

POLITECNICO DI TORINO
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Honors theses

The evaluating of the urban upgrading case study in the pre-feasibility phase

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In this degree thesis a lot of importance has been given to the evaluation since it is often used in planning for evaluating development alternatives. The purpose of this study is to provide a methodological and operative contribution to enrich the actual national normative (*Regolamento di attuazione della legge quadro in materia di lavori pubblici -Dpr 554/99-, Guida alla certificazione degli Studi di Fattibilità, febbraio 2001*) about the evaluating.

These laws are, in fact, very detailed about the international sustainability development rudiment but they show a lot of lacks about the methodological indications for the evaluating of the urban upgrading case study in the pre-feasibility phase.

This consideration comes out during the elaboration of the "Feasibility Study" for the regeneration of an area near the "Certosa of Collegno", historical palace with a high artistic value, built from the 17th and the 19th century, located in a small town, Collegno, near Turin in Italy. The Municipality of Collegno and a group of experts from the Polytechnic of Turin have developed a number of different scenarios for the regeneration of this area.

The thesis is divided in two different steps; first we tried a comparative analysis between the different evaluation tools and in the second step one problem structuring approach (the Multi-modal framework -MMF-) and two multicriteria analysis: the Analytic Hierarchy Process (AHP) and the Analytic Network Process (ANP) have been experimented.

This thesis will show a different problem structuring approach which is able to explain complexity without falling into reductionism and/or subjectivism. This approach refers to the Multi-modal framework (MMF) developed by Brandon & Lombardi (2005) which has proved to be able to help decision makers to handle the multiplicity of the issues embodied in the concept of urban sustainability, guiding the selection of appropriate criteria for evaluating alternatives solutions. An application of this framework to an Italian urban (re)development problem will be provided.

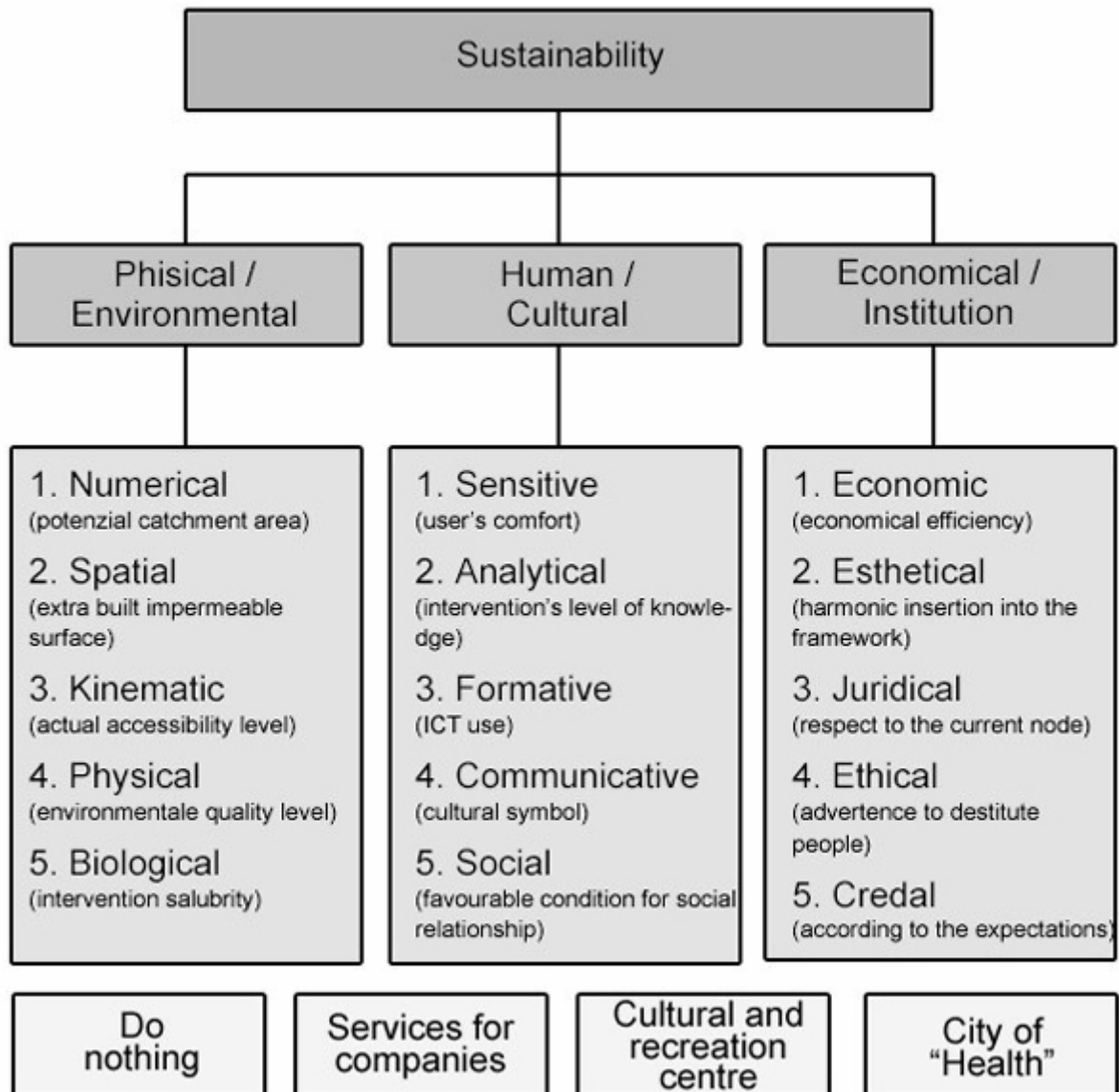
The multimodal framework has proved to be a useful approach to decision making problems in the field of urban transformation because it allows to identify specific criteria and it is able to consider all the dimensions of sustainability.

