SOME PROBLEMS CONCERNING THE PROVISION OF URBAN OPEN SPACE

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Daar is konflik in die voorsiening van oop ruimtes in stede. Aan die een kant is daar 'n behoefte aan grond vir gebruike soos paaie en sportterreine, en aan die ander kant die wens om huisvesting aan die grootste aantal mense te verskaf. Die vaste toekenning van ruimte, gebaseer op die bevolkingsyfers, kan dalk nie voldoen aan die vereistes van die inwoners nie. Die gebruik van dinamiese stelsel-simulasie en gedragsnorme kan help om die regte hoeveelheid ruimte te identifiseer.

Die toekenning van oop ruimte in die Republiek is op 'n redelik onwetenskaplike wyse gedoen, en om standaarde op die huidige stand van sake te baseer, kan die bestaande ontevredenheid laat voortduur.

1. INTRODUCTION

Since the beginning of town planning as a profession, it has been considered desirable to provide open space for communal facilities and for relaxation. The setting of acceptable norms and standards, by the authorities, for open space and its associated facilities, has accordingly been the subject of many debates and publications. It is generally agreed, however, that high priority should be given to the provision of open space.

The norms for open space, applied in the Republic, vary from municipality to municipality and are mostly of a general nature. One norm, for instance, proclaims that 1,33 hectares of open space should be provided for every 1 000 people residing in a specific area. Such a norm ignores socio-economic status, ethnic grouping, the type of housing in the area and even the kind of recreation favoured by the inhabitants. Could all these elements be allowed for in the formulation of a standard, and if so, how could their influence be determined over a period of time? In the following paragraphs an attempt is made to give some answers.

2. UNDERSTANDING THE PROBLEM

The evaluation of the adequacy of urban open space can be related either to the actual state of affairs or to what is really desirable. If what is regarded as desirable corresponds with the actual state of affairs, no problem would exist. However, the fact that the provision of urban open space generates concern, is an indication of the existence of problems in this field.

Steyn and Swart (Steyn, J. N. and Swart P. E. 1983) have considered the actual state of urban open space and two of their conclusions need to be emphasised.

- From their findings it is evident that no norms are used by municipal authorities to control either the amount of open space development or the nature of the facilities provided.
- Their investigation found that large towns provided less open space in terms of the number of inhabitants than smaller towns, but had more open space in terms of their area.

Thus, the existing situation, as described by Steyn and Swart, indicates that space norms need not necessarily have fixed values, and that a sliding scale linked to the size of a town might solve the problem.

In this paper a method of determining suitable open space norms is suggested, which is based on the value systems of a community. Furthermore, a method of coupling the sliding scale to the norms arrived at, will also be discussed.

3. DETERMINING URBAN OPEN SPACE NORMS FROM THE VIEWPOINT OF THE USER

The procedure relies, in part, on information from Ajzen and Fishbein's 'Theory of Reasoned Action'. (Ajzen, I and Fishbein, M. 1980) However, it is believed that a person's use and appreciation of open space is based on basic attitudes, which, in turn, are based on a system of values which applies not only to a particular individual, but also to the rest of the community. Ajzen and Fishbein not only elaborate on these thoughts in an orderly fashion, but actually furnish a procedure for determining certain norms by means of questionnaires.

In the search for valid norms for the development of open space, the role played by beliefs, attitudes, social influences and intentions can be explored in the context of Ajzen and Fishbein's theory. Diagram 1, taken from their book, has been modified to demonstrate how the 'intention' of the community in the use of urban open space, can be determined.

A similar equation was used by the author, in 1978, as the basis of a model for determining land use on a church erf. (Hibbert, A. 1978)

To obtain the value 'I' (the intention), every factor on the right hand side of the above equation has, of course, to be determined.

The following are examples of the scales used by Ajzen and Fishbein to measure some of these variables, translated into terms of land use.

