

# Shifting Paradigm of Ergonomics

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## ABSTRACT

*Increased competition for dwindling natural resources is making organizations focus more and more on productivity. In this continued journey for improving productivity the management discipline has witnessed several changes at a far more burgeoning rate than it happened ever before. The changing dynamics of technology is fast matched by the changing wants of present day consumers.*

*There used to be a stage when the Demand was more than Supply. The seller used to command price as well as the quality and make. Later, when the Supply started exceeding demand, this concept of increased production started making little benefits. Business houses started rewarding efficiency and efficacy rather than experience. Today the times are changing and the Consumers are becoming more quality conscious, they want products with the highest grades in make. Companies know that they have to maintain quality and yet be frugal at the same time. Many Business houses are collapsing because they are not able to adapt to changes of the new age consumers. This is the time where ergonomics is taking a reincarnation, whether business gurus accept it or not it is ergonomics which is framing the laws of policy making for the gen-next companies.*

*Keeping these vital aspects in mind the present study was undertaken. The study is based on critical analysis of data collected both from primary and secondary sources. The findings revealed that there were noticeable paradigm changes with respect to equipment focus of the past to workplace focus in the present and to work culture focus in future. Based on the study, suggestions and recommendations were listed.*

**Keywords:** Ergonomics Management, Ergonomy, Paradigm Shift in Business, Demand and Supply, Changing Phases of Business

## Introduction

### Meaning of Paradigm

The word paradigm has been used in science to describe distinct concepts. It comes from Greek word "*paradeigma*". Analyzing this word based on prefix and the main word, "*para*" means "beside, beyond" + "*deiknumi*" means "to show or to point out", Thus, the word "paradigm" would mean "pattern exhibited in the external world".

Paradigm means a certain way of thinking about something that is generally accepted. It can also mean a standard, or a routine method of achieving a result. It can also be defined as "Intellectual perception or view, accepted by an individual or a society as a clear example, or pattern of how things work in the world or a model derived thereof". This term was used first by the US science fiction historian Thomas Kuhn (1922-96) in his 1962 book 'The Structure Of Scientific Revolution' to refer to theoretical frameworks within which all scientific thinking and practices operate.

Synthesizing the different perspectives from etymological point of view it may be concluded that "belief systems manifested in the external world" as the most appropriate one to describe the meaning of the term "paradigm".

### Meaning of Ergonomics

Ergonomics is the study of designing equipment and devices that fit the human body, its movements, and its cognitive abilities. Thus, equipments and devices should be so designed as take care of limitations of human body, motor capabilities and sense organs and such limitations are collectively referred as "human factors".

The International Ergonomics Association defines the term ergonomics as the scientific discipline concerned with the understanding of interactions among humans and other elements of a work system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance. Therefore, the term ergonomics applies anatomical, physiological, and psychological knowledge to work and work environments in order to reduce or eliminate factors that cause pain or discomfort.

Ergonomics is employed to fulfill the two goals of health and productivity through appropriate tools, devices and equipments. It is relevant in the design of things such as safe furniture and easy-to-use interfaces to machines and equipment. Proper ergonomic design is necessary to prevent repetitive strain injuries, which can develop over time and can lead to long-term disability. Therefore, it takes into consideration the mental/physical capabilities and limitations in different work settings. Since it takes consideration the "human factors" It is also termed as human engineering.

## Literature Review

The American legal body of Occupational Safety and Health Administration (OSHA) recognizes ergonomics as a law for occupational safety and wellbeing of employees. Ergonomics originated during World War II, wherein scientists designed advanced and potentially improved systems to improve the effectiveness of the armed forces. The theory of ergonomics is not a new concept. In fact, this branch completed 50 years of its existence in the year 1999 itself. The word 'Ergonomics' comes from two separate Greek words: Ergon meaning the task and nomoi meaning natural laws pertaining to human fitness. The theory of ergonomics is based on established research areas such as engineering, physiology, sociology, psychology, etc.

The study found that high physical exertion was an independent predictor of back problems in both sexes. For both men and women, low social support at work and high job insecurity were independent predictors of restricted activity due to musculoskeletal disorders. Conversely, chronic back problems contributed to explanation of high job strain among women and high physical exertion among men. Restricted activity due to musculoskeletal disorders contributed to explanation of high job insecurity in both sexes.

