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# **Optimising Work Environment: An** Integrative Study of Ergonomic Interventions and their Impact on Contemporary Work Place Productivity

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### Abstract

The implementation of ergonomics in the workplace has the potential to enhance both worker productivity and working conditions. In order to maximize the health, safety, comfort and productivity of office workers, a substantial body of research pertinent to the design of office work environments is integrated within the conceptual framework of office ergonomics. A critical component of organizational success is employee productivity, which is determined in large part by characteristics such as job satisfaction and motivation. The article repeatedly demonstrates that employee productivity and ergonomics are strongly related. Similarly, it was noted that office workers' job accuracy was increased by ergonomic interventions such temperature management, noise reduction and lighting. It highlights the necessity of balancing safety and performance, implying that ergonomics can improve both. All of this research demonstrates how crucial ergonomics are to raising worker productivity.

Keywords: Ergonomics; Employee productivity; Safety; Ergonomics interventions; Employee performance

#### Introduction

Redesigning a task to fit the worker's needs in order to make it safer and more productive is known as ergonomics. The application of ergonomic solution research can boost productivity while offering workers a more pleasant and comfortable working environment [1]. It takes into account human physical, physiological, biomechanical and psychological capabilities. Ergonomics often aims to suit the individual to the task rather than the other way around. An ergonomist assesses a task's demands in relation to employees' ability to complete the activity within a given amount of time [2].

Given that ergonomics is the study of people, it is frequently useful to consider ergonomic issues in terms of the specific body systems that are impacted [3]. One such system is the musculoskeletal system. It affects the muscles, joints, tendons, ligaments and nerves in our body.

People may experience musculoskeletal disorders over time or they may arise suddenly as a result of overload. People became aware of this and carried out numerous studies [4]. Thus, productivity of the company is largely determined by the ergonomic design of the workstation which in turn affects workers' productivity at organization.

#### Significance of the study

The field of ergonomics is essential for maximizing worker productivity and wellbeing in workplace environments. In addition to industrial hygiene, it covers how the physical elements of the workplace are designed to provide comfort and safety. It has been demonstrated that implementing ergonomic programmers enhances quality, productivity and staff morale. The term ergonomics is frequently used in reference to an organization's physical features, such as the design of work environments, tasks, jobs, equipment, machines and chairs for human use that is safe, comfortable and productive. It minimizes the effects of people's limitations by enhancing their strengths and abilities.

Therefore, in order to lower ergonomic risk factors like WRMSD (Work Related Musculoskeletal Disorder), one of the most common occupational health issues, effective ergonomics design, training and awareness are crucial. High levels of physical demand, such as bending, twisting, kneeling and working with the arms over shoulder height, are major contributors to MSDs. The use ergonomics at workplace will increase worker safety, physical health and mental well-being and there by increases optimal productivity [5,6]. Employee participation's effect on productivity is more complex, with conflicting data pointing to possible effects. Furthermore, it has been determined that work environment organizational culture and leadership all play significant roles in raising worker productivity.

These results highlight the complexity of staff productivity and the requirement for a comprehensive strategy to increase it. Worker productivity is primarily influenced by two factors: Motivation and job satisfaction. A company's ability to achieve its objectives is undoubtedly greatly influenced by its level of work productivity. Employee productivity is greatly impacted by ergonomics and performance is affected by a number of elements, including computer monitor, lighting, temperature and noise. Reducing accidents, diseases and injuries is crucial since it can boost production, according to a review of ergonomics in the industrial sector [7]. All things considered, these studies demonstrate how important ergonomics is to establishing a cozy and secure work environment, which raises worker productivity and performance.

#### **Objectives of the study**

- · To understand the concept of ergonomics and workplace productivity.
- To study the major ergonomic factors that affect productivity of employees at the workplace.
- To understand the ergonomic interventions that can be adopted at the workplace.

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# **Literature Review**

#### **Concept of ergonomics**

In order to design for convenience and efficiency, it is crucial to consider ergonomics when operating equipment and fitting body posture. This includes material selection, control and display arrangement and control and display design for office (computer) workstations. The human body's mechanical and anatomical makeup and how it functions models of the human operating equipment designed to fit body posture and office (computer) workstation handling material selection, design and arrangement of controls and displays; how the mind deals with the environment; how the body interacts with the environment; body rhythms, work schedules and alcohol effects [8].

