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Application of a multi-criteria and participated evaluation procedure to select typology of intervention to redevelop degraded urban area

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Abstract

Through urban redevelopment of a degraded area, the deficiency in urban planning and/or building developments can be remedied, allowing for the flourishing of activities that can provide economic stimulus while improving the living conditions of citizens; in this way the local economy can be relaunched. Evaluation methodologies and procedures can contribute to steering the choices made by Public Administration (PA) in creating programmes and hypothesis of intervention that may be considered sustainable and shared by stakeholders. The text proposes the application of an evaluation procedure (Capanne area in Terracina, Latina, Lazio Region), based on the integrated use of a Multi-Criteria Analysis technique - the Analytic Hierarchy Process, as well as a technique promoting participation and interaction among stakeholders, the Stakeholders Analysis. The evaluation procedure can be used to support the PA to make the decision related to the best type of hypothesis of intervention among those possible: the decision must be taken on the basis of identified Stakeholders' needs and available resources, in order to further exploit the unexpressed potential of the intervention area. The structural elements of the evaluation procedure are aligned to article 1 of the "Prime Ministerial Decree" regarding 'Projects for the social and cultural regeneration of decaying urban areas' (15 October 2015) in order to identify the type of intervention allowable for financing provided in the Decree.

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Keywords: Multi-Criteria Analysis; Analytic Hierarchy Process; Stakeholders Analysis; Urban Regeneration; Land Development.

1. Introduction

In many Italian cities, both large and small, characterised by the presence of important territorial, environmental and landscape features and impressive historical/cultural resources, one often comes across urban areas marked by a

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high degree of social and economic decay and dilapidated building stock. This territorial contradiction can end up limiting the entire city's development potential (Morano, Tajani, 2013).

Thanks to suitable physical regeneration policies, designed to convert those areas most affected by urban decay, the conditions that could foster activities associated with the specific vocation of the territory where they are located could be created, activities that can improve the social well-being of the resident population in the area where these improvements are carried out, as well as boost the local economy (Nesticò et al., 2015a).

Despite the support provided in recent years on a European and national level, through complex redevelopment programmes designed to launch strategies for the conversion of such areas, many Italian borough councils are not able to meet the growing need to launch urban regeneration and local development projects in their areas (Stanghellini, 2012). Generally speaking, when finalising, planning and implementing regeneration projects, they find themselves having to tackle the following difficulties, often all at the same time:

- how to secure funding; the constant reduction in the amount of national/regional resources available for launching and implementing such improvement projects is often made worse by an inability to finalise and prepare the necessary documents and submit applications for access to the European or national funding earmarked for urban development (Tajani, Morano, 2015), as well as an inability to launch the forms of PPP that would allow the completion of improvements of public interest with supplementary and/or private resources;
- how to assess the choice, in general, of which type of urban regeneration instrument to use and, in particular, the choice of which type of urban redevelopment work required (Calabrò, Della Spina, 2014a): total transformation (a restructuring of the urban area's layout, building demolition and reconstruction, building renovation involving an increase in building size) or partial conservation (a restyling of buildings that does not involve an increase in size, with or without changes to a building's purpose);
- how to launch participatory decision-making processes that can prove acceptable to a number of different groups (stakeholders such as borough councils, residents, property owners, businesses, etc.) potentially interested in the territorial, economic and social development of a particular urban area, in order to ensure the successful outcome of such initiatives (European Commission, 2014).

The extent to which the first problem highlighted here is solved depends, first and foremost, on decisions concerning the distribution and allocation of public resources in regional and national economic planning documents. With the prime ministerial decree regarding 'Projects for the social and cultural regeneration of decaying urban areas' (hereinafter referred to as the DPCM), the Italian government recently (15 October 2015) earmarked €200 million for the 2015-2017 period, in order to launch regeneration projects in areas of urban decay throughout the country. A decaying urban area is a territory that has both an IDS (*indice di disagio sociale*, or social deprivation index) and IDE (*indice di disagio edilizio*, or building decay index) equal to or higher than one unit. This measure recommends the formulae that should be used to calculate these two indicators, though it should be noted that the IDS is worked out as the weighted average of the difference between the following indicators – unemployment rate, employment rate, concentration of youth population, level of education – and their respective national averages, as identified by the ISTAT National Institute of Statistics's 2011 census; and that the IDE compares the state of buildings in a decaying urban area with the national average using a weighting that corresponds to the national percentage of residential buildings that are in a 'bad' or 'mediocre' state (DPCM appendix, Article 2, paragraph 2).