The results of the study suggest that cumulative occupational exposure to lifting or carrying and extreme forward bending, and the lumbar forces associated with these activities, increases the risk for developing symptomatic osteochondrosis or spondylosis (a general term for degenerative changes in the spine) of the lumbar spine. A third study in this issue changes the focus to shift work. This study relates shift work to possible metabolic changes. Swedish researchers found that shift workers, as opposed to day workers, had a higher incidence of obesity, high triglycerides, and low concentrations of HDL cholesterol.

W. B. Seales(2007) The goal of this work is to develop and test new technologies that will break down the barriers that block more surgeons from attaining and continuing to practice (without injury or pain) high levels of skill in minimally invasive surgery (MIS). This project will develop new technology by concentrating on three major research thrusts: Smart Image: the project will develop and evaluate new approaches for extracting, fusing, and presenting information. Edward. R. Rennessy, Michal. R. Zielinsh :Army Natick Soldier Center(2008) No current standard exists for any aspect of Explosive Ordnance Disposal (EOD) suit performance. The National Institute of Standards and Technology Office of Law Enforcement Standards asked the US Army Natick Soldier Center (NSC) to develop a standard for future EOD suits. As part of the development of the EOD Personal Protective Equipment (EOD PPE) standard, NSC's Ergonomics Team evaluated several ergonomics aspects of current commercial EOD suits. A second series of tests were performed with light weight bomb disposal suits to get a number of tests that will give information about ergonomics and heat load. At the end of this second series of tests the final tests were determined. In the third series reference data of the light weight bomb disposal suits will be assessed.

Developing ergonomics in early stages of production system design is increasingly recognized as an essential step towards achieving healthy and sustainable production systems. According to Laitila (2005), the capacity of digital human modeling (DHM) to assess ergonomics has increased significantly in recent years. As a result, DHM tools are increasingly used to identify and steer clear of potentially harmful working postures, forces and durations which can lead to work-related musculoskeletal disorders - these in turn can result in company costs for worker replacement, compensation and rehabilitation Kuorinka and Forcier (1995). Also, recent research by Falck (2007) demonstrates a relationship between poor ergonomics and reduced product quality, and emphasizes an imperative need for a holistic approach to ergonomics development. Subsequently, ergonomics development in parallel to other aspects of production planning can lead to economical gains for companies in terms of more efficient task allocation, reduced costs for staff turnover or sick-leave absenteeism and prevention of potential reduced-quality production caused by poor workplace ergonomics. This is the rationale for developing the SIMTER tool. In analyzing and developing production ergonomics, a number of analysis methods can be applied. Developing ergonomics in early stages of production system design is increasingly recognized as an essential step towards achieving healthy and sustainable production systems.

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Interdisciplinary nature is a fundamental characteristic of ergonomics science. Multilateral structure of industrial ergonomics necessitates collaboration of numerous disciplines such as; occupational medicine, engineering, design, occupational safety and industrial psychology. If maintained properly, this interdisciplinary nature could culminate in comprehensive analysis of work environment and sound problem solving. Literature on corporate ergonomics programs demonstrates benefits of this Interdisciplinary nature in ergonomic improvement projects (Hagg, 2003, Smyth, 2003). For example, an IEP without a doctor would lack a great portion of not only necessary information to create solutions, but also a caution toward ergonomic improvements. A new work method that could increase productivity could introduce unforeseen occupational health risks. It is necessary that IEP leaders should be well informed about and aware of extensions of industrial ergonomics so that people from necessary disciplines could participate in ergonomics projects.

Organizations of the 21<sup>st</sup> century are extremely concerned about creating a warm, caring, supportive and encouraging environment for their employees at their workstation. While organization is trying to exploit the physical and mental capabilities and skills of their employees, it is very important to maintain a healthy psychosomatic balance for continuous improved performance of their employees. Ergonomics is a study of the relationship between people and their work environment wherein. The workplace, tasks and tools are designed to fit individual capabilities and limitation, so that people can do their jobs safely. Hence through my research work I got to know how bad ergonomics management effect in poor performance of the employees and find out the problems it created in them. My research work provides the solution to improve ergonomics management in the organization and how to design a good ergonomics management. The present study is carried out to bridge this gap with the following objectives.

