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# THE ROLE OF THE MANAGER IN THE EFFECTIVENESS OF ERGONOMIC INTERVENTIONS: MENTORING AND IMPROVEMENT OF THE PERFORMANCE OF CONSULTANTS

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## Abstract

Work can be a fulfilling experience for some and a source of hardship for others. Numerous authors delve into the complexities of workplace dynamics, examining the impact of the work environment on employees and their interactions, often highlighting negative aspects that can hinder productivity and harm a company. Specialized professionals in Ergonomics and Human Factors can assist companies in implementing various improvements, conducting interventions such as Preliminary Ergonomic Assessments and Ergonomic Work Analysis, aiming to create a more productive environment that promotes comfort, safety, and health in the work routine. This research seeks to identify the best practices for ergonomics consultants, with or without experience, working in a large non-profit organization that provides Occupational Safety and Health services to industries in the state of Rio de Janeiro and other locations, aiming for more robust knowledge management and effective service delivery in the field. The study methodology employs a semi-quantitative approach, utilizing an online form with closed and open-ended questions directed at professionals working in this company, who are currently involved in or intend to work with Ergonomics. The responses will help the author adopt management actions aligned with the expectations of the study's focus group - largely composed of Occupational Safety Technicians - to enable strategies that effectively support workplace transformation among diverse clients. This involves understanding, even in the preliminary phase, the root causes hindering a productive, comfortable, and safe environment within these companies.

**Keywords**: Ergonomics; Human Factors; Management; Work Transformation; Ergonomics Consulting.

## 1. INTRODUCTION

The Labor Regulatory Standard No. 17 (NR-17) of the Ministry of Labor and Employment refers to "Ergonomics" and aims to establish the guidelines and requirements that allow the adaptation of working conditions to the psychophysiological characteristics of workers, in order to provide comfort, safety, health and efficient performance at work.

But what is "Ergonomics"? Ergonomics (or Human Factors) is a science that requires a study that seeks a qualitative look at the activity, which ends up requiring considerable experience from the consultant to be put into action correctly and ensure that companies adopt

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good actions to improve work, allowing to bring a safer environment, healthy and comfortable for all (adapted from GUERIN et. al., 2001).

When the adaptation of working conditions is not adequate or effective, risk situations may arise and affect the health of workers, for example, in the psychosocial sphere, where the work environment leads to the employee's mental illness. The direct and indirect consequences of these risks can affect the company in its operational capacity and, above all, with the generation of work accidents, occupational diseases, absenteeism, among other occupational ills.

According to Technical Note No. 287 of 2016, NR-17 does not indicate the professional who can perform the ergonomic analysis of a workplace, but rather that he must have the necessary knowledge to do so, according to the excerpt: "Although there are already associations in Brazil that certify ergonomists and postgraduate courses in Ergonomics, there is no legal provision that imposes any type of specific qualification at this point, so that the company must ensure that the hired professional effectively has the knowledge and capacity to prepare the AET".

In this sense, Cardella (2016) exposes the complexity of work by mentioning that the human being constitutes the essential element of an organization, which is a group of people with a mission. The author also specifies that equipment and materials are necessary to perform the mission and other vital functions through operational systems, but what characterizes the organization, especially as a living system, are people.

Following Cardella's (2016) line of reasoning, Keeps (2021) states that a good leader is not only someone who can manage their workers in a positive way, but also in a motivating and intuitive way. The focus would then be on training, understanding and execution of tasks.

It is a great challenge for a consultant with little experience to have a full understanding of the work activity, to the point of recommending effective improvements. The project manager in the role of "mentor" should make the exchange between the vision of the problem and the path of transformation, given the complexity of the work, whether administrative or "factory floor".

It is worth mentioning SZNELWAR (2024) when we think about the issue of work bringing new challenges to the performance of ergonomists or, even as professionals inserted in some activity related to work, including law, philosophy, sociology, anthropology, engineering sciences, management sciences and health sciences, among others. The author highlights that the development of subjectivities depends on organizational conditions in which

the processes of recognition and, consequently, of the constitution of the pleasure of working, are not blocked. Therefore, the possibility of being creative; Creativity, being one of the human characteristics, an ever-existing potential, should be inserted in any and all production contexts, be part of any task. This, inspired by the sciences of work, especially the psychodynamics of work and ergonomics centered on activity, would be a safer step for work to be effectively adapted to the human being (SZNELWAR, 2024).

According to FERREIRA (2024), the ergonomist is the professional responsible for putting into practice the teachings of Ergonomics: his job is to analyze the work of others. To some, this seems simple: it would be enough to watch someone at work. In fact, many believe that, for the ergonomist, it would be enough to take "a look" at how the person works, in their postures, to understand everything. In reality, analyzing the activity in a work situation presents all sorts of difficulties.

