

# Ergonomic Management System – EMS

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## Abstract

*This study aims to discuss and evaluate an ergonomics program developed according to the health and safety management system, emphasizing the strategic plan, the program introduction and development as well as the phase of insertion into the company policy. The study involved an approach about the practices supported on the characteristics and objectives proposed by several authors for a successful development of ergonomics programs. A case study in an organization that has developed this practice with the health and safety management system is presented.*

**Keywords:** Ergonomics; Ergonomic management; Health and Safety

## 1. Introduction

Many situations of work and daily life are prejudicial to health. 450 thousand job-related accidents occur in Brazil annually and that most companies have an expenditure of almost US\$ 4.15 billion (considering insured and non-insured costs) [1]. The government and the families together spend around US\$1.7 billion to assist people who injure or become debilitated in the informal Market which makes no contribution to the State fund that guarantees the insurance for people who suffer accidents at work. Theoretically, the number comes close to US\$ 6.7 billion per year.

The expenses with musculoskeletal illness in the USA approximate US\$ 2.1 billion per year and the annual cost for the loss of production reaches about US\$ 100 million [2]. The American economic loss is over US\$ 2.7 billion per year [3].

Since they generate a high absence rate, limit the health of millions of workers and especially develop pains from the work environment, some authors hint at ways to reduce the level of work related illness and accidents. The solution that promised at least to diminish company expenses: the development of wellness programs for the employees [4].

Currently to beat the ever-growing struggle companies are using strategies that satisfy the consumer. In this environment one find the associations, independent of its nature, giving a bigger focus in developing political organizations compatible to the quality management and to the health and safety management system [5].

The integration of ergonomics into a quality management system. Management systems and ergonomics are closely together by their similar purposes and definitions [6]. It is impossible to have an enduring success in a sharing system without it being built based on ergonomics principles, with the entrepreneur as the center of interests and being adapted to the feature of the job and the managing system [7].

Ergonomics programs like an ergonomic management on the firm are the main steps for the growth of an ergonomic culture. These actions have been growing around the world. This is a response to the necessity of conjuring several of the companies' efforts with the quality of life, the reliability of processes, the reduction of costs, better work conditions as well as the implementation and maintenance of the quality and excellence patterns. Ergonomics programs are common in companies of Scotland and England [8]. The programs decreased labor injuries a lot, specially the musculoskeletal types. Manuals for implementation and development of ergonomics programs are freely spread in several organizations in both countries.

Through the implementation, development and maintenance of the program, a project of ongoing evaluation and improvement, making ergonomics a part of the organization process can be proposed [9]. The descriptive application proposes a multithematic approach of ergonomics in the organizations where engineers, medical doctors, physiotherapists, psychologists, administrators, physical educators and other ergonomics professionals became a part of a multitask system, essential for the prevention and control of the risks and labor accidents of any organization.

The ergonomics program becomes more and more necessary once ergonomics is considered to be a science that aggregate many objectives, such as health, safety, quality, efficiency and comfort [10].

## **2. Ergonomics Programs**

Extremely linked to the question of health and safety ergonomics programs are fundamental pieces in the prevention culture. The European BCM Airdrie initiated ergonomics research in its procedures and products in 1995, helped by the University of Loughborough. In 1997, they hired ergonomists that developed an ergonomics program methodology in their sites at Nottingham (England), Airdrie (Scotland), Vitre and Flers (France), Dietzenbach (Germany) and Tarragona (Spain) [11].

The GAO - General Accounting Office and HEHS - Health, Education, and Human Services from USA, GAO/HEHS [12], published the Private Sector Ergonomics Programs which comprises the data from companies that have succeeded with ergonomics programs. Some of them are: AMP, Electronic Connectors Manufacturing Facility, Navistar, SOCHS, Lewiston, TI, Defense Systems and Electronics Group Headquarters and AEFA Headquarters. Organizations like OSHA had also pointed success obtained in ergonomics programs. [13, 14]. Some of these programs are the corporate program from BCM Airdrie [11], the one used for years at IBM, the ones developed by the automobile industry like Ford [15], from Peugeot-Sochaux [16], Chrysler Corporation [17], Mercedes-Benz [18] and Toyota [19].

The main goals for the mentioned programs are: to cope with the current legislation; to prevent work accidents and illnesses and to increase productivity. The ergonomics committees that have been formed in Brazilian companies have included people with a diverse formation not related to the field of ergonomics [20].

These groups are normally composed by health (nurse, medical doctor, psychologist), safety (engineers and safety technician), project (industrial designer, projector) and maintenance professionals [21]. Ergonomics programs must be characterized by a systematic vision and a multidisciplinary approach, besides taking into consideration the human productivity aspects [22].

The multidisciplinary approach must be considered for the formation of teams who will act in the process as well as the experiences and knowledge of each one of its components must be acknowledged. Currently the most important requirements for an ergonomics program to succeed are: evolvment of the employees,

formation of an ergonomics management committee and the multidisciplinary approach [23]. The program model and the level of integration within the organization depend on some factors like responsibilities, involved personalities, available resources, culture and size of the organization.

