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QUANTITY AND QUALITY

EVALUATION INDICATORS FOR OUR CULTURAL-ARCHITECTURAL HERITAGE

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Abstract

In this paper the problem of evaluating our cultural-architectural heritage is treated. The aim is to design a method for incorporating multiple (tangible and intangible) dimensions of cultural-architectural assets.

In the first part a critical discussion of various cornerstones of evaluating such assets is given, whilst a plea is made for the use of a 'compound' evaluation method.

Next, an overview of various evaluation methods for our cultural heritage is given, ranging from monetary to scoring and decision support methods.

In the final part of the paper a new method, the so-called generalized regime method, is introduced. It provides a two-stage evaluation procedure for socio-cultural assets, based on the idea of a 'compound' evaluation. This method is able to take into consideration both cardinal and ordinal information. It is illustrated by means of a numerical example.

1. Introduction

The issue of development and conservation is not only politically relevant, but also analytically interesting (see among others Fusco Girard, 1987, and Nijkamp, 1988a), and several attempts have been made at fostering an understanding of the challenges to current conservation planning strategies. In recent years many - mainly descriptive -contributions have been made to analyse prevailing policies, strategies and measures in policy situations marked by conflicts between development and conservation. Furthermore, much attention has been devoted to 'conservation impact analysis' (CIA) which tries to assess the foreseeable physical, social and economic effects of conservation strategies by using appropriate analytical tools for integrating conservation into development planning.

The attention for conservation issues is apparent in both developing countries (e.g., Thailand, Mexico, Indonesia) and developed countries (e.g., Italy, the Netherlands, Greece). Especially in the framework of urban restructuring (e.g., urban renewal, transformation of urban functions, restructuring of urban environments) the conservation issue has become an important one, as here the conflict between 'high tech' versus 'high touch' developments is at stake. For instance in various cities the threat of urban degradation requires a physical and economic restructuring which very often is to the detriment of the historico-cultural heritage of the city. Despite many debates in this field, so far no uniformly acceptable urban development planning paradigm has emerged. While it is generally acknowledged that urban development means the creation of new assets in terms of physical, social and economic structures, it is at the same time recognized that each development process often also destroys traditional physical, social and cultural assets derived from our common heritage. Clearly, although not always immediately computable, all cultural assets represent an economic value which has to be considered in any urban transformation process. Unfortunately, the inclusion of such assets in the planning process often cannot be left to the market mechanism, as most urban historico-cultural assets represent 'unpriced goods' characterized by external effects which are not included in the conventional 'measuring rod of money'. Thus the development of appropriate evaluation methods is of paramount importance here, as otherwise a careful and balanced nurturing of cultural assets will never be realized.

However, the operational assessment of the socioeconomic and historico-cultural value of monuments is fraught with many difficulties (see also Nijkamp, 1988b). Monuments represent part of the historical, architectural, and cultural heritage of a country or city, and do not usually offer a direct productive contribution to the economy. Clearly, tourist revenues sometimes may reflect part of the interest of society in monument conservation and/or restoration, but in many cases this implies a biased and incomplete measure, so that monument policy can hardly be based on tourist values. On the contrary, in various places one may observe a situation in which large-scale tourism (sometimes marked by congestion) does affect the quality of a cultural heritage (Venice or Florence, for example).

The foregoing problems are especially relevant, because in the current period of economic stagnation there is a risk that budget cuts in the public sector first will affect the 'less productive' or 'soft' sectors such as monument conservation, arts, and so forth. Therefore, it is necessary to pay due attention to the socioeconomic and historico-cultural significance of our heritage.

In this contribution, I will abandon the narrow conventional economic viewpoint that the meaning of a certain good can be derived in a proper way from the revealed preferences of economic agents who express their desires on an artificial market. Instead, it is taken for granted that the socioeconomic and historical-artistic value of a cultural good is a multidimensional (or compound) indicator which cannot be reduced to one common denominator (such as the measuring rod of money). In fact, we are - from a planning viewpoint - much more interested in the 'complex social value' of cultural resources (Fusco Girard, 1986). This implies that the meaning of historical and cultural resources is not in the first place dependent on its absolute quantities, but on its constituent qualitative attributes or features (such as age, uniqueness, historical meaning, visual beauty, physical condition, artistic value, etc.). For instance, cities such as Venice, Florence, Sienna, or Padua would never have received an international reputation without the presence of intangible values inherent in their cultural monuments.

In order to clarify the meaning of our multidimensional approach, some general background observations on the preservation of our cultural heritage will be given first. The 1960s and 1970s showed a strong dominance of economic evaluation tools in public planning (for example, cost-benefit analysis, cost-effectiveness analysis). A major stimulus to the use of such tools was given by the United Nations Industrial

Development Organization, the Organization for Economic Cooperation and Development, and the World Bank. It was a widely held belief that a systematic application of rigorous economic thinking in evaluating and selecting public projects or plans would be a major instrument in improving the performance of the public sector (for instance, see Little and Mirrlees, 1974).

This conventional economic appraisal methodology mainly found its basis in welfare economics and was originally normative and prescriptive in nature, but it also implied various restrictive value judgements such as the emphasis on efficiency and the suppression of equity. Besides, the use of 'fictitious' shadow prices to assess benefits foregone was a major source of uncertainty in such project evaluations (see also Warr, 1982). Especially the aim to transform all relevant impacts into one common denominator, viz. the 'measuring rod of money', has become a source of major criticism (for an interesting review see Renard, 1986).

It is evident, however, that a compound evaluation of collective goods - and especially public capital goods such as churches, palaces, parks, landscapes, 'cityscapes', etc. - is far from easy and cannot be undertaken by the exclusive consideration of the tourist and recreation sector (see also Kalman, 1980; Lichfield, 1988). Especially in the Anglo-Saxon literature the expenditures made in visiting recreational destinations are often used as a proxy value for assessing the financial or economic meanings of natural parks, palaces, museums, etc. A geographically complicating problem here is the fact that such recreational commodities and the various users are distributed unequally over space. This means that recreational expenditures are codetermined by distance frictions, so that the evaluation of recreation opportunities has to take into account the transportation costs inherent in recreational and tourist visits. Consequently, the socioeconomic value of such recreational opportunities depends both on their indigenous attractiveness and on their location in geographic space. Therefore, increase of accessibility might then become an instrument in enhancing the socioeconomic value of cultural heritage. But the indigenous historico-cultural value of monuments is invariant with respect to geographical location (apart from the scale economies emanating from a 'socio-cultural complex'), so that we are still left with the problem of a compound evaluation.

In order to obtain a compound evaluation of recreational opportunities (museums, parks, palaces, etc.), a systematic typology of the societal functions of such public assets has to be made. In conventional economic approaches, such a functional classification forms the basis for a monetary assessment of the socioeconomic value of such goods (cf. Driver and Harris, 1981). In the framework of a broader analysis, the following typology of effects of recreation can be made (see also Filius, 1986):

(1) Psychological and social behavioural effects. Such effects emanate from an enhancement of mental well-being caused by an enjoyable visit to a valuable scarce cultural or environmental asset. Clearly, congestion (or excess demand) may lead to negative feelings of well-being.

