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ERGONOMIC PRACTICES IN INDUSTRIES: NATURE, MANAGEMENT AND ACTORS INVOLVED

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Summary

The present study sought to identify and understand the ergonomic practices adopted in 4 large industries in the Metropolitan Region of Campinas (RMC). Documentation was analyzed and semi-structured interviews were carried out with the actors involved in the management of ergonomic practices in these industries. The professionals responsible for ergonomics are located in the areas of health and occupational safety engineering. Inspection and compliance with standards are relevant motivators for carrying out ergonomic actions. The ergonomic improvements implemented are closely linked to the physical aspects of the work, which are easier to recognize. The actors involved understand that ergonomic practices improve issues related to health, safety, productivity and quality at work. There are difficulties in convincing the organizational leadership to carry out ergonomic improvements, and there is a need to prove the cost/benefit of these actions. It is concluded that the ergonomics specialist uses different methods, tools and strategies that are at his disposal to understand the work, with the responsibility of developing ergonomic actions according to the characteristics of the organization, its activities and its workers.

KEYWORDS: ergonomics, industry, management, OSH.

1. INTRODUCTION

There are many challenges posed by the globalization of the economy in Brazil, with the compromising of production, the high rates of absenteeism, excessive costs of treatments, absences, the high costs of compensation processes, of reintegration to work, are focuses of concern for managers from different areas of companies, who are looking for effective solutions to resolve these problems, with great social and financial impact (SILVA and BERTONCELLO, 2010). Furthermore, Regulatory Standard 17 requires ergonomic analysis of work in companies. This standard highlights the employer's responsibility in carrying out this analysis and highlights that work-related accidents and illnesses are predictable and, therefore, avoidable.

Deepening the understanding of how the company understands the ergonomic analysis of work practiced and what it makes of it is a great challenge. Given the need for industries to adapt to the requirements of Brazilian legislation and the difficulty in finding research that reports actions in this regard, it is of great relevance to know the universe of ergonomic practices adopted in industries, according to their nature (currents and methods used), management (how they are implemented and how they are managed) and the social actors involved (their training and perceptions).

Ergonomic practices can be understood as the activities that the actors involved develop in order to observe, analyze, understand, intervene, mediate, transform and design work, considering its physical, organizational and cognitive aspects.

This research sought to understand how ergonomics practices have developed, what their construction bases are and the strategies used by a group of RMC industries, identifying: the motivation for implementing ergonomic practices; the currents and methods used; the ergonomic practices carried out and the strategies adopted for their implementation; the actors involved and their perceptions.

In the world of ergonomics, there are several methodologies available to ergonomists. It is necessary to choose between them according to the nature of the proposed problem, the deadlines and usable resources and the situation to be studied (WISNER, 2003). Human factors ergonomics (HF) has roots in English (Anglo-Saxon) countries and is centered on the relationship between man and technology, considering the general characteristics of man, so that machines and technical devices are better adapted to operators (MASCIA & SZNELWAR, 1997). Meister (1999) describes human factors as physical, cognitive and motivational. HF's main objectives are to increase the productivity of men who interact with machines and to increase the safety/comfort that men, interacting with machines, feel while operating them.

Another current is the ergonomics of human activity, which emerged in Europe after the Second World War, faced with the need for reconstruction and improvement of working and production conditions. Mascia and Sznelwar (1997) state that activity analysis studies work situations in their technical and organizational context and in the relationships between production constraints. Work is analyzed as a process in which the operator, capable of initiatives and reactions, and his technical and dynamic environment interact (FALZON, 2007). This approach to the activity involves generalizing the results, but identifies the regularities relating to the limitations of the situation studied and the strategies developed by the workers. Organizational issues are present, as well as the analysis of the strategies used by the worker to manage the aforementioned distance between the prescribed and the real work, explaining the man/task system (GUÉRIN et al., 2001).

Montmollin and Darses (2011) understand that there is a complementarity between Human Factors and Activity Ergonomics. If, on the one hand, the ergonomics of human activity does not allow the establishment of catalogs of general data that can be used directly for the design of technical devices, as HF does, on the other hand, it acts where those

responsible for production have the most need: in critical situations where the operator skills that help prevent incidents and accidents at work.

