

Field investigation on ergonomics risk aspects of labour in construction site.

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ABSTRACT

The purpose of this paper is to study the ergonomics risk factors which affects the productivity in construction industries and to suggest various solutions for the problems by ergonomics risk factors .Construction industry is one of the highly risky industries with more number of accident and injuries. The ergonomics risk factors which are in relation of human and their nature of works are being taken into account. Many construction companies have difficulty in providing a safe working environment for their employees. This study will help these industries to enhance their problems. Musculoskeletal disorders are one of the major injury that occur on the construction site. This type of injury can affect the health of the labours, which severely affects the productivity of the site in a great manner. So, there is a need to provide a safe working environment on the worksite and proper education to the employees about ergonomics risk factors in order to enhance the work effectively in the construction site. The purpose of this research is to identify the major ergonomics risk factors on the construction site which has a great impact on the productivity. This study was done by site visit and asking questionnaire from the employees of the construction industry at various locations. This paper includes the questionnaires format for the ergonomics risk factors on the construction sites such as of vibration, work posture, climate, work time schedules, body injuries. This research also focus on the control measures to minimize and to improve safety by applying ergonomics methods in order to increase the productivity as well as to enhance the health of the labours.

1.INTRODUCTION

Building and construction is one of the oldest activities of mankind. Some of the important

improvements in history were the invention of nails and screws, the introduction of ceramic building materials and the invention of pre-stressed concrete. The course focuses on construction and structural principles, safety standards, and the steps involved in the design, procurement and construction of a project. Labour productivity is one of the key components of every company achievement and competitiveness in promote. Productivity in construction is often related to labour only. It is broadly defined as output per labour hour. The primary important step in the field of workgroup was the introduction of professional tradesmen. Specialization of trades was introduced in the premature middle Ages. In the second half of this century numerous new interests arose, mostly as jobs were split up into some new trades, which often consist of one or a few tasks. In most cases the only change for the construction procedure was the appearance of several tradesmen in a sequential order. Teamwork still exists in road construction and other civil works. As we look at the step of innovation in other undergrowth of industry, the building and construction industry should be described as most traditional. The concept of labour productivity is importantly linked to the input, output and process. Loss of productivity occurs at the crew level. It is at the crew that physical work is performed. Difficult working conditions, unavailable resources and an unsuitable workforce can each cause slowed pace of work, absenteeism, worker turnover, and an idle time, and fatigue, loss of motivation or poor quality work. Such responses by a crew may be directly observed by the contractor or identified through an appropriate system of measuring and tracking productivity. This action may improve the situation or cause further problems with working conditions, leading to further reduction in the crew's performance. Work is still physically straining, work organization and working methods are traditional. The study aims to identify and evaluate the main factors affecting the labour productivity and also give possible recommendations to improve ergonomics of construction projects. The level of profit in carrying out construction project improvement activities will also depend heavily on the quality of the management, financial, technical and organizational performance.

The paper is framed as follows: First, a project is based on the labour characteristics to execute their basic needs by apply ergonomics in arrange to raise labour productivity. For this reason, many literatures are reviewed. Subsequently, method used in the study is interpreted, followed by arrangement of the results. The discussion of the result then follows with the conclusion, providing a outline of the issues discussed.

1.1 OBJECTIVES

To optimize the integration of man and machine in order to increase productivity with accuracy. It involves to a work place suitable for the workers, machinery controls, minimize mental and physical strainer on the work to enable the improvement in efficiency and favorable environment for performing the task most effectively

