile management approach and put into practice in a company in automotive sector. As a result of the study, some steps of the model have been put into practice and some steps have been taken into planning in the mentioned company. This study is expected to contribute to literature and the businesses well, as it seeks to improve the safety conditions in production companies.

Key Words: Agile Management, Occupational Safety Management, Axiomatic Design

ÖZET

Sanayileşmenin hızlanmasıyla birlikte artan iş kazaları, işletmeleri önlem almak zorunda bırakmıştır. Bu yalnızca işletmelerin faaliyetlerine sorunsuz devam edebilmeleri için değil aynı zamanda işletmenin değerli, nadir, taklit edilemez ve ikame edilemez tek kaynağı olan insan unsuru için de çok önemlidir. Yapılan çalışmada, çevik yönetim yaklaşımıyla Aksiyomlarla Tasarım ilkelerine göre yeni bir iş güvenliği yönetim sistemi tasarlanıp otomotiv sektöründe bir firmada uygulamaya konulmuştur. Çalışma sonucunda, modelin bazı adımları uygulamaya konulmuş ve söz konusu şirkette planlamaya yönelik bazı adımlar atılmıştır. Bu çalışma, üretim şirketlerindeki güvenlik koşullarını iyileştirmeye çalıştığı için, çalışmanın literatüre ve işletmelere katkıda bulunması beklenmektedir.

Anahtar Kelimeler: Çevik Yönetim, İş Güvenliği Yönetimi, Aksiyomatik Tasarım

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INTRODUCTION

In this period when technological development and change is very fast, the industry is experiencing the first stage of a new revolution. The change in robotics technology in the Industry 4.0 era and the rapid spread of this change sectorally, even if it is costly at the entrance stage, it saves time and employees more attractive in the long term. It can be said that this attraction, beyond costing, means keeping up with the change, responding to expectations and even exceeding expectations with the rapid adaptation of effective market researches to the industry. Therefore, this attraction, which means continuing its activities for a business and competing with its competitors, means an imperative rather than a necessity. Considering the aims of businesses; the emphasis on being able to continue its activities, to gain profit and thus to grow is essentially always providing competitive advantage and making it sustainable.

Businesses achieve their goals with the resources they have. However, it is observed that even if they have the same resources on average in the same sector or in different sectors, it is seen that the enterprises differ from each other, while some of them have grown more and some must end their activities. In this case, the basic skills that emerge mean the ability to use the resources available to a business. Just like in Industry 4.0 period, many companies have different sizes, although they have started to have robotic technology. The main advantage that emerges here is the mistake of having machinery equipment and appropriate technologies. Moreover, it is believed that all the ingenuity is the elements of this fixed asset. This thought is not false, but lacking. Because if these values, which were considered as advantages, were provided alone, the average companies would have close profits and sizes. In fact, it is important for these assets, which are a resource, to gain competitive advantage, and to transform these resources into the ability to use them effectively by planning effectively. It is the human resources that use, plan, and manage these assets that enable companies to be so different. It is the climate and culture that it has spread into the firm. This source cannot be imitated like other sources. Enterprises want the viewpoint of the source to be valuable, rare, inimitable and non-substitutable for competitive advantage. It is known that even robotic technology can be imitated as a technology infrastructure. However, the engineer who makes his software is a very difficult value to imitate as a human resource and has no substitution. However, a learning organization chart, management structure, and an organizational culture that spreads and encourages this engineer cannot be imitated. At this point, it is obvious that the human element will become more valuable in a structure that keeps up with the change, as well as the loss of importance of the human element in the period of Industry 4.0.

The essence of the study is to apply practices that place importance on the human element within the business management. For this purpose, a new model application is proposed, which offers a different perspective on the issue of occupational safety. At the heart of this suggestion, this study, which will focus on creating value through the safety and health of the employee, is an investment in the human element, which is the most valuable resource for the enterprise, but it will not be harmed by many legal sanctions that will be a cost factor for the enterprise by eliminating the extra burdens brought by the legislation. Moreover, it is expected that the employee will touch the motivational direction that we encounter as the issues that he feels more valuable, his belonging is strengthened, his intention to continue is not interrupted, and he feels loyalty to his organization. In this study, the elements of agile management, which can be

considered new in occupational safety management, have been tried to be implemented and a new system design has been designed with the Design with Axioms method.

