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TRANSPORT PRIORITY ASSESSMENT TECHNIQUES DEVELOPED BY BRITISH LOCAL AUTHORITIES: A SYNOPSIS AND REVIEW

by

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1. INTRODUCTION

This Working Paper is the first in a series reporting progress on a 2-year ESRC-funded research project entitled "Priority Assessment Techniques for Local Transport Improvement Projects", and directed by Prof. A.D. May, Dr. A.D. Pearman and Mr. P.J. Mackie. The project's objectives - to be pursued in successive phases - are threefold: to undertake a critical review of the various techniques adopted by different local authorities; to obtain from the review a representative sample of methods for more detailed comparison and testing on a set of schemes for which data are available; and to combine the experience thus gained with wider practical and theoretical knowledge of multiple criteria assessment issues, in order to develop a model technique that overcomes existing problems and thereby contributes to better decision making.

2. THE CONTEXT: TRANSPORT PROJECT APPRAISAL

The Department of Transport has, over time, developed several techniques for assessing new projects - expecially roads. COBA, a computer based cost benefit analysis model, is the major tool for trunk road evaluation. In its 1977 review, the Advisory Committee on Trunk Road Assessment (ACTRA) found the methodology to be essentially sound but strongly biassed towards those factors which could readily be given money values - notably construction and ancillary costs, accident and time savings. They felt it inadequate merely to provide a checklist of environmental and other unquantifiables as a basis for proper assessment and therefore proposed a comprehensive Planning Balance Sheet-type framework which would distinguish all affected groups and impacts relevant to a particular project. These were to be quantified if possible, or else described as fully as possible (Leitch 1977).

A follow up report in 1979 by the Standing Advisory Committee on Trunk Road Assessment (SACTRA), as it is now known, reviewed and developed early experience with the 'framework'. Importantly, it was recommended for use, not only for different scales of scheme, but also at different stages of the planning process. These are

i) initial sifting of possible alternative solutions or alignments for further investigation;

ii) public consultation, to convey the general issues, seek responses on people's rating of respective factors and different options;

iii) clear presentation of information to the Minister for a decision as to the preferred solution, followed by detailed analysis of the chosen scheme.

iv) public inquiry, at which objections to the D.Tp.'s draft order, together with evidence by the Department, are

heard by an Inspector, who then recommends adoption, amendment or abandonment. The final decision rests with the Minister and Secretary of State (see Leitch 1979).

Many local authorities adopted the framework, at least for large schemes, but it is not without drawbacks. A number of councils have found it unhelpful in decision-making where many unquantifiables arise; and others could not devote the time and resources to collecting the range of information required. In addition, the necessary inputs are sometimes considered excessive - and certain aspects perhaps irrelevant - for small schemes. Several councils thus use the D.Tp.'s 'Roads 502' form for small or medium schemes, but others have found this unsuitable or inadequate too.

Furthermore, COBA, NESA and the 'framework' are designed primarily as tools for comparing alternative solutions to a particular problem, rather than comparing or ranking different problems (and perhaps their intended solutions). Although these techniques have sometimes been used for the latter purpose, many councils found them unsuitable because of the very different nature and likely impact of bypasses, junction improvements and footways, for example.

Two additional considerations are those of comprehensibility and the purpose for which the ranking exercise is being undertaken. As one respondent put it, "Councillors tend to be disinterested in such esoteric assessments of theoretical costs and benefits (as entailed in cost benefit analysis) and are much more concerned with what a proposed scheme will do in the way of achieving the overall aims and objectives of the Council. A further consideration that has to be borne in mind is the eligibility or otherwise of a scheme for European Commission grants (such as the European Regional Development Fund). This may affect not only the choice of schemes for the TPP but also the way the costs and benefits are presented."

Considerable effort has therefore been devoted to the development of various priority assessment techniques (PATs) which facilitate decision-making by reducing disparate variables for different schemes, and different possibilities for the same scheme, to common denominators. They are furthermore, specifically designed to appraise the extent to which scheme proposals fulfil council policy objectives. Among British local authorities these techniques have generally been of the 'point scoring' type, as discussed in more detail below. They are based on the Goals Achievement Matrix (GAM) approach, which is a branch of multicriteria decision making (MCDM), a field which has undergone significant research and progress since the mid-1970s. These theoretical and conceptual developments will be reviewed in a separate paper.

