

**GIS BASED SITE SUITABILITY ANALYSIS FOR LOCATION  
OF A SUGAR FACTORY IN TRANS MARA DISTRICT.**

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## Declaration

This research project is my original work and has not been presented for a degree in any other university.

Signature: Patrick Mwanza Lukoko Date: 14/01/16  
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This research project has been submitted for examination with my approval as the university supervisor.

Signature: Prof. Charles Ndegwa Mundia Date: 19/01/16

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## **ABSTRACT**

Domestic sugar production in Kenya is lagging behind growth in demand. Consequently, creation of more sugar mills within regions of high agricultural potential is necessary for expansion of the industry. Suitable arable land for such projects in Kenya is scarce, and essentially planners must select the best use of this resource to uphold sustainability. Locating optimum sites for new industrial investments is important, but involves large sets of alternatives, and evaluations of conflicting criteria. The complex nature of spatial decision problems requires a technique that can combine geographical data with value judgments. This study aims at finding the most suitable sites, for a sugar factory in Trans Mara district, using GIS based Multi-criteria evaluation.

Nine factors including slope, existing factory, roads, rivers, electricity sources, land use, soil texture, rainfall, and temperature were selected for suitability analysis. Selection of factors was based on reviewed literature, and opinion of experts. Selected factors were organized into two principal classes; Physical conditions and sugarcane crop requirements. Data on selected factors were acquired from governmental institutions and through interviews with experts. Acquired data were stored, harmonized and geo-processed in Arc GIS 10.1 platform to generate factor maps. Analytical hierarchy process (AHP) was used to elicit weights which were assigned to each factor. Weighted factor maps were finally standardized, reclassified and combined by weighted linear combination (WLC) aggregation method,

Combined factor maps produced a suitability map which shows that 2.02 % of the total area is highly suitable, 13.54% is moderately suitable, 82.33% marginally is suitable and 2.11 % is unsuitable. Highly suitable sites fall outside ecologically sensitive areas, within reasonable distance to power lines and major roads. The implication of these results is that GIS-MCE application in industrial sites selection minimizes environmental risks and reduces engineering costs.

**Keywords:** AHP, GIS, Multi-criteria evaluation, Site suitability analysis.