LITERATURE REVIEW

OCCUPATIONAL SAFETY AND MANAGEMENT

Humanity has been facing work accidents for thousands of years. It is stated that the number of people who died as a result of occupational accidents and occupational diseases in the last century has been approximately three times higher in wars than even those who died from drugs and alcohol (Ramos, Afonso, and Rodrigues, 2020).

Therefore, the concept of health is very important for the human being, which is the most important value that creates businesses and societies regardless of date, period, period or lane. The importance of this issue in terms of occupational health and safety is frequently encountered in many studies both in conceptual and factual explanations. When evaluated from this point of view;
Health is not only the absence of illness and disability, but physical, psychological and social well-being. Occupational health, on the other hand, can be defined as "systematic and scientific studies carried out in order to be protected from conditions that may harm health caused by various reasons during work in the workplace" (Çalış and Büyükakıncı, 2019).

Occupational safety plays an important role in protecting employees, ensuring production and operational safety, and minimizing the damage to the ecological environment. In order to better understand the concept of occupational safety, it will be useful to look at the causes of the security issue. Of course, the most important issue to be identified is the work accidents. (Salguero-Caparrós and others, 2020).

The accident can be said as a general sudden and unexpected incident, damaging the worker or production. Occupational disease, on the other hand, is a temporary or permanent illness, physical or mental disability that occurs due to the work of the insured after a certain period, not suddenly like an accident. At the end of the treatment due to a work accident or occupational disease, the loss of all or some of the insured's earning power in the profession is permanent. In other words, permanent incapacity is the lifelong disability of the employee. Continuous incapacity income is attributed to those who lose at least 10% of their earning power in the profession as a result of work accident or occupational disease. Temporary incapacity is a situation where the employee is temporarily unable to work due to work accident or occupational disease (Chen and others, 2020).

With its economic dimensions, material losses caused by occupational diseases and work accidents cause great losses in terms of country cost and economy. According to the World Health Organization, the cost of work accidents and occupational diseases reaches 4-5% of the world's gross product. 2016 Turkey's 2,590,517,000,000 which is equivalent to a figure of ₤ 103.6 billion TL of gross national product (Çalış, S. and Büyükakıncı, 2019).Costs of work accidents or occupational diseases in business and national economies; loss of working days,

compensations paid by the social security institution and the enterprise, losses incurred by the employer, insurance losses to be paid to the social security institution and court expenses.

Factors Affecting Accidents in Occupational Safety

In addition to the technology and environmental conditions used in the occurrence of occupational accidents, we can gather sociological, psychological and physiological factors, but we can collect all the reasons in two basic factors. These are insecure situations in the working environment and insecure behaviors of employees.

It is known that the education factor is important at the beginning of the solution of the problems related to occupational safety, and it is an important factor to improve the safety awareness of the employers and employees. It is stated that one of the most important factors of work accidents is lack of education. Due to insufficient training on occupational safety, various work accidents occur in various sectors. The importance of on-the-job training is better understood, considering that work accidents are more common among inexperienced and younger age groups. Although on-the-job training and basic occupational safety training are the issues that the law emphasizes, the desired results cannot be obtained since the private institutions providing these training are not fully audited. (Ruiz-Frutos and others, 2019).

Specialists, field supervisors and workplace physicians who will work in the occupational safety units in the enterprises should be well trained. However, occupational personnel such as occupational safety specialist, field supervisor, occupational health and safety technician, workplace doctor and other health personnel in our country have not reached a sufficient level in terms of both number and quality. Especially in universities, the content of occupational health and safety associate, undergraduate and graduate programs should be more comprehensive, and more emphasis should be placed on academic work (Cloete and others, 2019).