Sustainable development	Multi-modal aspects	Specific meaning with regard to the case study
PHYSICAL ENVIRONM. CAPITAL	Numerical	Potential users. The bigger is the potential users number, the more sustainable is the intervention.
	Spatial	Extra built impermeable surface expected from the intervention that could be detracted from green destination. The smaller is extra built impermeable surface, the more sustainable is the intervention.
	Kinematic	Capacity of the actual accessibility level to respond to the new activities requirements. The higher is the actual accessibility level, the more sustainable is the intervention.
	Physical	Environmental quality level, meant as resources and energies consumption, expected from the intervention. The lower is the resources and energies consumption, the more sustainable is the intervention.
	Biological	How healthy is the intervention, i.e. the quantity of emissions in the environment (air and water), attributable to the production of the intervention. The lower is the quantity of emissions expected from the new activities, the more sustainable is the intervention.
HUMAN CULTURAL CAPITAL	Sensitive	User's comfort, i.e. the user's perception of the environmental scenario arising from the intervention. It coincides with the sensation of physical/psychical unease or comfort. The higher is the expected comfort, the more sustainable is the intervention.
	Analytical	Level of knowledge and studies supporting the regeneration. The higher is the intervention's level of knowledge, the more sustainable is the intervention.
	Formative	ICT use. The bigger is the expected ICT use, the more sustainable is the intervention.
	Communicative	Cultural symbol, ability of the urban design to become cultural symbol for the Local Community. The bigger is the project's ability to communicate cultural symbols for the community, the more it is sustainable.
	Social	Favourable conditions for social relationships. Does the intervention provide favourable conditions for social intercourse?
ECONOMICAL INSTITUTION. CAPITAL	Economic	Economical efficiency. The higher is the economical efficiency, the more sustainable is the intervention.
	Esthetical	Harmonic insertion of the intervention into the urban context, from a morphological point of view. The more the urban renewal is harmonic with the context, the more it's sustainable.
	Juridical	Respect of the current norms and regulations. The less the intervention requires a change in current norms (e.g. Master Plan), the more it is sustainable.
	Ethical	Attention to disables and children and old people. The more the intervention is able to pay attention to all categories of people's needs, the more it is sustainable.
	Credal	Accordance to Local Community expectations, coherence with Public Authority's development strategies. How much the intervention is coherent with Local Community expectations?.