Therefore, the research seeks to identify good practices to be followed by ergonomics consultants, with or without experience, who work for a large non-profit company, located in Rio de Janeiro, aiming at a more solid knowledge management and allowing the delivery of effective services in Ergonomics.

Situational Leadership - Guiding Leader / Guiding Leader / Supporting Leader / and Delegating Leader - proposed by Hersey & Blanchard (1986) exalts the importance of a good manager, in this specific case of Ergonomics consulting, offering mentoring to those who are starting in the area and do not have enough knowledge to understand the work to transform it in the most effective way possible. This manager, however, must have the necessary experience to fulfill the role of mentor.

One must ask, above all, what management tools could promote a better understanding of the root cause of a work-related problem (study demand) and possible solutions?

One of the possible methods is *brainstorming*, as it makes it possible to absorb all the knowledge acquired about the real activity and what it can show us as a source of transformation. The ergonomics consultant needs to keep in mind that the worker's word is the kick-off for a truly transformative action at work.

According to the PMBOK (2017), the goal of *brainstorming* is to get a comprehensive list of each project risk and the sources of the overall project risk.

As a general objective, the study sought to know which tools and methods can be used to understand the needs of workers and better suggestions for improvements, which are easy to

understand by consultants who are at the forefront of ergonomic interventions within companies, especially those with less experience in the subject. In this way, the figure of the experienced manager plays the role of facilitator, directing the team of consultants to the success of their consultancies.

## 2. MATERIALS AND METHODS

The work was developed with empirical research through an online form (Google Forms), to collect a sample of data from ergonomics consultants, with or without experience, who work for a large non-profit company. The sample was collected through a personal network of professional contacts, with the help of the "WhatsApp" and "Office Outlook" (email) application in August 2023. It is important to note that there was the approval of the leadership of the evaluated population to send the link to the form, and each person who responded received PDF content on the theme "Ergonomics" as a form of thanks. Therefore, the disclosure was made individually with each occupational safety professional in the company.

The questions of the online form are based on a questionnaire with sixteen closed questions and one open question, addressing criteria for surveying the evaluated population, experience, technical vision on Ergonomics and efficient methods. The Likert Scale technique was used (in a total of six questions) to assess which method the population would choose for the action of understanding the root cause and the adequacies. According to TROJAN & SIPRAKI (2009), these scales are also called summations, and refer to a series of statements pertinent to the researched object, using more than one type of scale, assigning a number to each answer, aiming to measure the respondent's attitude towards each statement. Initially, according to the authors, data are collected on certain statements, on which options with degrees of intensity or importance are offered. According to Appolinário (2007, p. 81), the Likert scale can be defined as a "type of attitude scale in which the respondent indicates his degree of agreement or disagreement in relation to a certain object". At the end of the form, there is an open qualitative question to understand if the respondent knows any other method not described in it.

The data analysis methodology adopted was the elaboration of graphs for the closed questions and content analysis for the open question (last question), with a quantitative and qualitative-descriptive aspect. Possible disclosures of the results will have the endorsement of the researched company.

## 3. Results and Discussion

Information on the profile of the people evaluated is presented a priori. The graphs (figure 1) below show, in this order: participation in the survey (out of a total of 59 people) and the age group of the population.

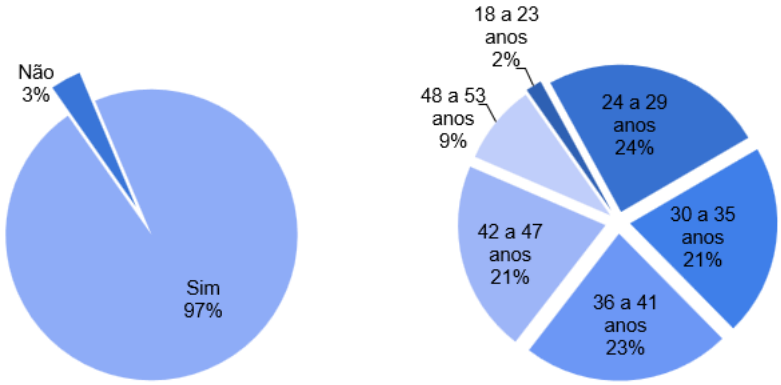


Figure 1. Graphs: 1st) participants in the research; 2nd) age group. Source: Original survey results

A good sample of the working population (target of this research) was obtained, with 97% (N=57) participation out of a possible 59. They are divided into four regions in the state of Rio de Janeiro – north, south, east and west – providing occupational safety and hygiene services. Regarding the age group, 24% are between 24 and 29 years old, 23% between 36 and 41 years old, 21% between 30 and 35 years old, 21% between 42 and 47 years old, 9% between 48 and 53 years old and finally 2% of the respondents between 18 and 23 years old. This audience allows for a better exchange of experiences in the practical tasks of the classes, with different views that tend to motivate everyone's learning, as long as it is well conducted by the person in charge.