Other than a comparative study of the PATs used by the GLC, West Midlands, West and South-Yorkshire Met. Counties at the turn

of the decade (Scotland 1981), little review work has been done in this area. It is not even known, for example, whether the PATs are actually functionally equivalent to the Leitch framework, in terms of the scale of project to which, and stage(s) of the appraisal process at which, they are applied or are capable of being applied. There is likely to be little uniformity in these respects. Differences between the structures of various PATs also suggest that they almost certainly do not all satisfy the six criteria for a comprehensive and versatile appraisal framework suggested by ACTRA, namely that

i) it should be generally comprehensible to the public and command their respect;

ii) the public should be able to identify how different groups of individuals would be affected by the scheme;

iii) it should be comprehensive in terms of the different kinds of effects of the road scheme;

iv) it should allow effective control of decentralised minor decisions;

v) it should not be expensive to use;

vi) it should balance costs and benefits (however described) in a rational manner.

3. SCOPE OF THIS PAPER

Here we present an initial analysis of returns from a survey of priority assessment techniques (PATs) in use with local authorities across England, Scotland and Wales. Initially councils were sent an explanatory letter and project outline, together with a request for information. Follow-up letters were sent after two months where necessary. The response rate was most satisfactory, with replies received from 39 out of 61 authorities, or 64%. Moreover, most councils expressed interest in our work, in some cases even requesting to be included in the pilot test of any technique we develop. Only two respondents declined to co-operate; a further 12 indicated that they did not use any formal PAT or were only in the early stages of developing one. This Working Paper therefore focuses on the techniques employed by 25 county and Scottish regional councils which made documentation available. Cheshire asked that details of their method not be disclosed since the material has not been published; it thus is referred to only in general terms below and has been omitted from Technical Note 190.

Where the techniques currently used have had one or more predessors, only the current methods are discussed in detail. This applies particularly to the recently abolished Greater London Council (GLC) and Metropolitan Counties, which were in the forefront of PAT development during the 1970s.

The Welsh Office have recently financed the development of a micro computer-based PAT for small schemes, 'Scheme Ranking Monitor' (SCRAM), which is being tested by the Welsh counties. It is intended to provide a uniform basis for assessment throughout the principality. Although its origin lies in a higher tier of government we consider it with the others.

4. THE RANGE OF TECHNIQUES REPORTED

Table 1 lists the authorities which responded to our request for information, together with summary information on their techniques and the scheme sizes to which they are applied. Dashes indicate the absence of a technique.

Several points are immediately apparent.

a) Firstly, the earliest techniques date from the mid-1970s when, as a result of the 1974 local government reorganisation, new authorities were faced with the task of ranking large numbers of diverse, competing schemes. Some of these were inherited from predecessor authorities or related to areas not previously under the jurisdiction of the new councils. This was particularly true in the case of the GLC (formed in 1965) and six Metropolitan Counties which assumed responsibility for large, populous geographical areas.

b) Secondly, while the GLC and Met. Counties set the early pace with development of fairly complex PATs - a trend taken up and later emulated by many shire counties - they subsequently moved in the direction of simpler, less rigidly structured techniques. According to officers interviewed, this trend is attributable to several interrelated factors:

   i) the initial ranking exercise generated sufficient projects to keep some authorities busy for a number of years, with the periodic in- or exclusion of only isolated additional schemes. The original techniques were not well suited to this piecemeal approach, while time and resources did not permit rerunning all schemes in the pool.

   ii) increased experience of, and familiarity with, the problems and strengths of the techniques, different scheme types and council policies, led officers in a few authorities (most notably West Yorkshire) to favour appraising schemes more qualitatively in terms of a list of clear policies and criteria instead of using formal point scoring.

   iii) the more complex a technique, the greater the potential problems of communicating the procedures and output to councillors. In some cases they felt that their decision-making role was being usurped by detailed weighted points scoring methods.

   iv) progressively greater capital budget restrictions have reduced the rate of project implementation and the level of staff resources able to be devoted to detailed project assessment. With increasing emphasis therefore falling on small improvements rather than major schemes, complex and data-hungry ranking techniques have been found inappropriate. In some respects this seems paradoxical, since one could argue with justification that financial stringency <u>increases</u>

the need for identifying priority schemes and ensuring the most efficient use of available resources. For much the same reasons, several shire counties which have not revised their initial 1970s techniques, admit that these are little used nowadays or that the portfolio of projects actually implemented differs significantly from that produced with the PAT. One or two of the counties with no PATs cited the problems of comparing diverse project types and dislike of 'subjective' evaluation as the major reasons for their lack of work in this sphere.

