



Participatory management in ergonomics and worker protagonism: experience report in a furniture industry in Rio Grande do Sul

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Summary

This article is based on an experience report on participatory management in ergonomics, as an important measure of workers' commitment to actions and results. The objective was focused on describing the results of applying the Ergonomic Checkpoints questionnaire: practical and easy-to-apply solutions to improve safety, health and working conditions. The field of study was a furniture industry in Greater Porto Alegre (Rio Grande do Sul). The questionnaire guided ergonomic issues and integrated the vision of the multidisciplinary group, composed of workers from the packaging sector, representatives of the Internal Accident Prevention Committee and the Specialized Service in Safety Engineering and Occupational Medicine, from the mechanical maintenance sector, production engineering, managers and ergonomics professionals, totaling 10 participants. The study is classified as observational and descriptive. As for the procedures, it is characterized by being an experience report approaching the problem under the qualitative paradigm. The results highlighted the importance of participatory management through the use of a simple tool, which guided the analysis of the problems and actions that were implemented. Improvements were generated in the organization of work and the environment, in addition to facilitating and mitigating the biggest risk found, which was the handling of products. Still in terms of results, financial gains were evaluated, although it was not the primary objective of this study group. The gains are related to the reduction of cargo handling and transport and optimization of production processes.

Keywords: Furniture industry; Participative management; Macroergonomics; World Labor Organization ergonomic checkpoints.

1. Introduction

Occupational Health and Safety (OSH) practices in companies aim to seek the well-being of workers, the prevention of accidents, illness at work, as well as the optimization of work and its results. The attention of prevention professionals is extremely important for companies that are characterized by manufacturing, such as the furniture industry, considering the number of workers involved in industrial processes. In this context, the furniture industry in Brazil, according to the Brazilian Association of Furniture Industries (ABIMÓVEL, 2023), has approximately 18 thousand companies, 80% of which are located in the South and Southeast regions. The Brazilian furniture industry, in 2021, directly and indirectly employed 270 thousand workers in furniture production, representing the eighth chain that generates the most jobs, being responsible for 1.2% of the Gross Domestic Product (GDP). The Rio Grande do Sul Furniture Industry Association (MOVERGS, 2022) highlights that the state of Rio Grande do Sul is the second largest furniture producing state in the country, with approximately 2,400 furniture industries that generate 37.4 thousand direct jobs.

Considering the number of workers in the furniture industry, one of the strategies to obtain results in the area of OSH is participatory management. Costa and Lionço (2006) state that subjects exercising participatory management sustain the meanings of their own experiences, being the protagonists in clarifying their social realities and their strategies for promoting quality of life and in line with their values and Social living. In this line of conduct, the updated vision of Occupational Risk Management (ORM) provided for in the new Regulatory Standard (NR) 01 (2020), indicates that prevention work must be integrated at all levels of the company. This approach includes operators up to management levels, with the aim of strengthening the health and safety culture in companies (MULLER, 2021).

More horizontal action, based on the integration of all actors involved in solving problems, becomes a tool to cover a greater number of workers. In the context of the company that is the focus of this case report, the ergonomics management process has been taking place for approximately 20 years, and it is possible to infer that in these years, an important transformation process has occurred in the organizational culture, as the vision of ergonomics

has become part of the day-to-day running of the company. Ergonomic performance is based on macroergonomics, with active participation of all organizational actors, especially workers. Ergonomics with a macroergonomic vision, according to Hendrick (1990), focuses on the human being, the environment, the machine, the work process and the organization, aiming to optimize the functioning of these interfaces. Macroergonomics seeks ergonomic improvements with the active participation of workers through tacit knowledge with the aim of building the most appropriate solution to ergonomic problems as a team.

Regarding the identification of ergonomic demands, NR 17 (MINISTÉRIO DO TRABALHO E PREVIDÊNCIA, 2021) guides the evaluation of the organization of work, the lifting, transport and unloading of individual loads, the furniture of workstations, work with machines, equipment and manual tools, as well as comfortable conditions in the work environment. In the ergonomic approach, Iida and Guimarães (2018) highlight that it covers all situations in which the relationship between the human being and a productive activity occurs. In this sense, with the aim of simplifying the concepts and applications of ergonomics in workers' daily lives and to guide the search for improvements, the Ergonomic Checkpoints questionnaire proposed by the International Labor Organization (ILO) and translated by Fundacentro was used as a tool. The questionnaire was developed to be used by teams seeking to implement improvements to working conditions, based on practical solutions to ensure safety, health and efficiency (ILO, 2018).

The questionnaire revised in 2018 covers the main ergonomic factors of the workplace, which are organized by categories into the following subjects: storage and handling of materials; hand tools; the safety of production machinery; the design of jobs; the illumination; the facilities; the control of dangerous substances and agents; the service locations and facilities and the organization of work. It is observed that in this context, where workers were the main protagonists in the analysis and implementation of improvements, the ILO tool was essential, due to the simple and didactic way in which it presents the ergonomic issues to be verified, including the organization of work.