1. *Intention*

I intend to go for a walk through the park some time this week.
likely _____:_____:_____:_____:_____:_____:_____: unlikely

2. *Attitude*

Taking a walk through the park some time this week would
be wise _____:_____:_____:_____:_____:_____:_____: be foolish

have good have bad
consequences_____:_____:_____:_____:_____:_____:_____: consequences

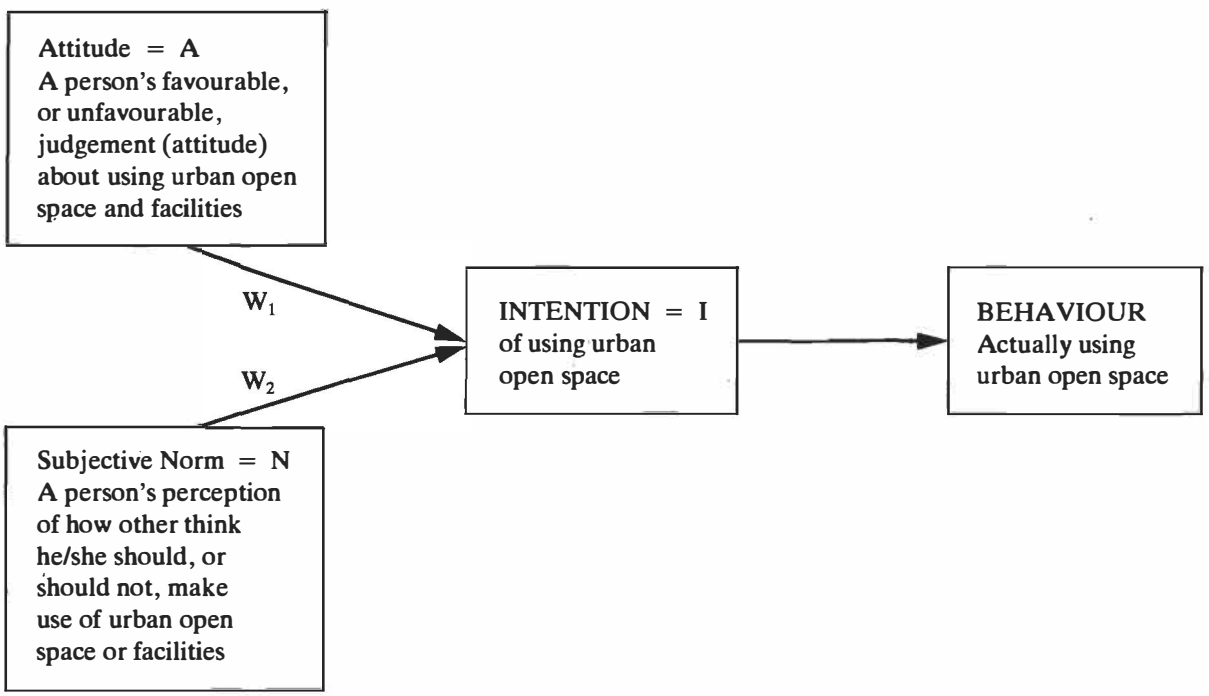
3. *Subjective norm*

Most people who are important to me think
I should _____:_____:_____:_____:_____:_____:_____: should not
go for a walk through the park this week.

By varying the class, content, type and time of the behaviour the intentions, attitudes and norms of the subject(s) can be assessed.

It should be mentioned that a considerable amount of work has already been done on energy conservation in residential areas, using social behaviour techniques. (Macey, S. M. and Brown, M. A. 1983). It is suggested that land use planners take advantage of this research to establish certain planning norms through a study of the various groups of people for whom a township is being planned. Norms may have been set already based on previous experience with various groups of people but they may not, however, meet their requirements.

DIAGRAM 1



Intention is thus seen as the following additive function:

$$I = AW_1 + NW_2$$

where

- I = The intention, viewed as the approximation of behaviour,
- A = Attitude,
- N = Norm, and
- W_1, W_2 = Weights relating the importance of A with I and N with I respectively.

Macey and Brown have expanded the Ajzen and Fishbein model. They suggest that behaviour is not only a function of attitude and a subjective norm, but that it also involves past experience (see Diagram 2).

It might be argued by urban space planners that the existing fixed, or static, norms are "more or less" correct, since they are based on the past experience of many people and planners. The present norms should, however, be dynamic and not static – a sliding scale is preferable to a fixed value.