The other two difficulties listed could be mitigated by using assessment tools that allow us to clearly identify the problematic circumstances we intend to tackle, identifying possible alternative solutions and the effects that each could have on the territory, choosing which of them best meets the needs of the local area (Guarini, Battisti, 2015).

Many documents issued by the European Commission recommend the use of assessment techniques and tools in order, among other things, to support complex decisions concerning the planning of territorial regeneration processes. Of these, Multi-Criteria Analysis (MCA) is particularly interesting. Such assessment tools become even more efficient if we take into account the preferences expressed by a sufficiently large and representative number of 'decision-making' stakeholders, resorting to methods and techniques that can encourage their participation (Participation and Interaction Techniques, or PITs). Indeed, the latter allow us to limit the number of conflicts that can arise between the expectations of different groups. By consulting and interacting with the opinions of different

groups, decisions can be made in the most widely agreed, inclusive and transparent way possible (European Commission, 2006).

This paper describes the results achieved when applying (Phase 2) a specially prepared assessment tool (Phase 1) during a study undertaken with the very aim of constructing and testing a tool that could help borough councils make an informed choice (which would be acceptable to the various different stakeholders that could be potentially affected) of the best type of project for regenerating a decayed urban environment, in line with European Union, regional and local development goals.

In keeping with what is recommended in European Commission documents, a procedure was set up during the 'methodological' Phase 1 of the study (Battisti et al., 2015) that envisages the combined use of an MCA technique – an AHP (Analytic Hierarchy Process) – and a PIT technique: an SA (Stakeholder Analysis). The procedure was developed with the aim of providing a tool that could assist borough councils when choosing what type of project to adopt when regenerating decayed urban environments, in keeping with the goal of the environmental, economic and social sustainability and enhancement of the area where they are located (Nestico, Pipolo, 2015).

In Phase 2 of the study, the process moved on to applying the assessment process to a case study previously identified in the previous phase – the Capanne district, a neglected part of the city of Terracina (in the province of Latina) – in order to identify which of the proposals for regeneration that have been formulated up to now could best meet the current needs of this town. It is worth highlighting the fact that when Terracina's borough council was dismissed early, before its mandate had expired (May 2015), the three options for regeneration that had already been indicated in Phase 1 of the study had not yet assumed the form of official planning proposals, nor had they received any official recognition with the passing of a resolution by the borough council or its leaders. Information regarding the three regeneration proposals presented in this document was therefore extrapolated from meta-project data inferred from general guidelines and studies commissioned by previous borough councils and general recommendations found in current town planning tools. It cannot therefore be attributed to the work or will of the borough council. Consequently, the results of the application have not been used by the Public Administration. Should the current Special Commissioner or future councillors intend to continue attempts to establish/choose possible regeneration projects, the assessment process could be applied once more. Paragraph two of this paper will therefore illustrate in brief 'The assessment process: methodological aspects (a summary)'; paragraph three will discuss 'Applying the assessment process'; and paragraph four will go over 'Conclusions'.

2. The assessment process: methodological aspects (a summary)

The assessment process was developed, as mentioned earlier, by combining an AHP and an SA, taking into account the following premises:

- a finite (and limited) number of alternatives (the different types of regeneration projects);
- the need to identify a suitable, but not excessive, number of judgement criteria and sub-criteria (depending on the various different objectives), with both quantitative and qualitative indicators;
- the need to identify the categories of stakeholder that should be involved in the decision-making process and include their opinions in the assessment process (Nijkamp et al, 1990).

In particular, out of all the various MCA techniques available, the AHP is the one that best takes into account all the abovementioned factors. Out of all the PITs, SA allows us to manage the participatory process with simple tools (interviews) that help highlight the points of view of the various different categories of stakeholder that should be involved, something that can be done quite quickly, leading to a brief overview of results that are effective and instrumental in achieving the aims sought by the assessment process. The process put forward consists of five phases (Table 1); in order to implement it, it is necessary to ensure the following beforehand:

- that the alternatives discussed by the assessment are identified, i.e. the various types of projects that need to be chosen from (the alternatives should have been discussed, even if just in passing, in council administrative or planning documents);
- that the categories of stakeholder that should be interviewed are identified.