Macroergonomy appears later than the previous currents, as a sub-discipline of ergonomics that deals with human-organization interface technology. This current focuses on the technological subsystem, the personal subsystem, the external environment, the organizational architecture and their respective interactions. For Hendrick and Kleiner (2006), it is a socio-technical approach (which works with the technological component, personnel and work that consists of the organizational structure), top-down (through a strategic approach), bottom-up (as it adopts the participatory approach) and middle-out (due to its focus on the process).

Iida (2005) classifies ergonomics into four categories. Design ergonomics takes place during the design of the product, machine, environment or systems. Correction ergonomics is applied in real situations to solve problems related to safety, fatigue, illnesses, quantity and quality of production. Awareness ergonomics is what empowers workers to identify and solve everyday problems. Finally, participatory ergonomics is what seeks to involve users/operators themselves in solving ergonomic problems.

According to the International Ergonomics Association, ergonomic practices can be related to different areas of specialization, such as Physical, Cognitive and Organizational Ergonomics. Physical Ergonomics is related to the anatomical, anthropometric, physiological and biomechanical characteristics of man in their relationship with physical activity, comprising work postures, manipulation of objects, movements, physical arrangement of the work environment, safety and health. Cognitive is related to mental processes, such as perception, memory, reasoning, mental load, decision processes, specialized performance, human-machine interaction, human reliability, professional stress. Organizational Ergonomics is related to the optimization of socio-technical systems, including their organizational structure, rules and processes, comprising communication, collective management, work design, teamwork, participatory design and organizational culture. For Falzon (2007), ergonomic practices can be thought of as diagnostic activities (to understand the work), intervention activities (to correct existing situations) and design activities (to develop new ways of working). The physical, organizational and cognitive aspects of work are not exclusive. Modifying one of them in activities generates possible transformations in other aspects.

For Guérin et al. (2001), the ergonomist aims to understand work in order to transform it. According to Montmollin and Darses (2011), understanding work means observing and analyzing, supported by concepts and methods, and transforming means intervening. These two axes of the ergonomist's work can vary according to the contexts, but also depending on the methodological, theoretical and deontological choices of the ergonomist, who does not intervene in isolation, but in collaboration with his interlocutors. Daniellou and Béguin (2007) state that the ergonomist knows how to identify the other actors involved and position his action in relation to theirs, favoring his mission - this dimension of the intervention is called “social construction”. Ergonomists are the transformative agents who carry out ergonomic practices in companies. They can be people not trained in ergonomics (designers using standards), people with additional training in ergonomics (doctors, design engineers) and also qualified ergonomists. The practice by the ergonomist, according to Bouyer (2014), can never disregard the subjective dimension of the activity. The practice of analyzing and understanding work in order to better consider subjective dimensions paves the way for an enrichment of models of this professional's activity.

For Neumann and Theberge (2010), in the course of professional practice, ergonomists engage in a variety of types of activities, acting as facilitators, with a proactive role in promoting the application of ergonomics in organizations.

2. MATERIAL AND METHODS

This study is part of a master's thesis and was developed with a qualitative and exploratory approach. Case studies were carried out in 4 RMC industries. It began with visits to agree on the participation of industries and their actors; the available documentation was analyzed, with the aim of understanding the organizational structures linked to ergonomic actions and the tools used by the professionals involved; semi-structured interviews were carried out with the actors. The script for these interviews sought to identify the following contents: position, function and seniority; characteristics of industries; history, construction and motivation for the implementation of ergonomics; data and activities of the professional responsible for ergonomics; other actors and areas involved with ergonomics; currents and methods adopted; ergonomic strategies and practices carried out; actors' perception of positive aspects and difficulties encountered in ergonomic practices. At least 140 hours were dedicated to interviews and documentation analysis, spread over four months in the field.

3. RESULTS

Characterization of industries, motivation for implementing ergonomic practices and actors involved

