INQUIRY OF AN ACCIDENT IN A CONSTRUCTION SITE AS SUPPORT TO PREVENTIVE ACTION

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There is a diversity of variables which can be connected to an accident, making the inquiry process, complex, and in accordance with a great deal of information accumulated at the company. Considering the human and economic costs caused by the accident, one can state that the inquiry of the causes of an accident may be comprehended as an opportunity to organizational learning. The aim of this work is to analyze an accident occurred in a construction site, in order to evidence the importance of the system of management in safety and health at work in the prevention of employment-related accidents. The study has consisted in an inspection of the place, collection of the company system of management in safety and health at work pointers, meetings with the mandates of the company and collection of depositions of employees and the victim’s relatives. One has observed that, even characterizing a fortuitous event, the accident has provoked several direct and indirect costs to the company. One emphasizes, therefore, safety at work and the worker’s health shall be seen as an investment, as a ‘business’ to organization, embracing activities which involve the human being as a whole, either at work, at home, in the transportation or the leisure.

1. Introduction

1.1 Accidents at Work in Brazil

In the legal concept, The Plan of Benefits of the Social welfare, through the Law 8.213 from the 24th of July 1991, regulated by Decree 611, in its 2nd Chapter, Section I, Article n. 19; defines accident at work as: “that which occurs through the exercise of the labor at the service of the company or through the exercise of the insured labor, provoking body injuries or functional disturbance that causes death or permanent or temporary loss or reduction, of the work capacity” (BRASIL, 2009a).

In the case of employment-related accident, whichever its nature, the company must emit the communication of accident at work - CAT, and direct it to the Ministry of the Social welfare, as well as copy to other public entities. In turn, the CATs are the ones that are going to subsidize the official statistics of accidents at work that, despite many times the emission does not occur, or to be filled in an inadequate way, display the number of industrial accidents in high dimensions.

Data are disclosed by the International Labor Organization - ILO (2008), which points out the occurrence of 270 million accidents at work and 160 million illnesses related to work per year. In Brazil, the Ministry of the Social welfare indicates that during the year of 2006 there had been registered 503,890 accidents at work, being 26,645 (5.28%) related to occupational illnesses (BRASIL, 2008). The same source indicates that 5.8% of the total of accidents, mention the construction industry.

In turn, the sector of civil construction is highlighted for displaying, amongst other peculiarities, rudimentary activities, and the interference of man in all the processes, line of static production and a great diversity of activities and, consequently, a great diversity of risks, possessing high indices of accidents at work. These, with great potential to cause economic and human losses of great impact to society, considering, the social-economic role of the sector.

1.2 The Costs of Accidents at Work

According to Barkokébas Junior et al (2004a), employment-related accident can take great proportions when one weighs only the economic costs, therefore the human costs are incommensurable, considering that, human life and invalidity cannot be quantified.

Human cost consists in pain, in invalidity, deaths, that is, in all the damages which are susceptible to cause suffering. Otherwise, economic cost is constituted by the expenses and losses that the accident produces, as material losses, damages in the equipment, loss of working hours by colleagues and commands, etc.

One can realize that human and economic costs are directly related and more often, they are difficult to differentiate. Moreover, there are many involved who directly and/or indirectly pay the employment-related accident, for instance, the victim and his/her family, the company and society.

However, it is evident that an accident at work causes a great suffering to the victim, therefore, when one does not deal with fatal accident, one is paid through physical and psychic arms, needing treatments and medical accompaniments, and many times medicines for the rest of his life. The psychological effect also can be pointed as damage to the worker, considering that, a mutilation has the potential to cause discrimination by society. Regarding
the economic point of view, accidents are susceptible to cause a decrease in the familiar income, in the case of removal or change of function in consequence of the accident.

Society, as we have already seen, also pays, because a person who is economically active is lost, with his accumulated experience and knowledge, or even, it handles with the expenditures of the victim through the contribution to the National Institute of Social Insurance - INSS.