Table 1. The assessment process: phases, contents, actions, benchmark techniques.

Steps	Content	Tasks	Reference evaluation technique
Preliminary provisions	Recognition of intervention area	Aware of intervention area	Direct recognition of intervention area
Definition of the hierarchy levels	Level 0) Overall objective (predefinite) Level 1) Specific objectives (to achieve overall objective) Level 2a) Criteria Level 2b) Sub-criteria and related indicatord (to achieve specific objectives) Level 3) Alternatives (evaluation object)	Construction of a multi-layered interconnected hierarchy	AHP
Construction of the impact matrix	Matrix containing the input data (impacts) alternatives for each sub-criterion of judgment	Performance of alternative detection	AHP
Implementation of the Stakeholders Analysis	Investigation schedules for the detection of the stakeholders' point of view with respect to: i) weight of the sub-criteria; ii) objective function of the sub-criteria	Stakeholders' point of view detection	Stakeholders Analysis
Construction of the point of view matrix	Matrix containing (for each stakeholder) criteria and sub-criteria weight, objective functions deduced from Stakeholders Analysis	Processing the Stakeholders Analysis results to obtain synthetic data for each categories stakedolder categories	AHP/Data processed from Stakeholder Analysis
Aggregation of opinions (joint data processing of the impact matrices and points of view) for the formulation of the list among the alternatives	Pairwise comparison using: i) performances of the impact matrix+objective function of point of view matrix (level 3 referred to level 2b); ii) sub-criteria weight (level 2b referred to level 2a); iii) criteria weight (level 2a referred to level 1)	Processing data of the impact and point of view matrices	AHP variation for data aggregation (impact and points of view matrices)
Results	Preference order of the alternatives	Identification of the type of intervention	AHP

In line with what is stated in EU documents regarding urban development actions and in keeping with the practical goals of the methodology itself in the proposed assessment process, the following aspects were established ‘a priori’: the general aim (the sustainable development of the local area) and the judgement criteria (financial, socio-economic, landscape and environmental, procedural and technical criteria) that were to be taken into account on the basis of the recommendations found in European Commission documents (the Europe Aid Manual, 2005) as well as EU directive 2014/24/EU. The specific objectives, sub-criteria and their respective indicators (enough to express the changes brought about by the initiative fully) must be established in relation to the specific context to which the assessment process is applied and, in any case, in keeping with what is stated in regional and local territorial planning instruments (regional territorial landscape plans, or PTPRs, and PRG general town plans). The set of sub-criteria and indicators will need to be established in line with the specific aims identified, in order to prove a consistent and balanced body of work that can be used to measure the extent to which specific objectives have been achieved. In Phase 1 of the study, a set of specific objectives and possible sub-criteria and indicators were also put forward, to be used in the case study under consideration.

In Phase 2 of the study, we went on to verify the degree to which the contents of the levels of hierarchy already proposed were consistent with what is stated in Article 6 paragraph 1 of the DPCM appendix (criteria for assessing projects and evaluating application requests). We went on to carry out a compliance operation (see paragraph 3.3.1) which seems important when choosing a project that is eligible for funding in line with Article 3 of the DPCM.

3. Applying the assessment process to the Capanne district

3.1. The Capanne district of Terracina (province of Latina)

Terracina is a coastal city with a population of around 50,000 inhabitants which, though boasting impressive local attractions with enormous potential, has seen a gradual decline in the local economy over the past ten years (2005-2015), particularly in its core business: tourism. This is due to the lack of actions and investments over the years on a small, medium and large scale that could solve the problems of economic and social urban decay found in a number of strategic parts of the city. Among the areas earmarked as priority locations for such a strategy is the Capanne district, one of the most strategic areas of the borough’s entire territory, an area that is easily recognised as a decaying urban environment when evaluated according to the parameters indicated in Article 2 paragraph 2 of the DPCM appendix of 15 October 2015. The district (approximately two hectares in extent) is named after the simple buildings, never over two stories high, that were built in the early 1950s and which make up its urban fabric. Home to approximately 1,500 inhabitants, it has a strategic location when compared to the four macro-environments that