Risk factors are workplace environment factors that trigger workplace accidents at workplaces. These; physical, chemical, biological, psychosocial and ergonomic risk factors. Physical risk factors; noise, pressure, vibration, lighting, thermal comfort and radiation. Many factors such as inadequate lighting at workplaces, exposure to toxic gases and vapors, working with unsafe machinery and equipment, working with ergonomically unsuitable equipment, and working in repetitive jobs for a long time are some of the physical and ergonomic risks that employees are exposed to (Thakur and others, 2018).

The psychology of the employees is also capable of causing work accidents. In psychosocial risk factors, more than one psychological cause comes together in the employee and triggers each other, increasing the probability of an accident. For example, situations such as alcohol or drug addiction of an inexperienced young worker, a middle-aged experienced worker who has a problem in living a livelihood are associated with psychosocial risk factors (Urtasun and Nuñez, 2018).

In terms of employee factor, the main causes of occupational accidents consist of unsafe behavior and conditions. According to the Domino Theory of Herbert William Heinrich, it is stated that the first three factors are due to employee errors.

If we look at the stages of Heinrich's Domino Theory;
1) Family and social environment: Working environment, conditions that will affect human health, behavior of colleagues, managers, etc.
2) Person's Error / Human Factor: individual problems, experience, physical condition, lack of education, self-confidence, etc.
3) a) Unsafe Movements (Behaviors): All non-exemplary behaviors that endanger employees, their production and other colleagues, from working in the department where they are not trained to not using personal protective equipment can be counted.
3) b) Unsafe (physical) conditions: From personal protective equipment to insufficient ventilation, all conditions that can directly affect work safety and employee health can be counted (Rad, 2013).

From the perspective of the employer, 88% of occupational accidents consist of unsafe acts, 2% are undetectable reasons and 10% are unsafe conditions. The employer is the leading cause of unsafe conditions.

The employer is obliged to fulfill his duties. They must follow safe measures in their workplaces and employ their employees in healthier environments. Otherwise, the employer who causes a work accident faces recourse cases opened by the Social Security Institution. It is the employer's responsibility to take the necessary measures and supervise the worker. These responsibilities are based on private and public law rules and occupational health and safety law. When these responsibilities are not fulfilled, penalties and costs, occupational health and safety legislation are more important for employers.

Occupational Safety Management

Occupational Safety Management should be established during the establishment phase of a business or enterprise, in planning phase. In order to prevent occupational accidents that may occur at workplaces, security approaches should be made to minimize hazards and risks.

If there is a work accident occurring, root cause analysis of that work accident should be done to ensure that such accidents are not repeated. Risk management should be done, and risk analysis should be carried out with the risk assessment study. In addition, Occupational Safety management and audits should be carried out. This situation ensures the safety awareness of employees and the culture of security become widespread.

There are also various norms and standards related to Occupational Safety Management. It is carried out in integration with management systems under total quality management. OHSAS18001, which is one of the international occupational health and safety management system certifications, has become common in almost all businesses. Production, planning, maintenance and controls of the enterprise are carried out in coordination with some other

systems (ISO 9001, ISO 14001, ISO 22001 etc.). With the OHSAS 18002 Occupational Health and Safety Guide, a healthier system is created in line with the existing stages.

Newly released in November 2017, ISO 45001 is a new system that will replace OHSAS 18001. This system is a slightly improved version of the current system. "Occupational Safety Management", which is strengthened with these systems in line with the existing laws, can provide successful production efficiency and process operation with less work accidents and occupational diseases.

Occupational Health and Safety Management System

Occupational health and safety is considered today as a management system and as part of the general management system. The OHSAS 18001 standard, a management system based on risk assessment, was developed by the British Standards Institute in order to identify the risks of organizations in the working environment and increase their performance. Being preventive includes necessary control mechanisms, corrective actions and feedback mechanisms. TS 18001 was published in Turkey in 2001. This system also covers activity plans, organizational structure, processes, experiences, procedures, responsibilities, concepts related to development, implementation, improvement, review and maintenance.

