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ARTISAN FISHING WITH RAFTS AND ITS REPERCUSSIONS FOR SAFETY, HEALTH OF RAFTERS AND QUALITY OF FISH

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Abstract: This article presents the ergonomic analysis of the lifeboat activity at the beach of Ponta Negra, in the city of Natal-RN, and its repercussions on health, safety, productivity and fish quality. The methodology used was based on the Ergonomic Analysis of Work, supported by a social construction process, using interational methods and techniques, specific protocols, observations and laboratory analyzes.

Keywords: fishing, rafts, ergonomics, AET

1. INTRODUCTION

1.1 WORK AND INDUSTRIAL SAFETY

Brazil fishes around 580 thousand tons per year at sea (Castello, 2010). Fishing communities represent a population of approximately 800 thousand artisanal fishermen, involving 2 million people who produce around 55% of national fishing production (Callou, 2010). In 2007, 28.8% of national fish production occurred in the Northeast Region, of which 96.3% corresponded to artisanal fishing, which makes the fleet in this region the least industrialized in the country (Castello, 2010). Rio Grande do Norte (RN), along its 410 km of coastline, has 25 coastal municipalities, 97 fishing communities and around 13,000 fishermen who carry out the activity for subsistence and commercial purposes. Of the RN fleet, 28.5% (1071) are rafts, which captured 12.10% of the annual volume of fish (2175 t) in 2007 (IBAMA, 2007). Of the 381 vessels registered in the Natal Fishing and Aquaculture Colony Z -04, 22.8% (87) are rafts. On Ponta Negra beach, the location of this study, there are 31 rafts and 42 rafters. (Saldanha et al, 2010, 2011)

Artisanal fishing, including raft activity, is characterized by unpredictability, high risks and inadequate working conditions. The long working hours, precarious hygiene conditions, lack of rescue equipment and adequate work instruments, added to the issues of reduced physical space, inadequate postures and strength requirements, adverse environmental and meteorological conditions, low productivity and profitability contribute to the situation of insecurity on the high seas, which has repercussions on the health, safety and livelihood of the rafters. (SALDANHA et al, 2010, 2011; OLIVEIRA, 2010, JAESCHKE, 2010; JAESCHKE, SALDANHA, 2012; CELESTINO, 2010. CELESTINO et al, 2012; VELOSO, 2010; VELOSO, SALDANHA, 2010; SANTOS et al, 2010).

This article presents the ergonomic analysis of the

raft activity on Ponta Negra beach, in the city of Natal-RN, and its repercussions on health, safety, productivity and quality of fish.

2. METHODOLOGY

The methodology used was based on the Ergonomic Work Analysis-AET method (WISNER, 1987, 1994; GUÉRIN et al, 2001; VIDAL, 2003). A

AET comprises a set of global, systematic and intercomplementary analyzes that allow the operational modeling of the work situation, that is, the modeling of real activity in its context, considering technical, human, environmental and social factors (VIDAL, 2003), comprising the following steps: instruction/construction of demands, activity modeling and design and construction of adapted solutions.

The construction of demands started from the provoked demands (SALDANHA et al, 2012) and was sustained by the process of social construction (VIDAL, 2003; SALDANHA, 2004). The ergonomic action was led by a multidisciplinary team made up of an ergonomist, production and food engineer, designer, environmental technologist, nutritionist and physiotherapist. In the analysis of the activity, interactional methods and techniques were used (conversational action, listening to spontaneous and provoked verbalizations), through the application of dynamic scripts and socio-economic questionnaires, specific protocols, observational methods and techniques (systematic observations aided by filming and photographs), documentary analysis, bibliographic and documentary research.

3- FISHING WITH RAFTS on Ponta Negra beach

– Natal-RN

3.1 The Jangadeiros

Artisanal fishing with rafts on Ponta Negra beach in Natal-RN is carried out by 42 male fishermen, predominantly aged between 41 and 50 years old, incomplete primary education and with a family size of 3 to 7 children. 69% declared that they carry out or have already carried out some activity in parallel to fishing, in order to supplement their income. Some fishermen have a lobster fishing license and receive a minimum wage during the closed season (December to May), used not only to purchase food, but also to purchase equipment and utensils necessary for fishing and maintenance of the raft. . The majority of rafters live in Vila de Ponta Negra, in an area located approximately 850 meters from the rafts' docking location.

