# An Agent-Based Model for Construction Material Management through a Non-Homogeneous Storage System

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## ABSTRACT

Construction site layout planning is a crucial job with significant impact on project time, cost, and productivity. It pertains to determining the locations and specifications of equipment units and material storage spots. Despite considerable efforts on location optimization of material storage spots, insufficient attention has been given to their specifications. Most conventional approaches used in previous research are limited, as they do not necessarily optimize factors, such as material transportation time, equipment utilization rate, and task execution flexibility, simultaneously, especially for large construction sites. To overcome these limitations, this study applies agent-based modeling (ABM) to develop a material storage management platform. This platform adopts a non-homogeneous storage system to allow for storing multiple material types in each single storage spot. This enables equipment units to feed from multiple storage spots, which in turn allows for further flexibility in task execution; however, this necessitates an in-depth plan to remove potential collisions between operating units and check material availability at storage spots. The platform is tested against numerous task execution scenarios to eventually find the most efficient material allocations during operation. The simulation's results using a case study of multiple tower cranes and supply locations indicate significant improvement in total schedule time.