



## SPORT AND ERGONOMIC

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### Abstract:

In our century, the changes and developments in the field of science and technology, has had negative and positive impact on today's society. Many health problems due to inadequate physical activity can be cited as examples. Naturally, the necessity to act for a healthier life indicates that we should emphasize the importance of the sport concept. The increase in the level of welfare and life standards of the individuals, whether amateur or professional, necessary some regulations for success in sports. For perfect sportive efficiency, relationships between human and machine mechanics should be studied in conjunction with anatomical, physiological, and psychological information. Many people have the belief that the use of ergonomics in sports activities that examine this relationship will obtain a safer and efficient result in sports. This is vital for the concept of sport and ergonomics will emerge more in the future. The main purpose of this study is to give a meaningful dimension to the concepts of sport and ergonomics and to examine the effects of the use of ergonomic tools on sport performance. In this study, relevant literature was examined using the survey methodology. The data was obtained from the existing published resources. This study will present a review of the studies on sports and ergonomics.

**Keywords:** ergonomic, sports, technology

### 1. Introduction

Ergonomics can be defined as a combination of physical, mental and emotional applications. This only grows productivity and productivity of individuals in a business and action environment, but also keeps security in the forefront. Ergonomics is defined as of the interaction between people and other elements. It is a field that applies theoretical principles, and a specific discipline about the data and methods that will design the best use of the whole system performance and human health.

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It is the root economy of the first researches about ergonomics. The aim of this approach is to increase labor productivity. In the first investigations, human beings were perceived as machines. Ergonomics has been identified as making more production and profit to capture the employee's tempo. Afterwards, it was implied that it is wrong to see the employee as a machine. It was presumed that working on performance will cause accidents. Ergonomic studies are being carried out to protect employees from danger and accidents that may occur while working. In today's world, there is an increase in the importance to create a motivating and peaceful environment for their employees. (Su B. A., 2001)

This general definition follows in the industry as well as in the sport. Ergonomics can also be applied to people who adopt a healthy lifestyle or for professional sports. Also, for skilled people who are able to live with special competition qualifications. It affects all aspects of sport life (Health, Education, Work Life and Social Environment). In this respect, the individual as a whole exhibits a more balanced and holistic attitude in all phases of social life.

Currently sports have become a science that enables the development of physical, spiritual and informal individuals. (Sunay, H., 2003). In general, the sport has been on the forefront of ergonomics for many years: High levels of energy consumption, thermoregulatory tension, pre-race emotional stress, information processing demands, fatigue in continuous activity are numerous problems that ergonomists are familiar with. (Reilly, T., 1984).

The fact that the sport has become a giant billions of dollars industry has further increased the importance of sportsmen and the success of their clubs and countries. This is the basis of the success of the athletes in this situation is the sport is the most healthy and the highest performance. (Bayraktar, B., Kurtoğlu, M., 2009).

Furthermore, the use of multimedia technology in the field of physical education has become a trend in sports venues, especially in the fields of education and training. Multimedia information technology enhances the interest of students and improves their knowledge and understanding of physics theory. Numerous virtual reality technologies and graphics, images, 2D animation, and sound make life-enhancing learning a reality, greatly enhancing the quality of physical education and the quality of physical education.

## 2. Definitions of ergonomic

Wojciech Jastrzebowski, a Polish scholar, first used the term ergonomics in 1857. He derived it from the Greek words *ergon* (work) and *nomos* (principle or law). (Michael, R., 2001).

[Meister \(1995\)](#) diversified between the theoretical knowledge within ergonomics, which explains people's interaction with other things, and the instrumental knowledge which can be utilised in design. (Meister, D., 1995).

Approximately ninety years after Jastrzebowski, in 1949 Professor in England. The use of the term "ergonomics" in the military science committee, headed by Hugh

Murrell, was proposed and officially adopted in 1950. (<http://ergo.human.cornell.edu/dea3250notes/ergorigin.html>, Date accessed 23 Mart 2013).

Ergonomics can be defined as the relation between human and occupation, the application of anatomical, psychological and physiological knowledge to the problems in these relations. (Kaya, S., 2008).

