

A geo-spatial methodology to locate accessible facilities for the Department of Home Affairs (DHA) in South Africa.

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Description:

Background:

Many rural areas (especially in the developing country context) face isolation and have poor levels of access to services and facilities. This places these areas at a disadvantage compared to many urban centres. The result is often unbalanced development and a trend to migrate to urban areas if an opportunity presents itself. This is true of the South African reality and also partly due to past policies that have resulted in a unique (own) settlement pattern and rural type not found in many other countries. This relatively high rural population density therefore requires that more services be provided to these communities. Currently, several government departments are tasked to provide services such as health care, education and social support and have to plan and provide more services in South Africa's deep rural areas. One such department, the Department of Home Affairs (DHA) recently published a document, which provides a blueprint for the department's restructuring process. One of the strategies looks at improving its accessibility and service delivery. The particular stated objective was "*to bring world class DHA services closer to the people*".

To ensure that the DHA offices are placed optimally to serve the needs of the community, the department approached the Council for Scientific and Industrial Research (CSIR) to establish whether the existing and planned offices fulfil the accessibility needs of the population. The CSIR conducted a preliminary analysis (Phase 1) based on a simple buffer (straight-line distance) methodology. The technique used was, however, found to be coarse when looking at the provincial and sub-provincial levels and a more detailed approach was then proposed. A further limitation in such applications is the availability and resolution of spatial information.

Approach:

An essential element of the overall approach is the use of a Geographical Information System (GIS) and related spatial interaction modelling technology. All the data capturing and preparation applied here utilise GIS functionality and procedures. Data such as demographic information and the location of existing facilities were assigned to a uniform tessellated surface to serve both as origins and destinations. Uniform area-sized units were preferred as they overcomes the problems associated with variable area units.

The results obtained from the accessibility modelling procedure are related to the spatial input data and various spatial data layers are combined to produce visual outputs (maps) to illustrate the results. The CSIR applied the Flowmap¹ interaction model and tested

¹ Flowmap is software dedicated to analyzing and displaying interaction or flow data.

several alternative facility expansion routines using the Eastern Cape Province as a pilot study area. Routines were applied to delineate existing facility service areas and then site accessible locations for new facilities. An essential element of the exercise is the objective to be satisfied. In fact, several objectives can be satisfied such as maximizing population coverage or minimizing the average travel time. Here the objectives of the DHA had to be addressed. Several routines were performed, and the results compared using the pilot study area. As not all variables of facility siting can be modeled, it was essential to have participation and engagements with relevant stakeholders both at national and provincial government departments in parallel to the analytical activity. Assumptions also had to be made such as the nature of transportation, given, for example, that many people in rural environments do not have access to vehicles and walk to facilities or where transport can be accessed.

Results obtained through modeling and analysis was shared with stakeholders during several workshop sessions. Here local knowledge and expertise was obtained and used to produce a combined output; proposals for facility placements. The modeling process applied techniques such as Catchment Area Analysis (CAA) and Proximity counting (PC) on travel time networks to identify sites for both permanent facilities as well as sites for possible mobile service. Mobile facilities would provide a service in areas where population thresholds is below what is required for permanent service points.

Key Conclusions:

The methodology relies initially on a scientific (quantitative) approach focussing on accessibility. Other socio-economic and political factors are subsequently introduced as a means to incorporate local information provided by officials from various departments in order to produce realistic proposals. This is essential especially in the South African context as 'buy-in' to technical processes is often difficult. Engagement with stakeholders also proved to be crucial for the planning process to proceed. The geo-spatial methodology applied, combined with the Flowmap Interaction model produced the required results. The Department of Home Affairs proceeded to apply the process in all nine provinces within South Africa to develop a complete set of proposed sites for permanent as well as mobile service points. Subsequent research using Flowmap has also explored ways to improve and optimise such proposed placements even further.