The design of a workplace, apparatus, machine, tool, product, environment and system with human physical, physiological, biomechanical and psychological factors in mind is known as ergonomics. Capabilities and maximizing the efficiency and production of work systems while guaranteeing the workers' health, safety and well-being. Generally speaking, ergonomics aims to suit the human to the task rather than the other way around [9].

#### **Benefits of ergonomics**

Employee injuries can be avoided by designing the equipment with science in mind. As a result of their improved physical comfort, workers' productivity will rise. Reduction in workplace injuries will lead to a decrease in compensation claims. Ergonomics research will lead to contented workers. By putting ergonomic changes into practice, discomfort-causing risk factors can be decreased. By lowering the main risk factors for MSDs, ergonomic advancements can increase productivity, efficiency and job satisfaction among workers. Enhanced spirits because they are aware that their business is enhancing workplace safety, employees who receive ergonomic attention may feel appreciated. Decreased absences employees who are pain-free and in good health are more likely to be engaged and productive, thanks to ergonomics. Productivity is increased by ergonomics. It is only logical to assume that creating a healthy work environment will increase productivity. Fostering an atmosphere that permits all humans, regardless of location, have a basic need to feel comfortable.

Quality is enhanced by ergonomics. Researchers contend that when under such stress, people find it difficult to perform comfortably. If an employee's task requires too much physical exertion, they might not perform it as trained. For instance, a high force requirement may cause an employee to not tighten a screw sufficiently, which could lead to a problem with the product's quality. Ergonomics raises worker satisfaction. It's a common belief that contented employees are productive employees. And this frequently calls for close bonds between the different members of a working team. Employees are aware when a corporation makes an attempt to maintain health and safety and it frequently when a business makes an effort to maintain health and safety, staff members notice and morale is frequently raised. Furthermore, high levels of energy at work contribute to a reduction in absenteeism.

A stronger safety culture is produced *via* ergonomics. Ergonomics demonstrates your business's dedication to health and safety as a top priority. Your company's most precious asset is its workforce and a culture of safety and health that is established and nurtured will

improve employee performance and benefit the entire organization. The proper implementation of the study will reduce the risk of accidents and will increase productivity and hence savings of the company [10].

# **Productivity of employees**

Employee productivity is affected by a variety of factors. The most crucial among the factors are motivation and job satisfaction. But other elements like collaboration, work-life harmony, monetary benefits and objective assessments also matter a lot. Professional databases can be used to assess and enhance worker productivity. The three components that have been identified motivation, work environment and job satisfaction will also be examined in connection to employee productivity. According to the findings, job satisfaction is the component that influences employee productivity the highest, followed by motivation. A study reveals that harassment, discrimination and coworker cooperation all have an impact on productivity. Moreover, a work-life imbalance has an impact on it. It has also been investigated how monetary incentives and objective assessments influence productivity. It is imperative that firms priorities these matters in order to enhance staff productivity [11].

There is mounting evidence linking many elements like employee contentment, comfort and health to perceived productivity. In addition to improving energy efficiency, certain management, design and use practices also boost productivity, which helps to shut the loop on a possible "virtuous" cycle. Sadly, these self-reinforcing characteristics are absent from the great majority of occupied structures and many of them are excessively complicated. This study looks at the variables that building managers and designers can regulate that have the greatest impact on worker productivity. We are concentrating on variables such as the amount of work hours worked, positive management-employee interactions, group performance and work connected to the employees' educational background that impact stress and job satisfaction. Higher levels of stress result in lower production, while higher levels of contentment result in higher output.

#### Ergonomic factors affecting productivity

Businesses will place a greater value on their workforce and provide an environment that encourages productivity as they strive to maintain their competitive edge in the market. It is evident that ergonomics contribute to overall productivity and serve as its foundation.

Factors affecting overall productivity that are ergonomic:

**Workplace design and settings:** A system has zero output value in the absence of a human. It must be made to suit the needs, preferences and circumstances of the workplace because it depends on people. Anthropometric measurements, kinesiological movement and human potential are critical elements in the design of the workplace.

Gruneberg and Oborne states that two elements must be evaluated in a workplace. The first and foremost is workplace design should be able to meet the requirements for communication, interactions with coworkers and machines (person mobility, as well as auditory and visual demands). The second has to do with how comfortable and at ease the individual is with regard for other people's positions in the nearby surroundings.