Occupational safety policy; should be determined and approved by the senior management of the organization and this policy should include the following (Serin and Çuhadar, 2015, 48);

a) It should comply with establishment risks and the nature of these risks,
b) Occupational safety management should include a commitment that includes continuous improvement in order to prevent injuries and accidents,
c) It should comply with the provisions of the legislative framework under minimum conditions.
d) A plan should be developed to review the objectives,
e) It should be written, implemented and followed.
f) An announcement must be made by the organization so that all employees are aware of their responsibilities,
g) It should be accessible to everyone,
h) It should be constantly reviewed to be up to date and available.

AGILE APPROACH

While the developing competitive environment compels today's businesses to use technology effectively, it has also created a different competitive environment to meet human needs faster and more effectively. In a globalizing competitive environment, it has become very important how accurately businesses use information and how much it reflects on the market. Accordingly, efforts to create an organizational culture that quickly learn and implement information are also regarded as the primary duties of businesses.

Continuous change and development environment have affected production. In its definition; production can also be a service, or it can occur as a physical manifestation of a good. Production

management is the management and decision-making process related to the production of the desired product by using the resources in the enterprises in the most ideal way (Sharifi and Zhang, 2000).

Agile management is defined as the advantageous use of changes and uncertainties in this decision-making process. The disappearance of local borders in today's competitive conditions, the globalization of competition completely, and the fact that technology changes rapidly and efficiently and creates an advantage in competition compels businesses to keep up with change and innovation.

Therefore, since change forces people to take actions outside of their routines, in some cases some people can develop an attitude towards change as they cannot easily digest this change. When evaluated in general terms, it is the human element that is the most important value that creates the enterprises, and a possible resistance against change can directly affect the systematic of the enterprise and leave the enterprises idle by reducing the ability to move. At this stage, agility is presented as a method in response to existing questions.

When looking at the historical process of production methods, three different methods are mostly emphasized. These are known as manual production, Fordist production and lean production. Today, with the agile management, a new one is added to them (Kasap and Peker, 2009).

Characteristics of Agile Organizations

Agility is seen as one of the main strategies in today's businesses where competition is intense and it is possible to list the characteristics of enterprises in agile production, which companies frequently apply to provide competitive advantage, as follows (Baki, 2003, 295);

- Simultaneousness should be observed in all activities in the organization,
- In-service training of employees should be made continuous,
- The organization should be sensitive towards its customers,
- Organization employees should be considered as a value of the business,
- The organization should be able to empower its employees and bring its employees to a qualification that can empower them,
- It should be relevant and sensitive to the organization environment,
- The organization must have accessible and usable information,
- The organization must be positioned correctly and design correctly from the first moment,
- The organization should pay attention to total quality management,
- The organization must have technology knowledge and include employees with leadership skills within the organization,
- The organization's vision should be clear and consistent.

Organizations have to be agile to survive. This is a requirement for fast-changing market conditions and customer demands to stay competitive.
However, an agile organization must have the following characteristics (Devor and others, 1997, 815):

Adding value to the customer: An agile organization should add value not only to itself but also to its customers.
Cooperation in competition: Being in strategic cooperation both in and around the enterprise should be one of the agile enterprises' preferences.
Expertise in change process or uncertainty: Agile businesses must be built with flexibility to keep up with all the uncertainties right from the start.
Increasing the impact of people and knowledge: Managers of agile businesses should progress in an entrepreneurial identity and for this identity should increase the impact of the human factor in the operational process.

