https://doi.org/10.4322/rae.v16n2.e202201.en

ABERGO 2022
XXII CONGRESSO BRASILEIRO DE ERGONOMIA
XV FÓRUM DE CERTIFICAÇÃO DO ERGONOMISTA BRASILEIRO
XVI FÓRUM DOS GRUPOS TÉCNICOS DA ABERGO

MICROPROJECT AS DIY: DESIGN FOR UNIQUENESS ON OFFSHORE PLATFORMS

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Summary: The text addresses the relationship between ergonomics, the singularity of action and the DIY approach in contexts of great uncertainty. Initially, it is discussed how operators deal with variability and diversity at work, highlighting the importance of considering the uniqueness of the action. Based on case studies in complex work environments, such as an offshore platform, the strategies adopted by workers to deal with unpredictable situations are analyzed.

The cases presented demonstrate the application of the concept of microproject and DIY in the execution of tasks. Operators use available resources in a creative and adaptive way to solve emerging problems while carrying out activities. This approach reveals the construction of a rationality of action in the specific context, which is not based on prior theoretical knowledge, but rather on practical experiences and the manipulation of available tools.

The case analysis shows that operators act as bricoleurs, constantly adjusting and transforming work systems to adapt to specific demands. This approach is essential in situations of uncertainty, where adaptation and improvisation are fundamental to the success of operations. It is concluded that the proposal of resources for action must consider this way of thinking, providing flexible and adaptable tools that allow workers to build local solutions to complex problems.

Keywords: situated conception; DIY; singularity

Introduction

Most of the ideas that emerge from French ergonomics are based on the concepts of variability and diversity. According to Daniellou (2005), "the situations that operators have to deal with are very variable (even in the case of repetitive work), just as the workers themselves can be characterized by their diversity and internal variability. Workers always try to take their internal state and task variations into account in the way they produce operational strategies."

Although such a perspective is coherent with its concepts, the ideas of variability and diversity can be limited, especially in situations of great uncertainty. This occurs due to a little explored dimension of the activity: the singularity of the action. According to Vermersch (2000), activity is found in an experience and, by definition, an experience is singular, has a unique temporal place and belongs to one person and one person only. Although action has invariants, lived experience gives every action a fluid and changeable dimension.

According to Quéré (2000), attention to the singularity of the action involves observing it from a particular, non-reproducible point of view, seen in its unity, as an event. This perspective contrasts with efforts to seek regularity and recurrence of actions, relating them to stable structures or identifying invariants, which leads us to the search for anticipation. The perspective of singularity, according to the author, involves understanding its sources and its process of "singularization", that is, the way in which a subject represents a situation and acts in accordance with his or her identity, values and skills.

Gotteland-Agostini (2013) and Gotteland-Agostini et al (2015) studied the activity of a supervisor in a horticultural production company. This is a typical scenario of situations of great uncertainty, as supervision is faced with the dynamics of an open environment, highly dependent on the natural element. In this context, the work could not be completely planned in advance, given the constant demands for adaptations from a technical point of view, on the one hand, and according to the activity, on the other. Thus, a situated conception came into play. The author understands that this conception is carried out in the form of microprojects, the duration of which is quite short. These microprojects were led by the supervisor, who developed framing actions for designing user tasks.

Abraçado et al. (2021) observed a similar situation regarding the activity of operators on offshore platforms. In addition to identifying the realization of the microproject, the authors also identified two typical characteristics of this type of situated conception: (1) it is a conception for use (FOLCHER, 2015) that mobilizes the constructive dimension of the activity (RABARDEL & BÉGUIN, 2005) and (2) it is an ephemeral conception, constructed to solve a specific problem, located in time and space, and deeply linked to the context.

There is, however, a dimension of the microproject little explored in previous studies, related to the way of thinking of the subjects who carry out the microproject. Lévi-Strauss (1952; 1962) opposes two ways of thinking about the world: “modern thinking” and “savage thinking”. For the author, the engineer's thinking has the effect of modern science and seeks to impose forms on matter according to a project. The bricoleur, on the other hand, proceeds from a diverted and skewed look, seeking to combine parts of sensitive matter.

In this sense, bricolage embodies the wild thinking present in each subject, allowing the performance of diverse tasks with tools placed a priori, that is, without subordinating the action to obtaining raw materials and specific tools designed and acquired for that project. It rests on an empirical approach and is defined by a closed instrumental universe and the rule of the game is to always deal with the "available means". Thus, the bricoleur has a finite and heterogeneous set of tools and materials at each moment, as the composition of this set was not developed for the current project. The bricoleur turns to this already constituted set, and interrogates its elements so that he can understand what each of them "means", thus defining a set to be used, but which ultimately it will differ from the instrumental set only by the internal arrangement of the parts. In Lévi-Strauss' view, the bricoleur is a designer, as he uses his inventory, establishing a set of relationships between the parts that compose it. He makes adaptations and combinations, reorganizing and exchanging parts of sensitive matter in order to make them produce ever new arrangements. These actions allow you to define a project.

