



WORK IN THE SOLID WASTE SORTING PROCESS – APPLICATION OF EWA IN A COOPERATIVE IN SÃO CARLOS - SP

Muller Rodrigues Parra

Universidade Federal de São Carlos - UFSCar
muller_mrp@hotmail.com

Gabriel Juvenal Reinert

Universidade Federal de São Carlos
gabriel.j.reinert@gmail.com

Rosalina Ogido

Universidade Federal de São Carlos
rogido@ufscar.br

Luiz Tonin

Universidade Federal de São Carlos
tonin@dep.ufscar.br

Summary

In services sorting materials for recycling, in general, there is very little use of the concept of ergonomics, either due to a lack of information or conditions for its application. In the screening process, most of the activities involved involve repetitive movements, lifting weights and transporting materials without the necessary equipment, causing fatigue and musculoskeletal injuries. Therefore, through the use of EWA, we sought to identify and evaluate deviations in relation to recommended standards that put biosafety, health and worker well-being at risk. It was therefore possible to indicate processes and equipment in an irregular situation, such as the absence of benches or lumbar support, PPE and other equipment during the working day, the high repetitiveness of a single action or function, the high risk of accidents, among other things and, thus, highlight the need for interventions in order to guarantee a minimally healthy work process.

Keywords: Ergonomics. EWA. Screening. Recycling. Health.

1. INTRODUCTION

Concerned about obtaining resources for their own subsistence and that of their family, waste sorting workers expose themselves to the risks inherent to the activity and adverse effects of this exposure are understood as normal work-related eventualities when, in fact, they characterize accidents, irregular work or processes (Albizu, 2008).

In Brazil, as in other developing countries, material collection, sorting and recycling activities take place manually, without protection and/or using obsolete equipment (Cornieri, 2011). The high turnover of workers in sorting cooperatives is directly associated with the precariousness and fragility of this work (Moises, 2009).

The determining factors for whether or not workers remain in this sector are working conditions, low pay, lack of opportunity to enter the formal job market and factors inherent to contact with waste (Moises, 2009).

Considering that adverse situations are directly related to vulnerability to illness (MS, 2011), the observation of aspects of quality of life and work, access to the public health network and socio-environmental conditions are essential for a better understanding of the illness process of the worker (Ayres et al., 1999).

Most of the activities carried out in the sorting process involve repetitive movements, heavy lifting and transport of materials without the necessary equipment, leading to fatigue and musculoskeletal injuries (Albizu, 2008; Bleck 2012; Wettberg, 2012; Souza, et al., 2014).

When asking about pain exclusively related to work, Souza et al. (2014), identified in workers allocated to the screening task, mainly complaints of pain in the upper and lower parts of the spine, shoulders, arms and legs, characterized as “unbearable”.

Another major risk to workers' health is the proliferation of populations of rodents and insects responsible for the transmission of diseases such as leptospirosis, yellow fever and dengue, due to the often inadequate disposal of materials (FUNASA, 2010).

Another possible consequence of the inadequate organization of these materials is that this fact can contribute to the occurrence of accidents, from small cuts to mutilation of body parts by sharp objects (Cornieri, 2011).

2. METHODOLOGICAL ASPECTS

This study was carried out in a cooperative, in the city of São Carlos, in the state of São Paulo, Brazil, of collectors formed in 2002, by workers from the city's landfill. This cooperative produces material processed from household solid waste (e.g. glass, cardboard, aluminum, plastic).

This cooperative provides services to the Municipality of São Carlos, receiving basic infrastructure – a shed, three trucks and two presses – and payment upon reaching contractual targets.

For this research, the Ergonomic Workplace Analysis (EWA) methodology was used, a tool for the common understanding of the work situation, also serving to evaluate changes in the work environment.

work, to compare different jobs with the same type of activity, to archive information about the job, among others (FIOH, 1989).

EWA is theoretically based on work physiology, biomechanics and occupational hygiene, psychological aspects and the participatory model of work organization, and may represent general and objective recommendations for healthy work (FIOH, 1989). This tool is based

on 14 quantifiable items and representatives of projectable health, safety and productivity factors at the workplace (FIOH, 1989).

Then, the cooperative's ergonomics were assessed using this tool, following the recommendations and standards described in its manual. After this collection, the data was processed and evaluated.