How an Organization can be made Agile

The agility of any organization enables combating variables that cannot be kept under control. In this context, agility is defined as an ability that will affect the growth and development of organizations in environments where unforeseen and continuous changes begin to spread (Maskell, 2001, 5).
Agility is a vitally important strategy developed with consideration. Being able to agile an organization also allows for faster response to customer demands, which can often vary, shorten production times, avoid waste, increase the efficiency of the use of expensive resources, produce more personalized products and expand the product range (Candan and others, 2017, 6).
Agility basically has four dimensions, and the agility of an organization depends on these four basic dimensions. These;
- Providing the customer with the greatest possible value,
- To cooperate with other businesses in order to increase their competitiveness,
- Ensuring structuring in order to be able to produce and grow even when the change and competition are uncertain,
- Increasing the domains and knowledge of the employees of the organization

There are three main factors to achieve agility. These are;
Awareness: The organization should understand the changing market and competition conditions by noticing the changing technology. In order to foresee the uncertainties that may arise within the organization and to communicate more effectively, the awareness of the organizations should increase.
Flexibility: Organizations are in a position to respond to wide-ranging requests, and being able to create funds for existing or new models, to benefit from external sources in terms of human resources are the factors that shape and direct the flexibility of the organization.
Production: Changes in organizational structure, competitive conditions, technological developments and time to keep up with these are seen as uncertain market variables that will increase both production and agility of businesses. Managing this process well will contribute to creating agile organizations. (Ambrose and Morello, 2004, 7)
In this study, it is aimed to model a sustainable occupational safety management system in order to reduce work accidents and increase efficiency by applying agility to occupational safety.

METHOD:

Design with Axioms is a method developed by Suh (1995) in order to utilize and develop materials, systems, products, processes and decision making.
Suh defines the design as the interaction between "What do we want to achieve?" and "How can we do this?". The contents and objectives of the design steps may be different. In order for the designer to achieve this desired result, a number of steps must be performed in order. Firstly, since our focus is on the customer, it is necessary to determine its needs. In the next step, it is necessary to reveal the problem sentence of the expectation we read. Then, after determining the solution of the problem and analyzing this solution to be optimum, it should be checked whether the expectations of the customer are met (Suh, 1995, 3).
The most important concept of design with axioms is the existence of axioms for the management of the design process. It is expressed mathematically as follows: the basic proposition that is not self-evident and cannot be proven wrong, does not require such a backward and proof, and which is self-evident and which is the basis and the premise of other propositions because of these features is called axiom. The theorem is a proposal that cannot be proved by itself but can be proved by accepted axioms or rules (Suh, 2001, 7).

The validity of the theorem is accepted if the axioms on which the theorem is based and deductive steps are valid. In conclusion, the fact that the Design with Axioms is based on axioms shows that the method is based on a scientific basis.

The two axioms that make up the design method with axioms are (Suh, 2001, 16):

Axiom 1: Independence axiom. Ensuring the independence of functional requirements
Axiom 2: Information axiom. Minimizing the information content of the design

These two design axioms provide a basis for creating product and system designs and choosing the best solution alternatives.

Agile Occupational Safety Management System Model

Occupational Safety is one of the most important applications that businesses should consider. As explained in the previous sections, dangerous situations and accidents caused by not applying the occupational safety rules will cause both loss of work force and disruptions and slowdowns in the service or product produced by the enterprise. Although the Occupational Safety Management System answers these questions, it may be necessary to be more agile in responding to some risks and dangers. In order to be faster, better quality and proactive in enterprises where bureaucracy has become cumbersome, an “Agile Workplace Safety Management System” model has been presented to the use of academicians and practitioners.
Model Axioms are prepared with the design principles and provide the independence axiom. In the following sections, model item is explained.

Creating the Model

The design model with Agile Work Safety Management System axioms is shown in Table 1. FR shows what to do, DP shows how. Therefore, at least one DP must be present in return for each FR to be realized.