c) Thirdly, PATs are applied to a wide variety of scheme cost ranges, although many are specifically designed to rank minor schemes i.e. under £1m. The most common ranges are between £50,000 or £100,000 and £250,000 or £500,000. Three counties, Devon, Kent and North Yorkshire have actually devised different techniques for specific scheme types or cost ranges. Several other authorities have developed a PAT for one particular cost range but use standard D.Tp. techniques e.g. Roads 502, for others. Many councils assess schemes over £1m with COBA (or the Scottish equivalent, NESA) or the Leitch type 'framework'. However, at least 12 have developed PATs which include this cost range. In some cases this was done because officers appreciated the inapplicability of COBA to urban schemes and ranking of non-economic considerations. Other authorities felt the Leitch framework to be too unquantified and therefore of little help in project ranking; while others still required a more directly policy-related technique.

d) Fourthly, the PATs are almost exclusively of the point scoring type, although there is great variety in their complexity, comprehensiveness, degree of specialisation and the extent to which (if at all) they incorporate explicit policy weights. These differences are analysed more fully below.

5. CATEGORISATION OF THE PATs

A necessary first step in analysing the available PATs and selecting a cross section for possible testing on a sample of schemes, is grouping them according to one or more appropriate criteria. Examination of the techniques and discussions with the councils using them suggest at least 8 potentially useful bases for categorisation. They do not yield unique listings and some clearly overlap. Table 2, which gives details of each method, appears as a separate Technical Note, No. 190.

a) The stage in the planning process at which they are used. e.g. purely technical rankings for presentation to members;

integrated policy-based techniques which (at least in theory) produce near-final rankings suitable for implementation; whether they rank only different problems (and their intended solutions), or alternative solutions to a single problem as well; whether use is mandatory or merely discretionary; whether they rank identified problems and/or assess proposed scheme solutions.

b) Whether they are designed for project ranking within a single budget head or between different heads.

c) The cost band(s) of schemes to which they are applied.

d) The number and range of heads and/or factors (variables) included. To some extent, of course, this may be dictated by (b) and (c) above, as well as data availability.

e) Whether the techniques incorporate only empirically measured variables ('objective' factors) or at least some more 'subjectively' appraised factors as well. By the latter is meant non directly measurable phenomena which require perceptual appraisal by the officer(s) using the technique. The terms 'subjective' and 'objective' should be used with caution, since the distinction is not always clear, and PATs are, in some respects at least, inherently subjective in nature. This need not be a drawback, however.

f) Whether factors in the technique appraise purely the problem severity, purely the expected degree of relief or both.

g) Whether the techniques simply record measured data or are partly of the point scoring type, whereby points are allocated according to specified criteria, 'conversion rates' or thresholds.

h) Whether the techniques incorporate any weighting procedure of a technical and/or policy based nature. It would also be useful to know how the weights were derived e.g. from stated council policies, by trial and error, or specific procedures.

Several of these criteria, while intuitively appealing, appear on closer inspection to have rather limited value in this particular context. Thus (a), for example, has two shortcomings. Firstly, the degree to which PATs are embedded in the planning process is subject to change - often, as pointed out earlier, during the 'life' of a given technique. Secondly, appropriately designed PATs lend themselves to application at successive stages of the planning process. They can initially be used to compare alternative solutions to a given problem, then to rank the preferred solutions to different problems within a budget head, and perhaps finally to compare between budget heads. Some are used as initial design tools and for successive stages, such as the West Midlands method; others e.g. North Yorkshire are designed for simple technical appraisal only while others, like

Kent and Hampshire, are used for ranking different problems (and preferred solutions). It is probably true to say that the simpler techniques (i.t.o. number and range of factors) are generally used for limited technical appraisal only, and that the most complex methods are suitable for application at successive planning phases. There is, however, no clear relationship in the 'middle range' of 6-15 factors (cf Table 7).

Since PATs are potentially well suited to interbudget comparison, (b) should provide useful information on the comprehensiveness or specialisation of individual PATs, and hence the merits or otherwise of various points and weighting systems. In practice, however, the techniques to hand are almost exclusively used for a single budget, namely roads and highways. This might be explicitly for TPP preparation, for determining priorities within a constrained capital budget, or for presentation to members as a policy responsive decision-making aid. However, there are at least two reasons for the lack of interbudget comparison. First and foremost is the actual local authority budgeting procedure, which separates roads and highways from maintenance and from public transport. Secondly, many council officers remain doubtful about the validity of comparing vastly different project types and scales. This probably explains why councils such as Cumbria, Devon, Dorset, Durham, Gwent, Kent, North Yokshire, Staffordshire, Strathclyde and Wiltshire, which have adopted PATs, use different techniques geared to specific cost bands or project types.