3. RESULTS

The use of EWA made it possible to define, during the execution of the screening work (previously defined as an analysis section) on two different tables, processes and/or equipment with deviations, large or small, from the standard recommendations for safe work that maintains health of the worker. Figure 1 shows the dimensions of the sorting tables and Figure 2 represents the elucidation of the workstation.

In the analysis of the first item, Workspace, it was possible to identify that workers used horizontal area 3 most of the time when carrying out their work activities, which is ideally intended for infrequent activities. The visual distance is, in general, compatible with the size of the materials being worked on and the viewing angle varies between 30° and 60°.

There was no high stool, lumbar support, hand tools or other work equipment and utensils available for workers.

The work is mainly framed as handling materials while standing. The sorting table is 80 cm high, leaving materials, in general, very close to the lower limit (10 cm away from elbow level) and far from the upper limit (30 cm away from elbow level) of the recommended range in order to avoid musculoskeletal diseases. Knowing that workers perform their work standing up, the only irregular distance in this item, besides the work area, is the free space behind the worker, close to 60 cm.

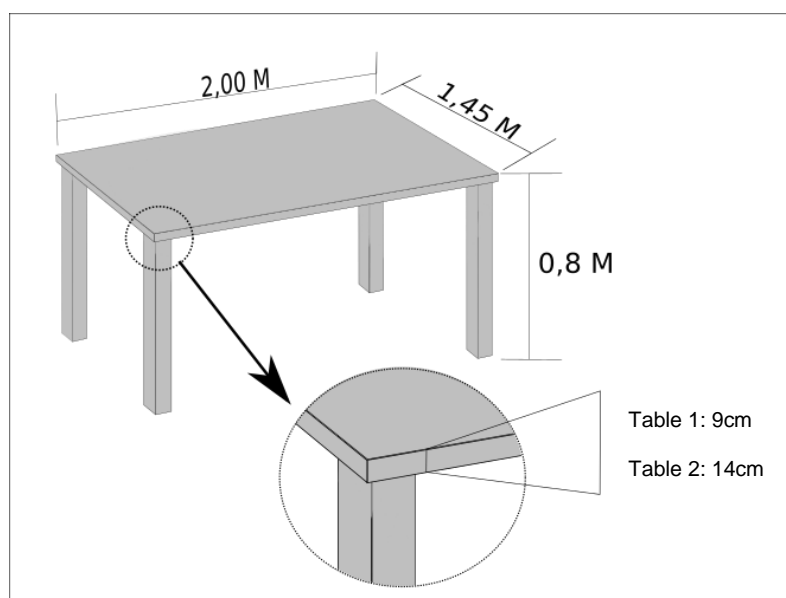


Figure 1: Dimensions of the sorting table. Self elaboration

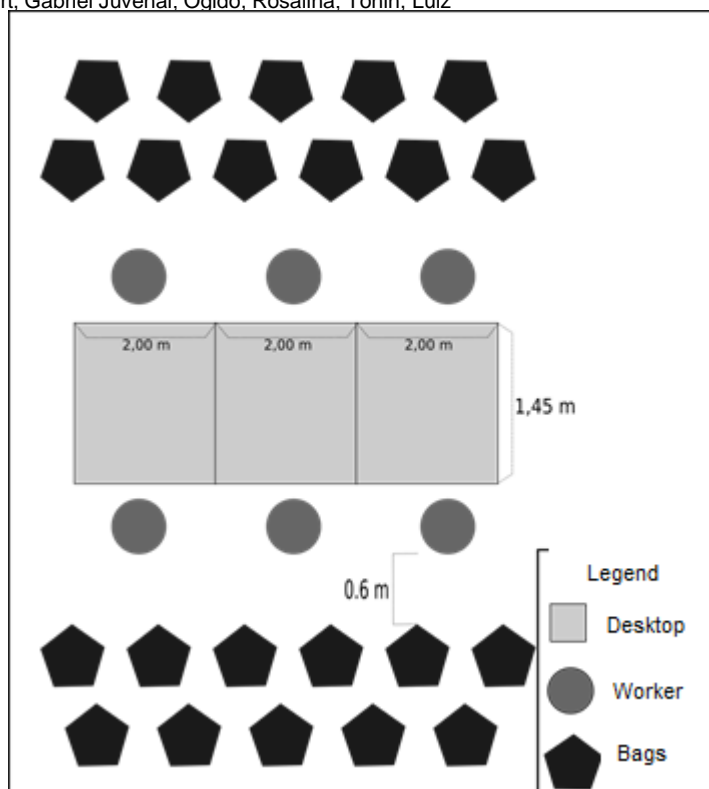


Figure 2: Elucidation of the job position. Self elaboration

We move on to the second item, General physical activity, whose necessary physical activity can be defined as optimal, given that it depends on the organization of work and that workload peaks do not occur frequently and do not produce a risk of excessive effort. However, the space and working method limit work movements. For the third item, Load lifting, the work was divided into two parts for analysis. The first would be routine sorting work, where the load can be easily lifted; the second would be lifting the “bags” to the sorting tables, where loads are lifted to a height of 80 cm, with the hands distanced from the body

between 30 and 50 cm, with the load varying in weight between 8 and 21kg.

Regarding working posture and movements, all points of analysis (neck-shoulders, elbow-wrist, back, hip-legs) showed small deviations, showing limitations in meeting the recommendations.

However, when analyzing the risk of accidents, the presence and handling of materials that may have sharp edges and risks of poisoning due to the dispersion of aerosols and other volatile compounds were identified during work. Therefore, the risk of an accident is very high and the severity can vary from mild to very serious.

With regard to work content, decision making, repetitiveness and attention, the worker, in general, is responsible for a simple task or just an operation with clear and unambiguous instructions, with an average duration of a repetitive work cycle below 5 seconds. Due to the short duration of this cycle, the observation time is minimal, representing less than 30% of the total value; however, the demand for attention can be framed as average, being an activity of positioning an element with a pattern.

The production method does not limit work and communication is possible during the execution of activities, being relatively limited by location at the post and/or need for concentration.