1.2 SCOPE

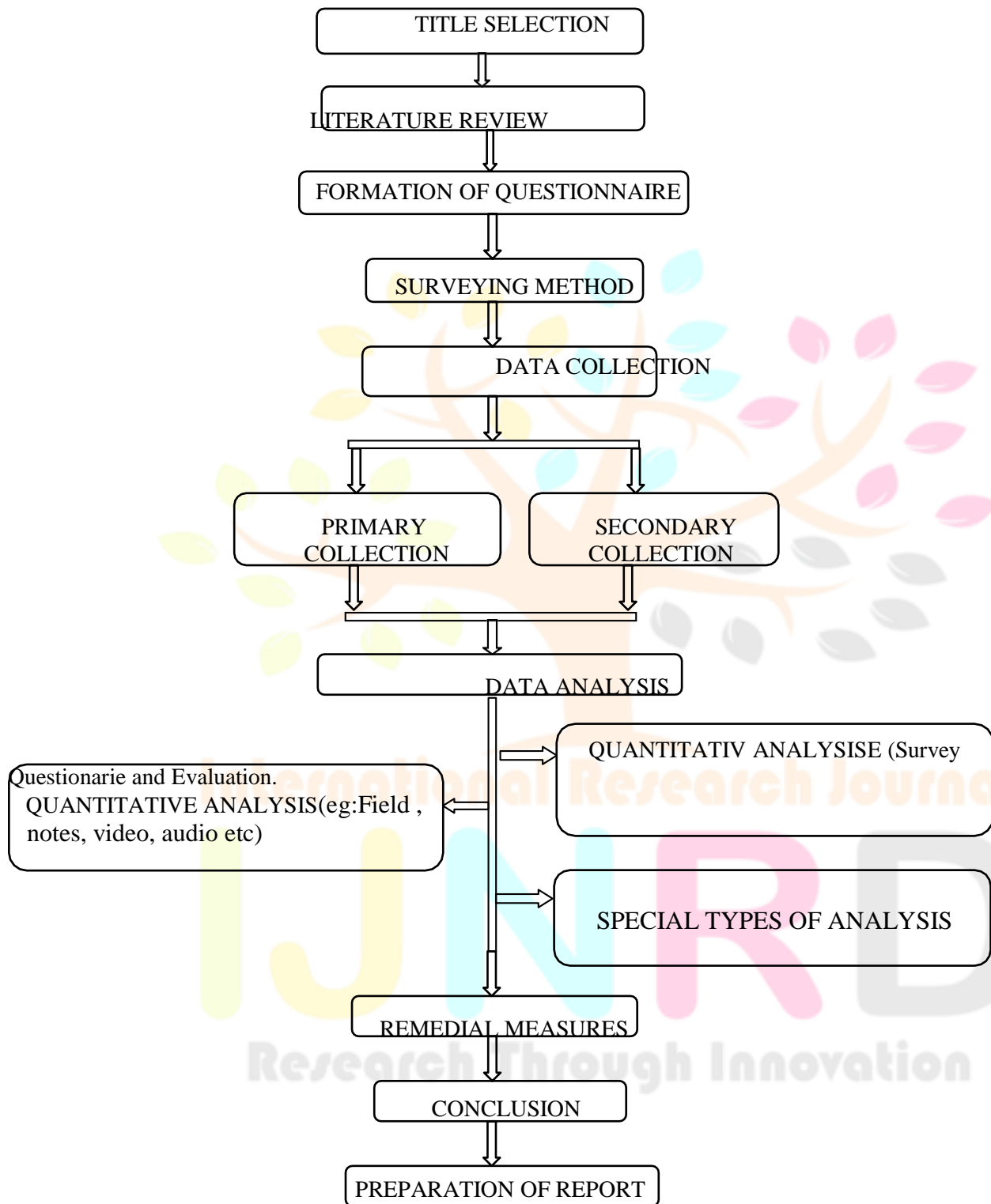
A successful ergonomics program utilizes the skills of many disciplines, including engineering, psychology, medical, safety, management and the employees or associates. The team works together to identify the problem, prioritize the problem, evaluate the cause or reason for the problem and decide the best mode of action to take to remedy the problem.

2. LITERATURE REVIEW

Dr.P.S.Kothai (2017) presented in International Research Journal of Engineering and Technology “A Review on Application of Ergonomic Principles for Work related Injuries in Construction projects” review on Injuries Forceful strain Heavy weight of load handled, Handling loads for significant distance, Maintaining same position while performing task in site, Vibration due to movement of equipment, Working at night shift, Climatic conditions affect the performance 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. The data will be analysed and suitable alternate solution will be given to the companies thus enhancing ergonomics implementation on the site.

Kim. J (2017) had presented on Journal on Ergonomics “The Role of Ergonomics for Construction Industry Safety and Health Improvements” Reviewed on Ergonomic resolutions have contributed to preventing injuries and fatalities and facilitate safety and health practices for the construction workers, but there seem to be great potentials for more widespread applications.

3.METHODOLOGY



4.QUESTIONNAIRE SURVEY

4.1 ERGONOMICS RISK FACTORS (ERF)

Workplaces traditionally have been designed to move products or support machines efficiently. Since people have always seemed so adaptable, how they fit into the workplace has received less attention. The increasing number of injuries caused by repetitive motion, excessive force and awkward postures, ergonomics has become a critical factor in workplace safety.

