



Determining the Causes of Punching Shear in Reinforced Slabs Using Fishbone Diagram

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Abstract

Risk identification and assessment can be analysed using many risk management tools. Fishbone diagram is one of these techniques which can be employed, for the identification of the causes behind the construction failure, which has become a phenomenon that often gets repeated in several projects. If these failures are not understood and handled scientifically, it may lead to disputes between the project parties. Additionally, the construction failure also leads to an increase in the project budget, which in turn causes a delay in the completion of the projects. Punching shear in reinforcement slab may be one of the reasons for construction failures. However, there are many doubts about other causes that lead to this failure as well as the role of these causes in the construction failure. Also, there are many causes linked to this failure of which some fall on the designer and the others fall on the contractor. Thus, this research aims to determine the causes of punching shear failure in the concrete slab and its role in the failure using a logic managerial analysis. For this purpose, the applicability of the Fishbone diagram has been extended, for the analysis of probability as well as the impact of the risk of punching shear, thus elucidating the risk score of each category without ignoring the global risk. In this direction, interviews and questionnaires are conducted with numerous experts specialize in both the design and execution field of construction projects for identifying the most important causes that lead to the occurrence of punching shear failure. Further, the Fishbone diagram for punching shear's risk illuminated that impact of some of the primary and secondary causes such as planning, designing, and maintenance is more than the expectation. Therefore, the concentration in these areas should be carried out by taking into consideration the adapt risk response plan to prevent or mitigate these risks.

Keywords: Fishbone Diagram; Global Risk; Weight; Probability; Impact.

1. Introduction

Usually, the defects in construction projects leading to its failures provoke the dispute between the project parties. These disputes in construction projects, if not solved timely, become very expensive – regarding time, personnel, finances, and opportunity costs [1]. Punching shear problem is one such expensive defect, which may need a costly decision thus requiring the demolition of the building. So, the current research attempts to present managerial analysis to determine the probable reasons that are responsible for the occurrence of the punching shear problem, thereby giving an indication to the decision makers and project parties that any construction defect must be analyzed scientifically to avoid the disputes between the project parties.

In the current investigation, only flat slabs were taken into consideration, as this type of structure comes up with easier installation, thereby enabling better usage of room height as compared to slabs supported by beams. Nowadays, many buildings such as car-park buildings use this type of system. But, the main disadvantage of this type of slab is the

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