“Modern thinking”, which is mobilized by the engineer, is essentially experimental, speculative and theoretical. He does not subordinate his tasks to pre-existing raw materials and tools; on the contrary, his repertoire is defined by his project. He proceeds through what could be called a “project approach”, bringing together knowledge, knowledge and materials, with a view to achieving the objectives he pursues, leaving the “contingent” aside to seek the “necessary”. It is subordinated to immediate use and efficiency, with a sense of productivity, and requires specific and specialized tools designed for that project.

In this article, the objective is to highlight the relationship between microprojects and DIY. Next, the challenges that this approach poses for industrial projects will be presented from the point of view of the singularity of the actions. To this end, concrete cases of cargo handling activities on offshore platforms will be used.

Methodology

To achieve the objectives of this study, the six stages of case studies proposed by Yin (1989) were used: planning, design, preparation, evidence collection, evidence analysis and reporting.

In the first stage, planning, the case study method was defined, considered appropriate for understanding how users think when acting in situations of great uncertainty. As microproject dynamics are based on the interactions of workers in the field, the combination of observation and other evidence becomes essential for the characteristics of this research (YIN, 1989).

The second stage, study design, covers the identification of theoretical references. The main concepts worked on in this research are bricolage (LÉVI-STRAUSS, 1952) and microproject (GOTTELAND-AGOSTINI, 2013; ABRAÇADO, 2021). Such concepts will be discussed from the perspective of the singularity of actions (VERMERSCH, 2000).

The third stage, preparation, consisted of detailing a research protocol. Evidence collection followed the ergonomic work analysis method, which uses direct observations of real work (GUERIN et al, 2001) and self-confrontations (MOLLO & FALZON, 2004). The objective of the direct observations was to identify, analyze and discuss typical real work situations and how field workers dealt with operational uncertainty and design solutions. Among the situations observed, two were selected that could represent the work of the cargo handling team.

The fourth stage, collecting evidence, considered eight shipments on oil platforms, totaling 32 days on board. In these shipments, 18 real situations were considered to understand how the microproject is carried out in cargo movement. Among them, the current research presents two typical work situations.

The fifth stage of the case study presents the analysis of the evidence. These analyzes were carried out according to the research demand in the different phases of data analysis. The discussion elements are based on the pattern matching technique. According to Yin

(1989), this is a technique based on a comparison between an empirically observed pattern and a pattern predicted before data collection. This technique consists of developing different theoretical propositions articulated in operational terms and identifying independent variables. The study analyzes the behavior of these variables in empirical cases.

In this study, the idea is to observe in concrete situations how the microproject relates to wild thinking and modern thinking, according to three central variables: (1) theoretical knowledge or constructed in the field, (2) tools selected or placed a priori, (3) specific/specialized or adapted tools, with construction of arrangements in the field.

Results

In this item, the two cases of cargo movement will be presented. Then, the cases will be analyzed, showing the behavior of the selected variables. The idea is to highlight the relationship between microprojects and DIY.

<u>CASE A – MOVEMENT OF A FLANGE TO THE WORKSHOP</u>

This movement concerns a flange (40 kg) located in a process plant module and should be moved to the boiler shop for maintenance. The supervisor worked to define how to make the journey. The main challenge would be moving the equipment to the central route of the process plant, located on the first floor. Given the lack of resources to move around the site, improvised means were used. The supervisor observed a pillar adjacent to a sailor's ladder and realized that he could use them as a resource to execute the maneuver:

> *We used this sailor's ladder as if it were a hole in the floor to reach the first floor and [we used] the pillar to thread the cable and generate friction. This way the weight to lower the load is much less. We call this maneuver 'down over turn' or 'pay cable over turn'. It helps a lot at times like these.*

The supervisor and the assistant together dragged the flange to the sailor's ladder while the assistants brought the necessary equipment to carry out the maneuver: a resistant cable, a guide cable and a platform cart. Then, the supervisor and assistant tied the guide cable to holes in the flange and screwed the cable to the pillar. Finally, they tested the consistency of the system: "The [assistant] put the load into action to test if it would work. We confirm that the cable can handle it and that, if necessary, I will hold the load" (Supervisor).

The team was divided into two: (1) the supervisor and an assistant on the 2nd floor and (2) two assistants on the first floor. In the team on the second floor, an important regulation was observed during the action: while the supervisor “paid the cable on the turn”, dictating the pace of the maneuver, the assistant was responsible for directing the flange, for maintaining communication with the assistants which were on the lower floor and for supporting part of the weight of the piece, when necessary (Figure 1). The supervisor maintained communication with the assistant, as he could not see the flange movement. If the flange was heavier, it is possible that the assistant was more focused on carrying weight and communication would be impaired, for example: “It ended up like this, with it there [on the interface] because I could handle the weight”.