Ergonomics explores the relationship between the worker's work, work tools, and the work environment. The goal is to get the highest yield from the human body by lowering the risk of injury. Learning to make simple adjustments with the working environment and habits will greatly increase the comfort and productivity of the person. As people work, they use a variety of programmed systems, such as various hand tools, mechanical tool reapers, work machines, robots, computers and remote controlled instruments. The purpose of this cooperation is to support people's physical and mental abilities. The fact that all kinds of tools and gear used by people are put into service in the most effective way will require the users to take into consideration their posture, sitting, general health, safety and compatibility with the system. (Baslo, M., 2002).

### **3. Purpose of ergonomics**

The aim of ergonomics is to increase productivity by reducing mechanical trauma in general. Additionally, to increase the efficiency of employees, to avoid unnecessary and excessive enforcement, to ensure that the work is regulated in a systematic way, to prevent unnecessary activities, to ensure human-machine-environment harmony.

Ergonomics has to be related to the real environment, in other words, the understanding of ergonomics and applications in real life requires a good understanding. The same element will also affect society's view of its value and place in the modern world. Related contextual factors can be summarized under the headings of financial, technological, legal, organizational, social, political and professional factors. (Wilson J. R., 2000).

Ergonomics should not be perceived as a series of improvement measures in favor of working, although ergonomics is a priority worker's job satisfaction increase, work in a biological, physiological and psychologically healthy environment, work safety, work efficiency and effectiveness at the highest level. Ergonomic benefits for the organization are increased productivity; improved work safety and improved work health are concrete indicators of these principles. Decrease in error rates and correspondingly decrease in production and service costs, increase in continuation of work, underlines the importance of ergonomics in terms of organizations. (Tutar, H., 2000).

### **4. Relationship between sport and ergonomics**

Sports have become a major social event across the world. Sports continue to develop as an important sector with plans made in accordance with scientific principles. In

addition, it can be evaluated as gaining the habit of exercising regularly which is important for health. (Açıkada, C., Ergen, E., 1990).

In sports, it is necessary to use many sciences in studies that push the boundaries of human power. (Muratlı, S., 1976). Especially with industrialization, sport has gained a new dimension. Whether amateur or professional, the performance and efficiency inherent in sport have gained an economic dimension along with the industrialization process. As such, increasing the performance and productivity also reveals the concept of ergonomics in sport.

It can be described as the collective efforts of the subjects during the performance of an athletic task that requires a sporty performance. (Bayraktar, B., Kurtoğlu, M., 2011). According to Franz Schneider, the truth is that healthy people work better and unhealthy people work worse. Sports physicians are well aware of how difficult it is for a team with injured athletes to win. The quality of the physical working environment is similar to the running shoe of an athlete. If the shoes fit the sport and the athlete, they can improve the performance of the sport. However, if they are not suitable, they may degrade performance. In this respect, the wrong shoes can be irritating and painful. Long-term effects can also result in foot deformations. Therefore, appropriate ergonomic practices are a complementary element in sports fields. (Chandel, A.M., 2012).

Experts state that it is important to use a number of fields' computer technologies from the determination of the energy metabolism system that athletes need for their muscles, to adequate and appropriate training program design, to proper posture support, and to prevent injuries caused by exercise programs that are inappropriate for athletes. It is important to use this technology in determining the level at which the mixed series of trampoline jumping and similar competitions displayed in other branches are applied and to determine the limits of human motion.

Athletes often rely on their personal experience or their coach's experience to improve their athletic abilities. Now, technologic devices that report these images with very slow motion are used, in which the weak and strong sides of the athletes are identified and the detailed motion images are captured in the analysis of the training and competition results, and this contributes to the development of the athletes' technical levels.

## **5. Changes in sporting goods**

Ergonomics engineering, which is becoming increasingly widespread with developing production technology, is an engineering field that uses contemporary production techniques to organize the tools and equipment that will increase the efficiency and performance of individuals and the appropriate environment. The main goal of elite athletes in competition sports is to obtain superior performance and efficiency safely. In this respect, it is necessary to provide a safe and suitable environment and material for the increase of performance. It is understood that, ergonomics engineering is a sport related discipline.

Technological developments also play an important role in becoming more ergonomic by entering into sports fields and materials used at the same time. (Atasoy, B., Kuter, F.Ö., 2005).

