Abstract of Master Thesis

Master's Degree
International Project Management
(Building, Real Estate and Infrastructure)

Application of Artificial Intelligence in
Construction Safety Management and Risk Deduction

Submitted by: Hamidreza Haji Ali Akbar Ghomi
Student Matriculation No.810776

Tutors: Prof. Dr.-Ing. Markus Schmidt
University of Applied sciences Stuttgart

M. Eng. Samir Alzeer
University of Applied sciences Stuttgart
ABSTRACT

This master thesis identifies major factors that affect construction safety. Safety in construction projects is one of the most important issues which had a negative influence on time, cost, quality, and overall performance of the construction projects in past decades. Furthermore, risks and hazards, converted it to one of the deadliest industries in the market.

In Construction, many accidents take place due to human mistake and irregularity during the construction process. The number of injuries and fatalities can be reduced by encouraging and forcing for a behavioral change. In addition, Occupational Safety and Health management systems (OSHMS) with its profound impact on the construction industry or a proper Personal Protective Equipment (PPE) plays a major role to reduce the risk chances, but it is not enough. Human error is a complex topic and is directly linked to the type of process and the ability the worker.

Previous studies show that, working at high, falling objects, manual handling, dangerous chemicals and overall risky job situations, lack of knowledge and even years of experience, has a direct impact on the severity of the accidents. Therefore, early identification of hazards and also utilizing new and proper technologies are important to help safety management. To prevent construction accidents, they have to be predicted and such predictions need a huge amount of data and knowledge about past accidents. Moreover, to take a right decision in a right time, the data needs to be analyze and process properly.

The main contribution of this study is to review the application of Artificial intelligence and visualization technologies in construction safety and reveal the positive role of visual technology on safety of construction workers. Modern technologies like AI and visualization technology can play a very important role to reach ultimate safety in construction industry. It is also found that visualization technology can assist construction safety management during the preconstruction by improving the efficiency and effectiveness of accident prevention and during construction process, by monitoring workers unsafe behavior and implement safety warnings in real time by integration of sensors and visual technologies which all process and analyze via Artificial Intelligence and Machine learning. Moreover, this paper shows that traditional methods have limited influence on improving health and safety issues in construction industry and new innovative method should be implemented. But new technologies like AI and ML, especially in the area of construction safety management, is still relatively new so it would be recommended to be used in conjunction with human experts. To achieve the aim and objectives of this research a semi structured interviews were conducted with construction experts. All the collected data were analyzed using qualitative measures. Also as a part of research objectives, a framework to convince managers to use AI in construction projects, is developed.