

Evolving a comprehensive geomatics multi-criteria evaluation index model for pipelines optimal route selection

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ABSTRACT

Optimal selection of pipeline route is considered a geospatial multi-criteria evaluation problem since it involves assessment of technical, environmental and safety-related factors that are significant leading to pipeline system operations. Moreover, the route is always capital intensive, with attendant environmental, social and economic problems. This study determines the optimal pipeline route for transmission of oil and gas products using the Dangote Refinery Project in Nigeria, as the case study. Routing factors identified from literature were structured into feedback model of Analytical Network Process (ANP) for prioritization based on responses received from experts through the administered questionnaire. In addition, the acquired, processed, and classified LANDSAT 8 imageries of the study area into the various land use and land cover were further modelled in ArcMap 10.2 environment in order to obtain an optimum route. From the findings, the most highly prioritized factors were the environmental and geological, while the least was the economic factor. Alternative Route 2 was selected as the optimal route among the four evaluated alternative routes based on designed evaluation criteria. This implies that Route 2 has minimum route length, minimum passage length through settlement areas and relatively reduced number of rivers, stream and existing platforms crossings.

KEY WORDS: *Geomatics; G-MCDM; Route Selection; Oil & Gas pipelines; Optimal Route; Marine Environment.*