In 1912, the Olympic Games for the first time in the fifth track electronic timer, the development have the intelligent sports equipment in use has gradually spread. Athletics, basketball and other programs are using electronic scoring, high jump, long jump, fencing, sensors and other smart devices project also record results with inductive devices. The application of intelligent instruments and equipment not only provides a fair and just environment for the sports events, but also makes the events more ornamental. (Han Can, Ma Lu, Luying Gan, 2011). In parallel with technological developments, as a result of the increase in people's living standards, expectations of athletes from clothing and other equipment used by sports, more than just being fit for soundness, design and fashion elements, performance and comfort of clothing have been the most important expectations. (Devecioğlu, S., Altingül, O., 2011). As a result of the developments made in the field of textile research and innovation with each passing day, increases in the performance of athletes are observed. (Çağdaş, M., Kaya, Z., 2011) In recent years, creating the bestselling potential in the world daily and Sports Wear has increased the importance of this field for manufacturers and researchers. Sportswear; daily clothes, professional athletic clothes, hobby and health-oriented sports clothes can be divided into three groups. Each group has different expectations from the clothes. (Güneşoğlu, S., 2005).

In sports equipment, the use of textile composites is increasing. For example, bicycle wheels, tennis rackets, golf clubs, ski and surf equipment, soccer and baseball are used in many places. Functional sportswear has recently been using "MobileThermo" garments, which provide a uniform distribution of heat and adjust the temperature at 38 ° C, 34 ° C and 30 ° C. In addition, the performance characteristics of the fabrics are improved with special finishing operations. For example, polyvinyl chloride (PVC) breathable fabrics have been developed with microporous coatings. Nowadays, sportswear, which absorbs body sweat and helps to dry quickly, is gaining importance. (As cited in Ada E., 2010).

The realization of actions in a healthy environment and high performance comes at the forefront of the functions of ergonomics in sport. Because increasing the sporty performance and taking the necessary precautions in this process are directly proportional to the safety of the ergonomics especially in sports fields. Especially the performance of sports facilities is more comfortable to exhibit and it is essential to take health-related precautions in this process. It is also important that sports facilities are ergonomic in terms of athletes and spectators as well as the prevalence of sports facilities.

Sports facilities are a form of sporting environment. The development of the sport and its widespread use in society is possible with the presence of facilities. (Ramazanoğlu, F., Ramazanoğlu, N., 2000). As the developing technology is in every area, sports should be considered in the center. The highest level of technology should be taken advantage of in all areas of Sport.

The success of the 2008 Beijing Olympic Games vigorously promote Beijing's informatization, in the same time, the concept "tech Olympics" is extremely popular. Information technology arena in the major sports venues on the promotion and application of progressive attention, the main application areas are as follows the application of information technology has been more and more valued. (Han Can, Ma Lu, Luying Gan, T., 2011)

In this context, China's hosting of the 2008 Olympics has been reported in studies that support the success of this area in the sports arena and entertainment centers, using the information technologies in the stadiums.

In stadiums, events can be better planned and organized through the implementation of information technology systems, such as the Command and Control Communication System and related sports programming software; time, man power and material can be saved.

Standard radio and television broadcasts and digital photographic equipment have the ability to record limited data in sports fields; it is not possible to record and store performances in important competitions. With the use of some advanced technological level devices, you can instantly present and reproduce a very important moment to the audience and watch it in the world. This is thought to be very important in increasing the economic efficiency of organizations.

## **6. Conclusion**

Information technology is used in a variety of fields, and information technology-based methods are a scientific basis for the development of sport training and sport performance. It is now widely practiced in a variety of areas of sporting education, including information technology, training programs, monitoring and management. Furthermore, the use of multimedia technology in the field of physical education has become a trend in sports venues, especially in the fields of education and training. Multimedia information technology enhances the interest of students and improves their knowledge and understanding of physics theory. Numerous virtual reality technologies and graphics, pictures, 2D animation and sound make the learning efficiency of students and colorful, vivid instruction that will greatly enhance the quality of physical education.

The acceleration of sporting success with the development of technology in sports causes competition among the athletes to increase, human physical boundaries and athletic performance limits are constantly evolving. It is now harder to break a new world record. It is thought that today, and in the future, for the perfect sportive performance, the support of other sciences, especially ergonomics, will be needed in every field of sports. This support is not just about improving sportive performance; it should provide a positive contribution to ensure that all humanity and future generations can exercise comfortably and comfortably in peace and security.

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