Table 2: Agile Safety Management System Model

FR_0 Create a safe working system	**DP_0 Agile work safety management system**
FR_1 Provide support from top management	**DP_1 Occupational safety policies and strategic plan**
FR_{11} Get management commitment	**DP_{11}** Occupational safety goals and budgets
FR_{12} Ensure leadership of top management	**DP_{12}** Job descriptions, role and responsibility distribution, OHS committee meetings held monthly
FR_2 Identify the risks and opportunities of existing processes in the business	**DP_2 Process risk analysis and SWOT analysis**
FR_{21} Identify existing hazards in the business and the risks that may arise from these hazards	**DP_{21}** Risk assessment every year with a proactive approach to activities identified in risk analysis
FR_{22} Build the risk assessment team and check the site	**DP_{22}** Checklist, OBEYA
FR_{23} Determining the frequency of employees' exposure to hazards and risks and risk assessment appropriate to the working environment	**DP_{23}** Types of error analysis, Fine - Kinney
FR_3 Provide a clean and safe working environment	**DP_3 7S procedure and Visual management**
FR_{31} Protected from ergonomic risk factors	**DP_{31}** REBA method
FR_{32} Protect from physical risk factors	**DP_{32}** Indoor measurements and personal protective equipment required once a year

FR_{33} Protect from chemical risk factors	**DP_{33}** Required yearly indoor measurements, material safety data sheet control and use of personal protective equipment
FR_{34} Protect from biological risk factors	**DP_{34}** Annual waste management plan, control of environmental factors and use of personal protective equipment
FR_{35} Protect from Radiation	**DP_{35}** Dosimeter measurement and personal protective equipment
FR_{36} Protection from psychosocial risk factors	**DP_{36}** MASLOW needs hierarchy
FR_{37} Protect from hazards of work equipment	**DP_{37}** Periodic technical control of stationary and mobile equipment every 6 months with Total Efficient Maintenance
FR_{38} Protect from electrical hazards	**DP_{38}** Periodic technical check every 6 months with red label application
FR_{39} Protect from workplace specific hazards	**DP_{39}** Environment, source and targeted applications
FR_4 Enable employees to change their behavior	**DP_4 Regular training for employees with annual training plans**
FR_{41} Use human resources effectively	**DP_{41}** Vocational qualification certified employee selection and training
FR_{42} Create a safety culture	**DP_{42}** At least 16 hours of basic occupational safety training per year
FR_{43} Set up a flexible job security employee unit	**DP_{43}** Occupational safety employee selection procedure
FR_5 Check employees	**DP_5 Recruitment examinations, health exams every 3 months, reactive controls**
FR_{51} Raise awareness of employees about health	**DP_{51}** Occupational hygiene training every year
FR_6 Create emergency management	**DP_6 Emergency requirements**
FR_{61} Create emergency action plan	**DP_{61}** Emergency procedure
FR_{62} Identify emergency teams and equipment	**DP_{62}** First Aid, fire, search and rescue and evacuation trainings
FR_{63} Perform emergency drills	**DP_{63}** Planning and reporting of the exercise in 6-month periods
FR_7 Occupational safety management	**DP_7 Management review meetings**

system measure performance	and internal audit
FR_8 Occupational safety performance measurement	**DP_8 Notified work accidents without notification and creation and review of the near-miss records**
FR_9 Improve occupational safety management system	**DP_9 Zero accident policy**
FR_{91} Extend successful applications	**DP_{91}** Benchmarking
FR_{92} Apply weekly field inspection and reporting	**DP_{92}** Reward penalty system

As a result, a new model is presented in this study that will minimize the potential risks and dangers and losses resulting from their results by using the agile approach, since the results of the current practices are not considered sufficient, and the need to provide faster and flexible results for the occupational safety management system has emerged.

This model can be applied to all hazard classes in occupational safety, sectors such as construction, mining, metal, automotive, transportation. Thanks to the model; companies with occupational safety management system will improve their systems and those who do not will create an occupational safety management system.

Evaluation of the Model

If this model is summarized briefly, it provides a clean and safe working environment by evaluating risks and opportunities, changing employee behavior, health control for employees.
If this model is applied; the number of annual work accidents and residents, the frequency and rate of work accidents, the speed and rate of work accidents, the number of days of incapacity due to work accidents and illness, the costs to be incurred due to work accidents, the number of insecure behaviors per year, the fines to be paid due to occupational safety, repetition of accidents, total production costs and reduction in corrective and preventive actions to be created; It is expected that there will be an increase in the number of employees participating in trainings, work efficiency, annual internal audits and drills, number of employees using personal protective equipment, number of consecutive days without accidents, annual periodic maintenance of work equipment, number of equipment meeting occupational safety standards, and percentage of actions to be closed.