The Ergonomics Risk Factors (ERF) that are discussed in this study are listed below:

- Awkward Work Posture
- Vibration
- Work Time Schedule
- Climate Condition
- Body Injuries

4.1.1 Awkward work posture

Work Posture refers to the position of different parts of your body. Muscles, tendons, and ligaments must work harder and can be stressed when you are in an awkward posture. Awkward posture occurs when any joint of your body bends or twists excessively, outside a comfortable range of motion

Various work activities can result in awkward postures:

- i) Leaning sideways, such as when reaching into a low drawer to one side
- ii) Bending down to work at a low level
- iii) Reaching overhead

4.1.2 Vibration

Vibrations occur when an object oscillates or rapidly moves back and forth about its stationary point, like a swinging pendulum. Vibrations are defined by the frequency (how fast the object is moving) and the magnitude or amplitude (the distance of the movement).

Vibration may be defined simply as any movement which a body makes about a fixed point. This movement can be regular, like the motion of a weight on the end of a spring, or it can be random. Vibration has been found to be an etiological factor in work environments utilizing tools vibrating in the frequency band of 20 to 80 Hz. For example, use of a chain saw or powered wood working tools for extended periods of time.

4.1.3 WORK TIME SCHEDULE:

Industries make use of a wide range of work schedules by varying the times of day at which employees start work, the number of hours they work each day, and the days of the week and the weeks of the year they work.

Like most of the other types of work schedule, shift work encompasses a variety of different work patterns. Shift work refers to a system of working in which one group of workers replaces another during the workday so that the number of operating hours exceeds the work hours of any particular individual. In relation to the topic of length of work hours, there is no agreed definition of what constitutes long work hours. In looking at the effects of work hours, many researchers have treated weekly work hours as a continuum whereas others have set a threshold such as 48 hours and have examined the effects of working longer. Other research has instead concentrated on the effects of the number of consecutive hours worked (e.g., extended shifts).

4.1.4 CLIMATIC CONDITION:

The Climate reflects shared employee perceptions of how safety management is being operationalized in the workplace, at a particular moment in time. The Safety Climate is a robust predictor of subjective and objective safety outcomes across industries and countries, which was the reason why the safety climate is considered the key indicator of safety performance in this study.

A recent study also found that the safety climate may be a more powerful predictor of safe work practices compared to legislation. For example, safety climate might be heightened after implementing a new safety procedure or after an incident. If the heightened safety climate is

maintained over time, it can lead to changes in the underlying culture. As safety climate captures the attitude towards safety at a specific point in time, it is a useful indicator of safety performance. Measuring safety climate is usually done using an employee survey or team discussions. To understand the safety climate in the construction sector, an initial study was performed in a construction company.

4.1.5 BODY INJURIES:

Body injuries are caused by exposure to ergonomic risk factors, such as repetitive strain, prolonged exposure to abnormal temperatures or vibration, prolonged awkward posture, or forceful exertion or pressure upon a particular body part. These injuries result from tasks that are not particularly harmful when exposure to the risk factor is only short term. The risk of an ergonomic body injury increases with the length of exposure to the risk factor, as does the potential severity of the risk.