(2) Spin-off effects. These broader indirect effects are the result of behavioural changes caused by visits to natural parks, cultural heritage, etc. and are, for example, reflected in productivity increases and decline in illness rates.

(3) Effects on non-users. Such effects are related to the potential value of a cultural asset even though this asset is not actually used. In this framework the notion of a so-called option value is relevant (Weisbrod, 1964). This concept may have various meanings (see also Hyman and Hufschmidt, 1983):

(a) risk aversion: potential visitors are not sure that they will ever visit the opportunity concerned, but do not want to lose the possibility to visit it in the (near or distant) future;
(b) quasioption demand: potential visitors have an interest in visiting the recreational good concerned, but prefer to wait until sufficient information is available;
(c) existence value: non-users attach a high value to the fact that the scarce socio-cultural asset is maintained, even when they do not plan to visit it;
(d) vicarious use value: non-users want to keep a certain public good intact, because they like it when others can enjoy this good;
(e) bequest value: non-users see it as their moral responsibility (or altruism) to protect and maintain a certain public good for future generations.

Consequently, the concept of option value is strongly related to the symbolic value of a good. However, a reliable monetary assessment of 'option values' in the framework of monuments is far from easy (Greenley et al, 1981).

(4) Effects on regional development. The presence of a scarce cultural or environmental asset is not only appealing for daily recreation, but also attracts many foreigners, whose spending capacity may be of great importance for regional development (for example, expenditures made in

restaurants and hotels). Such revenues for the region may also exert various indirect multiplier effects in the region.

(5) Effects on infrastructure and public management. These effects refer to the fact that the maintenance of a public commodity requires the use of many instruments by the government, for instance, information supply, fire protection, waste disposal, daily maintenance, etc.

(6) Environmental effects. Any use of a public good has various (positive and negative) environmental consequences, and these social spillover effects have to be taken into consideration as well.

In conventional economic evaluation an attempt is made usually at using the measuring rod of money for evaluating the direct and indirect effects of recreational commodities, on the basis of, inter alia, the notion of consumer surplus (incorporating also the so-called travel cost method). This consumer surplus represents the financial sacrifices (in terms of distance and time) a visitor is willing to make (the so-called willingness to pay) minus the actual costs of a visit (see also Sinden and Worrell, 1978). Usual research methods used to assess this willingness-to-pay are inter alia survey techniques and interviews. A major problem in this case is the specification of a demand function, because of heterogeneity among individual users, the importance of remaining (omitted) explanatory variables, synergetic effects caused by other recreation users (congestion, for example), the evaluation of time (or time preference), and the intangible nature of a historico-cultural heritage. This historico-cultural heritage encompasses a wide variety of (mainly public) capital goods embodying (part of) the history of a country, region, or city. Beside its historical, artistic, or scientific value (the symbolic heritage function), cultural heritage usually also has an actual user value, as well as a potential future value. Consequently, cultural heritage may be conceived of as a resource with a high economic potential (Ashworth and Voogd, 1986). The importance of this resource is reflected in the average annual growth rate of approximately 5% in tourism and recreation in the past twenty-five years in many countries. The historic cities of Europe (London, Paris, Rome, Copenhagen, Amsterdam, Athens, etc.) house collections of cultural and historical artifacts of an intrinsic and important international dimension. Although the supply of cultural heritage is usually locally determined, the demand is dominantly non-local and frequently international. Clearly, demand is here mainly a response to the supply side, and consequently the planning and maintenance of the historic city are tasks of utmost importance (see also Ashworth, 1986; Burtenshaw et al, 1981;

Dobby, 1978; Sinnott and Wall, 1980; Tarn, 1985; Ward, 1968; Williams et al, 1983).

A major instrument for enhancing the socioeconomic value of cultural heritage in historic city planning is the marketing of urban heritage so as to attract more tourism. But, in this respect, it is again important to gather adequate insight into the socioeconomic and historico-cultural value of monuments. As mentioned before, a conventional financial analysis does not do justice to the cultural wealth incorporated in monuments. And, therefore, it is necessary to develop an analysis framework that is capable of assessing the compound value of cultural assets.

In view of the above mentioned questions, the present study aims at providing a brief overview of various evaluation methods that have been developed by different authors (see section 2). Next, an attempt will be made at designing a new comprehensive method for evaluating cultural assets (section 3). Some prospective remarks will be presented in a final section.

2. Evaluation Methods for Cultural Assets: An Overview

In the present section a selected set of methods for evaluating in a multidimensional way the socio-cultural value of our historic heritage will be given.

2.1. Monetary Analysis

The monetary evaluation of cultural assets is mainly based on the cost-benefit methodology. Cost-benefit analysis is a technique which has been devised to assist the making of a rational choice between alternatives, particularly public investment alternatives. However, rational choice in the public sector is far from easy, because many benefits derived from a plan or project are for general use and therefore have no direct market price. This holds in particular for the socioeconomic evaluation of cultural assets, where a rational choice in conservation policy would require a comparison of different costs implied in the alternative plans and the different benefits accruing from them (in order to select the plan generating the maximum excess of benefits over costs). The latter exercise, however, requires that costs and benefits (related to different impacts of a plan) are translated into common, i.e. monetary, terms. Unfortunately, the monetary assessment of especially benefits is fraught with difficulties, and does at best lead to a partial socioeconomic evaluation of architectural and cultural assets. Given the large number of unpriced attributes of our cultural heritage, a comprehensive evaluation is hard to achieve by means of the cost-benefit methodology. And therefore, many authors have tried to devise alternative evaluation methods.