3.2 The Rafts

The rafts are medium-sized, called packet boats according to the classification by Araújo (1985). They are built in marine plywood and wood (Fig. 1), measuring from 3.6 to 5.14 m. long and 1.4 to 1.7 m. wide and weighing around 642 kg. They have sail and/or engine propulsion. They generally accommodate 2 to 3 crew members (master and assistants) who perform different functions.

The master builders, responsible for building the rafts, who are fishermen, build the rafts under precarious working conditions, using obsolete materials and tools. The construction is often carried out in the backyards of their homes and involves the collaboration of other fishermen. Each vessel has its own characteristics (dimensions, layout, elements), as requested by the owner when ordering the raft from the master builder. Learning in

Construction of the rafts is tacit and many

details are learned through trial and error, as the master builders are fishermen and, therefore, are users of the vessels they designed and built.

3.3 Capture Expedition

Capturing expeditions in Ponta Negra are carried out from Tuesdays to Saturdays. However, depending on the weather and sea conditions and the physical conditions of the rafters, an average of three expeditions are carried out per week. The predominant form of fishing is net fishing. However, it was noticed that the rafters can, at certain times of the year, fish with line and net, even just with line, covos or manzuá, in addition to free breast diving. Line fishing is also used while waiting to remove the nets, as a strategy to regulate sleep and drowsiness.

The work strategy is directly related to the type of fishing carried out: “round trip” and “ice” fishing. In the “round trip” fishing, lasting around 8 hours, fishermen go out to sea early in the morning, returning in the morning, or leave in the afternoon and return at night, depending on tidal conditions, lunar phases, months of the year and climatic conditions. In ice fishing, which is supplied with ice to preserve fish, fishermen usually go out to sea early in the morning and can spend up to 24 hours.

To choose the location for fishing, the masters use the hills and buildings of the city as reference points, which can be seen from the raft. Exit to the sea depends on tidal conditions, lunar phases, months of the year and weather conditions. The decision is made based on tacit knowledge, acquired through experience in the activity, demonstrating the know-how characteristic of these workers. This knowledge is often neglected due to the pressing need for sustenance and food.

The capture expedition begins with preparations at the fisherman's residence, from where he leaves towards Ponta Negra beach, taking with him food and instruments and tools necessary to carry out the activity. Upon arriving at the place where the rafts are moored, they begin the process of organizing and checking the raft. Next, the process of manually moving the raft to the sea is carried out, using two coconut rollers and the

cooperation of other rafters and rollers. The raft is then directed, the crew climbs in and begins specific navigation procedures according to the chosen propulsion mode, sail or engine. Arriving at the fishing spot, the rafters cast their nets into the sea, wait the necessary time and collect the nets, storing the fish in specific devices and the nets in the internal compartment of the raft. Depending on the result of the fishing, this procedure may be repeated in the same location or in another fishing spot. After these procedures, they navigate back to Ponta Negra beach, where, after carrying out the procedures for removing, docking and organizing the raft, they sell the fish and return to their homes where they rest until the next capture expedition or other related activity. fishing. (Figure 1).



Figure 1: Capture expedition in the raft activity in Ponta Negra, Natal-RN

Source: JAESCHKE, 2010

3.3 Repercussions of the Jangadeira Activity

3.4.1 Security

The analysis of accident reports showed that 85% of the rafters who participated in the research had already suffered some type of accident related to work, including accidents resulting in death. Of the total number of accidents, 83% occurred in the expedition stages carried out at sea and the remaining 17% in the stages carried out on land. The majority of accidents (42%) occurred during the return navigation to land, and may be related to the level of fatigue caused by the physical effort in the previous stage, the collection of nets, which was reported by 52.39% of the rafters as the most arduous stage. Participants report that return navigation is the phase in which the highest incidence of sleep and naps occurs.

All rafters reported that their rafts had capsized at least once, which occurs mainly due to wind conditions, sea currents and the way the maneuvers are carried out. Some rafts are more prone to capsizing. This is due, according to the rafters, to the shape of the vessel – those that are more convex tend to be more unstable. Flatter rafts are more stable when sailing, they reach lower speeds, however, their bows tend to sink when collecting the nets.

70% of reported accidents occurred when the sail was the means of propulsion. According to the rafters, the use of a sail makes the raft more susceptible to wind conditions, in addition, they reported that it is easier to sail with the use of the engine: “The sail catches a lot of wind, and the wind is strong. If you open a sail in a storm, the raft bends (tilting to the sides) under the weight of the wind, which is why it capsizes. And not in the engine, because it’s not carrying wind or anything, just us.” It is worth highlighting that the use of engines on Ponta Negra rafts is recent, having started in 2005, and, therefore,

For this reason, the occurrence of reported accidents may be lower than those occurring with sailing.

