

# A Review on Application of Ergonomic Principles for Work related Injuries in Construction projects

T. Ramya<sup>1</sup>, Dr. P.S.Kothai<sup>2</sup>, E.Abinayasri<sup>3</sup>

<sup>1</sup>Postgraduate Student, Department Of Civil Engineering, Kongu Engineering College, Perundurai, India

<sup>2</sup>Associate Professor, Department Of Civil Engineering, Kongu Engineering College, Perundurai, India

<sup>3</sup>Postgraduate Student, Department Of Civil Engineering, Kongu Engineering College, Perundurai, India

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**Abstract** - Construction industry is the one of the most hazardous industries with high level of injuries. The research to identify the ergonomic risk factors and manipulate pragmatic approaches and effective control measures to mitigate these ergonomic risk factors. In a work station the workers gets affected due to discomforts and several other factors such as forceful exertion, repetition, awkward and static postures, tools and materials. The factors are identified from the questionnaire survey among the workers in various construction projects. The ranking of the factors will be done by relative important index (RII) using the data's the major factors affecting the workers have to be identified from the results suitable suggestion will be given to the companies for improving their ergonomic techniques in worksite

**Key Words:** Ergonomics, workplace, factors, RII.

## 1. INTRODUCTION

Construction industry is an ancient human activity. It is a significant part of industrial culture, a exhibition of its diversity and complexity which can produce a widely varied built environment to serve the diverse needs of society. It is a complex process and is considered to be dangerous and risky job. Despite advances in technology, it remains a physically strenuous occupation. Construction is a labor intensive as well as craft based activity and thus behavior of people has an enormous influence upon the organization and performance of firms. Construction jobs are so challenging physically on a person's body, a variety of injuries can occur. First the paper will describe the unique of the building and construction industry. Then an over view is given of the attention of ergonomist for this industry. Overall conclusions are drawn from these studies in relation to ergonomics, but also to company performance. The study aims to identify and evaluate the main factors affecting the workers and also give the possible endorsements to improve ergonomics of construction projects.

## 2. ERGONOMICS

Ergonomics deals with designing and classify things so that people can use easily and safely. Adapting the job to fit the personnel can help reduce ergonomic stress and eliminate potential ergonomic disorder (e.g. carpel tunnel syndrome, trigger finger). Ergonomics target on the work environment and components such as the design and function of workstations, controls, safety devices, tools and illumination to fit the employee's physical requirements, efficiencies and limitations to ensure his and her wellbeing.

## 3. NEED FOR THE STUDY

Ergonomic program is considered as one of the effective plan taken into account by many workers to bring safety and health aspects for the work environment to maximize work performances. Indeed ergonomic has huge benefits and can increase efficiency of the organization.

## 4. OBJECTIVES

- To study about the ergonomic aspects among constructions workers.
- To suggest suitable safety and comfort working environment for the workers.
- To improve work efficiency by suggesting a safer approach
- To identify possible measures to minimize waste in construction site.

## 5. SCOPE OF THE WORK

In the present scenario construction industry has complexity in its nature because it contains large number of parties as clients, contractors, consultants and others. The failure of any construction project is mainly related to the problems and failure in workers' productivity. So this study is important to identifying and to evaluating the main factors affecting the workers of construction projects and to improve the ergonomic condition for the labors and also improve the workers safety in construction sector.

## 6. LITERATURE REVIEW

**Tuti et al (2016)** describes the productivity is an important issue in the construction industry. The result of this research prove that labor productivity achieved by the application of ergonomic work method increased significantly, especially for job that rely on skill and physical capability of labor.

**Saurabh et al (2016)** states that Construction jobs are so demanding physically on a person's body, a variety of injuries can occur. Therefore it is important for employers to provide a safe environment for their construction workers. Ergonomics is a momentous factor in achieving and maintaining high level of worker productivity and healthy.

**Naman et al (2015)** focuses on the study of the ergonomics aspects and various field areas on which ergonomics studies are carried out using different techniques and analysis. The purpose of this study is to demonstrate the ability to interpret the various facets of ergonomics contribution and influence in the industry and also various measurement techniques for the evaluation of same. From the research reported by different researchers it can be concluded that ergonomics is an important criteria that must be included in any industry for achieve human comfort and satisfaction.

**Janagan et al (2014)** studied to identify the major problems that each worker faces and finding the appropriate actions to overcome those problems. In this study to compare the characteristics of local and migrant labours. Different parameters such as Resource utilization, work quality, job knowledge etc...are used to compare the local and migrant labours.

**Manikandan et al (2014)** assess the ergonomic hazards mostly occur for the construction workers but they did not aware about the ergonomic hazards. The best solution is creating cognizance to the workers and provides proper training to work in a safe way.

**Atishey et al (2013)** research deals with the ergonomic risk control in construction industry. The study will highlight five significant ergonomics risk controls. Better communication and administration control will enhance ergonomics implementation in workplace. It is followed by the proper ergonomics design, organization training and education. The outline goal of the paper to reduce the ergonomic risk factors in construction industry.

**Alireza et al (2013)** aims to control ergonomic risk factors in construction operation and also monitor access the process of program implementation to prevent or cutout ergonomic risk factors in construction Industry

**Mojtaba et al (2013)** states that the cost of musculoskeletal Disorders is considered as the main proportion of workers related cost in construction industry. Establishing a remedial program will lead to injury gradually to some substantial

parts of the human body such as tendons, nerves, tissues. The purpose of this paper is to investigate all significant factors and develop the best corrective method against the costly, harmful and irreversible work related injuries.

