European Journal of Education Studies
ISSN: 2501 - 1111
ISSN-L: 2501 - 1111
Available online at: www.oapub.org/edu

DOI: 10.46827/ejes.v12i4.6031 Volume 12 | Issue 4 | 2025

A CASE STUDY FOR SITE SELECTION FOR MICROFINANCE FACILITIES USING GIS IN NAIROBI COUNTY, KENYA

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Abstract:
There are many Microfinance Institutions (MFIs) operating in Kenya to serve the Small Micro enterprises (SMEs) such as small retail shops, street vending, artisan manufacture, service provision, drug stores and so on. With arising need and availability of resources, it is not difficult to open a new MFI branch or agent, but to find a suitable location for the MFIs might be essential and challenging. Investigating a suitable site for Microfinance takes a lot of time and money. The technology of Geographic Information System (GIS) can help people to view, understand, interpret, and visualize spatial data in many ways that reveal relationships, patterns, and trends. This paper applies the features of GIS to analyze spatial data to efficiently choose a suitable site for microfinance facilities. This research project shows how to use GIS and Multi Criteria Evaluation MCE to help microfinance institutions in site selection for new facilities in Kibera slum, Nairobi County, Kenya. GIS techniques have been used for data collection, analysis and presentation.

Keywords: microfinance institutions, small micro enterprises, geographic information system (GIS)

1. Introduction

There has been a tremendous growth in the micro financial sector over the past years. (Kenya Microfinance Briefing Report, 2014) Microfinance is a source of finance for entrepreneurs and small businesses lacking access to banking and related services; it is a way to promote economic development, employment and growth through the support of micro-entrepreneurs and small businesses. The microfinance institutions commonly tend to use new methods developed over the last thirty years to deliver very small loans to unsalaried borrowers, taking little or no collateral (Yunus, 2014).

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Micro financial institutions in Kenya have mainly been using their own intuitive expert knowledge for identification of potential sites for their facilities and Central Bank of Kenya prudential guidelines for institutions licensed under the banking act (Prudential Guidelines for Microfinance in Kenya 2014). Identification of suitable areas/location for expansion and development is one of the critical issues that determine the future of these Micro financial institutions in terms of growth and revenue. Customer location, distribution and needs are very important factors in location of banking facilities and growth of any business. Locating financial facilities in low populated areas only increases administrative cost without realizing profits or benefits, knowing the population densities and distribution is difficult especially when using intuitive knowledge and files. This research paper therefore sought to determine an automated way that can be used to identify potential locations for MFIs in Kibera slum in Nairobi County Kenya and necessary steps taken using Geographic Information Systems (GIS) and Multi-Criteria Evaluation (MCE).

2. Objective of the Study

This research study was guided by the following objectives;

1) To carry out site suitability analysis for micro-finance facilities using Multi-Criteria Evaluation (MCE) and GIS approach.
2) Identify the potential sites for locating microfinance facilities.

3. Methodology

The purpose of this study was to carry out site suitability analysis for micro-finance facilities using Multi-Criteria Evaluation (MCE) and GIS approach in Kibera slums, Nairobi County Kenya. Kibera slum is very populated and is often said to be the "*biggest slum in Africa*" (Amelie & Sophie, 2009). Personal interviews of MFIs stakeholders such as CEO, Managers and Officers who run the MFIs in Kenya and have the skills and experience in the microfinance business was conducted to identify the criteria commonly used in opening new branch or agent. They identified the following criteria specifically for the area of study, Kibera, which were used for this project: Security (distance from police post), High Population Density (HPD), Distance from Existing Financial Facilities (DEFF) and Proximity to Main Roads (PMR).

A site selection decision is structured according to the following steps: (1) determining the criteria that are used in evaluating the alternatives; (2) describing relevant criteria in decision making process; (3) developing the multi-criteria site selection alternatives; and (4) evaluating the alternatives and making the final site selection decision (Ertugrul & Karakas, 2008), and are steps that guided this research to completion.

3.1 Criterion maps for Analysis

3.1.1 Population Layer

Kibera is highly populated, being a slum many people migrating from rural to urban areas in search of employment and better life find themselves in Kibera as they look for ways to start their life. This layer is an input to basic buffer and proximity analysis, used in the analysis of the population pattern and trends.

3.1.2 Security Layer

Coordinates of available police posts or camps in the area was collected using GPS receiver and overlaid in the base map for buffer analysis, security lights and crime spots areas were included as part of the security data.

3.1.3 Existing Financial Institutions Layer

Coordinates of bank branches, MFIs, mobile money agents, ATMs, and/or POS were overlaid for buffer analysis. These coordinates were collected using GPS receiver.

3.1.4 Buildings and Infrastructure

This data contains information on roads, railway line, boundaries and buildings in Kibera and was acquired as a shape file from Ramani Company in Nairobi, Kenya.

3.2 Spatial Analysis

The analysis for this research project was done by first, performing Buffer analysis for each layer separately, this involved making buffer analysis for security criterion that ranges from 0 to 200 meters which is the closest to security personnel as suggested (by MFI experts) distance from police post, Distance from existing financial institutions criterion that ranges from 0 to 500 meters and proximity to the roads which was 0 to 300 meters. This was followed by performing Euclidean distance for each of the buffered layers using the same parameters.

Reclassification for all the layers was done. This research established 6 class values from low to high, the ranking of the class values from 1 to 6 was assigned as equal interval breaks. Lastly weighted overlay analysis was done using the criteria. Below is the table for criteria priorities.