Humans who work in environments with repetitive and demanding tasks are more likely to experience problems with their neck, trunk,

shoulder, elbow, wrist and hands [12]. The most crucial factor that an organization should consider, particularly for employees engaging in sedentary work is their seating. Workers' seats need to be able to be adjusted so that they can approach the task in the most comfortable way possible to ultimately prevent injury.

Individuals, whose work requires computers, use mouse excessively and there is a chance that they may develop upper extremity musculoskeletal disorders and carpel tunnel syndrome. So, to avoid such complications workstations should be carefully designed. This will help to reduce neck discomforts and recurrent musculoskeletal pains.

**Elements in physical environment:** Environmental conditions need to be audited in order to increase overall productivity because they can lead to physiological and physical issues as well as impact employee performance. It is obvious that employees may come into contact with numerous risks while doing their jobs. Frequently, the body makes an effort to adapt to dangerous circumstances. Workers' productivity will be reduced if exposure limits are exceeded and there will be a risk to their health and safety.

Environmental elements like Heat, noise, dust, fumes, gases, toxic substances affect worker's productivity

- Noise: According to research by Broadbent, moderate noise levels (less than 85 dB) can have a negative impact on both performance and the choice of performance strategy. There is a strong correlation between noise exposure and heart issues, missed work, exhaustion and psychological stress. According to Gulian, et al., the noise does not impact accuracy at work, but it does severely hinder the rate of work of execution. It was also noted that men and women are affected differently by noise at work, with the former being unaffected and the latter being significantly affected. Even mild noise has been shown to cause stress in workers, particularly when combined with other unfavourable circumstances and to raise absenteeism, particularly in female employees.
- Heat and temperature: Different temperatures are encountered by workers in an organisation. According to Sparks, et al., high ambient temperatures reduce performance by elevating cardiovascular stress. According to Pilcher, et al., individual performance is negatively impacted by being in hot (900 F or above in the web bulb globe temperature index) and chilly conditions (500 F or smaller). There are other factors influencing this relationship such as task duration, temperature exposure time, etc.
- Lighting: Light affects a variety of biological effects that are not visible to humans, such as productivity. Blurred vision, headaches, watery eyes and eye strain are increased by improper lighting. If this discomfort continues, people may feel pressured to some extent, which may lead to stress. Therefore, organizations create a daylight effect by utilizing a variety of light types and colors. Researchers Mukae, et al. and Noguchi et al., have noted that variations in temperature, light intensity and colour can have an impact on autonomic nervous system function, mental activity and levels of fatigue and daytime sleepiness.

**Work schedule:** Work schedules differ based on the type of job, whether it's a full-time or part-time position. It is basically the number of days and times in a week that an employee is expected to work in an organization. These organizational factors from the perspective of ergonomics, has been observed that, if certain adjustments are made in these elements, it can have an impact on overall productivity. Studies by Shipley and Dunham, have shown that work shifts can impact

productivity, social relationships and physical health. Dunham, for instance, noted that shift employees put more effort but they are only able to contribute less to production. Additionally, he observed that after they adapted in 4-14 days, their error rates were decreased. The choice of rest periods can also have a significant impact on the morale and safety of employees.

**Equipment and hand tool design:** The worker, the tool and the task are considered to be the main parts of the operator and hand tool system. The interactions between the task, worker and hand tools and equipment which include work surfaces, controls, displays and body supports are crucial and their appropriate selection helps to increase productivity, ensure safety and lower the rate of human error. Optimizing the relationship between the worker, their equipment and hand tools should be the aim of ergonomists. Common health issues can be relieved by using hand tools and equipment that are designed with ergonomics in mind.

# Ergonomics and workplace productivity

These days, it is a common knowledge that one of the key components of raising the productivity of an organization or an industry as a whole is ergonomics. Environmental ergonomics takes into account a number of elements, including illumination, thermal comfort, vibration and a person's emotional and psychological requirements. Physical and psychological issues would raise stress levels, which would then have an impact on the organization's productivity. Stress causes workers to repeat the circumstances at work, which increases the risk of an accident [13].

