A method of verifying the effectiveness of limited parking zones

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Introduction. Growing motorisation has given rise to increased parking problems in built-up areas. This is partly due to the fact that legislation deals with parking either inadequately or at too late a date.

In Hamburg, parking fees existed as early as 1952, whereas it was not until some 23 years later that, thanks to the Wiener Landesgesetz, similar measures could be taken in Austria. Unfortunately, these regulations too have their shortcomings, which render their enforcement extremely difficult and make the parking fee policy very awkward to handle.

The greatest weakness of the Viennese system is that the adequate control of parking meters requires five to six times more personnel. A further problem lies in the fact that this control has to be carried out by the federal police, although limited parking zones are actually created with the exclusive aim of maintaining the economic profitability of certain areas.

In the course of the effectiveness controls concerning Vienna's limited parking zones a new method was developed enabling the traffic authorities to ascertain whether there is sufficient demand for limited parking zones, whether additional parking space will be needed and whether the control by the police is satisfactory. This provides the authorities with a means to control supervision and may put a stop to mutual accusations concerning any deficiencies in the traffic scheme.

Basic elements of the method
This method is essentially based on two figures:

(*1*) *The rate of utilisation*, which indicates the relation between occupied parking spaces and available parking spaces. This rate of utilisation allows one either to calculate or to determine empirically the probability of excess utilisation. The probability of excess utilisation can be calculated if the distribution of the degree of utilisation is known; a practical determination can be made by recording the number of vehicles looking for parking spaces (Fig 1).

(*2*) *The degree of effectiveness*, which indicates the relation between actual and desired occupancy within a certain period of time. An effectiveness of 1·0 in an observed limited parking zone would be indicative of a turnover that corresponds exactly to the desired parking turnover.

Data are gathered by means of recording the registration numbers of all vehicles parked in a limited parking zone at 15-minute intervals. All the figures mentioned above can be determined by a simple calculating program.

Evaluation method
By determining the desirable degree of effectiveness as well as the admissible probability of excess utilisation an area can be divided into four 'zones' by means of a co-ordinate system of axes including the variables of probability of excess utilisation and degree of effectiveness (Fig 2). By observing operation by means of the above method the position of the limited parking zones in the co-ordinate system can be ascertained for any point of time.

Zone 1 is characterised by only little probability of excess parking; at the same time, the degree of effectiveness is less than 1, which means that there is no additional traffic influencing the zone and that parking turnover is less than desired. This either means that there is no potential demand for parking space in this area or that the surrounding structure has already deteriorated to a degree where the formerly-created limited parking zone is no longer needed in the intended measure. The position of the limited parking zone in this area is also a sign of inadequate control.

Zone 2 is characterised by a high probability of excess utilisation and a low degree of effectiveness. The presence of a limited parking zone in this area shows that there is great demand for parking spaces (many vehicles looking for parking spaces), but that this demand cannot be satisfied due to inadequate operation (inefficient control). The turnover rate in this area is less than desired. It is characteristic of a limited parking zone situated in this area that control is inefficient or inadequate. A state of operation characterised by the presence of a limited parking zone in this area will therefore in the long run damage the structure and pollution and congestion will be the result.

Zone 3 is characterised by little probability of excess parking and by high degrees of effectiveness. It is the only zone that stands for efficient operation. It generates more traffic than would have to be expected from the structure. In this case the assumptions concerning the traffic flow data of the structure should be checked up. Limited parking zones situated in this zone are characterised either by a sound self-regulating effect among the drivers or by adequate control guaranteeing efficient operation of the limited parking zone.

Zone 4 is characterised by a high probability of excess utilisation and by high degrees of effectiveness. If a limited parking zone is situated within this area an extension of the zone should be aimed at, in order to be able to satisfy the demand for limited parking space.

