METHODFINDER

www.MethodFinder.net

Practitioner's Guide:

Delineation of Hinterland using Distant and Next Opportunity Matrix

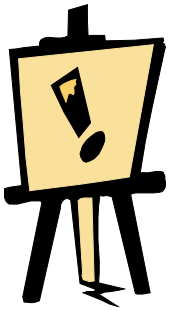
SPRING
Universität
Dortmund

METHODFINDER

Concept and Layout: Nikolaus Schall / Michael Becker

Delineation of Hinterland using Distant and Next Opportunity Matrix

Brief Description



A district is not only a system of functionally diversified settlements but also a network of social and economic and physical interactions. The processes and interactions are shaped by roads among settlements and villages in- and outside the district. Roads allow people living in an area to obtain access to the economic activities, infrastructure and social and administrative facilities. The road network determines the access of the urban traders and entrepreneurs to rural resources and raw materials. Within this system of interdependent interactions, the urban sector may become dominant to the disadvantage of the rural sector.

Within settlement patterns prices may differ. In general, prices increase with increasing rank of an urban place within the settlement hierarchy. As transportation costs do not explain the whole price difference the income situation of villagers can be improved through better rural-urban linkages, access to information on market prices etc.

There are a number of methods that help to study rural-urban linkages. They range from time budgets to market and transportation studies and from trading to social interaction and migration studies. The degree of functional integration can be measured in the following way:

- Distance Matrix: identifies those locations from which all other locations can be supplied with goods and services at minimum transportation costs.
- Next Opportunity Matrix: combine two methods namely the functional matrix and the distance matrix.

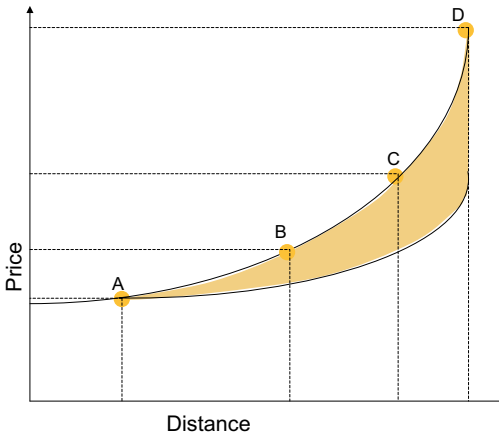


Figure 1: Market price development within a settlement system

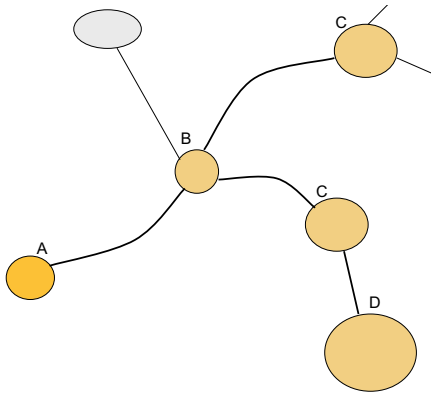


Figure 2: Spatial product path

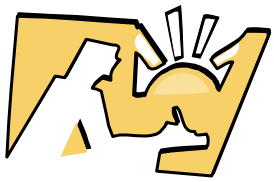
The shaded area indicates the difference between transportation costs and the market prices per unit. A, B, C, D indicate the rank. A denotes a village, B district centre, C & D provincial centres

Delineation of Hinterland using Distant and Next Opportunity Matrix

Proposed Main Users

District planners, Provincial planners, Sectoral planners

Purpose of the Method



Due to the heterogeneous spatial economy the ratio between freight costs and total production costs varies widely between locations. Transportation costs have a direct impact on production costs. They lead to an spatial differentiation of the production structure. While producers of consumer goods settle down near the market, raw material oriented industries have a tendency to be dispersed.

A new road will have far reaching impacts on the whole system of interaction. Land use pattern along the road may change, villages may settle down along the road due to the increased accessibility and the market areas increase with positive effects on production costs by the realisation of economies of scale. Consumer preferences in a spatial system are not only guided by the variety, quality and price of goods and services but also by the transportation efforts for obtaining certain goods and services. It is obvious that a new road increases the service area.

The improved or the extended road system make new crops economically viable, links agricultural production areas with crop collection and distribution centres. Increased interaction allows the diffusion of innovations and creates competition with other regions. All these cascade effects within and between spatial units cannot be left to the forces of the free-market system and planners and policy makers must be concerned with these interactions.

Defining the interactions between the rural-urban linkages also helps produce options for investment in infrastructure, for opening up new areas for investment. The public sector investment "leads" private sector investment decisions.