In respect of (c), 11 distinct cost bands occur, with between 1 and 6 techniques listed under each. The variety within bands is great (Table 3),

e.g. 1 "under £250k", the techniques range from simple data grading, to 7 factors, to 29 factors in a weighted point scoring method;

e.g. 2 "over £1m" includes both weighted and unweighted, both point scoring and non point scoring techniques, and methods with between 9 and 13 factors each.

No clear relationship is thus discernible between the cost bands to which PATs are applied and the number of factors or, indeed, the nature of the respective techniques. Aggregation of the cost bands does not appear very helpful, since many actually overlap in part, and since the bands are a mixture of several types: "less than", "greater than", "between a and b", and "all". Cost band alone is therefore rejected as a basis for classification.

At this stage we have rejected criteria (a) - (c), all of which are 'external' to the techniques themselves, and relate to their application within the planning process. Possibilities (d) - (h) all deal with 'internal' aspects of the PATs' structure, and these probably hold the best potential for classification.

As regards (f), some PATs do focus exclusively on either the problem severity or degree of relief expected, but others incorporate both aspects, and a few even contrive a less than satisfactory blend in that some factors relate to one and some to the other - with no apparent systematic link. Changes may also be made for practical reasons. The Gloucestershire PAT, for example, originally embraced both problem and solution scores; the latter have now been omitted because of difficulties of obtaining accurate solution cost and design data. Inspection of the PATs suggested no clear distinction between the techniques falling into these categories, so this criterion can be discarded.

TABLE 3:

PATs CLASSIFIED BY COST BAND

(COBA, NESA AND THE LEITCH FRAMEWORK EXCLUDED)

<£100k
N. Yorks (i) (4h;4f;u)
Nottinghamshire (4h;u)

<£150k
Cumbria (i) (4h;13f;w)

<£250k
Devon (ii)
Durham (i) (5h;29f;w)
S.Yorkshire (4h;7f;w)
Wiltshire (ii) (d0

<£500k
Cumbria (ii) Roads 502; (£150-£500k)
Gwent (ii) (?h;?f;w) (£500k-£5m)
N. Yorks (ii) Roads 502 (£100k-£500k)
Strathclyde (ii) (3h;w)
Welsh Office (4h;12f;w)

>£50k
Essex (4h;9f;w)

>£100k
Tyne & Wear (3h;6f;u)

>£250k
Devon (i) (7h;43f;w)
Wiltshire (i) (4h;4f)*

>£500k
Dorset (i) ?
Dorset (ii) (4h)
Gwent (i) (7h;36f;w)
Hampshire (3h;10f;w)

<£1m
Staffordshire (ii) (4h;14f;n)

>£1m
Cheshire (11h;11f;w)
Derbyshire (2h;10f;w)
Dumfries & Galloway (5h;13f;n)
Lancashire (7h;12f;u)
Staffordshire (4h;9f;u)

All
GLC (g.a.m.)
Gloucestershire (5h;)
Kent (i) (2h;13f;u)
Kent (ii) (8f)
W.Midlands (12h;12f;w)
W.Sussex (3h;8f;u)

Notes

* Not rigid or formal PAT
h = heads
f = factors
u = unweighted
w = weighted
n = non point scoring

(i) and (ii) refer to the first and second techniques of individual authorities as per Table 1.

Criterion (g) is quite an important diagnostic test. However, only 6 of the 25 PATs have no point scoring procedure whatsoever (Table 5). Of the 19 which do, 1 is incomplete in the sense that only certain factors are scored, while 2 more have relative category rather than absolute point scores.* This criterion should at most, therefore, be used to provide supplementary information.

On the potentially important criterion of weighting procedures (h), it emerged that 15 out of 25 PATs, of which we have full details, do incorporate some such component (Table 4). Again, unfortunately, there is great variation between techniques in each category. The unweighted group of 10 methods includes, for example, both North Yorkshire's 4 factor and Dumfries and Galloway's 13 factor PATs. 4 techniques are partly weighted, while 11 have weights for each variable. It also proved more difficult than anticipated to distinguish 'technical' from 'policy' weights, since there is invariably overlap, and some policy aspects are expressed as 'technical' weights. Virtually all weighted PATs make explicit reference - at least for some variables - to council policy as set out in the TPP, Structure Plan etc. But some councils derived the weights by trial and error on a sample of schemes; others sought to equalise or balance the scores of different heads. This basis for categorisation, while useful, also clearly provides insufficient insight to be adopted on its own. In any case, some authorities feel that the importance of weights in PATs is often over-estimated, since unrealistically large changes have to be made to them in order to affect appraisals and rankings.