### **Rationale behind the study**

The following was the rationale for the study.

- Due to thrust on productivity, the hours, efforts and energy spent at workplace is increasing both in manufacturing and service sectors. Since a person's major portion of the day is and will be spent at the workplace, the ergonomics related issues are assuming greater relevance. Further, the workplace stress is carried to the family resulting in strained social imbalances across societal fabric. Because of such relevance the present study was taken up.
- During the course of literature survey it was noticed that there were gaps in the available literature with respect to the trends in the field of ergonomics. In order to cover such gaps in literature, the present study was undertaken.
- The face of changes in the management field has raised the curiosity among the researchers to probe further. The present study was undertaken because of this curiosity as to what is the effect disenable changes in the field of management on the sphere of ergonomics.

### **Objectives**

The following are the objectives of the proposed study:

- Understand the prevailing ergonomics management practices and thereby mapping the paradigm changes in the sphere of ergonomics.
- To find out the pattern of changes in the management practices and to arrive at the role of ergonomics in the same.
- To classify and present the paradigm changes in the sphere of ergonomics with respect to past, present and future.
- Based on the study, to list the suggestions and recommendations.

## Research Methodology

The study is based on the research question “Is there any pattern in the development of ergonomics discipline in relation to management?”

Due to paucity of available literature on the changing dynamics of ergonomics field the exploratory approach was adopted for the present study. The study was based on critical analysis of developments in the field of ergonomics that were noticed during the course of directed literature review. This approach based on secondary sources facilitated to understand the context of the research question.

In addition to the secondary sources of data, interactions with the four experts in the field were consulted. The convergence of their valuable perspectives enabled to throw valuable insights and thereby crystallize an emerging pattern in the field of ergonomics vis-à-vis the overall management field.

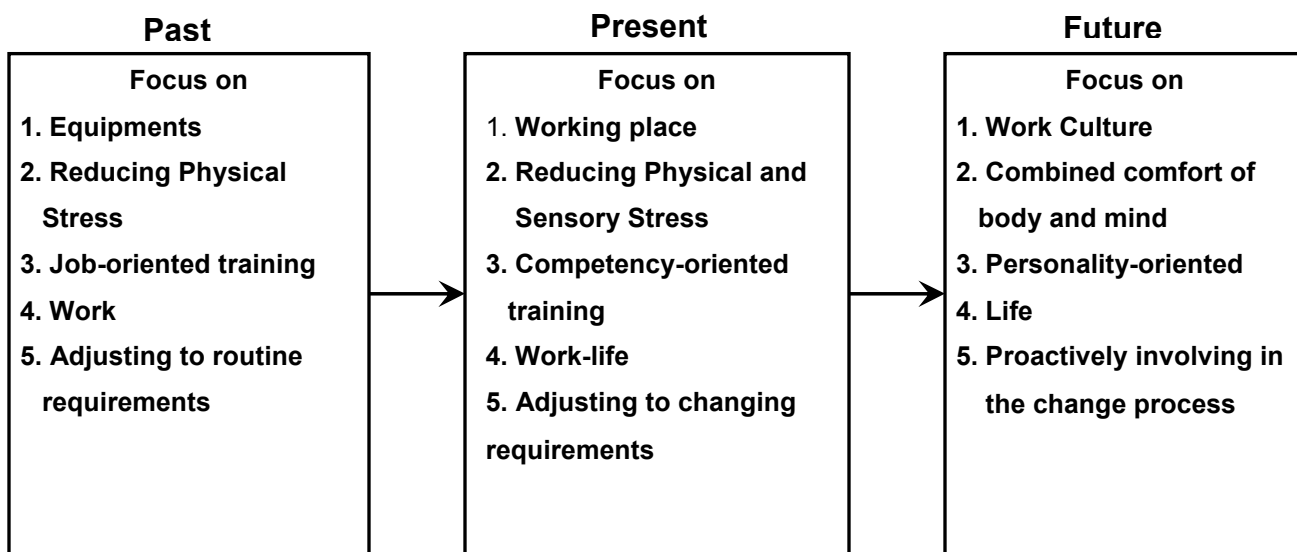
## Findings

Based on the detailed outcomes of the study, the following is a brief of the findings of the study.