On the first floor, one of the assistants manipulated the flange with a guide cable, also to avoid pendulum movement and direct the part towards the cart. The second assistant received the flange, positioned it on top of the cart and untied the cables. The organization of actions between these assistants is also carried out during the action. The plan only provided for the load to be lowered, received by assistants and placed on the cart. However, the organization to carry out the task was defined in use, depending on the situation.

At the end of the maneuver, the assistants moved the cart along the central road of the process plant, towards the workshop. In parallel, the supervisor dismantled the system designed for that maneuver and stored the materials.

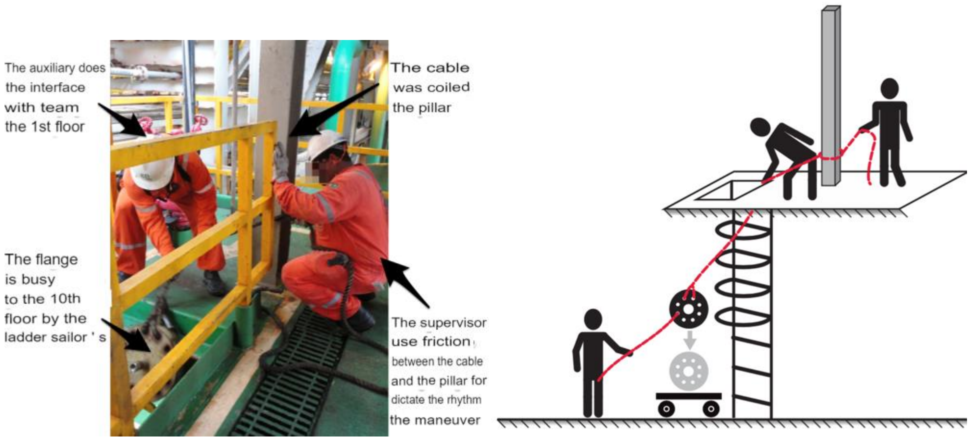

Figure 1 – Dynamics and representation of the Maneuver

CASE B – PUMP MOVEMENT IN THE ENGINE ROOM

The mechanical maintenance team required the removal of the hot water pump (600 kg), located in the engine room. The equipment stopped operating and would be disembarked for corrective maintenance on land. As soon as he received the demand, the supervisor went to the site to check the situation. He looked for and found the bomb in a cradle, but realized that the maneuver would not be trivial:

> *We have to take the bomb to that hatch, but I'm wondering how we're going to get the equipment there.*

The hatch referred to by the supervisor provides the interface between the engine room and the main deck of the ship, through a hatch. Above this hatch there is an automated hoist capable of moving between the two levels. However, to get there, it would be necessary to remove the equipment from the berth and move it to an access point on this hoist.

The room had a mezzanine, exactly where the bomb was located. To get to the hatch, the supervisor would need to bomb down to the main floor. Seeing the initial difficulty of the maneuver, the supervisor called the team together to discuss the movement plan:

> *We're going to use hoists to get [the pump] out of here [from the mezzanine], but we're looking at where we're going to install it. There is a monorail, but it doesn't go over the pump. Then we'll have to take the piece down to the main floor.*

During the discussion, users installed the hoist on the monorail, in order to facilitate the visualization of the best location to install the other hoists. Thus, the assistants were able to simulate and define which position of the auxiliary hoists could provide greater stability to the maneuver:

> *"They saw that there was a monorail, but it wasn't aligned and it was going to sway, right? This work with more than one hoist to stabilize the load happens because things are not always where we need them. You need to find a way." (TLT)*

Finally, two beams were improvised as a cutting point, using straps. As the monorail was not aligned with the cradle, the other hoists were used to exert weight on the cables to remove the pump without generating a pendulum movement. With the execution method defined and the hoists installed, users began the process by tying the pump with straps. While the supervisor and two assistants lifted the pump, the others tried to detach the pump from the support:

> *Let's go up with just the bomb. Support is [on site].*

When lifting the equipment, the operators tried to rock the pump to loosen the support, but realized that it was still stuck and that they would need to lower the equipment to free it. Unable to release the bomb, the users decided to return the equipment to the crib:

> *We didn't see this support stuck and we couldn't release it with it in the air. Then we went back with the bomb [to the crib] to release it before doing it again.*

With the pump parked on the floor, the operators were able to release the support and were finally able to lift the load, manipulating it with their hands to avoid sudden movements. Once it was already high enough to be removed from the cradle, the operators gradually loosened the cable of the hoists installed on the structures in order to align the pump with the monorail, thus preventing pendulum movement (Figure 2).