It is observed that isolated initiatives of ergonomic action appear from health or production problems in that sectors which had presented such demands, generating correction actions for specific work situation or projects of technological modernization as well as new production units. However, some jobs are developed with the help of external consulting, performance policies for problem prevention in a project are not established in the company [24]. Previous experiences are not capitalized and there is no learning to be used in future occurrences.

When a new demand is presented, the process of ergonomic intervention is initiated again as if there were no previous experience. But that something still remains from such experiences since as a consequence internal ergonomics committees are formed and also the formation of internal specialists may occur [25].

The isolated practice of ergonomics where an ergonomist carries through the analysis of the work and recommends the solutions to be later implanted is generally not materialized due to the lack of workers' involvement at the first moment (analysis) [26].

Furthermore, it is very difficult to get the workers involved in a second moment (the implementation). It can be stated that the ergonomic practice does not occur without the establishment of a participative process. The participation of workers in the management process as well as in a simple suggestion program does not only result in productivity increase but also in the prevention of accidents and occupational illnesses [27]. Although some specialists believe that the prevention of occupational muscular illnesses is just a question of changing physical aspects of the work there are evidences that the solution of the problem also includes work organization and it is finally established with the implementation of an ergonomics program.

The application of ergonomics will not be able to immediately point out problems or solutions since many aspects are distinct, interconnected or parallel. It will look through a methodological way that makes possible to instruct demands, shape the reality through methods that follow the ergonomic analysis of the work, lead to adequate solutions contributing to the improvement of processes and products [28].

The administration that gets the workers fully involved in the search for solutions will get advantages since nobody knows the work better than themselves [29]. The application of a participative process is verified throughout the ergonomic study [30]. The participation of the workers in the conception phase as well as in the implementation of projects guarantees a higher involvement and therefore a bigger chance of success in the modifications.

### **3. Case Study in a Beverage Industry**

The data were collected through the method of case study using direct interviews and comments. All the interviews were recorded and documented. Thirty six randomly chosen regular employees and the ergonomics program administrators were interviewed, representing about 10% of the unit operational population. The Safety Engineer, responsible for the ergonomics program, the Total Quality Program manager, responsible for the quality of the integration of the ergonomics program to OHSAS 18001 in the integrated management system and the Site Manager, responsible for the development of the processes in the organization were all included in the interviews.

The direct observations attempted to follow the practices of the program and to search for documented evidences of the actions. The research is subdivided in the stages of i) analysis of the characteristics of the ergonomics program; ii) program implementation; iii) program development; and iv) achieving goals evaluation.

For the research development, the Company, in São Paulo, Brazil, was selected. The Company is one of the biggest Brazilian beverage industries. This company is certified in OHSAS 18001 since 2001 and has an integrated ergonomics program. The ergonomics program develops as main activities studies of work conditions (ergonomic analysis of the work, casual analyses in industrial accidents), preventive education activities and training (lectures, courses, events, formation of responsible committee), and social programs (laboral gymnastic, individual and collective physical evaluation, worker physical rehabilitation, evaluation and treatment of occupational pathologies of the muscular system).

Based on this management system, the method is applied to the organization by a responsible team whose main objectives are the improvement of the conditions and work environment, worker health and safety and the attendance to the legislation and norms of the organization. They have as principles that the ergonomic risks must be eliminated or reduced to acceptable levels, implanting a control method for the overall organization.

The implementation process started by hiring specialized external consultant. The company initiated the process from the preliminary survey of the existing risks in the organization, then performing preventive actions in the points for improvement. To start the project, the employees undergone a training stage. This training affected all the levels of the company, from the high management to the shop floor employees. Another point to be stated related to the training is the system of area multipliers characterized as "facilitators" of the program, and the formation of a "support group" responsible for the supervision of action in the plant distinct areas.

The Ergonomics Program is based on:

- Performance policy - Kaiser establishes in its integrated management policies (health, environment, safety and quality) and in its objective in ergonomics: "To prevent and to control the aggressive agents, especially ergonomic and noise". This is divulged to all the collaborators in training, bulletin boards and in their identification badge. The employees also were interviewed and demonstrated knowledge and commitment to the practice of ergonomics in the organization, besides being aware of its risks. They also participate in making suggestions; action plans and demonstrated to know exactly what ergonomics means.
- Conduction by the top management - the top management is involved in the general numbers of the ergonomic management (Safety rating and general score of the site), since they impact the index of site performance due to the integration to the management system.
- Integration with Quality Department - the program is described through the Kaiser management system, involving health, safety, environment and organization quality areas.
- Legislation approach - for the development of the analyses and actions in ergonomics, some rules of the specific legislation had been observed, verifying the index of Kaisers' conformity.
- Multidisciplinary character – Ergonomics Program is developed through the boarding composed by a labor doctor, safety engineer, safety technician, nurse assistant, physiotherapist and other members in the health and safety support committees in Kaiser. For the development of the program a company specialized in ergonomics is hired. This experience and external ability of the specialized company team are fundamental for the development of the program, since they supply tools and search for specific actions that would be of limited access for the internal responsible.
- Participative management - all interviewed employees reported that they contribute in every phase of the program development identifying chances for improvement through evaluations, suggestions, and occurrence reports.
- Pro-active approach - for the development of the ergonomic analysis of the work, proactive tools are used (these being described in the EP Manual, using ergonomic evaluation tools in a spread sheet of preliminary analysis of risks) that identify the priority, graveness and levels of risk in every organization

sector, being programmed a goal of evaluation and constant evolution. An analysis chronogram that covers new evaluations and periodic revisions exists in the site.