Figure 2 shows the main position of the research participants.

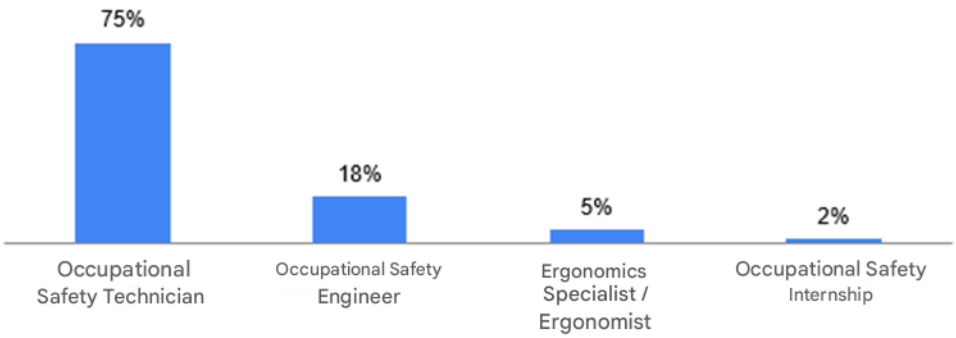

Figure 2. Chart on the position of the participants. Source: Original survey results

It is worth highlighting the importance of the Occupational Safety Technician - 75% of the total - for the research, since they are responsible for going to the field for the preliminary ergonomic assessment[2] (AEP), and who demand more help from the experienced manager. The safety engineer (18%) and the specialist (5%) play the role of project managers.

The level of education is shown in figure 3, below.

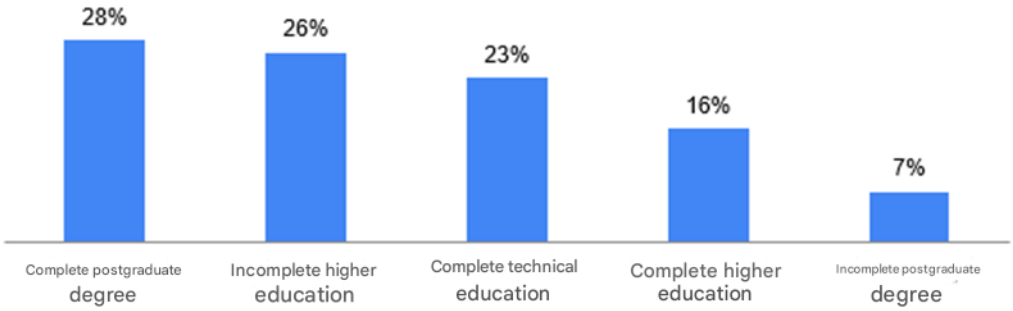


Figure 3. Graph on the level of education. Source: Original survey results

It is verified that 28% have completed graduate studies, followed by incomplete graduation 26%, complete technical education 23%, complete undergraduate 16% and complete graduate studies, with 7% of the total. Another positive factor for the training and good performances by the team is the fact that 77% of the total has already completed or is carrying out an undergraduate or postgraduate degree, which theoretically would increase the technical level of the team and facilitate the manager in training and recycling in the area of Ergonomics.

In figure 4, the first graph corresponds to the performance with Ergonomics or Human Factors or any service that is related to the area and, then, to the frequency of working in the area.

[2] The AEP is, according to NR-17, a preliminary study that can be contemplated in the stages of the hazard identification and risk assessment process, described in item 1.5.4 of Regulatory Standard No. 01 (NR 01) - General Provisions and Management of Occupational Risks.

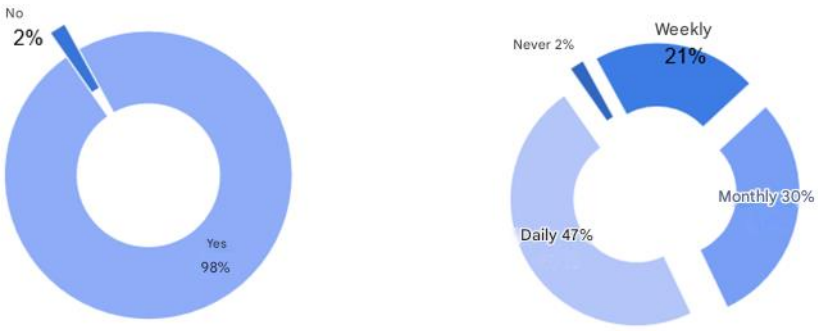


Figure 4. Graphs: 1st) "Do you already work with Ergonomics or Human Factors?"; 2nd) "How often do you work with Ergonomics?". Source: Original survey results

Of the respondents, 98% already work with Ergonomics, 47% of which are "daily", 30% "monthly", and 21% weekly. It is worth remembering that in the company surveyed, the demands of Ergonomics vary greatly, depending on the region of the state of Rio de Janeiro, some with more industries than others, for example. The fact is that many ergonomics reports are conceived throughout the year, which requires discipline with deliveries and skill in information. Again, the fact that the topic is familiar to a large part, who works daily or weekly, makes recycling and guidance easier for the manager, since it is not a new topic for the researched public.