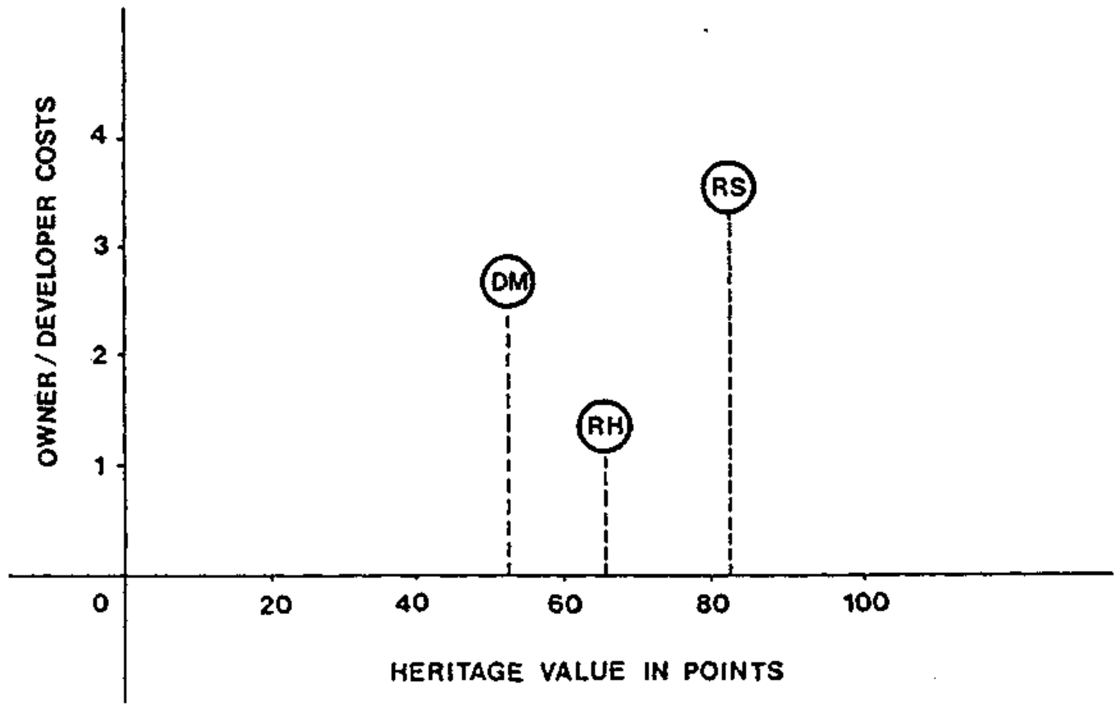
2.2. An adjusted monetary analysis

In Lichfield (1987) an attempt has been made to devise an adjusted monetary evaluation for conservation policy. The argument is that the use of a cultural value per se might imply decisions in which a considerable share of total available (but scarce) resources would be spent on a comparatively insignificant enhancement in total cultural value. However, if on the other hand policy decisions would be based only on commercial values of monuments, we might face an unacceptable erosion of cultural quality. Thus any particular budget should be spent to achieve the maximum possible value in heritage quality; to some extent we should strive for 'value for money'. In this framework the following elements have to be taken into consideration:

- commercial and cultural values are embodied in the historical asset and cannot be separated easily;
- commercial values are related mainly to real estate transactions, while cultural values refer to the meaning of the past heritage for the present and future generation;
- commercial values might be obtained from real estate agents, but cultural values have to be derived among others from experts' opinions (e.g., based on refined score methods);
- the cost items of a monument are related to the financial resources needed for the purpose of the asset (including maintenance of its cultural qualities);
- the costs might be charged to either the private owner or, as far as these costs concern items related to cultural values, to the government.

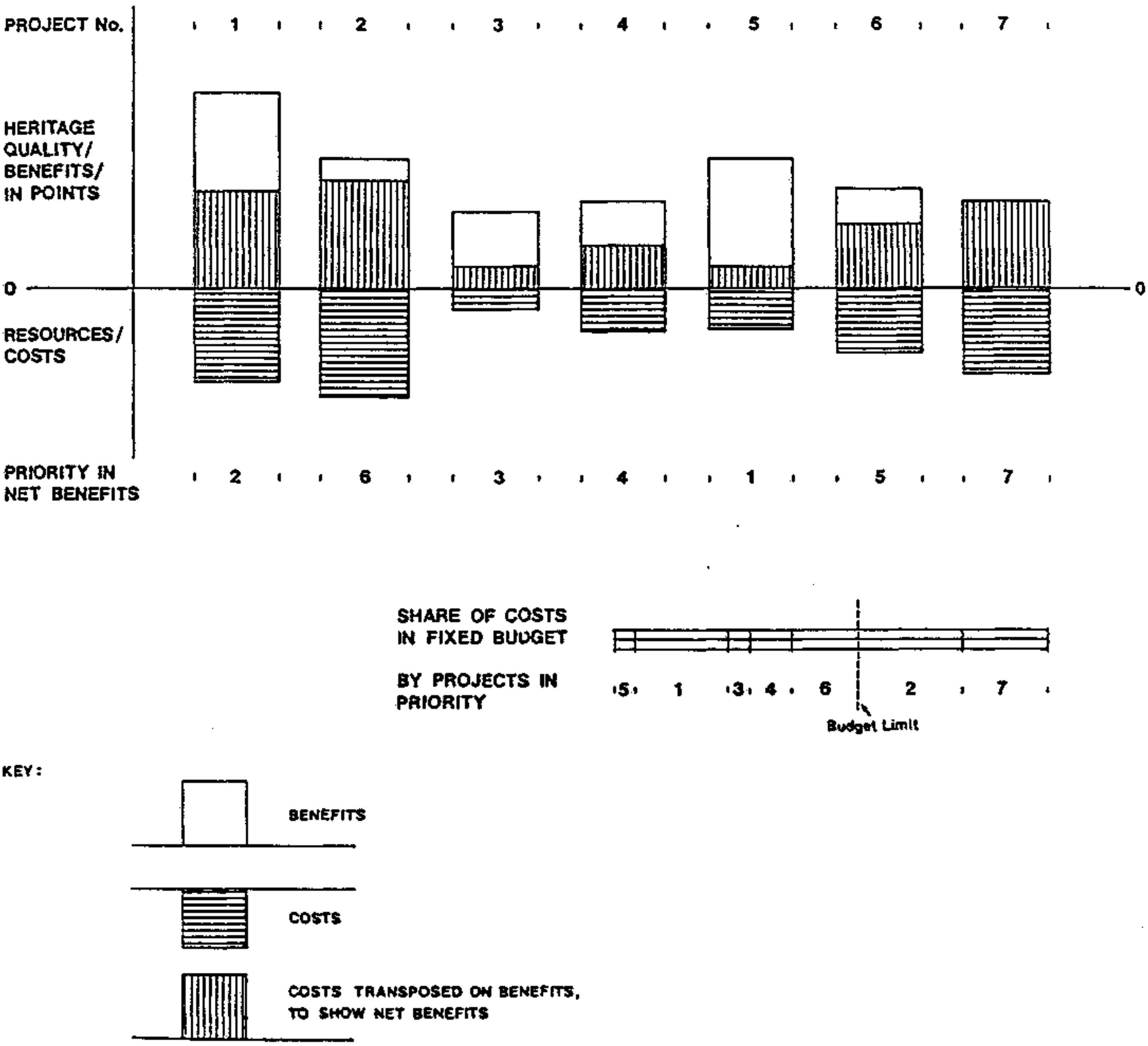
Given these observations, the question of 'value for money' then amounts to a comparison of the successive monument policy strategies ('options') in terms of differences in cultural qualities between these options (measured on a metric points scale). This is demonstrated in Diagram 1 for an illustrative example. It shows the changes in cultural value (in points) for the changes in cost in three typical situations in a conservation project: Do minimum, rehabilitation or restoration. The choice would be that option which gives the best ratio of value to cost.

DIAGRAM 1
DIRECT COSTS AND VALUE IN CONSERVATION OF THE HERITAGE



Abbreviation: DM : Do Minimum
RH : Rehabilitation
RS : Restoration

DIAGRAM 2
ASSESSING PRIORITIES OF CONSERVATION PROJECTS WITH FIXED BUDGET BY CRITERION OF NET BENEFITS



Note: Since the cost is in money but the benefit not, the relationship is not 'numerical' but proportional.