Figure 2 - Removing the support and removing the pump from the cradle

At this moment, the operators began moving the pump along the monorail to access the main floor of the engine room. However, the space below the monorail was occupied by equipment, which made it impossible for the pump to directly descend to the main floor. Thus, users chose, during the action, to install a tirfor to pull the pump (Figure 3) and avoid the equipment that was located below it.

Figure 3 - Users pull the pump with the tirfor to get past the interference

The operators tried to place the pump on the pallet directly, but were unable to do so due to the weight of the pump. Therefore, to place the pump on the pallet truck, it was necessary to lift it again. The operators mounted a hoist on a beam located on top of the pallet and, to avoid pendulum movement, two operators used the 'cable over loop' feature to generate friction between the cable and the room's structure. This allowed the reduction of the effort to contain the movement of the bomb, which was carried out gradually (Figure 4).

Figure 4 - Users assemble a system with hoists and cables to place the pump on the pallet truck

With the pump placed on top of the pallet truck, the operators moved it to the hatch. They then used the crane's hoist to move the equipment to the unit's main deck and then moved the equipment within reach of a crane to access the cargo deck.

CASE ANALYSIS

The cases allowed us to observe that, when operators act in situations of great uncertainty, the rationality of the action is not given a priori. On the contrary, it is constructed by the subjects depending on local conditions. The construction of this rationality is nothing more than a conception for use (FOLCHER, 2015) but it is driven by wild thinking, that is, it does not follow the traditional logic of engineering projects.

When carrying out the microproject, operators use the available resources, which are at hand. In Case A, the supervisor combined a ladder, a pillar and a cable to form a movement system, which allowed him to lower the flange to the first floor of the process plant. In Case B, the supervisor and operators used monorails and structures in the engine room to install cables, hoists and tirfores, all available on board in order to make the execution viable.

They also built arrangements in the field, adapting the available tools to the circumstances of the action. They make these resources interact, select a set of coherent tools that, combined and reorganized, can solve your problem. In Case A, the tools were combined to construct an arrangement they called “cable over lap”, combined with the use of the ladder as a route, which allowed an integrated operation between the two floors to descend the flange. In Case B, at different times arrangements of hoists, tirfores and cables were observed, mounted in different structures in the engine room to carry out the necessary movements.

It was also possible to observe, from the verbalizations, that the operators used knowledge built from previous experiences, that is, practical knowledge. At no point in the action was theoretical knowledge used, but intuitive solutions, which were brought from applications in other contexts.

In this sense, the operator-designer is nothing more than a bricoleur using available resources to solve the organizational demands that are requested of him. He uses his skills built in the field to select, organize, combine and transform available resources and, thus, build a rationality specific to the action, the microproject.

However, as we have shown, the microproject will allow the construction of a framework that frames the action, but is not the action itself. After building this rationality and establishing the movement system with the available resources, the operator carries out the action. This is the moment of conception in use, in which the system developed by the bricoleur is put to the test of reality, that is, the operator takes ownership of the artifact, begins to deal with unforeseen situations and, therefore, adapts it to the circumstances in use. . In this second moment, the operator is also acting as a bricoleur, as he is using the available resources (including the system he himself designed for the action) and the knowledge built in the action to adapt the system and solve the problem. Even in use, the bricoleur continues transforming and reorganizing the system to achieve his objectives, in the process we call conception in use.

Conclusion

We conclude that, in situations of great uncertainty, we observe two bricolages. The first aims to build the rationality of the action, that is, it is a conception for use. The second aims to correct, adjust and transform the system in use, depending on the demands that emerge as the activity unfolds.

The uniqueness led to the need for operators to finalize the design in the field. Since situations are unique, it is impossible for any project to predict how the activity will be carried out. This led us to the idea that the operator needs to build the rationality of action when demand emerges, through the microproject.

Naturally, the way teams organize themselves, interact and build solutions will vary in each field. Likewise, the resources to be offered will differ according to these factors. However, the way in which operators think and construct this rationality of action is identifiable: it is wild thinking, typical of the bricoleur, as proposed by Lévi-Strauss (1962).

The operator, like the bricoleur, starts from a finite set of resources given a priori to constitute his project. To build its solutions, it transforms, adapts, combines and reorganizes the elements available to build local solutions. With this, he invents new arrangements, enriches his resources and, thus, builds skills that allow him to solve more problems in time. In this way, to deal with singularity, the operator will always be a bricoleur who is constantly transforming work systems to adapt them to the different contexts that the unit lives in in order to achieve its objectives.

In this sense, the proposal of resources for action must be in accordance with this way of thinking. The intangible resources to be offered, for example, must be less focused on concepts and theories and more grounded in the field, so that they can be applied in concrete situations based on this thinking. Material resources, on the other hand, need to be flexible, adaptable and known based on concrete use in reference situations, which stops focusing on typical situations and starts to be guided by the process of building rationality.

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