5. SURVEY DETAILS

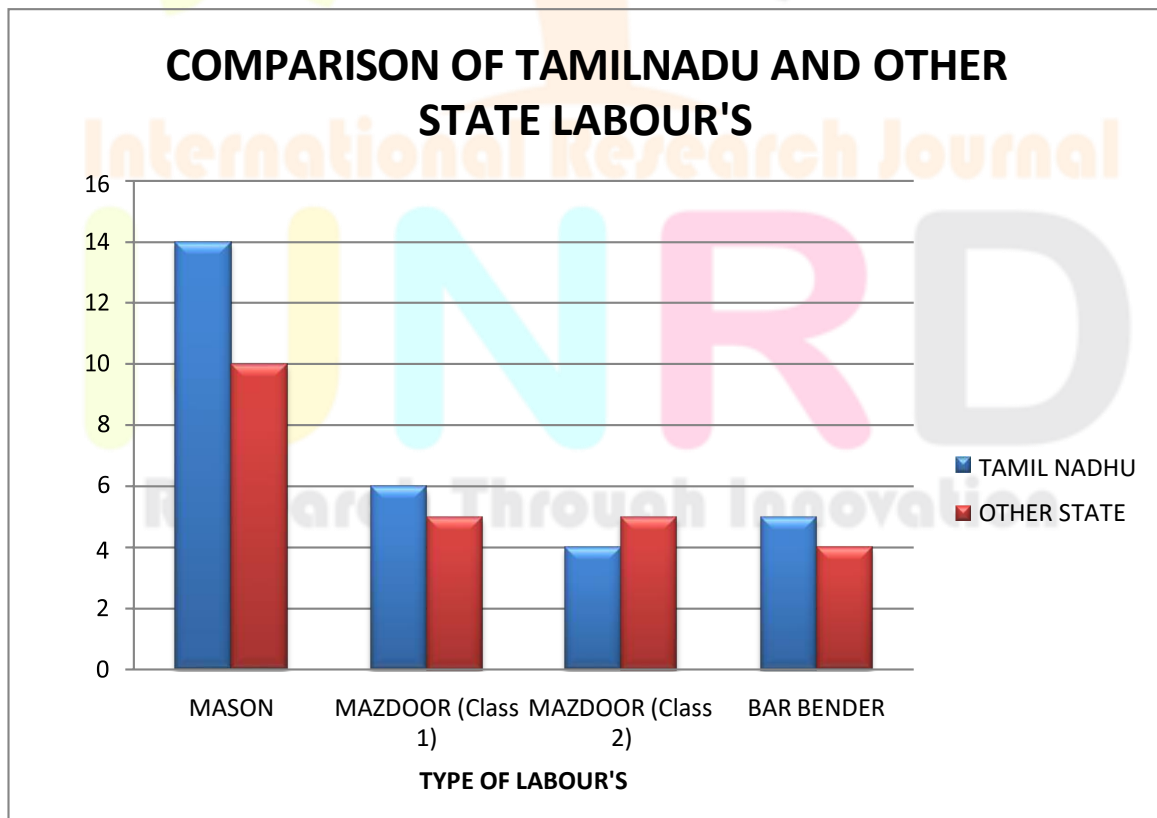
COMPANY NAME	SITE LOCATION	NUMBER OF LABOURS	TYPES OF LABOURS	PAY (RS)	WORKING TIME
VR CONSTRUCTION	WOMENS POLYTECHNIC COLLEGE	3	MASON * 2	800	9.00 am to 5.00pm
			MAZDOOR – II	400	
	EACHANARI	3	MASON	800	9.00 am to 5.00pm
			BAR BENDER	600	
			MAZDOOR – II	400	

	RS PURAM	3	MASON * 2	800	9.00 am to 5.00pm
			BAR BENDER	600	
AANANDA BUILDERS	SINGANALLUR COMPLEX	3	MASON	750	9.00 am to 5.00pm
			MAZDOOR-I	500	
			BAR BENDER	600	
	MILK FACTORY ,RS PURAM	3	MASON	750	
			MAZDOOR-I	500	
			MAZDOOR - II	400	

	TITLE PARK ROAD	3	MASON * 2	750	9.00 am to 5.00pm
			MAZDOOR - I	500	
	SUNDRA PURAM ,LIC NAGAR	3	MASON	750	9.00 am to 5.00pm
			MAZDOOR - I	500	
			MAZDOOR - II	400	
ROLEX CONSTRUCTION	SULUR	3	MASON	750	9.00 am to 5.00pm
			MAZDOOR - I	500	
			MAZDOOR - II	350	
	RATHINAM COLLEGE	3	MASON *2	750	
			MAZDOOR - II	350	
PSK CONSTRUCTION	ERODE	3	BAR BENDER	550	9.00 am to 5.00pm
			MAZDOOR - I	450	

CO.			MAZDOOR - II	350	
HORIZON CONSTRUCTION	VADAVELLI, ARUN NAGAR	3	MASON * 2	700	9.00 am to 5.00pm
			BAR BENBDER	650	
SRC CONSTRUCTION	UKKADAM	3	MASON * 2	700	9.00 am to 5.00pm
			MASZOOR - I	400	
GAMMON INDIA LTD	ONDI PUDUR	3	MASON	750	9.00 am to 5.00pm
			BAR BENDER *2	600	
MILLENNIUM POOLS PVT .LTD	GHANDHI PURAM	3	MAZDOOR – I * 2	500	9.00 am to 5.00pm
			MAZDOOR - II	350	
KPM TRUST	PEELAMEDU	3	MASON * 2	700	9.00 am to 5.00pm
			MAZDOOR - I	550	