In the case of this study, the use of the questions proposed by the ILO was adjusted based on the needs of the company, sector and/or ergonomic demands. In this way, it is possible to use it to guide the search for solutions for a specific objective that meets the categories

proposed in the questionnaire. It is noteworthy, however, that the expertise of each worker brought specific knowledge to propose solutions and the integration of actions that guided the most appropriate solutions for each situation. Bearing in mind the importance of workers in the macroergonomic approach as a means of transforming organizational culture, the following research problem is exposed: an approach directed through a questionnaire could contribute to facilitating the interaction of ergonomic concepts with the experience of workers to Looking for ergonomic improvements?

Therefore, the objective of this study is focused on describing the experience of using the OIT questionnaire to develop ergonomic improvements in the packaging sector in a furniture industry, with the worker as the protagonist of ergonomic actions. Regarding the objective, the study is classified as descriptive observational and regarding the technical procedures, it is characterized by being an experience report approaching the problem under the qualitative paradigm.

Ten workers participated in the meetings to discuss ergonomic demands and the application of the ILO questionnaire, including representatives from the packaging sector of a furniture company, representatives from the Internal Accident Prevention Commission (CIPA) and the Specialized Service in Engineering Safety and Occupational Medicine (SESMT), in the mechanical maintenance sector, production engineering, managers and ergonomics professionals. As for the data collection instrument, a block of questions from the ILO Ergonomic Checkpoint was selected, related to the handling and storage of materials. This demand was previously identified in the Ergonomic Work Analysis (AET), in the packaging sector. Another step carried out, which complements the application of the questionnaire, was the visit of all group members to their work stations, to carry out an analysis of activities in the packaging sector and thus provide a more focused experience to seek solutions to problems. ergonomic.

Data analysis and discussion was carried out through data triangulation, based on the concepts proposed by Minayo, Assis and Souza (2005). The authors describe, through data triangulation, the interlocution of different points of view that practically allows interaction, criticism and comparison between knowledge to allow a synthesis of collective construction.

2. Development

With a view to participatory management in ergonomics and the worker's leading role in the process of analyzing and discussing ergonomic improvements, the Ergonomic Checkpoints questionnaire proposed by the ILO (2018) was used. The tool provides a participatory approach and aims to help resolve ergonomic problems. In this way, bringing workers from different areas of the industry increasingly closer together to exchange experiences and knowledge. In this sense, Iida and Guimarães (2018) highlight that participatory ergonomics involves the system user himself in solving ergonomic problems when considering that users have practical knowledge, the details of which may go unnoticed by the analyst or designer. The proposal to apply the ILO questionnaire arises due to the fact that the methodology recommends practical solutions that are easy to apply in everyday work, through a systematic analysis carried out by a discussion group.

The objective of applying the ILO questionnaire to workers and a multidisciplinary team was focused on providing a participatory experience of analysis and discussion of ergonomic problems and the search for improvements. To this end, monthly face-to-face meetings and on-site analysis of work activities in the packaging sector of a furniture industry took place. The purpose of the questionnaire was clarified, and one of the differences was the participation of workers from other sectors to gather experiences and share the good ergonomic practices already implemented.

The focus of this study was the packaging sector, which in terms of ergonomic problems, according to Ergonomic Work Analysis, are centered on product handling. Biomechanical risks are caused by weight/force overload and critical postures of spinal flexion and rotation during product handling. According to Kroemer and Grandjean (2005), handling loads, such as lifting, lowering, pushing, pulling, carrying, holding and dragging, can involve static and dynamic effort, which characterizes it as heavy work. According to ILO Ergonomic Checkpoint 15 (2018), turning or tilting the trunk are movements that are not very stable, the worker wastes more time and ends up more tired than when performing the same work without these movements.

Associated with product handling, the main complaints reported by workers were focused on corridors locked due to excess materials from the Shipping sector. This situation generated extra physical effort, as it made it difficult to manually load the products, especially when repairs were carried out. In this case, the products were carried above shoulder level, due to restricted physical space, to the repair machine which was far from the packaging area.

To meet the demands centered on product handling, block 1 of the Ergonomic Checkpoints was chosen, proposed by the ILO, which evaluates the handling and storage of materials. This block consists of 21 questions that aim to evaluate the possibilities of mitigating inappropriate postures and physical effort, as well as improving the safety of the work environment. Each meeting lasted one hour, where the questions proposed in the questionnaire were initially read, and afterwards, a visit to the sector was carried out to clarify doubts and evaluate the improvement proposals together with the workers.

3 monthly meetings were proposed, which took place in the months of July, August and September of the year 2022. The demands were forwarded and in the first month, several actions were carried out, and at the end of the third month, it was found that the processes of the Packaging stage were more organized. Among the actions carried out are: removal of ready-made products that were taking up the space around the machine and obstructing the aisles; the plastic coils were stored in a location close to the winch, avoiding manual transport; the cardboard angles were identified and organized to facilitate the work activity; pallet racks were installed to make better use of physical space; a sewing machine was installed to repair products next to the packaging machine to avoid product handling; the aisles close to the machine were demarcated to avoid pallets of ready-made products in inappropriate areas; the plastic waste disposal cage was relocated elsewhere to ensure aisles remained unobstructed; The plastic sealing machine was put to test to correct flaws in the plastic closing performed automatically by the equipment. This measure avoids handling the mattress for repackaging, as well as plastic waste in the new packaging.

