

Digital Representation of Port Structures through BIM–GIS Integration and Open Data Principles: The Case of Trabzon Port

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Key words: Coastal Zone Management; Geoinformation/GI; GIM; Land management; Marine cadastre; Spatial planning; Standards; Building Information Modelling (BIM); Geographic Information Systems (GIS); Digital Transformation; Spatial Analysis

SUMMARY

With the growth of the world's population and rapid urbanization, the amount and diversity of data used in the building production process have increased. However, because building permit processes are managed by different institutions, fragmented databases cause problems in data integrity, standardization, and analysis. This situation makes it difficult to manage data effectively in urban planning, control, and decision-making processes. As a solution, this study aims to integrate the data used for building permits that confirm technical compliance with Building Information Modeling (BIM) and Geographic Information Systems (GIS). The goal of this integration is to create a comprehensive data management infrastructure and to contribute to the digital transformation of construction and planning processes. The study was carried out on the Trabzon Port, which requires multi-directional evaluation due to legal restrictions and complex land-use relations in coastal areas. The building components in the port area were modeled in 3D within the BIM environment, exported in IFC (Industry Foundation Classes) format, and integrated into the GIS environment. During this process, the permit-related data were added as attributes to each structural component, and the system was designed in line with OGC (Open Geospatial Consortium)-compatible data services. The results show that the proposed structure allows building permit data to be represented digitally in an integrated way and enables effective monitoring and spatial compliance analyses. The developed BIM–GIS-based approach aims to provide an applicable and scalable digital infrastructure not only for port projects but also for other coastal facilities such as marinas, shipyards, and terminals.

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FIG Congress 2026

The Future We Want - The SDGs and Beyond

Cape Town, South Africa, 24–29 May 2026