Regarding the characteristics of the workplace (lighting, thermal environment, noise), there is no glare due to the presence of clear or radiant light, reflective surfaces or shiny areas, the work environment presents small variations in temperature, marked by the seasons, and there is an estimated noise level of approximately 75 dB under normal

ambient noise conditions.

Therefore, restrictions on work, decision-making and lighting were assigned a value of 1, where the specifications are as close to ideal as possible; to general physical activity, lifting loads, working posture and movements, communication between workers and personal contacts and attention to value 2, indicating the presence of limitations in meeting recommended standards, but with a low risk of causing damage to workers' health;

As for the thermal environment, the value 3 was assigned, indicating deviations in relation to the recommended standards that may, over time, pose risks to workers' health; for the work space and presence of noise in the work environment the value 4, which indicates large deviations in relation to the recommended standards, making the work environment likely to cause damage to workers' health and; the risk of accidents, work content and repetitiveness of work the value 5, indicating large deviations in relation to the recommended standards and which, commonly, can cause damage to the worker's health.

4. DISCUSSION AND FINAL CONSIDERATIONS

EWA was used in this study to evaluate and indicate irregularities in the task performed on the sorting table, which requires manual skill and manual movement of materials.

The analysis made it possible to identify the presence of deviations in relation to the recommended standard in most items. This data is consistent with what was found in the literature, highlighting how this type of activity is neglected from the point of view of safety and health, even being on the margins of labor legislation.

Due to issues related to the organization of the work space, work positions are irregular and inconsistent. The workstation does not have a high bench or lumbar support, has limited space for worker movement and does not have tools to help carry out the activity. The activity is performed standing, for approximately 8 hours a day, characteristically repetitive and with a certain demand for attention.

The risk of accidents is high and there is no presence or use of PPE, which leaves workers vulnerable to physical accidents (e.g. cuts, punctures), chemical accidents (e.g. inhalation of solvents and/or other volatile compounds present in sorting materials), biological (e.g. fungi, bacteria, viruses) and physical health problems (e.g. musculoskeletal diseases).

This makes it possible to highlight the need for interventions that eliminate or, at least, alleviate the identified irregularities, with adaptation of the activity and workplace in order to guarantee the worker's biosafety, health and well-being.

In order to validate the discussion held here, a subjective comparative assessment of the items analyzed by the workers would also be necessary. However, due to the country's epidemiological situation due to the Sars-CoV-2 virus, it was not possible to carry out this, so this part of the process must be postponed.

With this, the objective of the research was fulfilled, in order to observe and classify the screening process of solid waste collectors, seeking to identify points for improvement and proposals for these points.

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