METHODFINDER

www.MethodFinder.net

Practitioner's Guide:

Rural Service Areas, Accessibility and Isolines

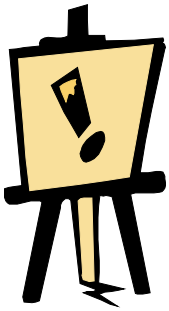
SPRING
Universität
Dortmund

METHODFINDER

Concept and Layout: Nikolaus Schall / Michael Becker

Rural Service Areas, Accessibility and Isolines

Brief Description



There is often limited knowledge of the spatial relations that exist in a district or region. Distances that people have to travel in order to access basic goods and services often further compound issues of underdevelopment. There is often a limited spatial information on accessibility issues. As a result of this, district and regional planners often find it difficult to justify planning measures designed to overcome the disparities between remote and easily accessible areas.

Existing maps can be used to calculate isolines and accessibility models for a district and region and these in turn can be used in order to plan new infrastructure such as rural or district access roads or can be used to justify upgrading existing infrastructure I order to reduce journey times and thus reduce costs.

The distance people have to travel in order to access basic services or to market their products has important bearing on their behavioural patterns. It is generally true that the closer people live to a function, the benefits accrued and the availability and frequency of use increases. However, a major restricting factor is the income and purchasing power. If people have limited purchasing power the availability and accessibility of goods and services is irrelevant, they simply cannot purchase the necessary services and products.

Using normative service areas and isolines planners are able to determine the service area radius, accessibility of villagers to service providers and markets. Isolines can also be used to determine either physical or time distance measures in order for people to access goods and services. When planning new infrastructure such as access roads, the methods help determine the effective coverage area that will benefit from the roads and the time and cost saving for the people living within the vicinity of the new roads.

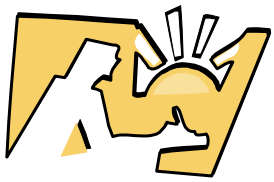
Additional methods that can be used to determine accessibility is the method "Mapping central and marginal areas" that can be found in the MethodFinder Practitioner's guide.

Rural Service Areas, Accessibility and Isolines

Proposed Main Users

District planners, Provincial planners, Sectoral planners

Purpose of the Method



Isolines: These are constructed around urban centres to distinguish integrated from un-integrated areas. Isolines are lines around the centre in the same physical or time distance measured from the urban centre along the road system. Distance can be converted into time by referring to the average speeds for the various kinds of road links and transportation opportunities. Care has to be taken when calculating the points between roads where the transportation may take place on feeder roads or on foot paths.

In the case when isolines are used as an approximation for the service area, the isolines generation requires a decision on what might be called the maximum travel time for people outside the urban place to obtain a specific urban good or service. This crucial point cannot be left out. For orientation purposes, the average interaction values of the regions can be used. In every case it is useful to construct several isolines of different travelling distances. Areas within overlapping isolines of neighbouring centres are within the sphere of influence of two urban centres, with opportunity choices. Isolines cane can be drawn for the services such as secondary schools. In this case the maximum travel time for the pupils is used. In the case of a regional market centre, the travel time includes waiting time, change in the transportation mode and the real transportation time of farmers.

Accessibility models: Describe the present situation possible accessibility models as an entry step into the service area identification. Questions arising from the proposes model are then subjected to field investigation and analysis. By combining the model with the results of the field work specific conclusion regarding the accessibility between rural and urban areas can be ascertained.

According to the gravitation hypothesis, it is assumed that inhabitants living at any point between two settlements A and B will be attracted to the towns accordance with the relative attractiveness of the towns and inversely with the distance.

Distance can be measured in straight lines or better in road distances. In addition, cost and time factors can be incorporated. Attractiveness can be measured by the population size or the functional index.

Rural Service Areas, Accessibility and Isolines

Advantages

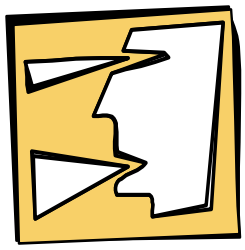
- The application of the methods will help planners to indicate areas with low access to urban facilities, goods and services.
- The methods can be helpful in determining areas with favourable location conditions, i.e. good accessibility.

Limitations

- Even though accessibility maybe improved, the income and purchasing power of people is a important determining factor with regard to accessibility.
- Accessibility can also be measured by the inability to purchase goods and services or the inability to make use things such as market information. Purchasing power, empowerment, literacy and other determining factors also impinge on the whole concept of availability and accessibility, not only distance relationships.

Rural Service Areas, Accessibility and Isolines

Principles & General Procedures



Rural (Normative) Service Areas / Isolines

In order to determine the normative service area a radius is drawn around a settlement (village, town or urban centre). The radius represents the service facility according to the distance. For example, the service radius of a small health clinic maybe 5 km while that of a district hospital could be as much as 40 km.

