Development of a workspace conflict verification model for temporary facilities based on a VR simulation

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The study aims to establish an integrated methodology that encompasses the architecture and a functional module for a VR-based integrated system to be used to verify workspace conflicts of temporary facilities.

Generally, workspace conflict in any construction site is related to a number of causes such as schedule conflicts, poor resource planning, and design errors. Due to such causes, conflicts of members, equipment’s and workers’ activity space, and placement of temporary facilities and storage yards take place. To address this issue, it is necessary to utilise various onsite empirical strategies and to introduce a methodology that can resolve physical conflicts in an objective manner through VR (Virtual Reality)-based systems (Moon 2009a). Therefore, this study suggests workspace conflict verification model based on VR simulation.

The proposed model can effectively resolve workspace conflicts in a reasonable and objective way depending on the nature of a given workspace conflict. To address workspace conflict verification, the workspace type is defined first and a 3D shape model is established in this study. Next, workspace constraints based on how a workspace is created and conflict types are identified. In addition, a heuristic rule-based inference model is developed to address logical conflicts and a methodology to build a system to optimise physical conflicts is suggested. Furthermore, an integrated model is configured to allow interactions and visualisations to verify conflicts.

Figure 1. Workspace conflict verification model  
Figure 2. Logical conflict verification model
The process of the suggested models is including:
1) Definition of workspace and conflict type for temporary facilities
2) Generation of workspace WBS by using project WBS from Database
3) Allocation of workspace to activity by the workspace WBS
4) Generation, placement and registration of workspace 3D shape with buffer space
5) Physical conflict verification placed within a work area
6) Logical conflict verification by rule-based heuristic model according to workspace conflict type
7) Visualisation of workspace 3D shape and conflict status
8) Analysis and resolution of workspace conflict by suggested model and developed system

By adapting this process, users can not only verify physical conflict but can also provide an empirical resolution suitable for given onsite conflict characteristics when a workspace conflict takes place. Therefore, this enables efficient space planning according to workspace at the early design and construction stages.

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