Finally we are left with the 2 most basic criteria, namely the range of headings and factors constituting each technique, (d), and the 'subjective' or 'objective' nature of these, (e). Taking the latter first, 7 out of 25 PATs are limited to measurable 'objective' variables (Table 6); moreover, the other 18 vary considerably in the number and importance of 'subjective' factors included. Some, such as Cheshire, Kent (ii) and Lancashire have only 1 or 2 environmental/amenity variables which fall into this categgry, whereas others e.g. Tyne and Wear, include major sections of unquantifiable elements. This therefore seems a potentially useful avenue for further investigation, but is still probably best taken in conjunction with criterion (g). Also of interest is the unsurprising coincidence of attributes in any given PAT. For example, the smallest techniques are generally aimed at low cost projects, are unweighted, consider only problem severity, comprise only directly measurable and 'objective' variables, and lack points scoring procedures (e.g. Dorset, Kent (iii), N.Yorkshire (i)).

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*While this last mentioned approach may theoretically simplify procedures by in effect combining the two successive stages of points allocation and relative ranking, it may well make comparison between schemes as a whole, more difficult.

But some relatively detailed techniques, such as Kent (i) and (ii), applicable to all or large scheme sizes, also avoid point or weight allocation and 'subjective' variables.

When the techniques are classified according to their number of factors (Table 7), the following distribution emerges:

1 - 5	factors:	4
6 - 10	factors:	10
11 - 15	factors:	7
16 - 20	factors:	0
Over 20	factors:	4

Taken together with the comments in the previous paragraph, the spread of PAT complexity strongly suggests that criteria (d) and (e) should be combined to form the primary basis for classification and further exploration.

Ultimately, of course, it is the range of information included, rather than the number of factors per se, which is of prime concern. The latter has merely been used as a proxy for the former to facilitate preliminary sorting. Headings have not been used as the basis for classification since inspection of the techniques revealed diverse nomenclature and allocation of factors between headings.

Scotland's (1981) approach was to classify factors under broad policy objectives, namely efficiency, equity, development and energy. He concluded, inter alia, that there was little, if any, explicit consideration of energy implications in terms of the factors used, despite reference to energy conservation in the councils' policy statements. This therefore indicated a shortcoming in the goals orientation of the PATs used at the time by the GLC, SYCC, WMCC and WYMCC. The same could certainly be said about all the PATs considered here, since none includes an explicit energy variable. However, West Midlands, for example, consider that their current 12-factor technique* does actually take account of energy savings through the vehicle flow and delay variables (which would be considered as 'efficiency' factors under Scotland's classification). To include another variable would, in their view, cause double counting. This point serves to illustrate the degree of care necessary in any classificatory exercise.

The most meaningful way forward is evidently to compare the information coverage of PATs in each of the 4 columns of Table 7, since there is clearly a broad correlation between the number of factors and range of information included in the respective techniques.

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* Used by WMCC until abolition on 1.4.86, and now being adopted by at least five of the seven districts concerned.

TABLE 4.

WEIGHTING IN PATs

Unweighted	Weighted	
	Some variables	All variables
Dorset (ii)	Central	Cheshire
Dumfries & Galloway	Essex	Cumbria
Kent (i), (ii) & (iii)	Hampshire	Derbyshire
Lancashire	South Yorkshire	Devon (i)
North Yorkshire		Durham
Nottinghamshire		Gloucestershire
Staffordshire (i)		Gwent (i)
Tyne & Wear		Strathclyde
		West Midlands
		West Sussex
		Welsh Office
Total 10	Total 4	Total 11

TABLE 5.