Figure 5 shows the services in the area of Ergonomics that the respondents perform.

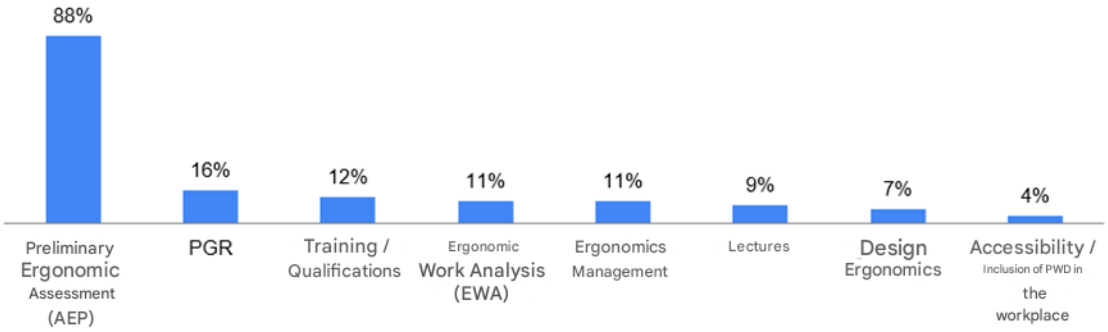


Figure 5. Chart - With which service(s)? (more than 1 option per respondent). Source: Original survey results

The AEP service is indicated by 88% of the respondents as a service provided, followed by the Risk Management Program (PGR) (16%). These are where there is the greatest demand for support and mentoring by the specialist.

Figure 6 shows the main difficulties with Ergonomics, according to the respondents, among some options.