The loss of an enabled and well trained person also generates a great human cost to the company, therefore, according to Bellovi et al (1990), some of the worker’s experiences and knowledge can be partially substituted, some not, considering that the later are related to the proper characteristics of the professional.

In other hand the economic cost to the company, Bellovi et al (1990) subdivides into costs easily computed and reasonable occult costs. In a similar way, Barkokébas et al (2004b) classifies the costs as direct and indirect, as shown in Figure 1.

![Figure 1 – Cost of Accident at Work (BARKOKÉBAS JR et al., 2004b)](image)

The direct economic cost is related to the expenses corresponding to the victim’s support and it is responsibility of the INSS. Otherwise, the indirect cost is displayed by the expenditures handled by the company, through the wage of the victim in the day of the accident, wages of the remaining workers who had interrupted their activities in result of the accident, wages adds for overtime, wages of the supervisors for providences in result of the accident, cost of material or equipment damaged in the accident, expenditures with the training of the substitute of the victim, reduction of the productivity of the victim when returning to work, amongst others.

Considering the negative impacts provoked by the accident at work, Binder et al. (1996) understand that the inquiry of the causes of an incident must be comprehend as a collective chance of organizational learning.

1.3 The causes of an accident at work

The causes of an accident at work can be innumerable, in its majority, recurrent of unsafe conditions in environments of work and human faults, which are susceptible to have origins of psychological order, or reflect social problems and of cultural and/or organizational formation. As the human faults are related to subjective factors, the task of the inquiry becomes real difficult; therefore, the mental problems and/or disturbances can or cannot be directly related to the labor activity.
Either for the proper unfamiliarity to the risks of accidents, or for an inadequate training, or the lack of aptitude or the interest for the work, or the reliable excess, or any order of reasons, the fact is that, many times, the same can be precociously detected by the responsible technician of the organization.

Because of this diversity of variables which can be entailed to an accident, that is, regarding that the accident is multi-casual, one realizes that the inquiry of an accident is complex, and it is based on a great number of information accumulated in the company.

In fact, the inquiry of accidents has demonstrated the importance of the actions related with safety and health at work in the performance of safety and health at work and in the indices of accidents of the organizations. The actions and behaviors of all workers, mandates and heads of the company implies in the development of the climate of safety and health at work of the organization. This climate influences the causal thought of all the members of the organization in relation to the causes of the accidents, as well as, the way to collect the information and to investigate the causes (FUGAS, 2007).

Therefore, in function of this diversity and multiplicity of involved factors, the prevention of the occupational risks must contemplate all the conditions of work that can affect the physical and mental integrity of the worker, thus, it is essentially necessary to know all the possible factors of existing risks in the environment of the work.

Binder and Almeida (1997) state that there are several methods developed with this purpose, albeit, for systems of lesser complexity, the choosing method is constituted by the inspections of environments and conditions of work. On the other hand, the same authors point that, some factors of the organization of work hardly are detected by the inspection, as the improvised assignment of workers for execution of tasks, the use of materials by several teams without assignment of responsible, lack of tools and materials to the execution of eventual or not routine tasks, that is, factors that acquire increasing importance in the out coming of accidents.

On the other hand the difficulties found in the prevention of accidents, Lopez et al. (1992) apud Véras (2004), state that, the effort that a society dedicates to the prevention of accidents, illnesses or catastrophes, one can consider the most complete pointer of the quality of life level by which this society works and aspire. Thus, they indicate that the writs of prevention must origin from the following premises:

- All accidents have natural causes and they are explained in a natural way (Effect Law));
- All faults and errors must be classified in terms of human characteristics and behaviors (principle of the implication);
- The causes and contingencies of each accident are interrelated (notion of system).