Evaluation of The Proposed Model in An Automotive Company

The “Agile Occupational Safety Management System” model created has been implemented in a company in the automotive industry. The automotive sector in terms of multiplicity of occurrence of accidents and serious consequences engendered is located between the first five lines of business in Turkey. Therefore, as a result of work accidents, many employees die or remain inoperable every year, and social and economic problems and losses occur. One of the most important reasons for this situation can be seen that the automotive industry has its own working

conditions. The combination of many different processes in the automotive industry and the different dangers of each process make work safety even more important.

Considering the main types of accidents occurring in the automotive industry, the most common types of accidents are accidents such as crushing, sprains, cuts, burrs and electric shock (TMMOB, 2018, 30). It is seen that the most important factor that plays a role in the occurrence of these accidents is the carelessness of the employees and the lack of training.

The company, where the application is carried out, has been in the automotive industry for more than 40 years, producing various models and types of tractors and construction equipment parts. It has more than 170 employees and has a line consisting of press, welding, laser cutting, CNC turning, CNC press brake, packaging, injection, assembly workshops and main assembly. The company, which has a large place in the tractor and construction equipment market, also gives importance to quality management systems.

In the company where occupational safety practices are being carried out, the proposed agile occupational safety model was evaluated step by step. As the work safety studies are being carried out in the company, it has been revealed that some steps are already being implemented and some steps will be the beginning. For three months in the firm, the model was examined for the applicability of each FR-DP pair.

Steps in the scope of legal obligation have been made in practice and other steps have not been fully completed. For example, situations such as total efficient maintenance, ergonomic risk assessment could not be done due to the unwillingness of the business management. If it could, it would be expected to have a more efficient and more beneficial working environment. However, the company has tried to give the necessary importance to occupational safety as much as possible and has been trying to reduce the number of work accidents. With the agile model, the number of work accidents is expected to decrease day by day.

Agile model application is fully compliant with the law of occupational health and safety. Our expectation is that it will be applicable to both the manufacturing and service sectors. However, it is thought that there may be disruptions in the service sector.

Establishing Occupational Safety policy, organizing occupational safety committee meetings monthly, performing risk analysis every year, applying checklist and OBEYA, recruiting employees with professional qualification certificate, conducting and reporting emergency drills every six months, management review meetings and internal audit , reward penalty system axioms have been accepted and put into effect by the application company.

Occupational Safety objectives, budget, creating job descriptions, visual management application, using the Fine-Kinney method as a risk assessment method, checking material safety data sheets, making corrections to the environment and resources, creating annual training plans and regular training of employees, introduction to work It has been updated since the axioms of examinations, creating emergency procedures, providing first aid, fire, evacuation training and creating and analyzing accident records have been done before in the company.

The company axioms were adopted by the company to create an Occupational Safety strategic plan, implement the 7S procedure, provide basic occupational safety trainings at least 16 hours a year, provide occupational hygiene training annually, and compare the work safety management system with successful practices.

Performing SWOT analysis related to Occupational Safety, using Error Types and Effects Analysis in risk assessment, performing ergonomic risk assessment, measuring indoor environment every year, measuring radiation dosimeter, carrying out total efficient maintenance every six months, applying red label, quarterly health examinations. The company has not been accepted by the company due to reasons such as company policy and economic reasons.
Since the studies should be carried out in the long term, it is recommended to compare with the previous years at the end of the year.

