Qualitative and quantitative human error analysis in hazardous industries

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Abstract

Human error has been cited as a cause in disasters and accidents in diverse industries such as aviation, nuclear power, oil and gas industry and medicine. More than 70 to 90 percent of factors that cause an accident refer to human error. On this account the present study was designed to investigate human errors in safety critical industries. The conceptual basis for this study was the Dirty Dozen model of Gordon Dupont, which includes 12 error categories for human error in aviation maintenance. One qualitative and one quantitative method were used to analyze human error in four different large industries such as chemical, timber, metal and automotive industry. On the one hand 315 participants filled in a human error questionnaire with 120 items based on the Dirty Dozen model. On the other hand 47 semi-structured interviews based on the Critical Incident Technique (CIT, Flanagan, 1954) were conducted with shift supervisors or team leaders. The interviewees retrospectively described specific events which had led to accidents or critical situations. The results identified in both methods safety critical factors such as lack of teamwork, lack of resources and economic or time pressure.

Introduction

Humans, by their nature, make mistakes. Therefore it should come as no surprise that human error has been cited as a cause in disasters and accidents in diverse industries such as aviation, nuclear power, oil and gas industry and medicine. More than 70 to 90 percent of factors that cause an accident refer to human error (Hollnagel, 1993; Giesa & Timpe, 2000).

Many academic error models exist, which focus or deal with cognitive structures and processes. The problems of many models are the lack of applied orientation and the lack of consensus (Wiegmann & Shappell, 2003). In the aviation industry the applied Dirty Dozen concept, developed by Gordon Dupont (1997), explains most of the causes of human error. Many airlines use this model successfully for identifying and analyzing human errors and for conceptualizing human factors trainings for maintenance personnel (Patankar & Taylor, 2004). The Dirty Dozen model contains different categories of human errors which can result in incidents or accidents from

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