characterise the city: its historic centre (to the south), the consolidated 'residential city' (to the west), the coastal 'tourist city' (to the north) and a semi-rural area (to the east). It also lies at a tangent compared to two important city thoroughfares, Via Roma and Viale della Vittoria, it is less than half a kilometre from the 'Lido' area, a busy focus for beach tourism, and it is close to the city's main services. Nevertheless, it is marked by significant problems: the poor quality of the urban fabric, the lack of standard town planning features (parks, car parks), bad roads, the lack of identity-forming places that create urban connections. The building stock of around 80,000 cubic metres is almost entirely residential. The urban plan features narrow roads without pavements, squares, parks or public car parks. As well as the borough council, many residents and businesses have now recognised the need to regenerate the Capanne district and develop the local potential associated with the relaunch of the tourist industry. The borough council therefore needs to understand which of the various types of project put forward up to now could be the best to redevelop the neighbourhood.

3.2. Preliminary actions leading up to the implementation of the process: identifying assessment alternatives and categories of stakeholder

The process was implemented by considering three different improvement meta-project options, formulated over the years to regenerate the district, and supplementary to the 'non-improvement' programme (currently underway):

- A restructuring of the urban layout: demolishing and reconstructing the area in order to create a new urban layout, known as the 'City', a city centre mainly set aside for businesses and tourist activities;
- Building renovation: redeveloping buildings, possibly changing their shape and use and even increasing their size;
- Building restyling: conservative repairs that maintain existing building shapes and uses.

As regards the problems affecting the neighbourhood and the options for regeneration identified, the stakeholders who could be affected by the improvements are the following:

- The borough council: councillors and/or political representatives currently in office;
- Property owners: the owners of the properties that would be affected by redevelopment work;
- Residents: residents, even those who do not own properties in the area earmarked for redevelopment;
- Local business people: managers/partners of businesses operating in the local area;
- Citizens: residents' associations, non-profit organisations, a random sample of citizens, etc...

Table 2. Main details of the three improvement proposals.

Data		Urban restructuring	Buildings restructuring	Building restyling	Non intervention
Intervention area	sm	20,000	20,000	20,000	20,000
Private existing Gloss Floor Area (GFA) concerned intervention	sm	25,000	25,000	25,000	25,000
Private residential existing GFA	%	90	90	90	90
Private existing non residential GFA	%	10	10	10	10
Public existing GFA	sm	0	0	0	0
Private project GFA	sm	32,500	27,500	25,000	25,000
Private project residential GFA	sm	25,000	25,000	25,000	25,000
Private project non residential residential GFA	sm	7,500	2,500	0	0
Public project GFA	sm	2,000	0	0	0
Land private areas before intervention	sm	18,000	18,000	18,000	18,000
Land private areas after intervention	sm	12,000	18,000	18,000	18,000
Land public areas before intervention	sm	2,000	2,000	2,000	2,000
Land public areas after intervention	sm	8,000	2,000	2,000	2,000
Urban standard before intervention	sm	0	0	0	0
Urban standard after intervention	sm	by law	0	0	0
Intervention cost	€	25,000,000	16,000,000	8,000,000	0
Extraordinary contribution	€	2,000,000	0	0	0
Contribution cost for Public Administration for intervention	€	0	0	0	0
Extraordinary maintenance costs of the neighborhood for Public	€/year	0	250,000	250,000	250,000
Market value (parametric) existing residential building	€/sm	1,400	1,400	1,400	1,400
Market value (parametric) project residential building	€/sm	2,600	2,200	1,800	1,400
New public works	N.	[3]	No	No	No
Cost for public works	€	2,000,000	-	-	-
Implementer	Type	S.T.U.	Consortium	Consortium	-
Authorization timing	Months	24	6	3	-
Realization timing	Months	24	18	12	-

3.3. Implementing the assessment process

As mentioned earlier, the specific objectives (financial efficiency/no costs to be incurred by the borough council, social fairness and an improvement in living standards, the protection of the environment, administrative speed and certainty, urban and building quality) were established in Phase 1 of the study and a set of sub-criteria and indicators were put forward, to be used when implementing the assessment. In Phase 2, now ongoing, an upgrade of the specific hierarchy concerning the case study carried out is proposed, in order to verify the extent to which its contents are consistent with what is stated in Article 6 paragraph 1 of the DPCM appendix and, where necessary, updating the set of criteria, sub-criteria and indicators previously put forward (Table 4). In particular, the following criteria and sub-criteria:

- the 'financial' criteria put forward were formulated to comply with the contents of 'criterion D: ability to involve private and public (national and European) bodies and funding and to set off a process whereby public funding would be boosted by private investment' of the appendix;
- the 'socio-economic' criteria put forward were formulated to comply with the contents of 'criterion A: reducing marginalisation and social decay' of the appendix;
- the 'environmental and landscape' and 'technical' criteria put forward were formulated to comply with the contents of 'criterion B: improving the quality of the urban area and the social and environmental fabric, using – among other things – building renovation work, particularly as regards the development of social and educational services and the promotion of cultural, educational and sporting activities and the protection of children and adults who have been the victims of violence, human trafficking, exploitation and sexual abuse';
- the 'procedural' criteria put forward were formulated to comply with the contents of 'criterion C: the speed with which improvements are implemented'.

The impact matrix (Table 3) was developed and compiled with the input data inferred and/or calculated on the basis of the information stated in documents concerning the three regeneration proposals.

Table 3. Impact matrix.

Criteria	Sub-criteria	Indicators	Urban restructuring	Buildings restructuring	Building restyling	Non intervention
Financial efficiency [capacity involvement of public and private subjects and public funding (national and European)and private investment; activation of a multiplier effect of public funding in respect of private investment]	Intervention cost	€	25,000,000	16,000,000	8,000,000	0
	Extraordinary contribution	€	2,000,000	0	0	0
	Cost for Public Administration for intervention	€	0	0	0	0
	Market value of private project buildings	Increase % compared *status quo*	85.71%	57.14%	28.57%	0.00%
	Cost for public works (intervention or non intervention)	€	2,000,000	250,000	250,000	250,000
Social equity and increase in quality of life (reduced marginalization phenomena and social degradation)	Stable employment	N. of jobs	100	20	0	0
	Temporary employment (building industry)	N. of jobs in construction sector	200	140	70	5
	Property used for public interest activities	Increase n. of building compared *status quo*	2	0	0	0
	Spaces for cultural activities	Sm for person	6.5	0	0	0
	Local variation of Gross Domestic Product	Increase GDP (qualitative: high-medium-low)	High	Medium	Low	Low
Urban quality and construction; landscape protection (improvement urban quality and social and environmental fabric quality)	Intervention compatibility with the landscape protection regulations	Yes/No	Yes	Yes	Yes	Yes
	Change of green/natural areas for person	Difference sm for person compared *status quo*	9	0	0	0
	Change of land private areas	Difference % compared *status quo*	-33.33%	0.00%	0.00%	0.00%
	Venustas	Aestetic judgemente (qualitative: high-medium-low)	High	Medium	Low	Low
	Energy class	A;B;C;D;E;F;G	A	B	C	G
Celerity and administrative certainty (enforceability of timely interventions)	Authorization and permits	N. of authorization	7	3	1	1
	Authorization timing	Months	24	6	3	1
	Realization timing	Months	24	18	12	6

The Stakeholder Analysis – designed to directly identify the fact-finding elements that could be useful for constructing a matrix of the points of view of people belonging to the stakeholder categories identified – was implemented by preparing a survey form that could be put to the people that needed to be interviewed (and were

subsequently interviewed), laid out in two parts and designed to do the following: i) to identify function-objectives (FO) for each indicator; each interviewee stated their preferred performance orientation, choosing one out of three possible orientations for function-objectives (as regards performance): 1) maximisation (a preference for maximum performance); 2) minimisation (a preference for minimum performance); 3) indicating a range of benchmark values; ii) to weigh up (W) criteria and sub-criteria: each interviewee attributed a degree of importance to each sub-criteria on a scale of 1 to 100.