NATURE OF PATs

Data Only	Point Scoring
Dorset (ii)	Central
Dumfries & Galloway	Cheshire
Kent (i), (ii) & (iii)	Cumbria (i)
Lancashire	Derbyshire (rel, not abs. points)
	Devon (i)
	Durham
	Essex
	Gloucestershire (1 part only)
	Gwent (i)
	Hampshire
	N. Yorkshire (i)
	Nottinghamshire (rel. not abs. points)
	S. Yorkshire
	Staffordshire
	Strathclyde
	Tyne and Wear
	West Midlands
	West Sussex
	Welsh Office
Total 6	Total 19

TABLE 6:

TYPES OF VARIABLES IN PATs

Empirical 'objective' only	Mixed 'obj.' and 'subj'
Derbyshire	Central
Dorset (ii)	Cheshire
Gloucestershire	Cumbria (i)
Kent (iii) & (i)	Devon (i)
North Yorkshire (i)	Dumfries & Galloway
West Midlands	Durham
	Essex
	Gwent (i)
	Hampshire
	Kent (ii)
	Lancashire
	Nottinghamshire
	South Yorkshire
	Staffordshire
	Strathclyde
	Tyne and Wear
	West Sussex
	Welsh Office
Total 7	Total 18

TABLE 7:

NO. OF FACTORS IN PATs

1 - 5	6 - 10	11 - 15	16 - 20	Over 20	
Central	Derbyshire	Cheshire	-	Devon (i)	(43)
Dorset (ii)	Essex	Cumbria (i)		Durham	(29)
Gloucestershire	Hampshire	Dumf & Gal		Gwent	(36)
N. Yorkshire	Kent(i)&(iii)	Kent (ii)		Strathclyde	(39
	Nottingham-shire	Lancashire			
		W.Midlands			
	S.Yorkshire	Welsh Office			
	Staffordshire				
	Tyne & Wear				
	W. Sussex				
Total 4	Total 10	Total 7	Total 0	Total 4	

i) 1 - 5 factors

North Yorkshire's method must be dealt with separately from the other 3 because it is designed for junctions only, whereas the others are applied to road schemes in general. It is thus geared exclusively to traffic efficiency and safety, which are weighed against scheme costs as an index of economic efficiency. The others each have 1 or 2 factors measuring traffic efficiency and safety, while 2 also contain a variable to account for the degree of amelioration achieved; 2 have an environmental impact variable and 2 include a measure of economic efficiency. Only 1 contains a development indicator, but one other includes a measure of the degree to which the schemes fulfil each of the council's 17 policies. This last mentioned variable is functionally equivalent to policy weights, which do not form part of the technique in question.

Thus even at the 'simple' end of the PAT scale there is notable variation in comprehensiveness; furthermore the sophistication of equivalent factors differs markedly. For example, traffic efficiency is measured in terms of vehicles per average August day by Central R.C.., in terms of vehicle km removed from existing roads by Dorset C.C. and in terms of journey time x traffic volume by Gloucestershire C.C. This serves to warn yet again that extreme caution is required in making direct comparisons between methods.

ii) 6 - 10 factors

There is little point in following through all 4 PAT categories in such detail: brief summaries will suffice. Those PATs with 6 - 10 variables include 2 - 4 traffic efficiency and safety variables, 1 - 5 environmental variables, 0 - 2 covering aspects of development, 0 - 2 economic variables and, in 3 cases, an equity factor dealing with public transport or pedestrian access. There is also a complete mix in terms of the possible classificatory variables discussed earlier: weighted vs unweighted; numerical vs categorical point scores; 'before' only vs 'after' only vs both 'before' and 'after' variables; data vs category variables, etc.

iii) 11 - 15 factors

The techniques with 11 - 15 variables differ from those described above in terms of the degree of disaggregation of variables rather than breadth of coverage in most cases. Nevertheless, interesting new variables do appear in some PATs e.g. Kent (ii) includes what is essentially an equity factor for 'community effects' (cohesiveness, disruptions during construction etc.), Lancashire distinguishes flows and improved conditions for pedestrians and cyclists separately; while the Welsh Office include 'contribution to tourism' as a development factor.

iv) Over 20 factors

Those PATs with over 20 variables embrace far greater detail under each heading, and generally consider both the 'before' and 'after' situations for each item as separate variables. There is a thorough mixture of data and category variables within each technique; all 4 PATs are of the 'point scoring' type, and include weights on at least some variables.

6. CONCLUSIONS

The analysis has clearly shown how great the diversity of PAT characteristics is, irrespective of which basis for classification is used. Great care is therefore necessary, since no single categorisation can encapsulate this variety.

Any comparative exercise will need to ensure that, as far as possible, like is being compared with like and that each step is made explicit.

It has been suggested here that the most fruitful basis for classification is likely to be the number and range of factors included rather than 'external' issues such as position in the planning process, or scheme cost bands to which they are applied. Four categories were distinguished in Table 7, and at least one technique from each should be included in the detailed comparative exercise during Phase II of this project. At the same time, it will probably be impracticable to use more than half a dozen PATs because of the complexities just referred to.

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