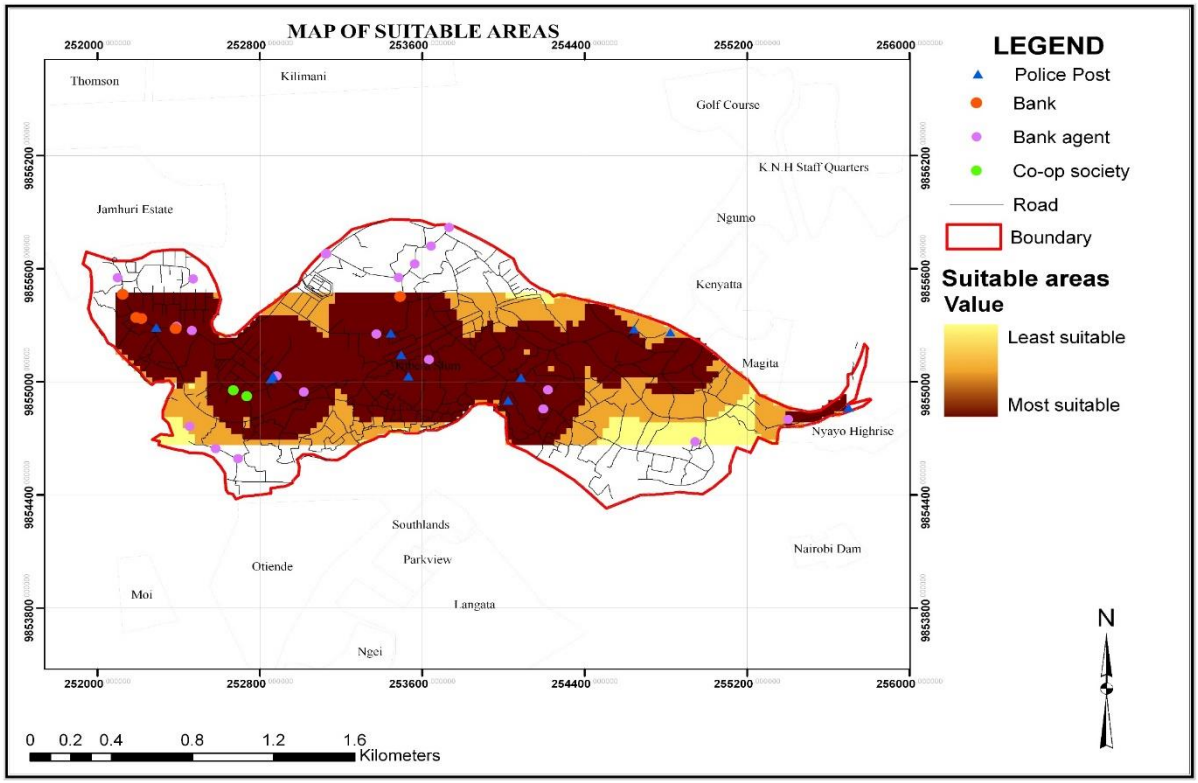
Table 1: Criteria Priorities/Weight

Criteria	Priorities/Weights
Security	40%
High population density	20%
Distance from existing financial institutions	20%
Proximity to the main roads	20%

The research project used Arc GIS software and the criteria were assigned the weights in the weighted overlay table, the criteria were assigned weights of 20% except security that was assigned 40%; according to the MFI experts, security is an important criterion and

needed to be given more priority especially considering the area being a slum which is prone to security risks.

4. Results



The results of above weighted overlay analysis show most suitable areas in dark color, these areas have high population, are closer to police posts and to main roads, and are best suited for location of the MFI facilities. These areas include Ayany, Serangombe, Karanja, Laini Saba, Kisumu ndogo, Mashimoni, Kambi muru and lower parts of Soweto east.

Least suitable areas are shown in light color which represents those regions that does not fully fit the criteria; even though the regions are highly populated, they are 200 meters away from police post and exceed 300 meters from major roads. Suitability map has six class values in terms of color. The value of 1 represents those areas that are least suited for location and represented with the light color, the value of 6 indicates that new facilities can be built/located and are the suitable areas these areas are represented in dark color.

5. Conclusion and Recommendation

The project was designed to show suitable MFIs site locations in reference to selection criteria identified by MFIs in Kenya. The survey according to five out of the nine licensed Deposit Taking Microfinance in Kenya, identified the criteria specifically for the area of

study; Kibera as security, population distribution, roads and lastly distance to existing microfinance institutions. The result from the study is useful to the MFIs and business entrepreneurs in Kenya.

The analysis demonstrated how GIS can be used to provide a spatial depiction of suitable location(s) where MFIs could establish banking facilities in Kibera. Generally, it demonstrates that GIS technology and applications analysis of this project can assist MFIs in making informed decisions before venturing into banking opportunity.

The suitable locations identified in the study indicate a new MFI could be established in any of the sub location in Kibera slum. MFIs would have to visit the sites for physical location analysis and infrastructure evaluation to ensure that a candidate location meets the other criteria e.g. parking space, suitable building etc.

From the analysis, the following sites were found to be suitable Ayany, Serangombe, Karanja, Laini Saba, Kisumu ndogo, Mashimoni, Kambi muru and lower parts of Soweto east.

The study recommends investigation of other methods in GIS analysis for MFIs. There are other methods including integrating GIS expert systems and so on, also there are other tools and software that can be used for the same analysis, it is important to do further research on these methods to identify and compare the results. Also, further research on how to use GIS to help in marketing the MFIs is important as marketing deals with customer's attraction using their location characteristics and generally marketing is a challenge to any business.

Conflict of Interest Statement

The author declare no conflicts of interest.

About the Author

Eunice Akinyi Odhiambo is a Geospatial Information System Specialist working at Kenya Rural Roads Authority (KERRA). Her area of specialization is GIS from University of Nairobi.

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