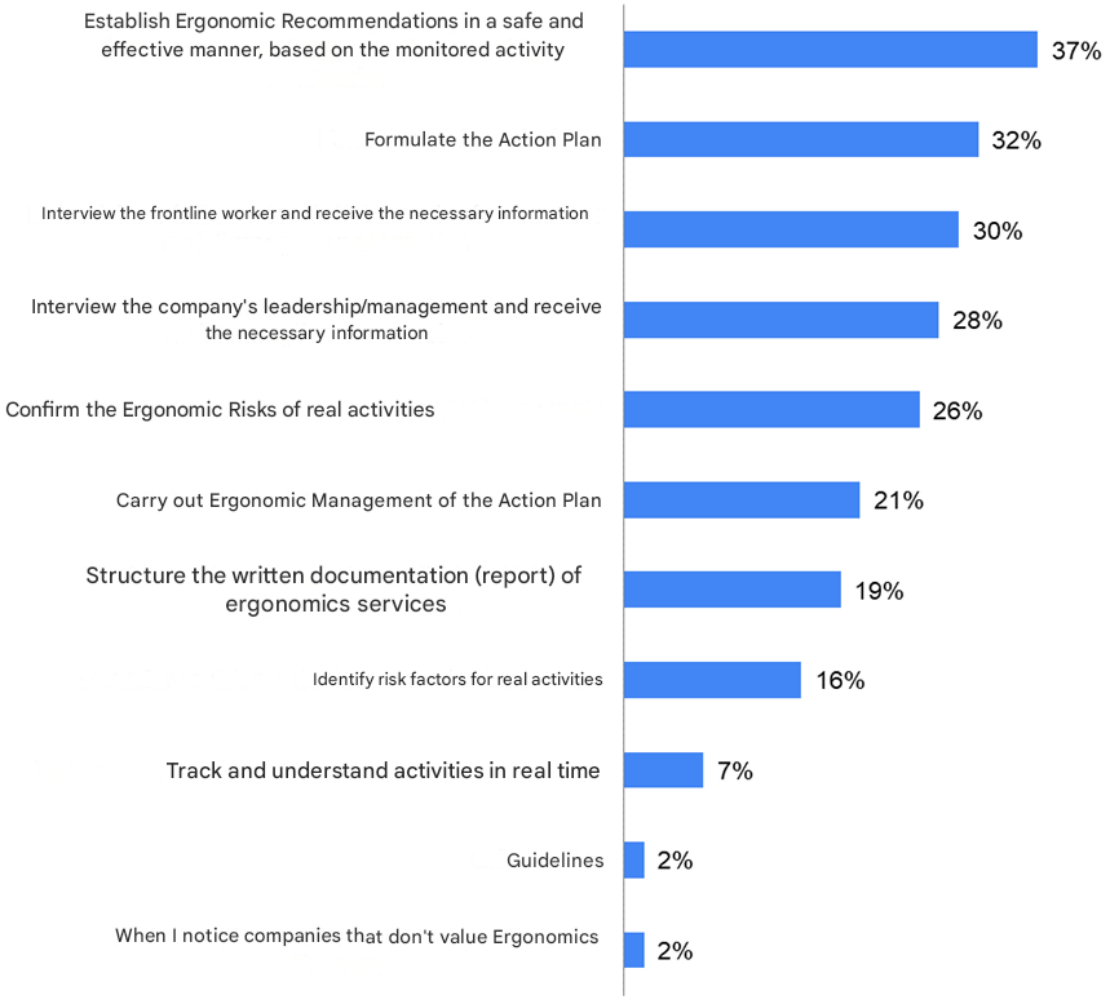


Figure 6. Graph - What are your main difficulties with Ergonomics, among the options below? (more than 1 option per respondent). Source: Original survey results

The five most relevant difficulties, according to the respondents are: "Establishing Ergonomic Recommendations in a safe and effective way, based on the activity monitored", with 37%; "Formulate the Action Plan" – 32%; "Interview the frontline worker and receive the necessary information" – 30%; "Interview the company's leadership/management and receive the necessary information" – 28%; "Confirm the Ergonomic Risks of real activities" – 26%. The result is in line with the object of this study, which is to promote safer management of the field team to promote work transformation, that is, effective ergonomic recommendations that will be part of an action plan.

Figure 7 lists the ways to establish ergonomic recommendations.

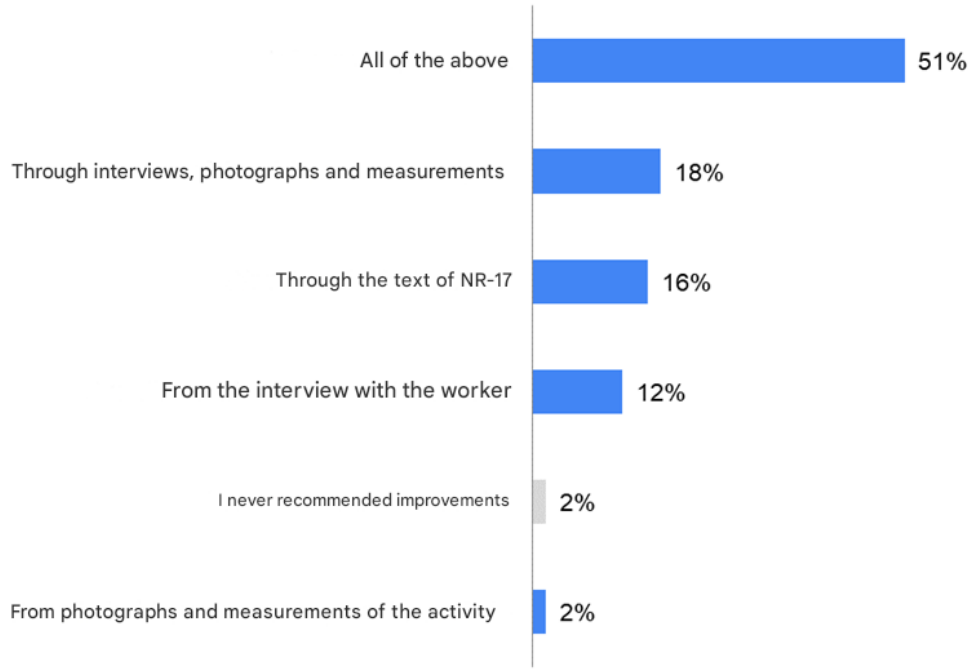


Figure 7. Chart – How do you establish ergonomic recommendations? Source: Original survey results

More than half (51%) say they use all the options presented to establish ergonomic recommendations. For 18%, only "through interviews, photographs and measurements"; to 16% "of the text of NR-17"; for 12% "from the interview with the worker"; and to 2% "from photographs and activity measurements". Two percent say they have never recommended improvements.

Figure 8 below presents the main difficulty in recommending some ergonomic improvements by the respondents.