More precisely: would the extra cultural quality of rehabilitation or restoration over Do Minimum be worth the extra cost? This is essentially a cost-effectiveness analysis.

This kind of analysis over the range of possible conservation projects also enables the classic question to be answered: given a limited budget which should be the priority projects in conservation? Diagram 2 presents the approach to the answer. Within the limited budget it is important that each project will be taken in the priority that achieves the maximum cultural quality and output compared with resource inputs.

By applying priorities in this way it follows that the maximum cultural quality for the given budget is achieved. This analysis provides an extremely interesting approach to monument conservation policy, but it has one severe limitation. All benefits - in terms of heritage quality - are measured on a single cardinal point scale, which neglects many qualitative aspects and which also presupposes that the 'complex social value' of monuments (cf. Fusco Girard, 1987) can be measured by means of a uni-dimensional common denominator.

2.3. <u>A point system</u>

There have been many debates on the question of monetary measurability of the value of cultural assets. In many cases authors have taken into consideration non-monetary observable indicators in order to arrive at a proper representation of a latent variable reflecting partly the societal importance of such an asset.

In view of the limitations inherent in the financial assessment of benefits of cultural assets, many years ago already a point system for giving numerical values to the qualities of various plans has been proposed by Crompton and Lichfield (1962). This system relies on enumerating particular aspects of a plan, allocating an arbitrary number of points to each (and thereby weighting them for importance), and assessing the quality of each plan under each heading by the subjective evaluation of plans.

It is evident that the use of weighted numerical scores may imply a biased representation of the actual socio-economic value of a cultural asset, as the cardinal meaning attached to these scores does not always correspond to the qualitative dimensions of the asset under consideration. The advantage is of course that it does enable some measure of quality and benefit to be obtained, although it might have been preferable to use an ordinal metric instead of cardinal metric here.

2.4. An adjusted point system

An adjusted point system has been devised by Melhorn and Keller (1973). These authors present a numerical approach to quantifying aesthetic factors and natural landscape conditions. Measurements and observations from topographic maps, aerial photographs and field reconnaissance are the primary sources used to derive the descriptive evaluation numbers. This sytem, the so-called LAND approach, will briefly be discussed here.

The LAND system starts with three evaluation categories: physical, biologic, and human use and interest. Then a fivepoint scale for a representation of relevant factors is introduced to evaluate the relative uniqueness at a site; the numerical values on this scale are derived from field observations (see for an application to landscape evaluation Table 1). Next, the uniqueness value for each factor is determined by its uniqueness ratio, defined as the reciprocal of the number of sites sharing the same evaluation number. Then the total uniqueness is computed as the sum of all uniqueness ratios for that landscape. In a similar way aesthetic indices can be computed.

It is noteworthy that although the LAND system was originally developed for landscape evaluation, it can easily be used for cityscape evaluation as well. The method has one evident shortcoming: it aims at deriving cardinal indices for uniqueness and aesthetic values based on ordinal or internal information, without using a rigorous statistical methodology for such a transformation. Thus the robustness of the result may be uncertain in this evaluation method.

Table 1. Factors and evaluation numbers for preliminary LAND system.

Factor Type	Number	Descriptive Category	Evaluation Number 1	2	3	4	5
Physical	1	Channel width, ft	< 10	10 to 30	30 to 100	100 to 300	> 300
	2	Low flow discharge, ft^3/sec	< 10	10 to 50	50 to 100	100 to 200	> 200
	3	Average discharge, ft^3/sec	< 10	10 to 100	100 to 500	500 to 1,000	> 1,000
	4	Basin area, sq mi	< 10	10 to 100	100 to 500	500 to 1,000	> 1,000
	5	Channel pattern	Sinuous, pool and riffles	Meandering, pool and riffles	Sinuous without riffles	Meandering, without pool and riffles	Braided
	6	Valley width and height ratio	< 5	5 to 12.5	12.5 to 25	25 to 50	> 50
	7	Bed material[a], percent	A 100	A 75, R 25	A 50, R 50	A 25, R 75	R 100
	8	Bank and valley material[b], percent	U 100	U 75, R 25	U 50, R 50	U 25, R 75	R 100
	9	Bed slope, ft/ft	< 0.0005	0.0005 to 0.001	0.001 to 0.005	0.005 to 0.01	> 0.01
	10	Width of valley flat, ft	< 100	100 to 500	500 to 1,000	1,000 to 5,000	> 5,000
	11	Erosion of banks	Stable	-	Slumping	-	Eroding
	12	Valley slope, x deg	0 to 10	10 to 30	30 to 50	50 to 70	70 to 90
	13	Sinuosity	< 1.25	1.25 to 1.5	1.5 to 1.75	1.75 to 2.0	> 2.0
	14	Number of tributaries	None	1 to 3	3 to 5	5 to 7	> 7
Biologic and water quality	15	Water color	Clear and colorless	-	Green tints	-	Brown
	16	Floating material	None	Vegetation	Foamy	Oily	Variety
	17	Algae	None	Bed and bank partly covered	-	-	Everything covered
	18	Land plants on floodplain	Open	Wooded with brush	Wooded	Cultivated	Mixture cultivated and other
	19	Land plants on hillslope	Open	Wooded with brush	Wooded	Cultivated	Mixture cultivated and other
	20	Water plants	Absent	-	-	-	Abundant
Human use and interest	21	Trash per 100 ft	< 2	2 to 5	6 to 10	11 to 50	> 50
	22	Variability of trash	Equally distributed	-	-	-	Predominantly in localized areas
	23	Artificial control	Free and natural	Partially controlled	Partially channelized	Completely channelized	Dammed
	24	Utilities, bridges, roads	None	< 4	5 to 10	11 to 20	> 20
	25	Urbanization	No buildings	Cabins, trailors, campsites, few farm houses	Farm houses	Mixture of 2 and 3 and urban	Predominantly urban
	26	Historical features	None	1	2	3	> 3
	27	Local scene	Pleasing	-	-	-	Nauseating
	28	View confinement	Open	-	-	-	Closed by hills, cliffs
	29	Rapid and falls	None	-	-	-	Abundant
	30	Land use	Agriculture	Recreation	Urbanization	Recreation and urban	Agriculture and urban
	31	Misfits	None	1	2	3	> 3

[a]A = alluvium, and R = rock. [b]U = unconfined, and R = rock.

2.5. A compound score method

A more comprehensive evaluation method has been devised by Kalman (1980) for the evaluation of the cultural built heritage in Canada. Central in this method are five judgement criteria, viz. architecture, history, environment, usefulness and integrity, each of them playing a role in judging plans and policies for historic buildings. In this respect, various steps are to be undertaken, viz. an inventory (i.e., on site survey), an evaluation of cultural quality, and a formulation of conservation plans. The above mentioned five basic criteria are subdivided into various subcriteria, including weights for the successive basic values (see also Table 2).