6.DESCRPTION OF LABOURS



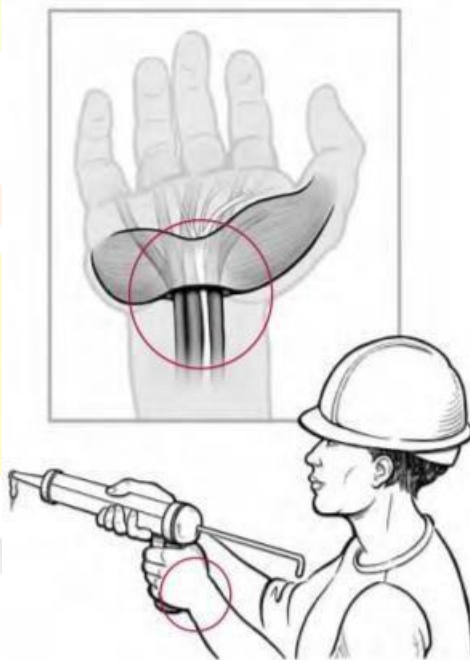
7.SOLUTIONS

7.1 AWKWARD WORKPOSTURE

Hyper extension of wrist and demand of high strength.

Solution:

- Keep a small, micro-bend in the knees and elbows to prevent you from locking back the joints and encourage your muscles to work instead
- Build muscle strength in the surrounding areas to prevent the joints from over-compensating and taking the workload
- Work on technique. Make sure you have good technique and proper alignment.
- Wear tight gloves
- Make ensure wearing safety and thick tight cloths.



7.2 VIBRATION

Vibration is transmitted to the whole body via the hand arm

Solution:

From chainsaws to impact drills to soil compactors, some hand-held power tools can produce a lot of vibration. Certain tools generate vibration levels so high that they can damage the blood vessels and nerves in your hands. The problem usually begins with numbness and tingling in your hands. After you have been exposed to vibration for a while, your finger may become discoloured or white, especially when they get cold. In extreme cases, gangrene is possible. This injury is sometimes called as “white finger or white arm vibration syndrome” (HAVS). You are at greater risk of developing a vibration- related injury if you use vibrating power tools often or for long periods of time.

Soil Compactors



Air Bladder Gloves

7.3 WORK TIME SCHEDULE

Heavy tasks are unevenly distributed throughout the shift Solutions:

It is very important to consult the shift workers and their safety representatives in the risk assessment process, as they have a clear interest in the matter and a direct knowledge of the advantages and disadvantages of existing work patterns. Keep records of any interviews or discussions for future reference.

Employing a number of different aids and techniques can stimulate discussion and help planning.

- encourage workers to share their experiences of shift work;
- discuss which shifts are hardest and why;
- use assessment tools and techniques to highlight potential problems and compare different shift schedules
- provide examples of different shift-work schedules
- invite spontaneous contribution of ideas
- take moderate exercise before starting work which may increase your alertness during the shift

7.4 CLIMATIC CONDITION

Lack of protection measures against emergency release and contact with dangerous

Solution:

- Fall protection.
- Portable ladders not extended 3 feet above landing.
- Eye and face protection.
- Head protection.
- Aerial lifts.



Scaffolding



Fall Protection Rope And Ladder

7.5 BODY INJURIES

General solutions for doing material handling with less risk of injury include:

Change tools and/or equipment.

You can buy or rent material handling devices for all aspects of construction. Devices include special round handles and cushioned grips for carrying heavy objects; powered and non-powered carts and dollies for indoor or outdoor use; rolling carts to move sheet materials, pipes, or conduit; and stands and jacks to hold materials during installation. Mechanical, hydraulic, and vacuum lifts are available in a variety of sizes and styles. Some allow relatively easy positioning of components and materials.



8.CONCLUSION

This study is focused on the ergonomics risk factors in the construction industry. It also enclosed to find the most significant ergonomics risk factors or conditions that may increase the likelihood of injury to musculoskeletal system of the labours. The risk factors include working in awkward work posture, vibration which may come from gripping, lifting, pushing or pulling. Working in climate condition either in extremely cold or extremely hot is also one of the main risk factors. Working in uncomfortable static position or contact stress of muscles and tendon also will increase the likelihood of injury. In order to reduce the effect of injuries to labours there are many other ways some work them are being suggested as solutions to resolve the problems arrived by the ergonomics risk factors, some of them are been described as fallows. Educate the labours about the pain, the working condition and their working environment. Promoting and organizing health education and promotion on stretching exercises, sleep enhancement, or mindfulness to manage their pain. Introducing various techniques, mechanisms and new equipments which enhance the effect of ergonomics risk factors. In this study by consolidating the survey results various solutions and remedial measures is given for the considered ergonomics risk factors on the basics of ranking. This solutions are being prepared with more care and liability on the welfare of the labours which are is to be suggested for the various construction industries take over this solutions to resolve the problems of their labours. Hopefully, these solutions will save labours from pain deterioration and enhance their productivity.

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