

Statistical Approach to Identify Stress and Biases Impairing Decision-Making in High-Risk Industry

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Abstract : Decision-making occurs several times an hour when working in high risk industry and an erroneous choice might have undesirable outcomes for people and the environment surrounding the industrial plant. Industrial decisions are very often made in a context of acute stress. Time pressure is a crucial stressor leading decision makers sometimes to boost up the decision-making process and if it is not possible then shift to the simplest strategy. We thus found it interesting to update the characterization of the stress factors impairing decision-making at Chinon Nuclear Power Plant (France) in order to optimize decision making contexts and/or associated processes. The investigation was based on the analysis of reports addressing safety events over the last 3 years. Among 93 reports, those explicitly addressing decision-making issues were identified. Characterization of each event was undertaken in terms of three criteria: stressors, biases impairing decision making and weaknesses of the decision-making process. The statistical analysis showed that biases were distributed over 10 possibilities among which the hypothesis confirmation bias was clearly salient. No significant correlation was found between criteria. The analysis indicated that the main stressor was time pressure and highlights an unexpected form of stressor: the trust asymmetry principle of the expert. The analysis led to the conclusion that this stressor impaired decision-making from a psychological angle rather than from a physiological angle: it induces defensive bias of self-esteem, self-protection associated with a bias of confirmation. This leads to the hypothesis that this stressor can intervene in some cases without being detected, and to the hypothesis that other stressors of the same kind might occur without being detected too. Further investigations addressing these hypotheses are considered. The analysis also led to the conclusion that dealing with these issues implied i) decision-making methods being well known to the workers and automated and ii) the decision-making tools being well known and strictly applied. Training was thus adjusted.

Keywords : bias, expert, high risk industry, stress.

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