Delineation of Hinterland using Distant and Next Opportunity Matrix

Advantages

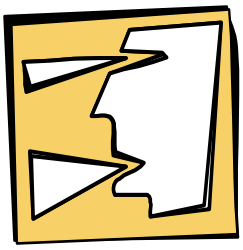
- Areas of a district or province which are not well integrated into the network are usually characterised by a low level production, mostly subsistence agriculture, a low level of trade, low level of farm input supply and low social mobility. They suffer under transportation costs. The time budget of farmers is drastically effected by long distances they have to cover. Market opportunities are not easily realised and the isolated working and living conditions reduce mobility and innovation. Understanding where these areas are and how they can be helped ensures that a better integration of activities is undertaken in order to tap the existing potentials.
- Areas of the district which are well integrated into the interaction network by the physical road system are the locations of higher ordered services, facilities, small scale industries and market thresholds and locational advantages for the effective production and distribution. Once again knowing where these areas are and how they can be better served are further advantages of using the technique.

Limitations

- Main disadvantage of the tool is that it is quite a time consuming exercise the result of which merely provides an overview of what is available.
- Subjective impressions of the quality of data can be misleading at first sight. The need to update the rating scala with increasing knowledge of the situation becomes all the more important.

Delineation of Hinterland using Distant and Next Opportunity Matrix

Principles & General Procedures



Distance Matrix

Step 1:

All travel distances between all urban centres and villages along the roads are measured.

Step 2:

The obtained travel distance can be converted into travel time by using data on speed for the various kinds of road links and transportation opportunities.

Step 3:

The distances or the time values down the columns or across the rows are summed up.

Step 4:

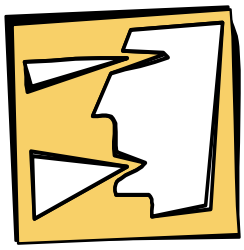
The urban places with the premium value supplies all others at minimized transportation costs. According to the locational values the degree of integration can be identified.

Table 1: Settlement Distance Matrix

To / From	Village A	Centre B	Town C	Town D	Town E	City F
Village A		98	98	156	188	10
Centre B	98		48	58	40	88
Town C	09	48		106	88	88
Town D	156	58	106		75	141
Town E	138	40	88	75		121
City F	10	88	88	146	128	

Delineation of Hinterland using Distant and Next Opportunity Matrix

Principles & General Procedures



Next Opportunity Matrix

The general character of the distance matrix restricts its use and interpretation. A more detailed picture will be gained from the next opportunity matrix which combines two tools with each other; the functional matrix and the distance matrix. The rationale behind the model is the assumption that consumers minimize transportation efforts under the condition that all other factors are equal.

Step 1:

The basic idea consist in the proposal to go through the functional matrix row by row and to identify blanks or unavailable functions.

Step 2:

Then the next location to the urban place under consideration is identified within the matrix where the missing function is available.

Step 3:

The identified transportation costs are incorporated into the next opportunity matrix.

Step 4:

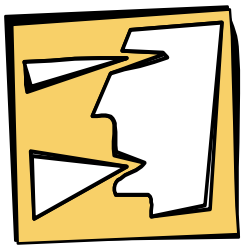
Going through all the functions and scanning up all the values the total interaction effort is indicated by the last column.

Table 2: Settlement Next Opportunity Matrix

Function / Settlement	Nursery school	Primary school	Secondary school	Health clinic	Market place	Agri-Business	Processing factory
Village A							
Centre B					98		98
Town C			48	48	48	48	98
Town D				58	156	58	156
Town E			40	40	138	40	138
City F		10		10	10	10	10

Delineation of Hinterland using Distant and Next Opportunity Matrix

Principles & General Procedures



The finding of the next opportunity matrix can be interpreted in different directions:

- Places with high values might be called remote areas with low access to urban facilities.
- Places with low values are highly self-sufficient with locational advantages.
- The overall transportation effort of one location to the facilities in other location is computed over all facilities in the following way:
- Distance or time x target group x frequency x unit costs = average cost of the target group in a specific location using a specific facility in the next location.
- This computation over all functions and locations provides the planners with decision criteria on the future distribution of the facilities and the allocation of investments.
- The demand potential is derived from the interactions of a target group.

The results of the next opportunity matrix provides first insights into interaction patterns. The method also helps avoid complicated empirical studies. It is possible to estimate demand patterns, to distinguish between integrated and non-integrated areas to derive some ideas for the allocation of investments in connection with new infrastructure facilities.

Delineation of Hinterland using Distant and Next Opportunity Matrix

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