Step 1:

Determine the important services that should be spatially depicted

Step 2:

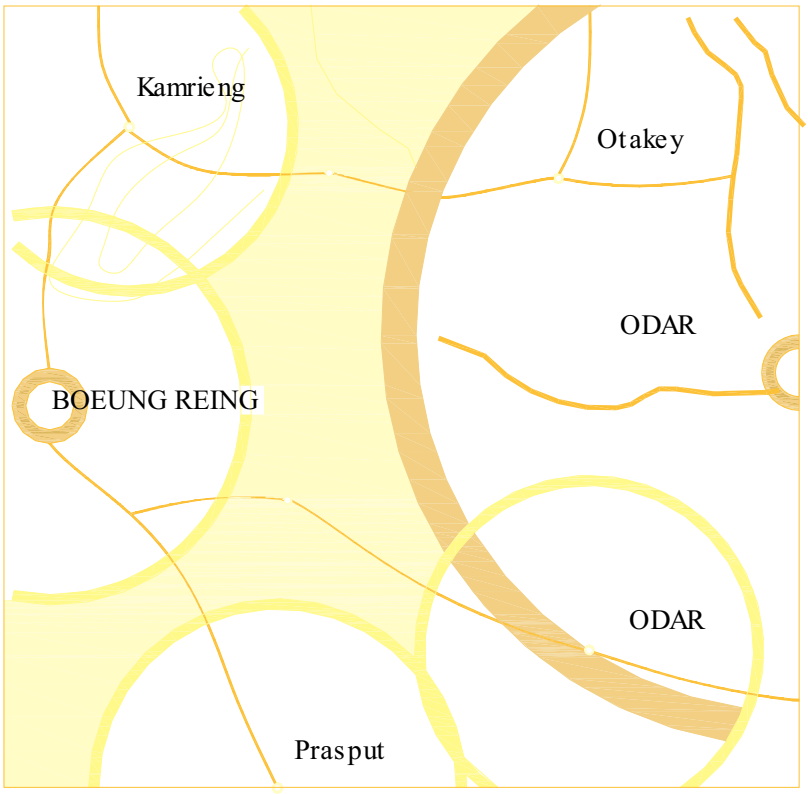
Determine the acceptable service area for the specific service

Step 3:

Draw a radius around the settlement for each respective service that the planner wishes to depict.

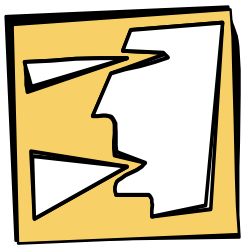
Similar process can be undertaken for isolines. Isolines represent distances to services in a similar way to the normative service areas described above.

Map 1: Example of normative radius of a service area for a selected facility



Rural Service Areas, Accessibility and Isolines

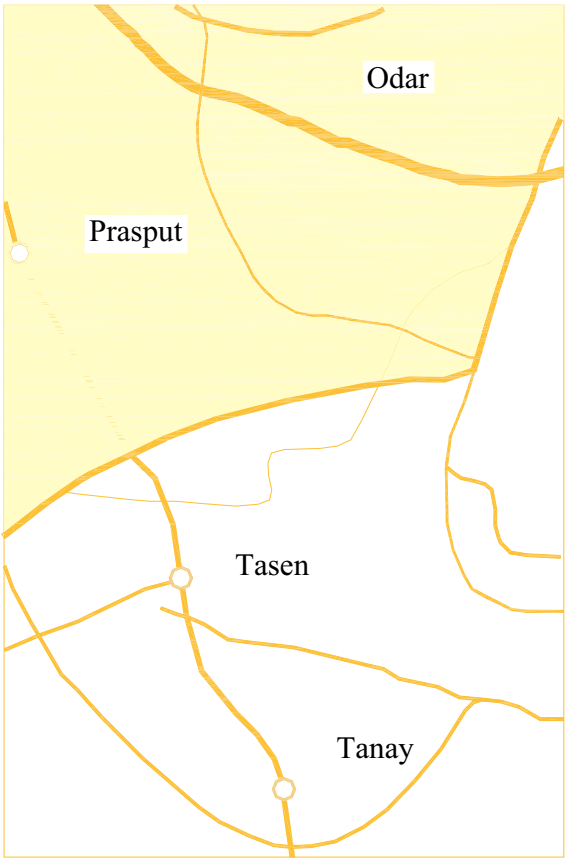
Principles & General Procedures



Possible forms of interpretation rural service centres:

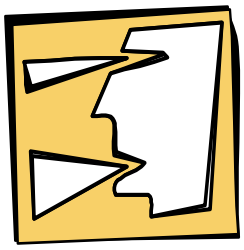
- A possibility may exist to extend the service area by improving the transportation network
- There is a need to also examine whether or not the settlements offer sufficient capacity to cover the expected additional demand for goods and services
- The population outside of the service area may or may not fulfil the necessary threshold values required for a new rural centre or in order to be able to upgrade existing centres to higher order service centres
- Projections into the future may indicate that the threshold values maybe achieved at a later stage, this should be determined when this is likely to happen.
- The overall carrying capacity for the area maybe limited, the number of people living in the area is already at the limited in which case the expansion or development of a new centre cannot be justified.
- It is important, where possible, to select the most suitable settlement to be upgraded in terms of service provision and accessibility

Map 2: Mapping of areas outside effective isoline of rural centres



Rural Service Areas, Accessibility and Isolines

Principles & General Procedures



Accessibility analysis

According to the gravitation hypothesis, it is assumed that inhabitants living at any point between two settlements A and B will be attracted to the towns accordance with the relative attractiveness of the towns and inversely with the distance.

Step 1:

Identify all the settlements to be analysed, including the neighbouring settlements.

Step 2:

Identify the distance (in km) to each settlement (d). For this it is possible to use the results of the distance matrix method.

Step 3:

Determine the functional index (C). The results of the functional index method should be used.

Step 4:

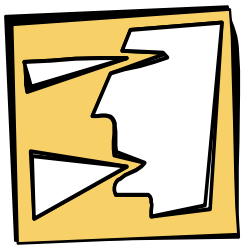
Compute the break even point (km)

$$dA = \frac{dAB}{\sqrt{\frac{CB}{CA} + 1}}$$

Table 1: Results of calculation (example only)

Settlement	Village A	Village B	Town C	Town D
Distance	45	32	25	70
Functional Index	33.13	71.39	221.69	301.69
Result	25.0	14.74	8.14	20.52

Rural Service Areas, Accessibility and Isolines



Step 5:

Alternatively it is possible to use the population instead of the functional index.

Step 6:

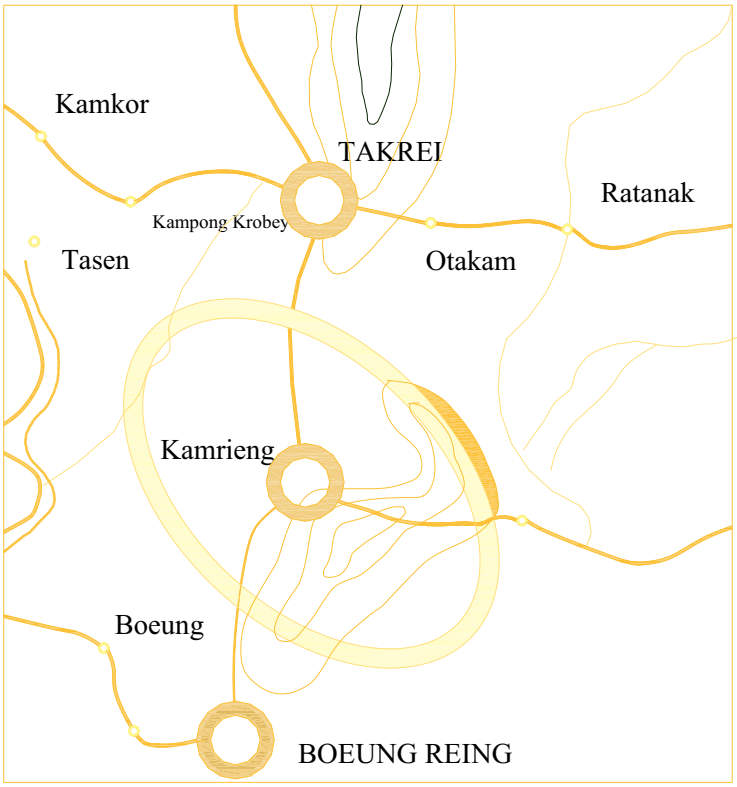
The alternative model calculation would be:

$$dA = \frac{dAB}{CB + CA} \times CA$$

Table 2: Results of calculation (example only)

22.05	14.09	8.27	19.12
27.42	13.43	4.72	10.23

Map 3: Mapping of service area (example only)



Rural Service Areas, Accessibility and Isolines

References and Sources Used

Jenssen, B.; (ed), **Planning as a Dialogue,** District Development Planning and Management in Developing Countries, SPRING Research Series Nr. 2, Dortmund, 1992

Jenssen, B.; **Towards a Quantification of Agglomeration Disadvantages in Metroploitan Areas of Developing Countries**, University of Dortmund, IRPUD, 1984

Rondinelli, Dennis, A.: **Applied Methods of Regional Planning: The Urban Functions in Rural Development Approach**, Clark University: Rural Marketing Centers Working Group (USAID), 1983a

Thimm, Hr.R., Green, D.A.G., Leupolt, M. (Eds); P**lannning and Operating Rural Centres in Developing Countries,** Studien zur Ländlichen Entwicklung. No. 18, 1986