**Godwin et al (2013)** research deals with the hazards of work related Musculoskeletal from load lifting in building construction. This disorder resulting from repetitive work activity and wok condition over a long period of time. The application of ergonomics would lead to a significant in the lifting index associated in lifting various loads. There by enhancing the good health of the workers improve productivity; drastically reduce the risks of the spread of musculoskeletal disorder among the work force as well as work related injury.

**Shabin et al (2013)** conducted research study to identify the major ergonomic factors and prioritize them based on its severity and consequences. To undertake that Likert scale questionnaire is prepared for the survey work and FMEA methodology is chosen. Followed by the FMEA risk priority number is computed for prioritizing factors. Analysis is carried out and the result is to minimizing the hazardous work in the construction industry.

**Ayat et al (2005)** identifies the ergonomics is a significant factor in achieving and maintaining high levels of worker productivity and also eliminate hazards in construction industry. The aim of this study is to measure and understand the level of ergonomic awareness in the industry and identify the current safety measures.

**Byung (1998)** sorts out the rigorous literature review deals with the characteristics of occupational deaths and injuries in the construction industry of South Korea. The national statistics of industrial fates in the years 1991±1994 were removed from the annual publications of the Ministry of labor. These data analyzed in terms of the size of firm, age of injured person, accident type, wound type, injured part of body, and agency of accident.

**Martin et al (1991)** this study investigates the most of the accidents involve falls of persons and occur during work on roofs, scaffolds and ladders. Collapse of structures and falling materials also account for many victims. These accidents can be evaded by the establishment of procedures and regulations to enhance safety. Many of the safety hazards are specific to the different job classification and workers underestimate the hazards in their own work.

## 7. METHODOLOGY

The methodology is carried as per the objectives of study. The study also continued to find the key factors affecting the ergonomics of construction project. Based on the factors a questionnaire was prepared and surveyed from various firms. The collected data was analyzed using SPSS. The analysis was done to identify the key factors affecting the

performance of construction project. Based on the data obtained analysis was done and conclusion was arrived.

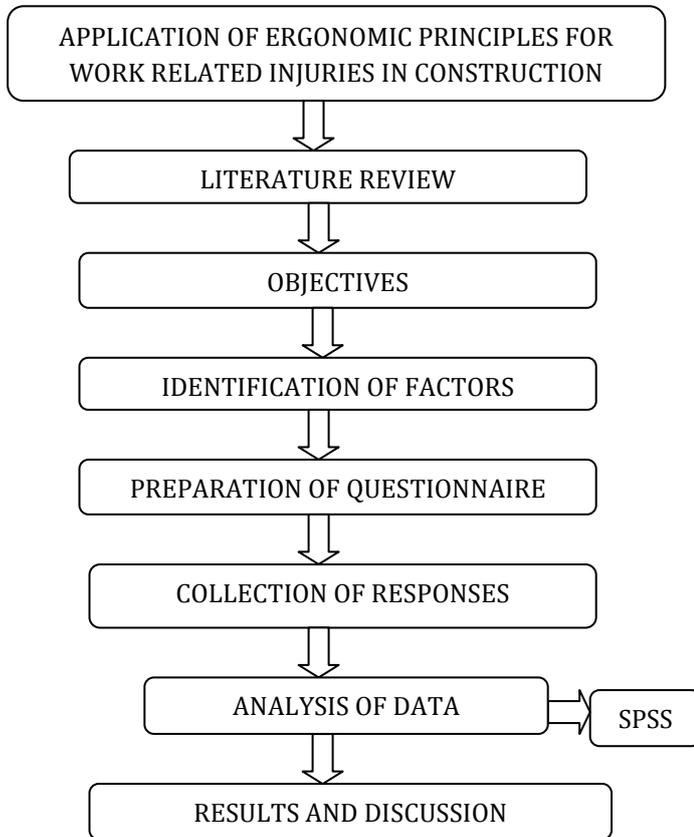


Fig 1 .Methodology flow chart

### 7.1 Factors contributing to work related injuries

#### FORCEFUL STRAIN

- Heavy weight of load handled
- Handling loads for significant distance
- Speed movement of work
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#### AWKWARD AND STATIC POSTURE

- Comfortness with tools
- Maintaining same position while performing task.
- Working awkward posture in site

#### VIBRATION

- Vibration due to movement of equipment
- Physical disturbance felt for vibration
- Prolonged exposure to vibration

#### DURATION

- Working at holidays
- Changes in scheduling during execution
- Working at night shift

#### REPETITION

- Repetitive movements
- Boredom felt because of repetition
- Negotiate work due to repetition

#### EXTREME TEMPERATURE

- Working in humid condition
- Climatic conditions affect the performance.
- Stress level during work in extreme temperature

#### CONTACT STRESS

- Contact stress with machine and working tools
- Noise level of operating machine
- Mental stress while working on machine

### 8. CONCLUSION

The construction industry is rated as one of the key industry. It helps in developing and achieving the goal of society. Workers productivity is very important because they cause losses to the governing agencies and influence the ergonomic of the construction industry. Ergonomics is drastically reducing the work related injuries in construction projects. This research is intended to identify the cause of probable factors affecting workers in building construction. Based on the poetry a detailed questionnaire was prepared and survey was conducted from workers from various companies. The data will be analyzed and suitable alternate solution will be given to the companies thus enhancing ergonomics implementation on the site.

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