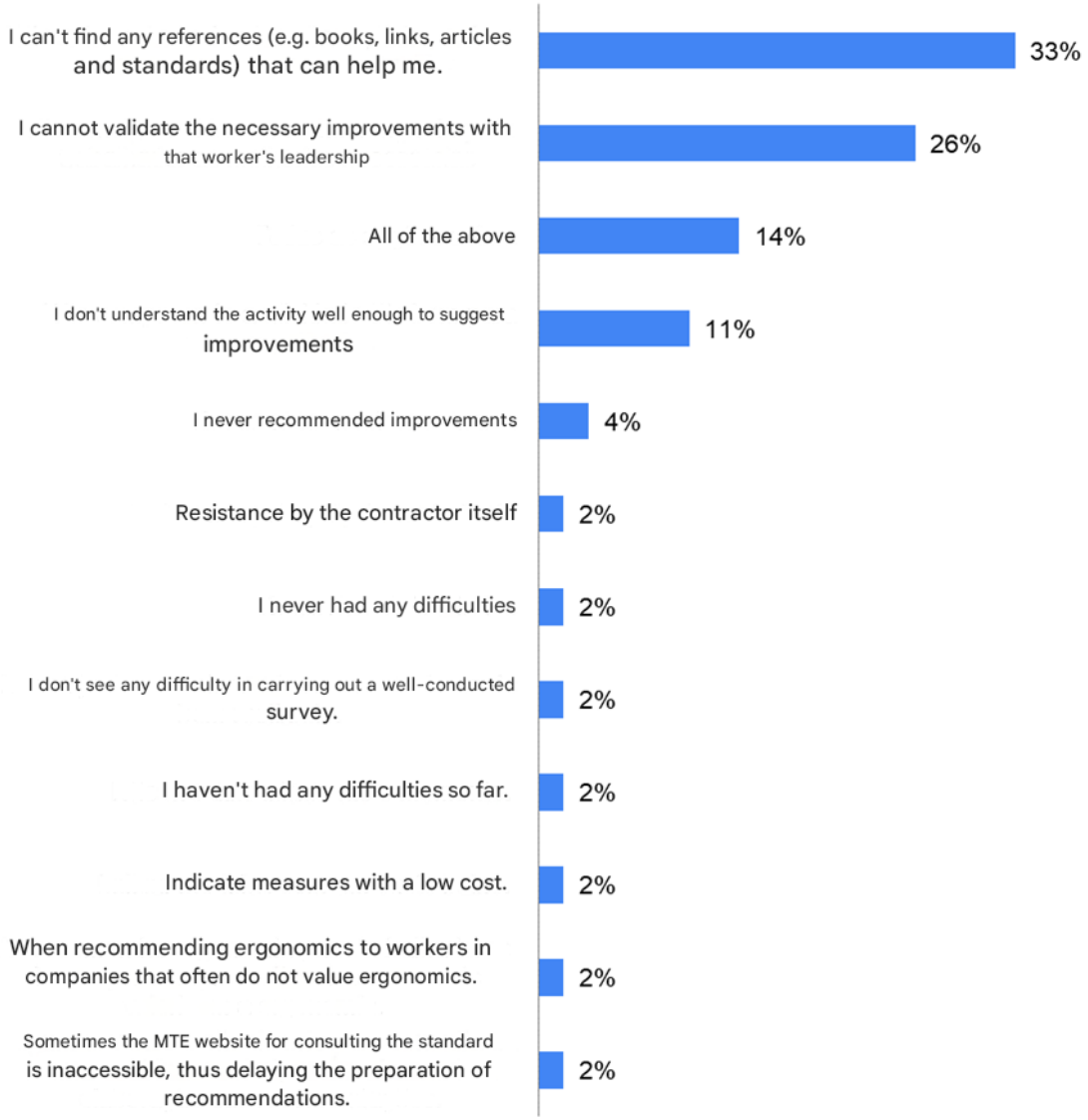


Figure 8. Graph - What is your main difficulty in recommending some ergonomic improvements? Source: Original survey results

The main difficulties when recommending ergonomic improvements are, in this order: "I can't find references (e.g., books, links, articles, and standards) that can help me" – 33%; "I can't validate with the leadership of that worker the necessary improvements" – 26%; All options (14%); and "I don't understand the activity so well to propose improvements", with 11% of respondents. The result corroborates the hypothesis about the importance of having some tool or method that facilitates this phase of recommendations, considered complex by many, especially those with less experience. Moreover, they must be recommendations aligned with the reality of the company evaluated, which can actually bring improvements and reduce risks

related to Ergonomics at work. The predominant profile of respondents in the result is that of Safety Technician, which confirms the need for more focused support in this class.

Thinking about tools that can be used to better understand the root cause of a work-related problem (study demand) and about the possible solutions (recommendations) for this problem, they were asked to give their opinion on which would be the most effective among six options chosen by the author of the research. In *Forms*, the respondent had access to a description of each tool/method, illustrative images, and a reference (link or bibliography) about each one.