		Maximum points in score	
		Historical	Future
A	Architecture	40	35
B	History	45	25
C	Environment	5	10
D	Useability	0	15
E	Integrity	10	15
		100	100

Table 2. Weights attached to basic criteria

Next, numerical points are allocated to each sub-criterion (see Table 3). On the basis of this so-called building evaluation sheet the values of all cultural assets under consideration can be assessed. This scaling technique thus leads to a cardinal expression for cultural quality. It is a very interesting approach, as it provides a comprehensive measure, but it has also weaknesses as the transformation into numerical figures is to a large extent arbitrary (see also Lichfield 1988).

Table 3

EVALUATION OF CULTURAL QUALITY IN BUILDINGS BY POINTS SCORING

Building Evaluation Sheet					
Name					
Location					
Reference Number					
A	**Architecture**	**(Maximum 35)**			
	1 Style	20	10	5	0
	2 Construction	15	8	4	0
	3 Age	10	5	2	0
	4 Architect	8	4	2	0
	5 Design	8	4	2	0
	6 Interior	4	2	1	0
B	**History**	**(Maximum 25)**			
	7 Person	25	10	5	0
	8 Event	25	10	5	0
	9 Context	20	10	5	0
C	**Environment**	**(Maximum 10)**			
	10 Continuity	10	5	2	0
	11 Setting	5	2	1	0
	12 Landmark	10	5	2	0
D	**Usability**	**(Maximum 15)**			
	13 Compatibility	8	4	2	0
	14 Adaptability	8	4	2	0
	15 Public	8	4	2	0
	16 Services	8	4	2	0
	17 Cost	8	4	2	0
E	**Integrity**	**(Maximum 15)**			
	18 Site	5	3	1	0
	19 Alterations	5	3	2	0
	20 Condition	5	3	2	0
	Total Score Group	**A**	**B**	**C**	**D**
Evaluated by	**Date**				
Recommendation					
Reviewed by	**Date**				
Comments					
Approved by	**Date**				
Comments					

An evaluation sheet appropriate for evaluating with fixed numerical scores

2.6. <u>A decision support method</u>

In recent years the problem of landscape and 'cityscape' preservation (including monument conservation) has also been treated in the context of decision support systems (see Anselin and Talen, 1984). The model of Anselin and Talen encompasses an extensive data base, a multi-criteria decision model and a locational analysis. The computerized data base is constructed from a detailed survey of the physical structures in the study area, which allows for the generation of the most dominant architectural characteristics and prototypes based on a statistical analysis, rather than as the result of a priori judgements of the analyst.

The conceptual framework for the selection of historic districts has a modular structure consisting of three parts: a <u>data</u> module, a <u>decision</u> module and a <u>delineation</u> module (see Figure 1).

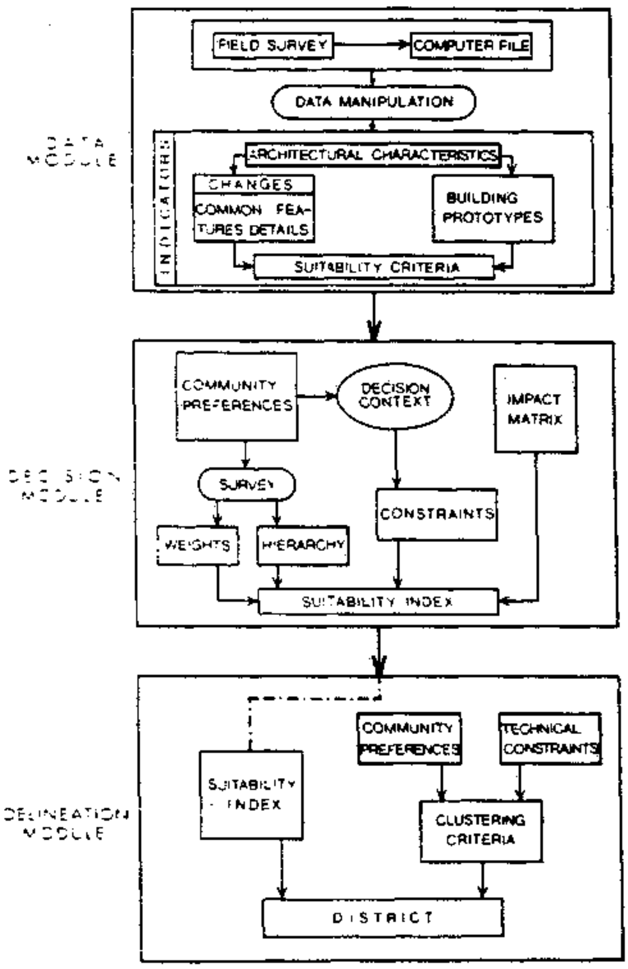


Figure 1. Three modules of a conceptual framework for selecting historic districts

The data module makes up the factual basis of the analysis; it consists of a detailed and structured data base of suitability criteria and related indicators (for inclusion in a historic district), derived from an intensive field survey of each structure in the study area.

The decision module has three elements (the community preference structure, the decision context, and the impact matrix). These elements are used to arrive at a suitability index, as an application of multiobjective and multicriteria evaluation analysis.

The delineation model focuses on the urban district boundaries, once the suitability is determined for the elements which will constitute the components of the districts. This is essentially a locational analysis problem, in that the proper clustering of the elements has to be devised in line with the community objectives and within constraints such as contiguity, clear delineation, etc.

An application of this decision support method for evaluating the historic value of an urban district was presented by the authors for a part of downtown Columbus, Ohio, based on Saaty's prioritization method. The major advantage of this method was its ability to combine community preferences with expert opinions in a structured way and to use comprehensive survey material in an efficient way, so that the idea of an historic district in a 20th century vernacular neighbourhood, where it is not immediately obvious why and what should be considered worth preserving, can become a viable planning resource.

2.7. Retrospect

There is a need for an integrated cultural and functional economic urban development strategy, in which economic, social, architectural, and historical aspects of city life are brought into harmony. Therefore, it is no use looking exclusively at the cost side of monument policy. Monuments have a social benefit whose (economic, social and cultural) value is related to the history of society and is perceived by the present generation (including all direct and indirect users) in view of the future.

These benefits are clearly multidimensional in nature. Here a parallel may be drawn with antiquities sold on the market. The value of an antique good (a painting, for example) depends on its age, its degree of uniqueness, its artistic quality, and its representation of a certain style period. The same holds true for an urban monument, although here an additional important consideration plays a role, namely its integration in the existing historical urban structure (in addition to the revenues generated by this historical cultural resource).

This implies essentially that an urban monument has to be valued from the angle of a multiattribute utility approach. Its value for society is determined by various attributes such as age, uniqueness, artistic value, style period, integration in urban structure, and economic revenues. The multidimensional profile constitutes the indigenous socioeconomic and historical-artistic value of a cultural resource, seen from the viewpoint of a multidimensional utility theory.