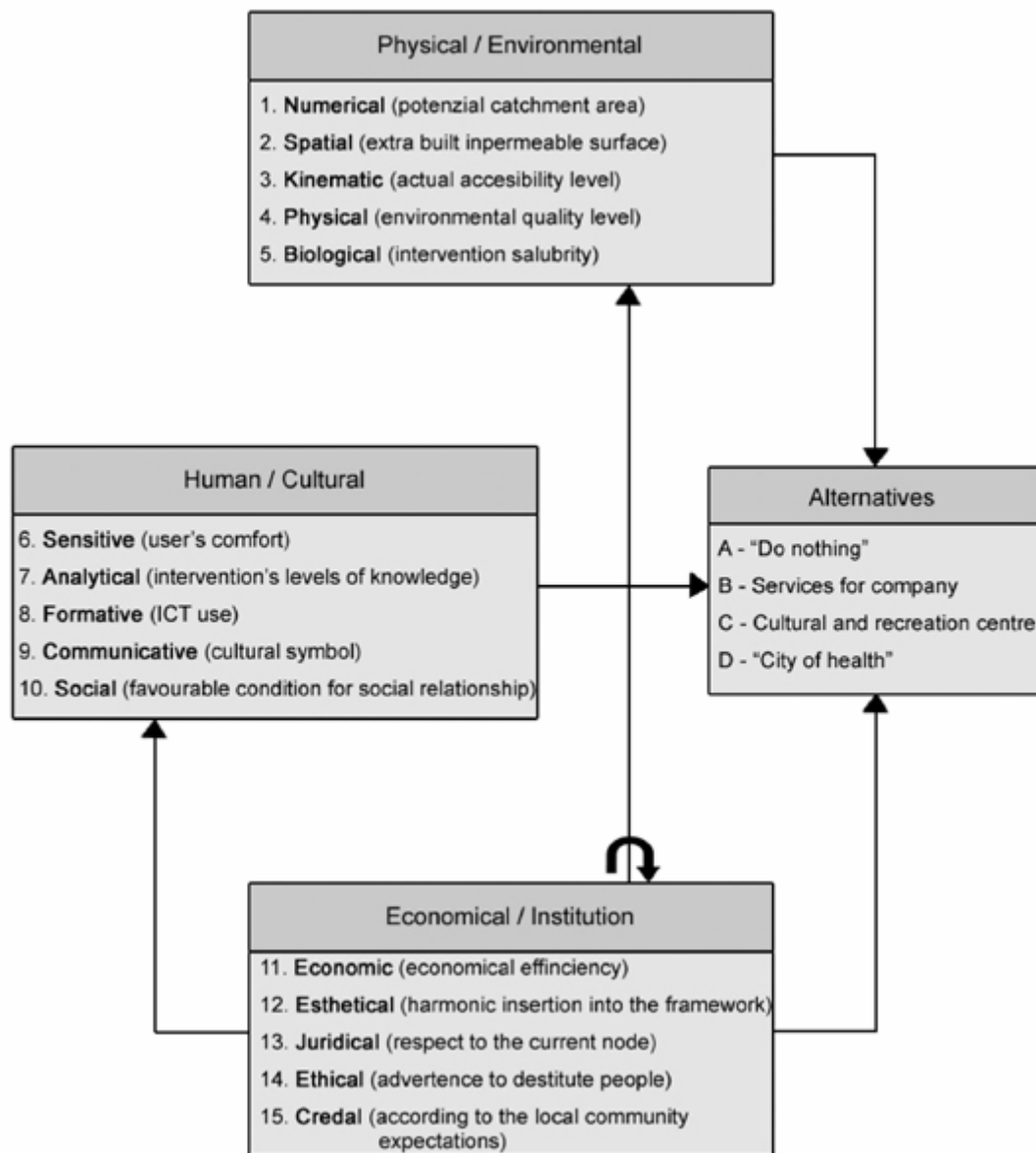
The multimodal framework applied to the case - study

With reference to the multi-criteria analysis, a very important role is played by the Analytic Hierarchy Process – AHP and by its generalization to feedback networks, the Analytic Network Process –ANP (the ANP is the first mathematical theory that makes possible to systematically deal with all kinds of dependencies and feedback. It requires a network structure to represent the problem, as well as pair-wise comparison to establish relations within the structure). In fact, many decision problems can not be structured hierarchically because they involve the interaction and dependence of higher-level elements on lower-level elements.

Not only does the importance of the criteria determine the importance of the alternatives as in a hierarchy, but also the importance of the alternatives themselves determines the importance of the criteria.



The hierarchy model AHP



The network model ANP

In conclusion of this study, we affirm that the ANP methodology is a robust multi-attribute decision-making technique for synthesizing criteria and elements governing urban transformation.

In the presented study, the ANP was applied according to the “simple” network form. The structure of the model heavily influences the results of an evaluation process. The ANP allows to structure any kind of decision problem with different relationships and interdependencies or feedback. Therefore, it requires evident knowledge of sustainable design development. For this reason, this study adopted the MMF for supporting this understanding.

This study represents the first application of the ANP in Italy and one of the first example of ANP application in the field of urban transformation at international level.

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