- Employees feel that a good ergonomically designed chair with proper ventilation is not enough to increase efficiency.
- Monotony and Boredom decreases efficacy and efficiency of employees
- Employees feel that training and development activities will bring in a new zeal in their working manners.
- Job satisfaction is the most important reward for the work done by the employees of an organization
- Managements are aware about the fact that deficiencies in physical working conditions that exist in the organization and they are trying to adopt methods to improve them.
- Employees expect good working environment.
- Even though employees know about ergonomics management there is no clear cut idea. They have heard about the concept but then to they lack knowledge.
- The most important and primary factor for an energized work culture is the working environment provided by the company
- Employees agreed that when they are happy they produce better and work pressures do not affect them
- Employees felt that perks, fringe benefits, company sponsored family trips etc. keeps them dedicated to the same organization.
- Employees felt that companies in which their friends are working are better adapted to transition and changes
- Most of the respondents wanted to work for forward looking organizations

Based on the above findings the changing paradigms of ergonomics were mapped

## Changing Paradigms of Ergonomics



### Discussion

It would not be wrong to say that the transition in the Business and Commerce World is happening at a far more burgeoning rate than it happened ever before. The changing dynamics of technology is fast matched by the changing wants of present day consumers. In such competitive scenario, it is Quality of goods and services which commands the respect of the customers and not other features like attractiveness and make. Due to before mentioned events, Product Life Cycle (PLC) stages are happening fast leaving no other go for the top management but to spend and invest more money on Research & Development (R&D) and on Human Capital.

Further, there used to be a stage when the Demand was more than Supply. The seller used to command price as well as the quality and make. Manufacturers in this era started giving emphasis to the concept of ergonomics in order to increase efficiency so that they could cash in on the growing demand and shortage of supply. Ergonomics coupled with concepts of project management were used to cut the turn around time on each process so as to increase the per capita production and this in turn started resulting in increased top lines and bottom lines for the company.

Later, when the Supply started exceeding demand this concept of increased production started making little benefits to the manufacturer as he wanted to cut down on production any how as the demand was decreasing and there was huge supply available in the market. In this given situation the companies started cutting down on manpower and other resources. Business houses started rewarding efficiency and efficacy rather than experience. Companies were always in the look to cut costs and reduce the selling price, which resulted in compromising on quality.

Today the times are changing and the Consumers are becoming more quality conscious, they want products with the highest grades in make. Companies know that they have to maintain quality and yet be frugal at the same time. Many Business houses are collapsing because they are not able to adapt to changes of the new age consumers. This is the time where ergonomics is taking a reincarnation, whether business gurus accept it or not it is ergonomics which is framing the laws of policy making for the gen-next companies. Companies are starting to invest more on their manpower than on other resources like plant and machinery. Research and training are becoming the key elements of every forward looking organization. Ergonomics as a concept is changing from physical to mental as organizations and their processes are moving from standardized to customize and quality defined business setup. There is no doubt that ergonomics is maintaining its stand as a concept where the process time is reduced to minimum but it is doing so by changing the various laws of management. Today, Ergonomics is moving beyond boundaries of how you sit, stand or what chair to use in order to increase efficiency to a point where it is rewriting concepts of Production, Marketing and Management in areas where changes would create efficiency with employee satisfaction.

### **Suggestions and recommendations**

- Companies should invest in careers of their employees by training and developing them.
- The real wealth of an organization is not its plant and machinery but the manpower resources
- Companies should incorporate the concept of Ergonomics beyond the ergonomically designed chair and working environment it provides to its employees
- Companies should change their stanza of ergonomics from physical utilities to mental utilities
- Create a 'Suggestion' box where employees can submit their suggestions, this will not only be a source for new 'given' tips, but also improve morale and create the community-minded cooperative approach.
- Managements require a better understanding of concept and practice of the ergonomics management.
- Cooperate with employees in friendly manner it helps to reduce the work stress of the employees.



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