Industry 1 is a chemical multinational, with risk level 3, installed for over 60 years in Brazil. It has 2400 workers at the RMC plant, where the Brazilian corporate team is located. The implementation of ergonomic practices began in 2002 due to an inspection. The professional responsible for corporate ergonomics is a materials engineer, with the company for 23 years, specialist in EHS (Environment, Health, Safety). Industry 2 is a metallurgical multinational, with risk level 4 and has been in Brazil for 57 years. It has more than 5000 workers in the RMC plant. Ergonomics emerged in 1997, in safety engineering, together with the medical department. Inspections by the Public Ministry of Labor (MPT) were very present, having a positive influence on the continuity of ergonomic actions in the industry. The person responsible for ergonomics is a mechanical technologist and time and methods analyst, working in industrial engineering for 15 years and at the company for 40 years. Industry 3 is multinational chemical/agroindustrial, with risk level 3 and has been in Brazil for 36 years. It has 568 workers. Ergonomics began in 2009 when the manager of the safety, health and environment area questioned compliance with regulatory standards. The person responsible for ergonomics is an occupational hygienist, from the HSE (Health, Safety, Environment) area, who has been with the company for 10 years. Industry 4 is a metallurgical multinational, with risk level 4 and has been in Brazil for 36 years and has 1600 workers. Ergonomics began in 2004, with the need to improve the working conditions of the site's operating units, due to the high rate of complaints related to musculoskeletal disorders. In 2008, after inspection by the MPT, there was an increase in the ergonomist's workload and the scope of work for all operating units. The person responsible for ergonomics is an outsourced physiotherapist in the area of occupational medicine, with 10 years at the company.

With the exception of industry 3, where ergonomic practices emerged out of prevention to comply with legislation, inspection had a decisive influence on the emergence of ergonomics in other industries.

Those responsible for ergonomics were located in different areas. Two of them in occupational safety engineering, another in industrial engineering and the last in occupational medicine, below human resources. In three industries, the other sectors involved were safety engineering, industrial engineering, production, maintenance, occupational medicine, and the legal sector. The actors involved were process engineers, new project development engineers, safety technicians, leaders, production supervisors, operators, maintainers and health professionals.

In relation to the duties of ergonomists, it was clear that some differences were linked

to the professionals' training and the sector in which they operate.

Currents and methods adopted

In industry 1, a relevant influence of the matrix was observed, guided by the ergonomics approach based on HF. The main concern was related to the physical aspects (anatomical, anthropometric, physiological, sensory) of the human-machine interface. In industries 2 and 4, influences of both HF and the ergonomics of human activity were observed. Concern was noted with studying the real work of operators. In industry 4, there was a greater commitment to human variability, interference, constraints and the participation of operators in solving problems and validating improvements. In industry 3, analyzing the report made by the outsourced professional, it was verified the use of quantitative tools for analyzing physical risks.

Ergonomic Practices and Strategies Adopted

The ergonomic demands of all industries came from common sectors: production, administrative, engineering, occupational medicine and legal.

In industry 1, a structure well defined by the headquarters and followed by the subsidiary was observed. The strategies were defined in a top-down manner, with policies at the organizational level, allowing a transversal ergonomic program in the organization, incorporating this theme as the company's value and belief, as found in studies carried out by Bolis (2011). In industry 2, although with influence from the headquarters, the strategies were developed locally. Several changes to the program occurred due to the change of managers, demonstrating that the model was still linked to these actors and not to the organization itself. In industry 3 it was found that there is no program, but some actions linked to ergonomics, coordinated by safety engineering. The ergonomic analysis carried out by an external professional distanced ergonomics from the organization and even from the workers, limiting the transfer of knowledge from the specialist to the actors involved. In industry 4, strategies were developed as the ergonomist carried out his analyzes and as transformation needs emerged. It happened in a botton-up manner. Initially it had the support of occupational medicine and, with the actions implemented and the involvement of other actors, the other areas were incorporated into the model that was built. It was found that at the beginning of the continuous ergonomics process most of the actions were reactive in nature, and as the program matured, it gradually became involved with more proactive measures, becoming an integral part of the company's policy, in the same way form observed in studies carried out by Hägg (2003).

Except in industry 3, the presence of the ergonomist in design projects stands out. The specialist's participation proved to be necessary and recognized by the technical team and managers.

Another characteristic present in all industries was the interrelationship between the ergonomist and occupational medicine. Each organization had a different way of operating, however with common elements, such as monitoring musculoskeletal injuries and physical discomfort in the workplace; the suitability of work for workers with restrictions; and technical guidelines for identifying work stressors, in order to avoid the onset of illnesses or effective treatment.

To identify the improvements made, areas of specialization were considered. It was found that in all industries most of the modifications were linked to physical ergonomics, such as adjustments to: working postures, repetitive movements, lifting loads and excessive forces; modifications of machines and devices; the creation of guides and guidelines for configurations of new equipment and products. In relation to organizational ergonomics, improvements focused on establishing task rotations and breaks, as well as discussing issues of rhythm and work cycles. Only in industry 4 was there greater action in these aspects.