Traditionally, ergonomics has been used to identify the postures and tasks that cause significant musculoskeletal stresses in an effort to reduce the number of occupational injuries. However, there is a chance that productivity can be increased using the same concepts that underpin ergonomics. Workplace configurations and postures that maximize employees' productivity may be predicted using ergonomic guidelines [14].

Workplace ergonomics improves the value to the company and increases employee interest in their positions. Applying good ergonomic principles helps to prevent musculoskeletal injuries at workplace. Both the frequency and severity of musculoskeletal injuries are reduced when these principles are implemented in the design of a task, job, process or procedure. Productivity and morale frequently rise along with it. Employers avoid expenses and workers avoid suffering. It is thought that proactive ergonomics, such as organizational and physical ergonomics and psychosocial elements, can support quality and productivity when incorporated into a company's organizational structure. Numerous studies have demonstrated how ergonomics improves quality.

All industries, especially the industrial sector, should embrace and apply ergonomics' tenets in order to make work environments safer, more comfortable and more productive for workers. Additionally, it can create a positive impression if workers perform better at their jobs.

#### Ergonomic interventions at workplace

**Workplace seating:** By designing the chairs at workplace ergonomically, it can prevent strain and fatigue of employees which in turn improves their productivity. The strain on the arm and shoulder muscles can be reduced with chairs that are adjustable and have strategically placed armrests [15]. Additionally, it can reduce the

amount of tension in your neck. A person should ensure that, when seated, their hips retain a 'S' shape in alignment with the curvature of their spine. In this position, pressure on the cartilage and the hip's primary function can be avoided [16].

**Setting room temperature and ventilation:** Employee productivity is positively impacted by an organization's ventilation system and temperature. An overly heated workplace with improper ventilation can worsen employee fatigue and cause emotional disturbances. Maintaining a calm and effective work environment in an organization requires exercising moderation when regulating the temperature. Excessive heat or cold or temperature, has been linked to poor performance and elevated stress levels in humans, according to ergonomics research and. Thus organization temperature should be neither too hot nor too cold. There should be a good air circulation and maintain a pleasant odor within the organization.

Acoustic aspects: It has been reported that people working in a workplace with unbearable noise may experience headaches, hypertension, elevated blood pressure, improper sleep, lack of confidence and interpersonal relationship issues. When designing an ergonomic workstation, the comfort and well-being of employees are also taken into consideration with regard to acoustics. Additionally, it frees workers from distractions like noise so they can work on projects with concentration. In order to achieve this, the office must be furnished with noise-cancelling furnishings and acoustic dampening equipment, such as printer cabinets, acoustic ceilings and glass dividers between workstations [17].

**Lighting system:** In order to ensure that tasks are completed successfully and efficiently, lighting is crucial. In actuality, the kind of work done within an organization determines the lighting needs and this has a big impact on employee job discontent. According to Kuller, et al., light powered by high-frequency ballasts is regarded as more pleasant than light powered by conventional ballasts. When using fluorescence lighting, they advise using high-frequency ballasts of high quality. The standard lighting in a workplace, such as one without windows (5000 K, 500 Lux) were significantly better than the variable lighting system.

**Working hours:** An organization must carefully consider its working hours to guarantee that its human resources can get enough sleep. Tasks can be completed successfully and efficiently when working hours priorities sufficient rest intervals. Working long hours without getting enough sleep can make you tired and can raise a person's level of stress [18].

#### Discussion

The research revealed that ergonomic design is crucial for employee productivity in several ways like reducing physical discomfort and pain, improved focus and concentration, increased energy levels and reduced fatigue, enhanced morale and job satisfaction, reduced absenteeism, lower healthcare costs etc. The organizations can adopt ergonomic practices that can improve the employee productivity [19,20]. Some of the practices include providing employees with adjustable furniture, frequent breaks, proper lighting etc. By implementing ergonomic principles, businesses can create a work environment that is both healthy and productive for their employees. This can lead to a significant return on investment in terms of improved productivity, reduced healthcare costs and higher employee morale.

# Conclusion

From this paper, we understand that there is a strong relation between ergonomics and workplace productivity. Organizations should make every effort to give their employees a comfortable place to work in order to prevent burnout from setting in too quickly. Businesses these days are placing a strong emphasis on employee physical and mental health. As suggested in this paper ergonomic Interventions should be implemented to enhance overall total productivity of the employees.

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