Briefly, the six options presented are below:

1. **"Fault Tree Analysis - AAF":** technique that identifies hazards and analyzes risks from an event (Top) chosen for study, establishing combinations of failures and the conditions that could cause the occurrence of this event;
2. **"Ishikawa Diagram":** visual tool usually presented as a fishbone, seeks to raise all the possible causes of a problem, discovering its real root causes, starting from a *Brainstorming* or set of ideas, which will list all the possible causes of a problem that needs to be solved. It starts with the most direct causes, the main bones of the fish, to the secondary causes, defined by the smaller bones, which would be forgotten without the support of this tool;
3. **"APR - Preliminary Risk Analysis":** hazard identification and risk analysis technique that seeks to identify dangerous events, causes, consequences and promote control measures. Preliminary, because it is used as the first approach to objects of study. Also known as Preliminary Hazard Analysis – APP;
4. **"*Reverse-Brainstorming*" (or reverse *brainstorming*):** a classic method of *brainstorming*, where it is not the solution, but the problem that is the first objective, focusing on the problem and the possible causes for it. Everyone (workers and consultant) is encouraged to list ideas about the cause of the problem, which are collected. Next, the focus is on the solution, and the elements that have a possible impact can be addressed individually;
5. **Starbusting:** like reverse *brainstorming*, it is a method for dealing specifically with issues that are very complex, where issues are often overlooked, or where it tends to be difficult to find solutions where the problem is not yet well defined. The problem is presented and participants are encouraged to raise as many questions as possible. The problem is examined from many different angles and

these questions can then be answered as a basis for further discussion or serve as a topic of conversation;

6. **"5 Whys":** also known as "*5-Why*", it is closely linked to total quality management and continuous improvement in companies, consisting of the repetition of the question "Why?". In this way, there is a deepening of a danger or risk factor raised by the consultant that can be deepened in the evaluated organization, it becomes easier to find the root cause of the problem with clarity and strategy.

The Likert Scale technique (Appolinário, 2007, p. 81) was used as an attitude scale in which respondents indicate agreement or disagreement in relation to an object, in this case, a tool with a brief description and its proper reference presented in the *online form* (*Google Forms*). The results are presented in figure 9, through graphs.

The three most effective tools according to the respondents, adding the percentage of option "5" (totally agree) and 4 (agreement) are, in this order:

1º. Preliminary Risk Analysis - "APR": with 93%;
2º. "5 Whys": with 81%,
3º. And "Ishikawa Diagram" - Cause and Effect Diagram or Fishbone Diagram: with 79%.

It was already expected by the author of the research that the Preliminary Risk Analysis (PRA) tool would be considered the most effective, given that the Preliminary Ergonomic Assessment (PRE) itself has characteristics familiar to the PRA, in the sense of identifying hazards and analyzing risks in a preliminary way, identifying dangerous events, causes, consequences and establishing control measures.