The previous overview of different evaluation methods for historico-cultural sites and buildings shows a wide variety in scope and approach, ranging from financial methods to point score methods, and from traditional cost-benefit methods to modern multicriteria decision support methods. A main problem which has as yet remained largely unresolved is the level of measurement (or precision of information) in all such evaluation methods. Various methods - useful as they may be - can often not be applied meaningfully when the analytical basis of such methods presupposes a level of data precision which does not exist in practice. Therefore, we have to look for a research methodology which is flexible enough to encapture various levels of measurement. In section 3 an analysis framework based on a generalized regime method (GRM) will be presented. This GRM is able to deal with various levels of measurement.

3. A Generalized Regime Method (GRM)

3.1. Introduction

In this section a new method for providing a 'compound' evaluation of cultural assets will be proposed. This method is able to take into consideration both cardinal and ordinal measurement scales. The essence of the method is a two-stage evaluation. The first stage is to identify a set of latent (and hence unobservable) variables which serve to characterize various important dimensions of a cultural asset (like socio-economic significance, historical meaning, etc.). Next, for each latent variable a set of observable indicators is specified, so that the analysis can be carried out in two successive steps: a numerical approximation of each latent variable on the basis of measurable indicators, followed by a 'compound' evaluation of the approximated values of the latent variables.

Clearly, the problems of specifying measurable indicators for a latent variable deserve careful attention. For instance, if we want to approximate the latent variable 'socio-economic development', we may use observable indicators like (growth in) employment, average income (growth), investment levels, etc. Also in a socio-cultural context, various indicators may be specified, such as age of monuments, uniqueness, typical representation of a certain style period etc. The way such indicators are ultimately used for a 'compound' evaluation is usually based on a multivariate method, like principal component analysis (for hard data) or multi-dimensional scaling (for soft data). In all cases an attempt is made to reduce a multidimensional set of data to a limited but representative subset.

In this context, the so-called regime method has proven to be an extremely helpful tool.

The regime method is essentially based on the concept of dominance, which indicates whether or not (and, in case of cardinal information, how much) one choice option is more preferable to another one, seen from the perspective of a pairwise comparison (see also Nijkamp, 1988b). The generalized regime method (GRM) discussed here differs from the conventional regime method in one main respect. Many attributes of an historic site or building are latent variables, which have to be measured more precisely by means of observable indicators. This involves essentially a two-stage procedure for evaluation methods for conservation planning, as will be illustrated on the basis of the impact table presented below (see Table 4).

Our two-stage procedure implies that first all measurable indicators within one main judgement criterion are taken together so as to arrive at a numerical expression (or ranking) of the choice options under consideration for that particular criterion. The next step is to take all main criteria together so as to arrive at a numerical expression (or ranking) of all choice options for the historico-cultural value of the asset concerned. The precise method to be used in this two-stage procedure will be described later on. In the sequel we will present the GRM for the case of ordinal information. But as an introduction we first briefly discuss multidimensional evaluation problems based on cardinal information.

main judgement criteria

	1	2	....
choice options	measurable indicators (i) (ii) (iii) ...	....	....
1 I			

Table 4. Illustrative two-stage impact table

3.2. Evaluation with cardinal information

Suppose we would have an impact matrix as presented in Table 4. We assume that all entries e_{ij} ($i = 1, \ldots, I$; $j = 1, \ldots, J$) are measured in cardinal units. We assume here that all criteria are measured as benefit criteria, i.e., 'the higher, the better'.

If certain criteria are not benefit criteria, but cost criteria, they have to be multiplied with -1 in order to transform them into benefit criteria. In some cases, a critical level of an indicator may exist, beyond which a further decrease means a reduction in welfare. For instance, a low population density in a city is not very favourable (as then a carrying capacity for certain urban amenities is absent), whilst on the other hand a high population density is not favourable either (as then diseconomies of scale and congestion may occur). In that case we would have to specify a reference level of population density (which is to be regarded as the supreme point), while all deviations from this point are to be regarded negative discrepancies.

A first way of analyzing such a data set is to plot the data for all choice options pairwise in a two-dimensional figure (see Figure 2). In this figure, 4 choice options are assumed. Such a figure gives us

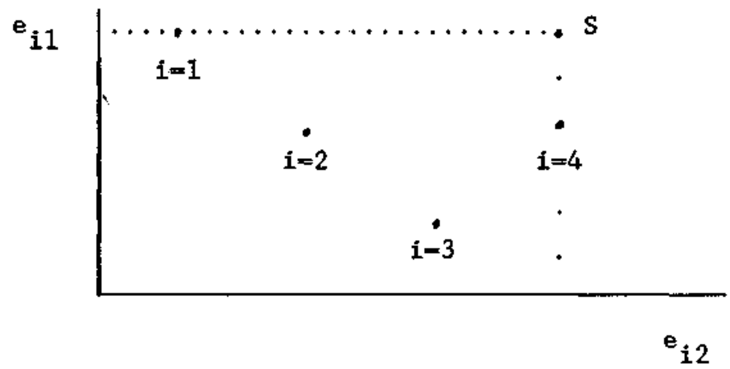


Figure 2. A two-dimensional representation of a cardinal impact matrix.

some insight into the relative differences and the potential relative dominance of the various choice options.

Point S in figure 2 is the supreme point, as it is the (hypothetical) ideal point from all 4 choice options. Although this is an unfeasible point, we may use the supreme point as a frame of reference, viz. by identifying that particular choice option which is as close as possible to the supreme point S. This point would then be the solution to our multidimensional choice problem.

However, there is one problem here, viz. the fact that in reality not all criteria are regarded as equally important. Thus we would need a certain weighting procedure in order to derive reliable conclusions (see also Keeney and Raiffa, 1976, Rietveld, 1980, and Rietveld and Nijkamp, 1987). Suppose we would have a weight sets λ_j $(j=1,\ldots,J)$ related to the successive judgement criteria. Clearly, the λ_j's have to add up to 1.

We will formalize now the supreme point approach, i.e.,

$$e_j^{max} = \max_i e_{ij} \quad , \qquad (3.1)$$

Then the relative distance D_i from a choice option i to the supreme point S can be computed as follows:

$$D_i = \frac{\sum_{j=1}^{J} \lambda_j (e_j^{max} - e_{ij})}{\sum_{j=1}^{J} \lambda_j e_{ij}} \qquad (3.2)$$

It is easily seen that in the latter case the optimal solution (i.e., a dominant regime) can be found by selecting the choice option with the minimum value of all D_i's:

$$D^o = \min_i D_i \qquad (3.3)$$

This is a straightforward method which has been applied various times in actual planning problems (see Rietveld, 1980). However, in reality the assumption of a cardinal measurement is often not fulfilled, so that then this method cannot be used. In case of ordinal measurements, it makes more sense to use a pairwise comparison method instead of a discrepancy method. This GRM with ordinal information will be discussed in the next section.