Practical application of the method
The scope of application covers checking-up of the conditions in existing limited parking zones and, with periodic repetitions, the

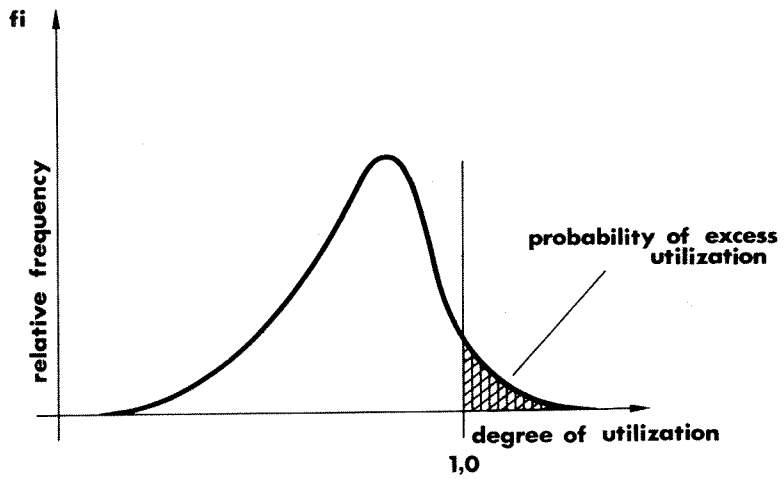


Fig 1.

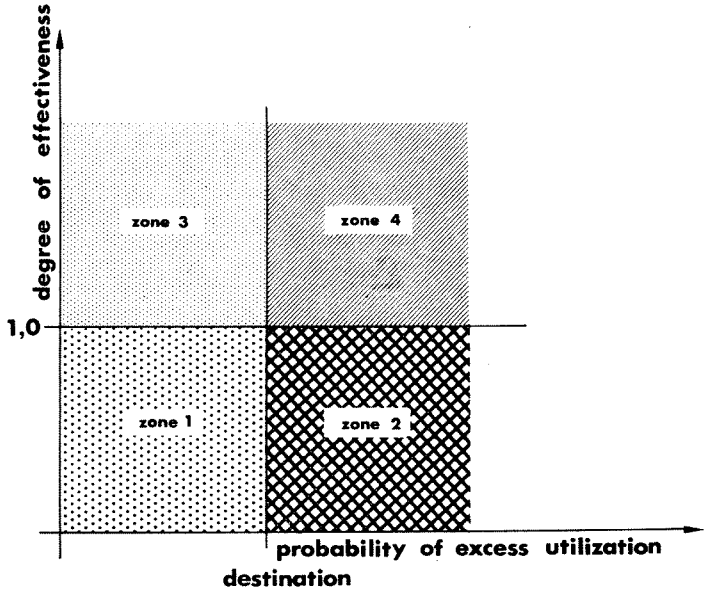
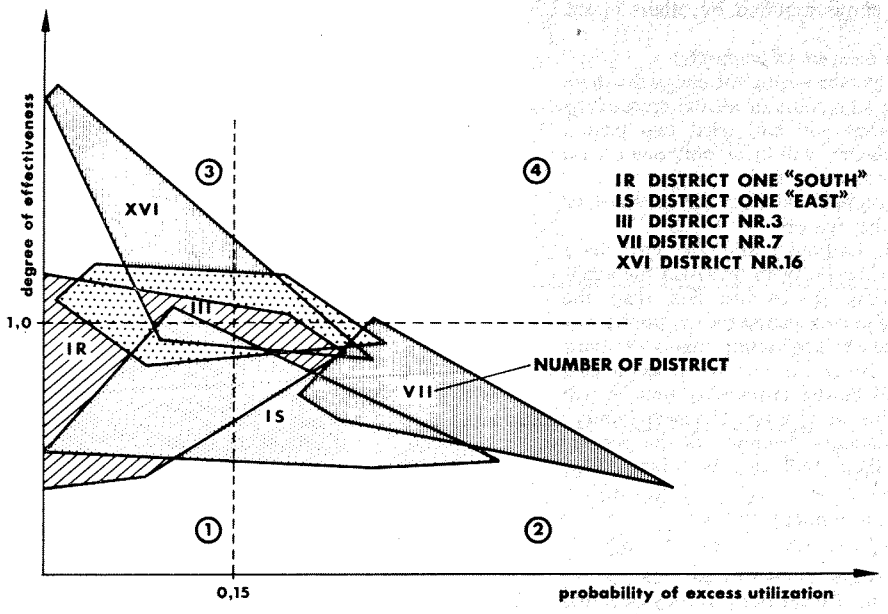
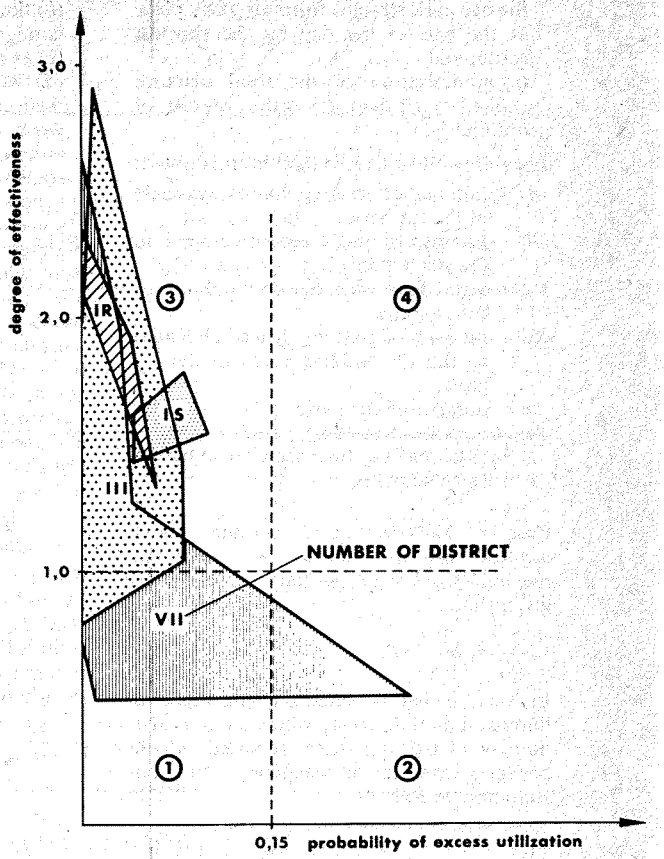


