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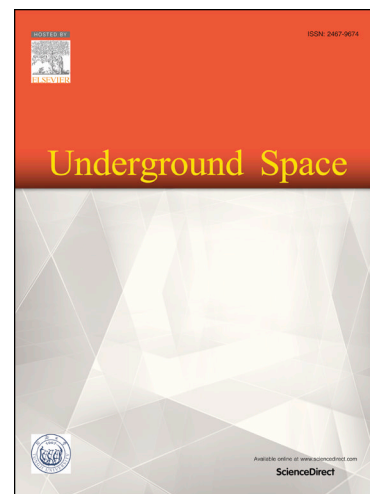
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# EFFICIENT LOGISTICS ENABLED BY SMART SOLUTIONS IN TUNNELING

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**Abstract:** While logistics comprises an important part of tunneling costs, it is generally not considered a lever of performance but rather a constraint to a project's progress. This study presents some insights on how smart technology can impact the tunneling industry. The impact is even greater because of the complexity of the tunneling supply chain, and smart technology could help support this process. Finally, we discuss how the nature of the tunneling industry invites stakeholders to develop a common understanding of the project prior to construction to successfully deploy smart technology during the use or maintenance phase.

**Keywords:** smart technology, logistics, underground space, supply chain, construction, lean construction

## 1 INTRODUCTION

Efficient onsite logistics can greatly enhance the performance of projects in terms of final outcomes (Skjelbred, Fossheim, & Drevland, 2015). Currently, construction managers are generally associated with technical expertise and day-to-day management, while construction logistics receive less of their attention.

To show the effect of good onsite construction building logistics, Table 1 translates the impact of good logistics on income. Good logistics are strongly correlated with lower material costs because theft and breakage of materials are minimized. Logistics can also result in a reduction in labor costs by reducing the time spent looking for and recovering products on site. Table 1 considers only the effect of logistics on material cost reduction.

As seen in the table, a 5% reduction in material costs can save 14% in financial performance, while a 10% decrease saves about 29%. This example demonstrates the substantial gains that can be made through managing logistics on site.

Efficient logistics also has an important impact on project delivery time. Building contracts generally stipulate that the construction company is assessed penalties for each day of delayed delivery. According to our interviews with tunnel project managers, the total cost of one day without work in a tunnel project could reach millions of euros.

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