However, to guarantee the effectiveness and the efficiency of preventive actions, it is necessary that all human resources of the organization to participate in an effective way and make themselves integrant part of a whole, beyond that, they must be actions that answer to the system of management in safety and health at work of the organization, or even, direct to its implementation.

2. System of management in safety and health at work

The system of management in safety and health at work is seen by the International Labor Organization - ILO, through its guidelines on system of management in safety and health at
work, the ILO-OSH 2001, as voluntary and not certifiable, considering that, the greatest objective is to protect the workers against factors of risks.

ILO-OSH 2001 recommends guidelines regarding the organizations, in order to supply orientations on the integration with the elements of the system of management in safety and health at work and, yet, to motivate the management and the responsible ones for the workers, to the continuous improvement of the outcomes. Therefore, the system of management in safety and health at work in the scope of the organization contributes with the aiming of the actions of safety and health at work, in the planning of the financial resources, in the establishment of the management of safety and health at work; in the reduction of the risks of embargoes and interdictions at the work sites; in the valuation of the workmanship; in the valuation of the company image in the market, amongst other factors.

Thus, it is part of the system, the measurement of its performance, in order to monitor and control the actions of safety and health at work, as well as, a means of communication and organizational learning. Barkokébas et al (2008) states that the measurement of performance is stimulated, mainly by the focus in results, since, the pointer consists of a tool for identification of the company needs, and, consequently, of orientation of the prioritizations of goals and strategies of the company.

3. Objective

To analyze an accident occurred in a work site, in order to evidence the importance of the system of management in safety and health at work in the prevention of accidents at.

4. Methodology

The study had consisted of an inspection of the place, collection of the company’s system of management in safety and health at work pointers, meetings with the company mandates and collection of depositions of employees and the victim’s relatives.

The inspection had been accomplished in the day following the accident, in which photographic registers and observations at the work site were carried through. It is important to highlight, that the inspection attempted mainly for 8th flagstone, place where the collaborator had fallen. The observations had been structuralized on the basis of the legislation of safety and health at work, and emphasis in the Regulatory Norm NR-18 Conditions and Environment at Work in the Construction Industry (BRASIL, 2009b).

In parallel, one had seeked the pointers of safety made available for the company, recurring the performance of safety at work conditions at the work site, in order to verify the measures of control thus adopted by the company in the four months that had preceded the event, and, to verify the coherence with the data of the inspection.

After the comparison of the data, the research team participated of meetings with the mandates of the company, in order to collect information adds and to get depositions victim’s relatives and employees of the company, amongst which, the technician of safety, the assistant of the workmanship, the office incumbent, the manager of engineering and the company safety engineer.
5. Results

5.1 Ambit

The work site consists of a multifamily residential construction, located in high standard zone 18 floors and approximately 5,293m² of constructed area.

It is worth to highlight, that the company responsible for the construction of the building, is of great transport, operating in the sector of construction of vertical buildings, possesses the certificate of system of quality management, ISO 9000/2001, and has implemented, the system of management in safety and health at work.

5.2 Physical description relative to the Safety and Health at Work site analyzed

The inspection was accomplished in the day following day the, accident in which photographic registers and comments in all the work site had been carried through. It is important to highlight, that the inspection attempted mainly for 8th flagstone, place where the collaborator had fallen.

Regarding the direct cause of the collaborator’s death, the detection of control measures against falls from height was prioritized, as well as, the verification if the same ones were in compliance with the legislation of safety and health at work

The control measures against falls were in accordance with what determines the NR-18, specifically in its item 18.13 – Protection measures against falls from height. It was verified the existence of resistant provisory closings in the floor openings, as well as, the span of access to the elevators cases, as it shows Figures 1 and 2.