Fig 2.





Position of the limited parking zones within the assessment scheme before the introduction of parking fees (Fig 3, above) and after, May–September 1975 (Fig 4, right).

determination of demand for further limited parking zones or the assessment of the demand for parking garages. Any changes in user habits and in control, as well as the effect of a system on the area of the limited parking zone, express themselves in a shift within the co-ordinate system. Shifts towards a higher degree of effectiveness indicate that the utilisation of the limited parking area has become more intense. Horizontal shifts towards a higher probability of excess utilisation indicate that there is more demand for parking space, but that control is inadequate. Horizontal shifts towards the left indicate a decrease in limited parking demand.

Figures 3 and 4 show the results of the first investigations carried out in Vienna. They show that the formerly rather unfavourable condition of the Vienna limited parking zones has considerably improved in the areas observed at random since parking fees were introduced. All of a sudden, there is more parking space available.

By periodically repeating this procedure it is possible to quantify any trend concerning the shifting of the co-ordinate system. This enables the authorities to find out whether control has remained constant in a certain area (degree of effectiveness must remain the same), whether control has slackened (in this case the degree of effectiveness usually decreases) or whether the degree of effectiveness and the probability of excess parking increase. This indicates an additional need of limited parking facilities. Thus it is possible, by determining the speed of those shifts from the results of the periodical investigations, to forecast the demand for additional parking spaces and for parking garages for the near future. This provides an instrument enabling the planner as well as the practical expert effectively to control and operate parking. This method, however, also shows that the provision of the Vienna local legislation, fixing a uniform parking fee for the whole town, is inadequate. As has been shown by our method, the same fee has different effects in different zones.

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