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# A INNOVATIVE APPROACH TO SEQUNCE THE CRANE SERVICE REQUESTS IN CONSTRUCTION PROJECTS

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**Abstract:**
In construction projects, cranes play an essential role in transportation of the materials and providing the construction teams with their requested materials within an acceptable wait time to fulfil the service requests. Although cranes are among the more costly and limited machinery resources in construction projects, material delivery requests are frequently made ad hoc. Existing optimization models in the literature only minimize the crane travel time to fulfil a sequence of crane service requests, and the wait times of the construction teams to receive their requested services are neglected. This study aims to develop a multi-objective optimization model which accounts for minimizing both the crane travel time and standard deviation of the construction teams' wait times to fairly distribute the wait times. The proposed model uses a designed two-objective improved harmony search which is able to find the set of non-dominated (Pareto-optimal) solutions to schedule the material delivery requests. A benchmark case example in the literature is solved and the results indicate that the proposed model is able to resolve the associated drawbacks of the existing optimization models where the material and crew locations are not laid out evenly on the construction site. The proposed model can be adapted in real practice to better the operation of the cranes in terms of efficient sequence ordering of service requests to not only minimize the crane operation cost when lower travel time is selected, but also fairly distribute the wait times among the construction teams to be serviced.

*Keywords: innovation, decision support system, crane, multi-objective optimization, construction projects, resource management*