Regarding aspects linked to cognitive ergonomics, it was noticed that, although present in every transformation of activities, they were not recognized and understood by the majority of actors involved in the industries researched.

Perception of the Actors Involved in Relation to Ergonomic Practices/Ergonomics Programs

Similar perceptions were observed in all industries regarding positive aspects, highlighting the health and safety of workers (with the reduction of illnesses, accidents, absences, increased well-being and comfort) and also aspects linked to improved productivity and influence on organizational culture.

Regarding the difficulties presented, the following stood out: the implementation of some improvements due to the high cost; calculating the cost/benefit of improvements; few professionals involved due to a high demand for ergonomic actions; the slowness in implementing improvements; and little support from senior management for ergonomics programs.

4. DISCUSSION

Inspection and the need to comply with standards are still relevant motivators for industries to carry out ergonomic analyzes and implement improvements. In accordance with Montmollin and Darses (2011), it is observed that the ergonomic standards developed and published are attempts to establish ideal values and limits beyond which the existence of danger and excessive fatigue for the worker is considered. Many ergonomists fear that this practice encourages those responsible for designing jobs to stick to the limits set by standards, renouncing a more complete and specific analysis of the work. Although ergonomists consider standards to be useful, they also consider that a normative view can be dangerous, which corroborates Wisner (2003). Recognition by company managers is limited to compliance with legislation. On the other hand, in the Brazilian labor market, these sets of legal and normative provisions still support and suggest the construction of ergonomics in industries.

As for currents and methods, a multiplicity of methodologies used by industries were available to ergonomists (WISNER, 2003), making it necessary to choose between them all, adapting the methodology to the problem.

As Hägg (2003) reports, in corporate initiatives in different types of ergonomics programs, common elements are identified, such as prevention and health promotion, workstation modification projects, new projects, respecting aspects linked to quality , participatory aspects and training. Each industry presents different strategies, analysis tools and ways of acting.

The role of the ergonomist in the design, as evidenced in these industries, goes beyond predicting in detail the activity that will be carried out in the future, evaluating to what extent the choices will allow the elaboration of operating modes compatible with the chosen criteria, in terms of health, effectiveness productive, personal development and collective work.

It is clear that the ergonomic improvements implemented by industries are extremely linked to the physical aspects involved in the work, as they are sometimes the easiest to recognize by the actors involved. Organizational aspects are also addressed, but less frequently. Finally, in accordance with Garrigou et al. (2007), the cognitive dimensions underlying the activity are still greatly underestimated.

The positive aspects perceived by most actors involved with ergonomics in industries allude to improvements in workers' health and safety. To overcome the difficulties encountered, there is a need for more professionals involved in ergonomic actions, greater

support from senior management, and the adoption of participatory approaches, which involve workers in identifying and solving problems.

There is a clear recognition of ergonomic practices in industries in terms of issues related to health, safety, productivity and quality at work, but there are still difficulties within the organization for them to be executed quickly, easily accepted and incorporated into the company's goals. top management. In agreement with studies by Hägg (2003), ergonomics programs are still often seen as just a health and safety issue, with only a few companies reaching the state where ergonomics constitutes an integral part of the company's global strategy.

5. CONCLUSION

In his intervention in industries, the ergonomist's essential challenge is to mobilize existing knowledge and methods and, at the same time, remain available for the discovery of dimensions that this preliminary knowledge and methods had not allowed to be predicted, in accordance with Daniellou and Béguin (2007).

More than a technical construction based on the analysis of the activity, ergonomic action in new projects implies a social construction – corroborating Duarte (2002), a participatory project structure based on the involvement of operators and others responsible for production, with the aim of make them work with greater efficiency and operational reliability, recognizing the capital of experience and knowledge that the company is building during its existence.

When researching ergonomics practices in industries, it is clear that ergonomics can contribute to the renewal of business strategies, foster worker creativity for innovation, and help the industry create processes and operations by providing new efficient and effective ways of production.

Ergonomic practices favor the understanding of the activity, giving meaning to the work. They also establish dialogue between the actors involved at different hierarchical levels, contribute to transformations and improvements in order to preserve the health and safety of workers, as well as cooperating towards better performance of the organization.

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