

Construction Safety Innovation Management: Adoption, Diffusion, and Measurement

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Innovation advancement and their increased application have been identified as a significant factor that helps improve work performance, including worker safety in most industries. Historically, the construction industry has struggled to match the innovative pace of most industries and records the most accidents and fatalities. Results from an extensive review of literature postulate several reasons for this anomaly. For one, the lack of documented innovation transfers protocols that encompasses administrative and technological innovations is considered a shortcoming. Since the level of safety innovation could predict safety performance, the lack of a process to measure the innovative level of safety tools makes it impossible for construction managers and safety practitioners to objectively measure the level of innovation. As well, developing an adaptable framework for measuring financial implications of adopting safety innovation provides quantifiable justification for improving the use and diffusion of safety innovation.

The research objectives of the current study is (1) provide peer reviewed literature that informs future research direction on safety technologies (work zone safety technology case study); (2) Improve safety technology adoption rate through developing an adaptable model for technology acceptance; (3) Standardize process for evaluating work zone safety innovation (using intrusion alert technology as an example); (4) Suggest an adaptable framework for estimating financial implication of construction safety innovations (using intrusion alert technology as an example); (5) Provide tool for measuring level of safety innovation. Through extracting and analyzing qualitative and quantitative data from horizontal construction projects, the current research aims to propose solutions grounded in academic rigor. A mixed methods approach that incorporates experiential data from questionnaire surveys, Delphi panel, and interviews with construction stakeholders, observational data from in-depth project case studies, and discrete event simulation models (agent-based modeling and econometric models) will be implemented in different phases to achieve the current study's objectives.

Results from a systematic review of over 160 safety technological innovations (case study of work zone safety technology) literature indicate that the lack of financial impact analysis (benefit-cost analysis, return on investment, etc.) and lack of adequate communication between stakeholders during technology manufacturing and evaluation process impacts adoption decision. As part of a research team, we developed and validated an evaluation protocol for a work zone safety technology. The researcher is of the opinion that by achieving the set objectives, the ongoing study complements and expands ongoing research efforts geared towards improving technology use in construction. Specifically, the research will provide tools that improve the adoption and diffusion of safety technologies in construction work zone.

Keywords: Work Zone Safety, Safety Innovation, Adoption, Diffusion