3.3 GRM with ordinal information

In the case of the assessment of the value of cultural assets it must be realized that most information on the pertinent attributes is qualitative, soft, or fuzzy in nature. This problem of 'measuring the unmeasurable' (Nijkamp et al., 1985) is an intriguing issue in evaluation research. In the present paper I will therefore also concentrate on qualitative evaluation methods, usually called 'qualitative multicriteria methods'.

There is a wide variety of such methods (for surveys see Nijkamp, 1981; Rietveld, 1980; Voogd, 1983). There is unfortunately often a discrepancy between simple but analytically wrong methods, and sophisticated but analytically proper methods. In recent years a new method has emerged which tries to meet reasonable criteria such as methodological soundness, mathematical and statistical accessibility, and easy computer use. The method is called the regime method and will be used in this paper (Hinloopen et al, 1983; and Hinloopen and Nijkamp, 1988). The method will be described here in a concise way.

Suppose a problem with I choice options or alternatives i (i = 1,...,I) is characterized by J judgement criteria j (j = 1, ...,J). The basic information we have is composed of qualitative data about the ordinal value of all J judgement criteria for all I choice options. In particular, we assume a partial ranking of all I choice options for each criterion j, so that the following effect matrix can be constructed,

$$E = \begin{bmatrix} e_{11} & \cdots & e_{1J} \\ \vdots & & \vdots \\ e_{I1} & \cdots & e_{IJ} \end{bmatrix} \quad (3.6)$$

The entry e_{ij} ($i = 1, \ldots, I$; $j = 1, \ldots, J$) thus represents the rank order of alternative i according to judgement criterion j. Without loss of generality, we may assume a rank order characterized by the condition 'the higher, the better'; in other words, if $e_{ij} > e_{i'j}$, then choice option i is preferable to option i' for judgement criterion j.

As there is not usually a single dominating alternative, we need additional information on the relative importance of (some of) the judgement criteria. In the case of weighting methods this information is given by means of preference weights attached to the successive criteria. If we deal with ordinal information, the weights are represented by means of rank orders w_j ($j = 1,\ldots,J$) in a weight vector w:

$$w = (w_1, \ldots, w_J)^T \quad (3.6)$$

Clearly, it is again assumed that $w_j > w_{j'}$ implies that criterion j is regarded as a more important criterion than j'.

Next, the regime method uses a pairwise comparison of all choice options, so that the mutual comparison of two choice options is not influenced by the presence and effects of other alternatives. Of course, the eventual rank order of any two alternatives is codetermined by remaining alternatives (compare the independence of irrelevant alternatives problem).

In order to explain the mechanism of the regime method, I will first define the concept of a regime in an ordinal sense. Consider two alternative choice options, i and i'. If for criterion j a certain choice option i is better than option i' (that is, $s_{ii'j} = e_{ij} - e_{i'j} > 0$), then it should be noted that in the case of ordinal information, the order of magnitude of $s_{ii'j}$ is not relevant, but only its sign. Consequently, if $r_{ii'j}$ = sign $s_{ii'j} = +$, then alternative i is better than alternative i' for criterion j. Otherwise, $r_{ii'j} = -$, or (in the case of ties) $r_{ii'j}$ = 0. By making such a pairwise comparison for any two alternatives i and i' for all criteria j (j = 1, ...,J), we may construct a Jx1 regime vector $r_{ii'}$, defined as

$$r_{ii'} = (r_{ii'1}, \ldots, r_{ii'J})^T, \qquad i,i', \; i' = i \qquad (3.7)$$

Thus, the regime vector contains only + and - signs (or, in the case of ties, 0 signs as well), and reflects a certain degree of (pairwise) dominance of choice option i with respect to option i' for the unweighted effects for all J judgement criteria. Clearly, we have I(I-1) pair-wise comparisons altogether, and hence also I(I-1) regime vectors. These regime vectors can be included in an JxI(I-1)
regime matrix R:

$$R = \left[\underbrace{r_{12}, r_{13}, \ldots, r_{1I},}_{I-1} \ldots \underbrace{r_{I1}, \ldots, r_{I\,(I-1)}}_{I-1} \right] \qquad (3.8)$$

It is evident that if a certain regime vector $r_{ii'}$ contained only + signs, alternative i would dominate alternative i' absolutely. Usually, however, a regime vector contains both + and - signs, so that additional information in the form of the weights vector (3.6) is required.

In order to treat ordinal information on weights, the assumption is now made that the ordinal weights $w_j (j = 1, \ldots, J)$ are a rank order representation of an (unknown) underlying cardinal stochastic weight vector w*, viz. $w^* = (w_i^*, \ldots, w_J^*)^T$, with $\max_j \{w_j^*\} = 1$, $w_j^* \geq 0$, j. The ordinal ranking of the weights is thus supposed to be consistent with the quantitative information incorporated in an unknown cardinal vector, w*; in other words, $w_j > w_{j'} \rightarrow w_j^* > w_{j'}^*$. Next, we assume that the weighted dominance of choice option i with regard to option i' can be represented by means of the following stochastic expression based on a weighted summation of cardinal entities (implying essentially an additive linear utility structure):

$$v_{ii'} = \sum_{j=1}^{J} \sigma_{ii'j} w_j^* . \qquad (3.9)$$

If $v_{ii'}$ is positive, choice option i is dominant with respect to option i'. However, in our case we do not have information on the cardinal value of w_j^*, but only on the ordinal value of w_j (which is assumed to be consistent with w_j^*). Therefore, we introduce a certain probability, $p_{ii'}$, for the dominance of option i with respect to option i', i.e.

$$p_{ii'} = \text{prob}(v_{ii'} > 0), \qquad (3.10)$$

and define as an aggregate probability measure,

$$p_i = \frac{1}{I-1} \sum_{i' \neq i} p_{ii'} \qquad (3.11)$$

Then it can easily be seen that p_i is the average probability that alternative i is higher valued than any other alternative. Concsequently, the eventual rank order of choice options is determined by the rank order (or the order of magnitude) of the p_i.

However, the crucial problem here is to assess $p_{ii'}$ and p_i. This implies that we have to make an assumption about the probability distribution function both of the w_j^* and of the $s_{ii'j}$. In view of the ordinal nature of the w_j, it is plausible to assume for the whole relevant area a uniform density function for the w_j^*. The motive is that if the ordinal weights vector, w, is interpreted as originating from a stochastic weight vector, w*, there is, without any prior information, no reason to assume that a certain numerical value of w* has a higher probability than any other value. In other words, the weights vector, w*, can adopt with equal probability each value that is in agreement with the ordinal information implied by w. This argument is essentially based on the 'principle of insufficient reason', which also constitutes the foundation stone for the so-called Laplace criterion in the case of decision making under uncertainty (Taha, 1976). However, if prior information in a specific case suggests there is reason to assume a different probability distribution function (a normal distribution, for example), there is no reason to exclude this new information. Of course, this may influence the values of $p_{ii'}$ and hence the ranking of alternatives. The precise way in which rank order results can be derived from a probability distribution when there is qualitative information will not be discussed further here, as this topic has been extensively described elsewhere (Hinloopen and Nijkamp, 1988). But it may suffice to mention that, in principle, the use of stochastic analysis, which is consistent with an originally ordinal data set, may help to overcome the methodological problem emanating from impermissible numerical operations on qualitative data. The regime method is also able to handle ties in the effect matrix and in the weight vector. The regime method is available on a diskette for an IBM-compatible PC, so that is can easily be used by planners in the field. This method will be illustrated by means of a numerical example in section 4.

