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An Application of Geographic Information System for Quarries Management

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Extended Abstract

Geographic Information Systems (GIS) have evolved considerably, offering a wide range of applications. The flexibility of open-source software allows users to develop customized tools to address specific challenges in various fields [1]. The availability of construction materials is essential for infrastructure development in any modern society [2]. Therefore, quarries represent a field of study where the effectiveness of GIS can significantly optimize operations.

In the mining sector, available programs and tools are often complex, especially when dealing with 3D models or advanced algorithms. Additionally, quarry operations require more accessible and agile solutions that enable users to efficiently handle spatial data and obtain real-time results for operational decision-making [3]. Furthermore, effective quarry management is essential for mitigating environmental impacts and maximizing short and long-term sustainability. Our approach focuses on implementing a block model in a GIS, which integrates relevant information for quarry management and can be used in short-, medium-, and long-term mine planning [4]. This will provide users with quick access to data related to production, product quality, consumption, and socio-environmental impacts, as well as the quality of the rock being excavated. The results will facilitate visualization through tables, graphs, and maps of the current or future state, excavation progress, or possible mining strategies.

GIS can contribute to quarry management through results that provide a clear view of operation evolution and allow the identification of areas for improvement and optimization opportunities, in addition to a reduction in impacts such as emissions of gases into the atmosphere from loading or transportation stages [5], [6]. The ability to access accurate data on consumption and emissions quickly and efficiently provides users with the opportunity to make well-versed decisions that drive operational efficiency improvement and promote the use of practices aligned with the concept of green mining.

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