Abstract

The total number of accidents at work in all industries has been on a decreasing trend since 1969. Still, even now, 1,030 persons are killed annually, and among them, the number of deaths in the construction industry is 342, representing 33% of the total. Furthermore, the breakdown of deaths by age shows those who were 50 or older occupy 48.0% of the dead, and those in the construction industry represent a high proportion of them. Their percentage tends to be higher than percentages of those in other industries.

This study is an action research conducted in the Information and Telcommunication Engineering Department of Company Sumitomo Densedut co., Ltd., which is classified into the construction industry. It is intended to contribute to the solution of practical problems pertaining to safety activities by clarifying the processes of creating, sharing, and using safety knowledge in safety activities in the construction industry. It is important for the creation of safety knowledge to make explicit the formal knowledge of an organization and experiential knowledge of individuals and to systematize such knowledge to let it be shared and used by an organization. The major research question (MRQ) of this study is set as, "How was safety knowledge in the information and telcommunication engineering department created, shared, and used?" Processes of creating, sharing, and using safety knowledge in safety activities at the department are then elucidated to make a theoretical model explaining safety knowledge management in the construction industry. The author took part in safety activities at the department of Company Sumitomo Densedut co., Ltd., as a safety manager from April 2010 to May 2015, implemented an action plan in four stages, and collected and analyzed data in accordance with the following procedures.

(1) In order to investigate causes of fall accidents actually happened, safety managers, field managers, and workers worked together at the venues of accidents to analyze their causes. Furthermore, the effectiveness of learning potentially dangerous near-miss incidents as a part of recurrence prevention measures was analyzed.

(2) In order to systematize knowledge necessary for accident prevention, potentially dangerous near-miss incident cases and human errors were analyzed. A risk sensitivity sheet was created as a means to transfer systematized knowledge through safety education.

(3) Safety education was implemented, and a questionnaire survey was conducted to verify its result.

(4) In order to transfer further safety knowledge, training was given where each working group analyzed accident cases. Participants were asked to write a report, which was then analyzed.

The answer to MRQ obtained from the above analysis is as follows. Safety knowledge in an information and telcommunication engineering department was created, shared, and used through four processes of the "analysis of experiential knowledge of field managers, workers, and safety managers," the "relational analysis of potentially dangerous near-miss incident cases and human errors," the "systematization of safety knowledge by the risk sensitivity sheet," the "transfer of systematized safety knowledge through education and training," and the "application of safety knowledge."

The "theoretical model for safety knowledge management in the construction industry," which was developed through logical reasoning based on the review of preceding studies and data obtained from the action research in the information and telcommunication engineering department, was named "AIAI Model." This model shows the creation, sharing, and use of safety knowledge and consists of four phases: "Analyzing," "Integrating," "Acquiring," and "Implementing." In the "Analyzing" phase, knowledge of potentially dangerous near-miss incident and industrial accidents is analyzed, and knowledge necessary for accident prevention is created from it. In the "Integrating" phase, knowledge as safety education curriculum is created by using safety ideas, safety goals, and various laws and regulations.

In the "Acquiring" phase, knowledge such as a safety standard is used to create knowledge of accident prevention. In the "Implementing" phase, individual ingenious ideas and wisdom for risk avoidance measures are created through risk prediction activities. Safety knowledge becomes rich both quantitatively and qualitatively as these four phases develop in a spiral.

Its practical implication is that, in order for each worker to put safety knowledge into practice actively and voluntarily, safety management strategies and tactics are required for establishing the mechanism and environment that support it. In the future, it is planned to develop practical training of safety knowledge management and a new method for knowledge transfer.

Key word: Near-miss incident, Human errors, Risk sensitivity sheet, Safety education, AIAI Model