The Building Economics Division of the National Building Research Institute recently had the opportunity to compare a static open space norm with a dynamic open space norm in the course of research on a 'building industry programming' project. Two models of the Pretoria metropolitan community were simulated with the aid of J W Forrester's System Dynamic Simulation. (Alfeld, L. E. and Graham, A. K. 1976). In the first model (Model I), a static (or fixed) open space norm of 1,33 hectares of open space per thousand people was adopted. In the second model (Model II), variable open space norms were based on the 1970 average family size and the nature of their accommodation (see Table 1).

The open space norm, per housing type, varied as the family size was expected to vary between 1970 and the year 2000. The above table shows the starting open space values for a particular family size.

The parameter variations summarised in Table 2 were built into both models, for each year from 1970–2000.

Table 3 presents the results obtained from both models, in respect of the provision of open space. The figures were obtained by means of the DYNAMO simulation language.

DIAGRAM 2 – DETERMINING URBAN OPEN SPACE NORMS, USING EXISTING NORMS

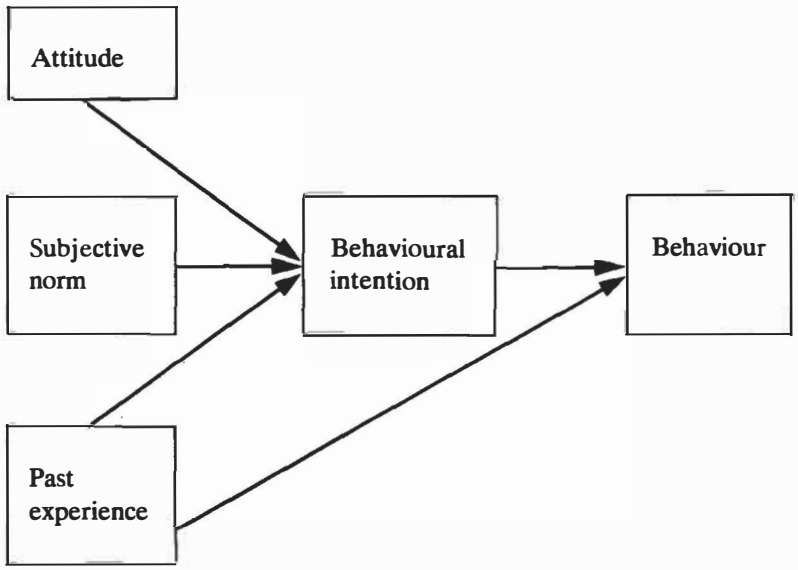


Table 1 *Open Space Norm (Model II)*

Housing type	Family size (1970)	Norm for open space per family in m^2
Houses	4,01	39
Low-rise high density housing	2,70	45
High-rise flats	2,47	52

Table 2: *Parameter Variations*

Parameter	Variable from 1970–2000
Population:	Births, deaths, migration
Floor size:	Houses, low- and high-rise housing
Erf size:	Houses, low- and high-rise housing
Percentage of the community in:	Houses, low- and high-rise housing
Family size in:	Houses, low- and high-rise housing
Primary school children per:	House, low- and high-rise unit
Secondary school children per:	House, low- and high-rise unit

Explanation of Table 3

Column 1: The time span over which the models were calculated – from 1970, on a yearly basis, until the year 2000.

Column 2: The total cumulative White population expected in the Pretoria metropolitan area, within the given time span, on a yearly basis.

Column 3: The number of Whites, for a year given in column 1, less the number of Whites given for the previous year.

Column 4: The land needed for the additional population given in Column 3; this includes the land necessary for houses, low-rise and high-rise flats, roads, open spaces, schools and shops.

Column 5: The White population density expressed as persons per hectare – it is arrived at by dividing column 3 by column 4.