A sample of 65 people, representing the various different stakeholder categories identified, were interviewed in Terracina's town hall and in the study area: 11 were members of the borough council and/or political representatives currently in office; 15 were owners of property in the area earmarked for redevelopment; 21 were residents who do not own properties in the area earmarked for redevelopment; three were representatives of the local business community (managers/business partners working in the local area); and 15 were residents' representatives (residents' associations, non-profit organisations, a random sample of citizens, etc.). The data gathered from interviews was analysed in order to come up with a summary of the opinions demonstrating the points of view of each category of stakeholder (De Mare et al., 2015). This summary of opinions allowed us to compile a viewpoint matrix (Table 4). It lists, for each sub-criterion, a summarised judgement attributable to each category of stakeholder as regards: i) W (arithmetical average of the importance indicated in interviews with all those belonging to a specific category of stakeholder); ii) FO, chosen according to the highest number of preferences expressed by interviewees as regards the three possible orientations of these same function-objectives (max, min, range).

Table 4. Viewpoint matrix.

Sub-criteria	Indicators	Borough council		Property owners		Residents		Local busin. people		Citizens	
		W	FO	W	FO	W	FO	W	FO	W	FO
Intervention cost	€	3	min	4	min	4	min	13	min	5	min
Extraordinary contribution	€	10	max	0	max	0	max	8	min	9	max
Cost for Public Administration for	€	16	min	2	min	2	min	4	max	12	min
Market value of private project buildings	Increase % compared status quo	0	max	26	max	16	max	20	max	2	max
Cost for public works (intervention or non intervention)	€	8	max	3	max	3	max	0	max	10	max
Stable employment	N. of jobs	10	max	6	max	6	max	0	max	12	max
Temporary employment (building industry)	N. of jobs in construction sector	5	max	1	max	1	max	0	max	4	max
Property used for public interest activities	Increase n. of building compared status quo	7	max	4	max	6	max	0	max	5	max
Spaces for cultural activities	Sm for person	5	max	7	max	8	max	4	max	4	max
Local variation of Gross Domestic Product	Increase GDP (qualitative: high-medium-low)	9	max	6	max	8	max	8	max	9	max
Intervention compatibility with the landscape protection regulations	Yes/No	2	max	1	max	1	max	0	max	3	max
Change of green/natural areas for person	Difference sm for person compared status quo	4	max	5	max	5	max	2	max	4	max
Change of land private areas	Difference % compared status quo	0	max	6	max	6	max	2	max	0	max
Venustas	Aestetic judgement (qualitative: high-medium-low)	6	max	7	max	8	max	5	max	6	max
Energy class	A;B;C;D;E;F;G	2	max	5	max	5	max	5	max	2	max
Authorization and permits	N. of authorization	0	min	7	min	7	min	8	min	0	min
Authorization timing	Months	5	min	5	min	7	min	9	min	5	min
Realization timing	Months	8	min	5	min	7	min	12	min	8	min
	Total 100	-		100	-	100	-	100	-	100	-

By putting together all the opinions expressed, using the methods envisaged by the AHP, it proved possible to obtain an order of preferences (mono/group league table) for each category of stakeholder out of the four alternatives examined (Table 5). A reading of the mono-group league tables highlights how three categories of stakeholder (borough council, residents and citizens) generally had the same opinion as regards the best alternative, which proved to be building renovation. The league table compiled by representatives of the local business community and citizens expressed different preferences, but the option of building renovation still came second; this option can therefore be considered the 'most preferable' one.

Table 5. Results of evaluation.

Hypothesis of intervention	Classification				
	Borough council	Property owners	Residents	Local business	Citizens
Urban restructuring	*2*	*3*	*3*	*1*	*2*
Buildings restructuring	*1*	*2*	*1*	*2*	*1*
Buildings restyling	*2*	*1*	*2*	*3*	*2*
Non intervention	*4*	*4*	*4*	*4*	*4*

4. Conclusions

The methodological process outlined here allowed us to translate the expectations of the various different groups affected by regeneration and redevelopment projects, to differing degrees, into benchmark elements for constructing a league table of preferences for the different types of improvements (that would have the best chance of being granted funding as at Article 1 of the DPCM) that could be explored, compared to the objectives that are created through such change, focusing attention on the interaction between the different stakeholder categories as regards the respective benefits each stands to gain (Calabrò, Della Spina, 2014b). The use of this proposed method could therefore prove to be an opportunity for borough councils when, in undertaking urban regeneration programmes, they seek a consensus on the type of improvements chosen, which makes it more probable that such improvements will lead to development, competitiveness, the relaunch of the economy and an improvement in a community's living standards, and which also avoids the risk of raising protests and/or criticism when implementing the particular type of improvement programme chosen.

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