The fishermen stated that in 80% of the reported accidents the raft was in good condition, in 20% the plywood was very worn and caused component breakage with consequent water infiltration. In 75% of the reported

accidents, meteorological conditions were not favorable for carrying out the expedition (strong winds and rain; storms). Financial conditions often lead fishermen to take risks at sea in unfavorable conditions, as per the following statements: “Some go there to support their family, risk their own lives”. “It depends on the person’s precision. I’ve already gone to the tide in a storm because I didn’t have anything to eat. But it’s not good.”

It is worth highlighting the lack of respect for national navigation safety standards, NORMAM 02 - Maritime Authority Standards for vessels used in inland navigation, the category in which rafts are included. Vessels in this category are only allowed to sail up to 3 miles from the coast. However, the rafts, in some situations, exceed this limit in search of more distant fishing grounds. Another aggravating factor concerns the failure to comply with the mandatory use of life jackets throughout the capture expedition. In the reported accidents, the fishermen were not using their vests.

3.4.2 Health: Musculoskeletal Risks

Artisanal fishing with rafts represents a high musculoskeletal risk, associating physical effort, adoption of forced postures, with rotation of the spine and repetition of movements, mainly flexion-extension of the spine, aggravated by the demand for strength of the stabilizing muscles of the human body to guarantee the balance.

The large percentage of reports of musculoskeletal pain in the spine, legs and arms stands out. The results of applying the Pain Diagram show that 23.8% of the rafters had musculoskeletal pain before the expedition, which occurred in one (9.52%), two (9.52%) or three (4.76%) parts of the body. One of the most reported areas was the lumbar region (19.05%), with an intensity between 4 and 8, on a scale of 0 to 10. The prevalence of pain/discomfort after the expedition confirms the lumbar spine as the area with the highest incidence, but with occurrence (42.86%) and intensity (between 3 and 10) were higher.

When asked about the occurrence of pain in the last seven days and in the last twelve months, 95.24% of the rafters reported having felt some pain in the last seven days, and 100% in the last twelve months. Regarding the number of painful body parts, 50% of the rafters who reported pain in the last seven days had 3 to 11 painful body parts, with the highest concentration being between 3 and 8 body parts. In the twelve months, 50% of the rafters presented 5 to 14 painful areas.

The part of the body with the highest incidence of pain in the last seven days is the lumbar spine (71.43%), the knees (52.38%), the ankle or feet (33.33%). Similarly, in the last twelve months, the lumbar spine (80.95%), cervical (57.14%) and knees (57.14%) represented the highest rates of pain in rafters. There was an increase of 31.25% in reports of pain/discomfort in the last 7 days (64 reports) in relation to reports of pain in the last 12 months (84 reports), with an increase of 4.35% in the lower limbs (23 for 24

reports), in the spine, 45.83% (24 to 35 reports) and, in the upper limbs, 47.06 (24 to 35 reports).

The constant pain, associated with the need to carry out fishing activities to support the family, as well as the lack of guidance regarding the most appropriate way to carry out the activity, evolved into chronic pain, and in some cases, the need for surgical procedures, mainly lumbar disc herniations. This factor denotes a recurring problem in the health of

as explained in the statement of one of the jangadeiros: “if the government were to retire the column people there would be a lot of retired people, and I only see people complaining about columns”.

3.4.3 Health: Food and Nutrition

The data from the quantitative analysis of the diet demonstrate, with regard to the consumption of calories in the diet, that 57% of the rafters have a caloric intake below that recommended by FAO/WHO (1985) and 43% above that recommended. There are differences between the type and volume of food consumed during “outbound” and “ice” fishing, mainly due to the lack of a suitable place on the vessel for packaging it. Income from fishing is another

problem that interferes with access to food. 62% of jangadeiros stated that their income does not meet their daily needs, from the point of view of adequate nutrition.