Column 6: The open space (in hectares) needed for the population given in column 3. This is derived from Model I, in which a fixed standard of 1,33 ha

Table 3: *Results obtained, comparing static Model I with Dynamic Model II*

Year (1)	Cumulative population (× 1 000) (2)	Fractional population (× 1 000) (3)	Total land (ha) (4)	Population density (people per ha) (5)	Model I open space (ha) (6)	Model II open space (ha) (7)
1970	303,77	–	–	–	–	–
1971	311,53	7,760	427,82	18,139	10,321	10,081
1972	319,48	7,957	438,25	18,156	10,583	10,367
1973	327,63	8,153	452,98	17,998	10,843	10,480
1974	336,00	8,362	464,25	18,012	11,121	10,778
1975	344,56	8,565	460,65	18,594	11,391	10,997
1976	353,36	8,793	471,80	18,638	11,695	11,318
1977	362,36	9,000	459,76	19,576	11,970	11,694
1978	371,59	9,238	469,74	19,667	12,287	12,035
1979	381,05	9,457	481,45	19,643	12,578	12,047
1980	390,70	9,651	489,58	19,713	12,836	12,327
1981	400,54	9,835	477,33	20,604	13,081	12,662
1982	410,39	9,855	476,73	20,671	13,107	12,725
1983	420,26	9,867	481,88	20,476	13,123	12,728
1984	430,38	10,123	491,49	20,597	13,464	13,085
1985	440,76	10,735	515,33	10,132	14,278	13,473
1986	451,41	10,653	525,97	20,254	14,168	13,854
1987	462,34	10,927	504,74	21,650	14,533	14,100
1988	473,56	11,223	514,19	21,827	14,927	14,499
1989	485,07	11,516	534,02	21,564	15,316	14,656
1990	496,90	11,828	544,39	21,726	15,731	15,066
1991	509,04	12,137	540,57	22,452	16,142	15,234
1992	521,50	12,463	550,26	22,649	16,576	15,646
1993	534,29	12,786	570,30	22,419	17,005	16,306
1994	547,42	13,130	580,65	22,612	17,463	16,751
1995	560,89	13,472	579,10	23,263	17,918	16,969
1996	574,72	13,831	589,14	23,477	18,395	17,423
1997	588,91	14,188	570,99	24,847	18,870	18,080
1998	603,47	14,560	579,96	25,105	19,365	18,561
1999	618,40	14,930	581,22	25,687	19,857	19,089
2000	633,72	15,322	590,31	25,955	20,378	19,600

open space for each 1 000 people, was applied.

Column 7: The open space (in hectares) needed for the population given in column 3. This is derived from open space Model II, in which a dynamic open space standard, as shown in Table 1, was applied.

It is important to note that differences exist between columns 6 and 7. Although these differences are relatively small, cognisance should be taken of them as there are indications that they could be larger in other circumstances. It stands to reason that if there is a difference between the amount of open space allocated by a fixed norm (column 6) and the amount allocated by the System Dynamics Simulation procedure (column 7), then one or both of these procedures is on the wrong track.

The System Dynamics Simulation procedure takes account of a host of norms (Table 1), parameters and variables (Table 2) while, on the other hand, the 'fixed norm' procedure simply allocates a certain fixed amount of open space (133 ha) for each 1 000 people. On the strength of this reasoning it can be maintained that the System Dynamics procedure simulates open space requirements more soundly than the 'fixed norm' procedure. A system which appears to simulate open space requirements on a reasonably sound basis, could be accepted with greater confidence and should certainly be followed up.

It should also be borne in mind that residential areas may change in character with time, through the assimilation of new groups of people. The planner can unfortunately not anticipate this, but by making use of both existing norms and the behavioural method he can calculate the optimum solution for any required period.

4. CONCLUSIONS

- Concern over the provision of appropriate open space certainly exists. Some of these problems can be solved, firstly, by evaluating the use made of existing urban open space, as was done by Steyn and Swart , and secondly, by estimating the amount of open space required by the urban community. It is suggested that minimising the difference between what exists and what is desired can reduce concern over the provision of open space and thus solve some of the problems that exist in this field.
- To find the amount of open space required by a community needs at least two steps. Firstly, the open space requirement can be estimated from certain promulgated or 'fixed' norms and the use of a simulation language such as DYNAMO. Secondly, questionnaires can be used to determine 'urban open space behaviour patterns'. It appears that the best way of measuring urban open space requirements, is to combine both methods.

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