One can also observes, the meeting of requirements contained in item 18.12 - Stairs, slopes and pedestrians lanes of the NR-18, since, it is related to collective protection measures against falls of people and objects, through covers and balustrades systems and baseboard (Figure 3). Regarding the protections against falls in the peripheries of the flagstone, it was evidenced that the same ones had metallic balustrades settled adequately to the structure of the building, as shows Figure 4.
It was also observed, that in the 8th flagstone of the building, there was metallic structures which functioned as timbering of the immediately superior flagstone. Moreover, it was verified the disposal of safety cable to set the safety belt in this flagstone floor (Figure 5). In the other hand, the existence of small openings between the propping towers could be evidenced, as seen in Figure 6.

In relation to primary and secondary platforms, one has verified that the same meet the requirements of the norm, regarding the minimum dimensions, the setting, structure and resistance, as show Figures 7 and 8.
5.3 The workmanship SST performance pointers

After the inspection carried through in the worksites, one had searched the pointers of safety of the system of management in safety and health at work for the four months which had preceded the event, in order to compare with the inspection data and verify the coherence of the outcomes.

The following pointers were looked over: Safety Pointer - SP, Quantitative Pointer – QP and Economic Pointer - EP.

The safety pointer represents the performance of the worksite in relation to the safety norms, through the percentages of the situations in agreement (CO), disagreement (DES) and serious imminent risk (GIR). As clarification, the situations ’CO' are those conditions of work in compliance with the legislation; ’DES', when the work condition doesn’t meet the legislation and ’GIR', when the work condition is susceptible to cause work accident or occupational disease with serious injury to the worker’s physical integrity.

In accordance with the Regulatory Norm N. 3 - Embargo and Interdiction (BRASIL, 2009c), one considers serious and imminent risk all environmental condition of work that is susceptible to cause employment-related accident or occupational disease with serious injury to the worker’s physical integrity.

One has observed that in the Safety Pointer - SP, the percentage of the items in compliance with the norm reached values between 85% and 95% during the four months, showing a safety performance of satisfactory work at the worksite (figure 9).

In the Quantitative Pointer - QP, which displays the performance of the worksites regarding the safety conditions and hygiene at work throughout the inspections accomplished through the amount of item in serious and imminent disagreement and of risk, one has observed the representation of a decreasing graph related to the item in disagreement. In relation to the items in serious and imminent risk, an oscillation between the null value and 02 occurrences had been evidenced (Figure 10).
In the other hand, the economic pointer, which displays the simulation of the costs related to the liabilities of safety at work recurrent from the not meeting of the legislation, displayed a decreasing line in the three initial inspections, having an increase only in the last inspection. (Figure 11). Note that, the economic pointer takes as reference annex II of the Regulatory Norm NR 28 - Fiscalizations and Penalties (BRASIL, 2009d). The values of the fines are simulated in function of the number of workers at the worksite and the gravity of the occurrence, considering that, the values settled in NR 18 are based on UFIR, of which adopted value is of R$ 1,0641.

In a plain way, one has realized the concerning of the construction company with the aspects of the safety and health at work, considering that, the monitoring of the work conditions had already been carried through. Thus, the coherence of the data collected in the inspection with the performance of the safety pointers, evidenced the compromising in the development of a continuous work in safety and health at work.

5.4 Important reports for the analysis of the incident

According to reports of employees and the victim relatives, a person in charge of administration of the workmanship received a phone call from the sister-in-law of the victim, in order to communicate that he had received a call from the brother-in-law, who was very tense and nervous, threatening to jump from the building.

Another important fact is that the technician of safety at the workmanship when receiving the
information from the person in charge, tried to avoid the accident, calling immediately the victim’s cell phone, asking him to come down in order to get work instructions.

However, according to an assistant of the workmanship, the same had met the victim in the stairs of the 8th floor, being requested by him, to deliver his cell phone to the safety technician.

Instants later, the victim fell from 8th floor, hitting the street, outside the worksite, and, without reaching the collective protection trays of the building.

5.5 Other relevant considerations for the analysis of the occurrence

One has verified through depositions of the victim’s brothers, that the victim was under pressure and quite stressed out, beside possessing an unstable relationship with his girlfriend. Moreover, his father was in a clinic in order to treat depression, being the victim and his brothers, responsible for their father’s treatment and the expenditures.