From the nutritional assessment it was diagnosed that only 24% of rafters are eutrophic according to the BMI classification (WHO, 2001). Among the 76.2% who are overweight, 42.8% are overweight and 28.6% are grade I obesity and 4.7 are grade II obesity. In relation to the percentage of body fat (%BF), 8 (40%) have a BF% above average and 12 (40%) are at risk of developing diseases associated with obesity. Regarding the risk of developing metabolic changes, according to the WHR (WHO, 2001), 3 (15%) of these fishermen present

low risk, 4 (20%), high risk; 11(55%), risk moderate; 1 (5%) very high risk and 1 (5%) does not present this risk. According to the interpretation of isolated waist circumference, 45% do not present a risk for the development of metabolic complications while 55% present some degree of such risk (25% increased risk and 30% very increased risk).

Fish Quality

Based on the results obtained with the Quality Index Method (MIQ), bacteriological analyzes and the physicochemical parameters in the present study are considered:

- Taking the hydrogen potential as ideal – pH ≤ 6.50, 74.51% of the samples are within current legal standards (BRASIL, 1997);
- The results obtained, referring to the Total Volatile Bases - BVT, do not exceed the limits acceptable by legislation (BRASIL, 1997).
- Sensory analyzes show that the fish samples collected from the rafts are of acceptable quality, presenting an I.Q. less than 2. According to M. Costa, (sd), to be considered suitable for the required quality standards, the IQ could not exceed the

maximum score of five points.

- The results of the microbiological analyzes show that the fish analyzed does not represent food unsuitable for consumption from a sanitary point of view and does not represent a potential risk to the health of the consumer. The occurrence of this group of microorganisms in fish indicates the need for improvements in hygienic and sanitary conditions after fish capture.

3.4.4 Productivity and Sustenance

Preliminary study on fishing production in the months of January and June 2010 with 11 and 12 rafts respectively, showed that in January/2010 81 expeditions were carried out, 21 of which were “ice” expeditions and 60 “round trip” expeditions, an average of 7.4 expeditions per raft (maximum 16; minimum 1) capturing 2,854.5 kg of fish, an average of 35.24 kg per expedition. In June/2010, the 12 rafts carried out 106 expeditions, of which 03 were “ice” expeditions and 103 were “out and back”, an average of 8.83 expeditions per raft (max. 14; min. 2), capturing

1,211 kg of fish, an average of 11.42 kg per expedition.

The process of selling fish by the master or owner of the raft can be carried out directly to the consumer or indirectly, passing the fish on to the middleman or dealer. First-class fish are sold to middlemen for R\$6.00 and second-class fish for R\$2.00. However, this value may be reduced in periods of abundant catch. The division of the amount is as follows: the owner of the raft receives 50% of the total and the remainder is divided between the master and the owner. If the master is the owner of the raft, he will keep 75% of the total fish caught.

The financial income from fishing varies, being influenced by the period of the year, the type of fishing and whether the raft owner owns the vessel or not, and activities parallel to fishing are frequent. Some rafters have a license to fish lobster and receive a minimum wage during the closed season (the temporary stoppage of fishing for the preservation of the species, motivated by reproduction and/or recruitment, as well as stoppages caused by natural phenomena or accidents).)

(December to May). The low financial return is cited as one of the reasons for the lack of interest of new generations in learning and practicing the craft. Furthermore, the current generation of rafters does not encourage their children to continue the craft, thus breaking a tradition of passing on the activity between generations.

The sale of fish does not guarantee the sustainability of this population, both due to the reduction of natural stocks and problems related to marketing, as the fish are subject to low prices imposed by middlemen (marchants) who buy the fish 'in natura' to resell.

4. CONCLUSION

The results presented here point to the need to create and deepen specific public policies and implement a specific articulated/integrated program of government public actions (municipal, state and federal), which brings together credible institutions and technical skills in the social sector. , economic (financing, production, logistics and sales), cultural, ecological and artisanal fishing, together with the direct participation of fishermen and their community, to leverage and consolidate the sustained activity of artisanal and raft fishing in the city of Natal.

The scientific findings and ergonomic actions resulting from this project have contributed to preserving and thriving the centuries-old and traditional activity of artisanal fishing with rafts in Ponta Negra, which heroically sub-exists in contemporary times, thanks to the mobilization actions of its community, which has faced how can the effective absence of incentives from public authorities, the threat of unbridled tourism, the unbalanced growth of the real estate industry and the actions of environmental degradation that impact the economy of artisanal fishing, which is of great importance for the city's economy and the development of meaning and sense of belonging among fishermen in relation to the place where they live and produce, Praia Ponta Negra and the

community of Vila de Ponta Negra, and of Potiguar society as a whole.

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