CONCLUSION

In parallel with the rapidly changing industrial sector, it is possible to talk about technological, sociological, demographic different levels of change. As there can be different levels of returns due to perceptual differences, especially in all human-oriented studies, differences in risk accident and precaution can vary from company to company, from industry to industry. At this point, especially the rapidly changing conditions and the adaptation of those working to these conditions at the same level and at the same speed are essential. Given the agile approach issue and sub-dimensions at this stage, it is expected to provide a high standardization in the field of occupational safety. At this point, agile approach applications that do not change from person to person, offering a proactive, fast, flexible and simple perspective that are needed both theoretically and methodologically.
Especially when evaluated from a sectoral point of view, occupational health and safety is the humanitarian and legal necessity in which the physical, mental and motivational energy of human resources must be released. In general terms, competition factors are considered valuable in terms of growth, profit and continuing the activity, which are among the objectives of the company. In this respect, considering the competition issues and conditions, the necessity of differentiation of companies in terms of superiority over their competitors comes to the fore. However, since almost all of the non-human resources can be imitated, the competitiveness value of the enterprise decreases and the rarity of the resources is lost. Therefore, all the conditions that add advantage to the business for a period are eliminated. At this stage, the source to be used in terms of competition turns out to be valuable, rare and non-substitutable. When we evaluate the business as a whole, it is known that the resources that are counted are only human resources. It is evident that the biggest investments of businesses are their employees, as they are considered as a resource at this stage. This resource is the human and intellectual capital that will take the business further. It is only possible for businesses to use this capital effectively and efficiently with the continuity of that resource. This continuity is often read as an intention to continue, alienate or leave work. However, in this study, the subject was mostly dealt with on the health and safety of the employees.

According to the data of the social security institution, it is known that approximately 2000 people per year die in work accidents in our country, and this statistic coincides with a fatal work accident in about four hours. The purpose of the model at this stage; to reduce occupational accidents, to minimize them at later levels, thus to increase the efficiency of human resources, to reduce costs and to ultimately serve the general objectives of the business, while adding sustainable competitive advantage to the business.

One of the most important issues that should not be overlooked while processing the most trending topics on robotics technology in the period of Industry 4.0 is a possible imitation or loss of advantages with technology theft. In this case, it seems possible with innovation and engineering design or software to become competitive again by revealing the differences. Almost all sectors now must be in the focus of reactivation with the aforementioned costs while benefiting from the benefits of technology. At this stage, being able to keep up with change requires being proactive and fast and flexible. At this stage, it is the human resource that makes the difference, manages the process and touches the process from various aspects.

Regardless of the level of industrial attractiveness, all kinds of sectors and businesses of different sizes within those sectors and even the departments that make up those businesses now must turn their direction into behavioral oriented outputs. In this period when change is very fast with all aspects, it is essential to have an organizational environment that will ensure that this resource remains valuable, although it is essential to have a valuable human resource. Establishing a learning organization, establishing teams that share what they know, securing industrial integration and environmental compliance focus, creating an organizational culture that can hardly be placed in essence, but not easily changed once it is established, and managerial values that can be added with new regulations quickly change this culture. A flexible structure in which it can be integrated in some way has to be built. Considering the dimensions of the agile approach, an organizational structure is currently defined. At this stage, occupational safety practices developed both with technology and changing legislation must be integrated into this organizational structure. It is possible to exemplify this even in our country in a time period that can be evaluated as a very short period. For example, since OHSAS 18001 Occupational Health and Safety Management System, which has been used for many years, must include some innovations such as occupational safety culture and leadership, it has recently been changed to ISO 45001 Occupational Health and Safety Management System and transition period has been started. It is seen that this reflection of changing environmental conditions even in the legislation makes it necessary to integrate a behaviorally focused occupational safety culture into the organizational structure when attention is paid to the premises added to the legislation.

According to the results of the study; Although the sectors differ, important findings have been obtained regarding the applicability of this model. Considering the current competitive conditions, considering the increase in the productivity capacity and the reduction of costs of revealing the physical, mental and motivational energy of the valuable, rare and unsubstituted human resources, which are unlikely to be imitated; It is recommended to real sector actors to reduce occupational accidents as a result of harmonization of the relevant model to be applied in their own sectors and to contribute to the ultimate goals of the business.

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