In Figure 1, the situation can be seen before (1A) and after (1B) the improvements made: such as freeing up the aisles and removing pallets of products from the circulation area and placing shelves for stock, which provided more space and improved the sector organization.

Figure 1 – Before and after organizing the physical packaging space



Source: Authors, 2023

The Production Engineering sector evaluated the improvements made with the aim of measuring financial gains. In this context, Hal Hendrick, in an international lecture held in 1996, emphatically mentioned that "good ergonomics is good economics" (HENDRICK, 2003). This bias allows ergonomics, related to the production sector, to also be accepted by proving the favorable cost/benefit ratio. The result can be seen in Table 1, where it is possible to identify the improvement and gain obtained.

Table 1 – Improvements and gains obtained

Description of the improvement	Gain achieved
The plastic coils were stored in a location close to the winch, avoiding transportation.	Travel was avoided and the proximity of materials was improved, resulting in daily savings in the number of changes and the time involved in carrying them out.
The electric hoist was replaced with a more robust structure, making it possible to increase the weight of the plastic coils from 50 kg to 100 kg. The plastic weight was unified, thus eliminating 12 micron plastics.	By unifying plastic weights to 10 microns, physical space was improved as fewer storage pallets were needed around the machine. With the unification of plastics we saved R\$9,438.59 per month on materials.
A sewing machine was installed to repair the products next to the packaging machine to avoid handling the products.	Monthly savings of R\$424.75 with reduced product movement.
The plastic sealing machine is being tested to correct flaws in the plastic closing performed automatically by the equipment. This measure avoids handling the product for repackaging, in addition to plastic waste in the new packaging.	Monthly savings of R\$819.06 on materials, as plastic waste was avoided with packaging.
Total savings/month	R\$ 10.914,44

Source: Authors, 2023

Although the initial objective of the ergonomics project was not focused on achieving financial gains, it is important to highlight that ergonomic improvements represent a win-win for companies. Working conditions improve and allow workers to perform their activities with more ease and comfort, as well as with fewer physical and biomechanical constraints. The company, on the other hand, saves in terms of time, with unnecessary material handling.

Loss due to movement and loss due to transportation are described by Shingo (1996), who identifies the seven production losses, which include: losses due to overproduction, losses due to transportation, losses due to excessive processing, losses due to manufacturing defective products, losses due to waiting, movement losses, inventory losses. In the Packaging sector, the transport or movement of materials was optimized by bringing the sewing machine closer to carry out the repair, and by using equipment to manually correct the failure to close the plastic packaging. In both situations, the product was handled, causing physical overload when correcting the failure. By eliminating handling, there is an increase in the time in which workers carry out activities that aim to add value, based on the total time they spend in the organization (ANTUNES et al., 2008).

In addition to the gains related to the process, satisfaction was expressed regarding the improvements in the activity and work environment of the Packaging team of workers. This was manifested in the opinion survey with workers, carried out to understand their perception of the improvements made. Next, two testimonials from the opinion survey on the improvement implemented to organize the physical space of Packaging are presented. The results were expressed as follows: "The physical space has improved, the shelves are good and so is the sewing machine", and "I think it's looking great! The sector is getting organized, the physical space has increased, and with the machine of sewing for repairs has become more practical." In terms of suggestions for improvements, in addition to those already implemented, it was stated that: "it could have a table to facilitate the removal of the product at the end of the packaging", "have another fan and another clock point to pass the badge". Based on this feedback, improvements will continue to be implemented, configuring a continuous process of improvements in ergonomics and participatory management. Based on the results of the opinion survey, the validation of the improvements implemented was successfully obtained by the study group in the packaging stage.

The methodology of an interactive and participatory approach, with the protagonism of workers, will be applied to other specific demands from other sectors of the same industry. To date, the methodology has been applied in two other sectors of the furniture industry, to meet specific ergonomic demands with different work groups. In both situations, the positive results in working conditions and compliance with NR 17 stand out. In this way, it was observed that the use of the questionnaire proposed by the ILO, associated with the macroergonomic and participatory approach to the development of improvements, facilitated the understanding of concepts and methodologies appropriate and adapted to the reality of the company and workers, considering the assumptions of NR 17.

3. Conclusions

This study aimed to evaluate the results of an approach directed through a questionnaire and its contributions to facilitate interaction and approximation of the concepts of ergonomics practice, considering the experience and protagonism of workers in the search for ergonomic improvements. It is believed that a single isolated method does not guarantee that the study objectives will be achieved. In this way, the approach used was successful, by associating the macroergonomic vision, which foresees the participation of workers in all phases of the ergonomic evaluation process, added to the systematized proposal of the questionnaire, with directed questions.

This simple tool, but which proved to be effective, will be applied to other ergonomic demands in the industry. By involving other participants, in new study groups, it is possible to disseminate ergonomics concepts in a simple, practical and applicable way in any context, with the worker as the main agent of transformation to improve processes and mitigate ergonomic risks.

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