It was also highlighted in the deposition given by the safety engineer of the company, that the victim had told the safety supervisor technician that he had discovered that his father had a cancer and that he hadn’t told his family, and he was not being able to deal with the situation. The safety engineer still states in the deposition, that right before the occurrence, there had been a decrease in the victim’s performance at work, happening at the same time that he had become aware of his father health situation.

Also it was taken into consideration, regarding the reports of employees, that the collaborator always was well accounted by the employees of the workmanship and that he had never become involved in fight or quarrels. Also, the manager of engineering of the company, in his deposition, told that he had never had no negative information regarding the victim by his immediate bosses, and that he had never known about no misunderstanding between employees and the victim.

5.6 Comprehension of the results and diagnosis

At the beginning, one has arisen the assumption that the victim could have been suffering pressures at work, fact that had not been confirmed, since, the work rhythm was the same, and there had no service increase. Moreover, there was the support of a safety team at work in the company, composed by 03 safety technician, 03 trainees of safety, 01 safety engineer, 01 manager of safety engineering and an engineer of production in the workmanship.

It was also verified, that the term of performance decrease at work by the victim coincided with the time he had argumented with his girlfriend and the illness of his father. Before this, he had revealed himself engaged and very efficient.

In the technical sphere, it was observed that when falling, the body of the victim did not shock with the trays of the building, hitting directly the street. That is, such fact to occur, the body needed impulse, thus demonstrating, the need of trespassing the trays distance.

Although one admits currently, the possibility of characterization of suicide as labor accident, is fact, the need of the existence of a nexus of evident causality. In this in case, before the evidences of the inquiry, one has diagnosised that the victim committed suicide, fact confirmed for the public agencies.

It was observed that, even characterizing a fortuitous event, the accident provoked several direct and indirect costs. At the moment of the accident, the last flagstone of the construction was being concretized, that from the awareness of the occurrence, the employees who were executing the activity, evidently, had interrupted it immediately. That is, although the
company had no responsibilities with the occurred accident, the same provoked a loss of material, expenditures with external technical assessorship and accompaniment of the process, costs with the loss of time by his fellows and mandates, beyond the paralysis of all the activities at the worksite during three days. One must consider, the time to reestablish the rhythm of the activities at the worksite, since, the accident intervenes with psychological aspects, reflecting in the performance of the fellow workers.

At last, one could also add, damages as the loss of the company image in the market and the cost with the analysis of the accident, through the police and legal accompaniments, in the civil and criminal areas.

6. Final Considerations

The study shows that, although the compromising of the organization in the actions of safety and health at work the company is not exempt from costs due to fortuitous events in its worksites.

It could be verified, through the performance of the analyzed pointers of safety, that the investments in safety and health at work had revealed satisfactory. Although this, the company had handled with the direct and indirect costs, proceeding from the accident.

On the other hand, if the case was characterized as an accident at work, the company would have to assume all the inherent costs and responsibilities, as for example, indemnities, working conflicts, expenditures with judgments and judicial convictions, administrative punishments, amongst others.

It is emphasized, therefore, that safety at work and the health of the worker must be seen as investment, as a 'business' for the organization. A system of management in safety and health at work effectively implemented and established results in positive aspects in the work conditions, and consequently, in the reduction of the indices of accidents and consequent costs, providing benefits to the workers, the companies and society.

7. Recommendations

Facing the diagnosis, it was also verified the need of the accompaniments also in the social plan, through the behavioral monitoring of the collaborators by social assistants. Therefore, despite it is a company of great transport and consist of social assistants in its program, these professionals are not inserted in the routine of a worksite.

At last, safety and health at work must be considered under diverse aspects, that is, in all the activities that involve the human being as a whole, either at work, at home, in the transportation or leisure.

References