3.4 GRM with mixed information

A situation with mixed information emerges if either the impact matrix or the weight vector (or both) contain both cardinal and ordinal information. In that case the ordinal information has to be transferred first into appropriate cardinal units, so as to make the two different data systems mutually compatible. Both the ordinal and the cardinal versions of the regime method aim at finding a dominant choice option based on a multivariate data set. Although the numerical operations are of course different, the underlying methodology is analogous, as in both cases an attempt is made at identifying from a discrete set of choice possibilities an as yet unknown choice option which is as close as possible to an ideal point or ideal ranking. The technicalities of this method can be found in Hinloopen et al. (1983) and Hinloopen and Nijkamp (1988), and will not be discussed here any further.

4. A Numerical Illustration of GRM

In this section we will illustrate in a numerical sense the essence of GRM. Suppose we want to evaluate the 'complex social value' (Fusco Girard, 1987) of 11 historico-cultural districts in an old city (for instance, with a view on the allocation of public funds for restoration). We assume that we have three main judgement criteria, viz. the socio-economic profile, the geographical-environmental profile, and the cultural-architectural profile. Each of these main judgement profiles is composed of observable attributes in the following way:

socio-economic profile

(i) average income per capita
(ii) percentage unemployment
(iii) average wealth per capita

<u>geographical-environmental profile</u>

(i) population density

(ii) natural environment, parks etc. (as percentage of urban district)

(iii) industrialization index (share of industrial activities in the district

(iv) immission index for pollution (e.g., concentration of sulfur dioxide)

<u>cultural-architectural profile</u>

(i) accessibility of historic city centre (e.g., number of bus lines)

(ii) index for cultural amenities per capita (e.g., average number of cultural amenities)

(iii) index for monuments per capita (e.g., average number of monuments)

(iv) distance with respect to the socio-economic centre of the city

(v) index for architectural uniqueness

We assume now that all data in our 'conservation impact analysis' (CIA) are gathered in an ordinal way, so that the above described GRN operations can be executed on this data set. We also assume the existence of 11 historic urban districts, which have to be evaluated. The relevant illustrative impact matrix is represented in Table 5.

	socio-economic profile			geographical-environmental profile				cultural-architectural profile				
eleven urban districts	(i)	(ii)	(iii)	(i)	(ii)	(iii)	(iv)	(i)	(ii)	(iii)	(iv)	(v)
1	6	3	7	8	1	8	7	2	9	10	1	10
2	1	2	3	10	5	11	11	2	11	11	3	1
3	2	1	5	11	10	10	10	3	10	9	2	6
4	4	5	4	7	6	7	9	4	4	7	6	5
5	7	9	6	6	11	6	8	6	5	5	8	7
6	9	11	10	3	7	5	4	7	1	6	11	11
7	10	8	9	2	4	2	2	9	7	2	10	9
8	11	10	8	1	3	1	1	11	2	1	7	8
9	8	6	11	9	2	9	6	8	8	8	5	2
10	5	7	2	5	9	3	5	5	6	3	9	3
11	3	4	1	4	8	4	3	10	3	4	4	4

Table 5. Ordinal impact matrix for historic urban districts.

The first step is then to carry out a regime analysis for each individual main criterion (assuming an unweighted aggregation in our case). These results are presented as ordinal rankings in Table 6. It is interesting to observe that these results reflect distinct results at the level of each of the three main criteria. Especially criteria 1 and 2, as well as criteria 2 and 3 show contrasting results, so that the weights attached to these criteria may be decisive for the final rankings of alternatives.

Next we repeat this procedure at the level of all three main criteria; this procedure then leads to the final ranking of all 11 choice options. These final results - for various weight combinations - are presented in Table 7. It appears that most results are fairly robust against changes in the weight system.

	historic urban districts										
	1	2	3	4	5	6	7	8	9	10	11
socio-economic profile	6	1	2	4	7	11	9	10	8	5	3
geographical-environmental profile	6	10	11	9	7	3	2	1	8	5	4
cultural-architectural	9	4	6	2	7	11	10	5	8	3	1

Table 6. Ordinal rankings of 11 historic urban districts at the level of individual main profile

weight system	historic urban districts 1	2	3	4	5	6	7	8	9	10	11
$w_1=w_2=w_3$	7	3	6	2	8	11	9	5	10	4	1
$w_1>w_2>w_3$	6	2	4	3	7	11	10	8	9	5	1
$w_1>w_3>w_2$	6	2	4	3	7	11	10	8	9	5	1
$w_2>w_1>w_3$	6	8	11	4	9	7	5	2	10	3	1
$w_2>w_3>w_1$	6	8	11	4	9	7	5	2	10	3	1
$w_3>w_1>w_2$	8	4	6	2	7	11	10	5	9	3	1
$w_3>w_2>w_1$	8	4	6	2	7	11	10	5	9	3	1

Table 7. Ordinal rankings of 11 historic urban districts for different weight sets for main criteria.

It is evident that choice option 11 is in all cases inferior, whilst also alternatives 2, 4 and 10 score very low. Intermediate choice options are amongst others 1, 5 and 8, whilst choice options 3, 6, 7 and 9 score relatively high. In fact, the results are rather straightforward: choice option 3 appears to be the best one if the second criterion (w_2) is getting the highest weight (i.e., the geographical-environmental aspects), whilst choice option 6 scores as the best alternative in all other cases. These results are very plausible in the light of the rankings of Table 6; alternative 3 has the highest score for geographical-environmental aspects, whereas alternative 6 has the highest scores for both socio-economic and cultural-architectural evaluation criteria.

5. Epilogue

The previous analysis can be used as a prioritization scheme for monument policy, as it provides directives for the way the supply of (the quality of) cultural heritage may be improved so as to achieve the highest compound socioeconomic and historicocultural value.

An intriguing problem emerges if we have to take into account the existence of a limited budget for monument policy. Then a simultaneous realization of monument conservation plans is unfeasible, so that an intertemporal ranking of plans has to be made. A multicriteria analysis may also be helpful in this case.

A more difficult problem arises if some - as such extremely valuable - monuments are in a very bad physical condition (see also Nijkamp, 1988a). In that case, the previous analysis might easily lead to a neglect of such monuments. Therefore, in such cases one has to assess the potential value of all monuments (based on the values of attributes after a restoration plan has been carried out). Then a multicriteria analysis can be employed to design a ranking scheme for restoration plans of urban monuments.

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