- Reactive approach - a sector of physiotherapy is provided in the site to minimize muscular damages or disturbances. Problems that need other interventions in the program are also evaluated by the committee in the monthly meetings and action plan are carried out. The plans are generally revised after three months.

- Continuous learning – throughout the year, education and training activities are developed, especially lectures, informative issues and labor gymnastics programs.

- Continuous improvement – according to the quality manager, due to the insertion of the program in the Integrated Management System, the ergonomics management has been continuously evaluated and outcomes are followed up and disclosed using the continuous improvement PDCA - Plan, Do, Check, Act - method.

- Ergonomics committee – the site has an ergonomics committee, called support group, which is responsible for performance and actions of ergonomics management.

- Ergonomic analysis – since 2000, Kaiser has been reporting the ergonomic analysis once a year regarding work in every workstation.

- Incident investigation – ergonomics-related incidents and accidents are investigated and evaluated case-by-case. An action plan is developed to remedy and remove the root-causes but this activity is only performed for job safety purposes.

- Improvement projects – for each item non-conforming to ergonomic conditions improvement projects are developed and monitored by the ergonomics management responsible and by the ergonomics committee.

- Preventive actions - the site develops actions such as physiotherapy guidance in workstations, corrective postural gymnastics programs, guidance pamphlets and encouragement to physical activities practice.

- Education and improvement training – all interviewed employers commented that each improvement developed has its training plan before being implemented. The employee receives information about the improvement, its benefits and how to preserve it. This information is given in his own workstation or in the training room. The improvements noticed by means of documents are recorded and attached to the EP Manual. These are drilled and justified before implementation.

- Statistical data survey – data showed reduction in the cases of outpatient demand related to Work Related Musculoskeletal Disorders” (WRMSDs) issues. In addition several improvements in other indicators have occurred such as in satisfaction, pains, tiredness, stress, attendance to preventive programs, ergonomic improvements, training performed and physical health.

- Performance indicators – each sector is followed up by its performance indicators that are consolidated directly to the general health and safety rating that in turns impacts directly the annual profit participation for the employees. Every year, the employees receive an amount that is proportional to the achievement of goals proposed in the general site indicators. The indicators are disclosed by management to the employees in an easily accessed and clearly visible location. If the goals fail to be fulfilled, the percentage of profit participation is reduced or even cancelled. The health and safety rating is 14% of general site scorecard where ergonomics is equal to 20% of the health and safety rating.

- Improvement evidences – each improvement implemented is evidenced in its “before and after” to show direct and indirect benefits for the company and employees. Around 25% of the improvement projects evidenced every year on the ergonomics analysis are developed and this was stated as the minimum target value.

- Audits – during internal and external OHSAS 18001 audits, all the requirements of the ergonomics management and its integration with the standard are audited for every department. Each area receives this agenda in advance and all pertinent items are evaluated.

- Project evaluation and short, medium and long term actions – by prioritizing the ergonomics risks, actions are provided within their corresponding times. Every year besides the goal of solving 25% of the ergonomics issues, the site must discuss about lead times for future improvements.
- Legal protection – during many inspections of the Ministry of Labour and external audits, the ergonomics management actions minimized and even neutralized issues that used to be a problem for the organization, including the support to many problematic situations.

#### 4. Conclusions

From the discussed topics, it can be inferred that ergonomics is an important pillar of prevention of occupational accidents. Furthermore, for the implementation of a health and safety management system to be effective the involvement of the workers who contribute with their prior knowledge of jobs and the co-participation of company management are essential variables to plan a method of preventing accidents.

For the studied case, the implementation of an ergonomics program have evidenced that it meets the purpose to provide the organization with elements of an effective method to develop ergonomics within a Health and Safety Management System based on OHSAS 18001. This helps the organization to achieve its goals and to show improvements in reducing work related accidents/incidents and occupational illnesses.

Developing an ergonomics program together with OHSAS 18001 in the discussed site was efficient and effective. It was evidenced in this research that assuming OHSAS 18001 as an integral part of the program and count on with the recommendations to model the monitoring and management system may be considered as a new management concept which is very significant in developing and implementing the ergonomics as a relevant process of the organization.

Inserting ergonomics indicators that impact the scorecard and its consequent impact on the company profit make the work to have a real participative approach that involves all the organization members to achieve a good program performance from top management to shop floor. The sustainability of the ergonomics program that pertains to the integrated management system also contributes to this participation.

It is expected that applying an ergonomics management method based on OHSAS 18001 would provide significant data for further development for both international and national standards to certify Health and Safety Management Systems. In addition it would serve as future base to confirm productivity improvement since until now this is limited to theoretical assumptions and cannot be evidenced in the production processes.

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