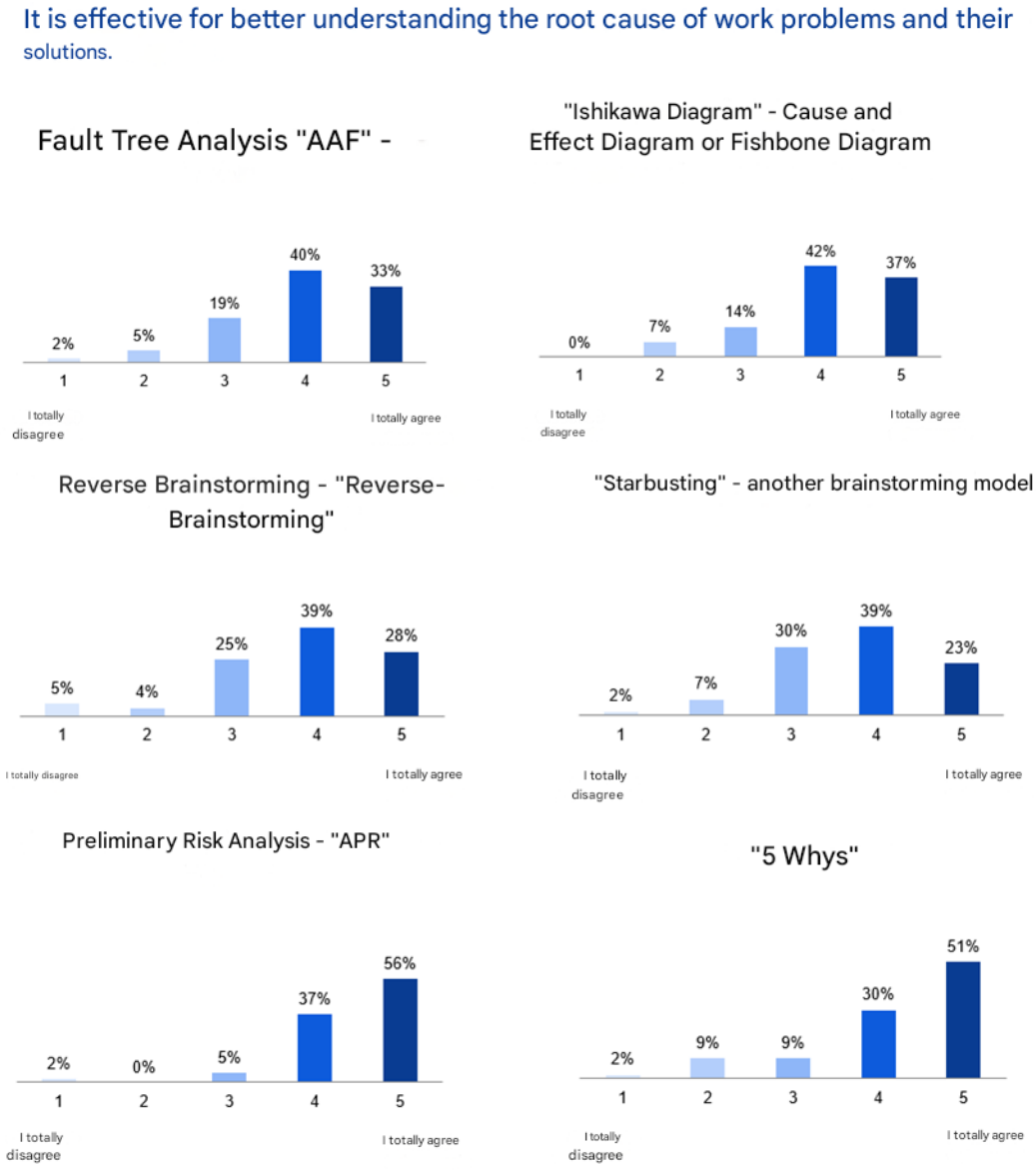


Figure 9. Graphs based on the Likert Scale – tools for understanding the root cause of a problem. Source: Original survey results

But which tools would be, in the view of these professionals, the best to complement AEP? The result of the survey concluded two tools as the preferred ones by the respondents. For this reason, they were chosen by the author of the research to be inserted as complementary to the AEP in future training / qualification or recycling: "5 whys" and "Ishikawa Diagram". One can raise as a hypothesis for this choice the fact that they are tools more familiar to professionals who work with occupational hygiene and occupational safety, the main focus of the research.

Finally, table 1 presents the answers given to an open question, leaving the respondent free to mention new possibilities of tools.

| | **Do you know or use any other tool, not mentioned in the form above? Which? Explain a little about her concept. Would this be effective for Ergonomics and would you have ease in using it?** |
|---|---|
| 1 | The tools mentioned above are the most used in Ergonomics surveys, I do not remember at this moment any other applicable ones. |
| 2 | I know Bow Tie, but it's not that easy although in my opinion it's excellent. |
| 3 | I identify as a tool a customized interview with the leveling of questions and answers, and the possibility of a key reading and dialogue with the client. |
| 4 | Risk matrix. |
| 5 | Hazard and risk assessment methodology of the ISO 45001 standard. Where a 4 x4 matrix is used to grade ergonomic risks, in order to know which risks need to be treated in the short, medium and long term. |
| 6 | I don't use it, but I know the Ishikawa Diagram tool which was taught in the technical course on occupational safety. |
| 7 | My suggestion is to continue with the analysis of the organization's absenteeism and being linked to ergonomic issues, I suggest the use of the Pareto chart (80/20 method). Once the main causes of these absences have been identified, these data can help in conducting the most assertive actions and how the method itself guides the greater probability of solving the identified problems. |
| 8 | For me, any tool can be used for some ergonomic situation. As long as it has logic and foundations. It depends on the demand and purpose of your analysis. |

Table 1: If you know or use any other tool, not mentioned in the form. Source: Original survey results

## 4. CONCLUSIONS

In line with what is described on pages 342 and 343 of the PMBOK Guide (PMI, 2017), this research praises training and qualification by raising all the activities designed to improve the skills of the project team members - in this case, the Ergonomics consultants.

The fact is that, as team development efforts such as training and education are implemented, the project manager will be able to evaluate, formally or informally, the effectiveness of the technicians responsible for the services provided to the various industries in the state of Rio de Janeiro, establishing as a goal the good service to the real needs of customers and ensuring the transformation of work in the ergonomic sphere.

It is considered motivating for this work group to use a tool familiar to all of them in the Ergonomics consultancy. This can bring great opportunities for more effective ergonomic recommendations and further help companies/customers in ergonomic management. Everyone wins, especially frontline workers, who will be able to count on a safer and more comfortable job in these companies.

As a result of this research, the result can be used as a basis for an adaptation of the training and recycling of the researched population. The use of the tools chosen in the study, through practical examples in the classroom and from practical observations in the field (company), will make learning more assertive, thus making it possible to offer even better Ergonomics services to the clients of this consulting company in OSH (Occupational Safety and Health).

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