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Evaluation process and problem-solving*

The paper aims at investigating some aspects of the evaluation process under the perspective of the problem solving approach. Firstly, the basic sketch of the evaluation process is summarized and it is pointed out its relationship with the institutional dimensions (Vat, 2009, 2004). Then the characteristics of the evaluation process as a problem-solving activity are presented and discussed in terms of identification of problem domain and problem types. Three proposition are then drawn from this framework a discussed. Preliminary conclusions are proposed.

1. Background and study hypothesis

The evaluation process is normally recognized as the basic methodological and conceptual framework of evaluation problems resolution (Michieli, 1991; Cormegna, 1989; Merlo, 1992; Medici, 1977). It is basically articulated in three stages which structure the practices of the assessors and provide the stakeholders with a sequence of operations which should be shared by each potential assessor (Di Cocco, 1975). The main characteristics of the evaluation process concern with the objectivity, the validity and the normality of the values determined. Scholars take normally for granted the methodological robustness of the process. In last decades developments were achieved which concern with: a) the definition of new classes of monetary (and non monetary) values (as in the case of the environmental evaluations); b) the enrichment of the assessor's toolbox for the data analysis.

The first strand of analysis received an increasing attention as the environmental issues management and, more in general, the interaction between socio-economic systems and the environment came to the light and capture the attention of citizens and policy-makers. The identification of new classes of values (Total Economic Value paradigm) can be said to be conservative with respect to the conceptual nature of the evaluation process. Actually, the new classes are nor-

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mally perfectly treated within the context of the evaluation process (Casini, 1995). This allows one to state that the evaluation process is general with respect the classes of values.

The development of new techniques of data analysis represents the second basic line of innovation of the evaluation process. Statistical and Mathematical methods are at the basis of this enrichment. Briefly, one may point out that while the Statistical methods have normally been integrated in the evaluation process according to an approach intended to the reproduction of the observed data, the Mathematical models are instead concerned with the attempts to reproduce the decision-making process intended as the source of values at stake. The use of Statistical methods has been invoked both to the purpose of studying the basic phenomenon entailed by the evaluation process – e.g. the land market – and properly to the purpose of evaluating a good or a services (see Simonotti, 1989 for a general introduction). The approaches related tend to frame the statistical methods within the evaluation process, a challenge being to limit the influence of calculativeness upon the evaluation.

The evaluation practices have been conceptualized as meaningful rule structures, institutional in nature and built on specific rationality dimensions (Vatn, 2009). Under this view, despite the richness of the outcomes mentioned, it seems that scholars did not pay attention to the role of rationality in the evaluation process. The appraisal methodology mainly relies on the assumption of the rationality of neoclassical economics. Both the conceptualization of the market exchange process – the basis for comparison – and the use on method and techniques explicitly referring to utility and profit maximizing individuals confirm this view. On the other hand the evaluation process entails a proper rationality content which appears to be in essence closer to the bonded rationality concept. For example, the assessor primarily acts as an interpreter of the market data where the human perspective cannot be substituted by any direct calculus. The value judgement is conceived intrinsically uncertain and probable, leaving room for unexpected market outcomes of the transaction subsequent to the evaluation.

The hypothesis assumed here is that the evaluation task can be thought of a specific problem the agent have to face and to solve, at least in order to undertake the exchange of goods and services. This hypothesis leads to the question on how the evaluation problem is addressed and solved. The competition is usually considered the basic process allowing the exchange take place (Marshall, 1972). The economic theory showed that institutions allow individuals to economize on cognitive resources (North, 1997; Simon, 1991): several institutions – among them the competitive market plays the main role – support agents in the evaluation tasks (Vatn, 2009; 2004). Therefore the hypothesis can be better formulated submitting that the evaluation process can be thought of as a problem-solving process.

The problem solving is a basic activity carried out in all the field of human life (Bransford, Stein, 1997). Its conceptualization highlight the provide the tool for a systematic approach to some steps of the evaluation process, while the institutional view emphasizing the role of cognitive resources nature of the evaluation (Vatn, 2009) gives room to the problem solving as a critical professional task.

Scholars in evaluation doctrine distinguish the following three stages: a) identification of the purpose of the evaluation; b) choice of the evaluation procedure; c) data collecting and analysis. I contend that the intrinsic nature and logic of each of these stage takes advantage from the adoption of a problem-solving perspective. Namely, in this study my purpose is to consider on some aspects of the process of evaluating good and services which can be interpreted in terms of problem-solving. I submit that this analytical perspective improves the validity and effectiveness chances of the evaluation practices.

2. Method of the study

The method of the study is based on the comparison between the logical structure of the process evaluation and that of the problem solving process. I develop the analysis in three steps. Drawing from literature I firstly analyze the structure and the content of the evaluation process and of its stages. Then, I delineate a system of propositions which are intended to shed light of the nature of the evaluation process as logical structure aimed at problem-solving. The third step is concerned with the deduction of possibilities of developing the application of problem solving approach in the evaluation process.

3. The steps of the evaluation process

The evaluation theory states that the evaluation process requires three basic steps:

a) *Identification of the purpose of the evaluation* the first stage is aimed at formulating the evaluation problems in terms the theory. The assessor is required to recognize what form of value supports the solution of the evaluation problem, taking into accounts the system of rights connected to the good to be evaluated, the socio-economic context and the willingness of the agents. Basically, the forms of the values refer to exchange (market value) or to production (cost of production).

The willingness of the agents depends upon the system of the rights as these establish the domain of action of each agent. On the other hand, the assessor has to consider the characteristics of the institutional, economic and social context in order to identify the normal domain of action. The activities which could be normally undertaken by the agents (e.g. a given economic use of the resource to be evaluated), provide the basis for the appraisal of an objective value. An deep discussion of the right representation of the choice of the form of value is presented by Campus and Romiti (1992).

b) *Choice of the evaluation procedure* according the figure 2, the evaluation procedure depends upon the institutional framework (Vatn, 2009) and from the availability of data and the complexity of the good (Di Cocco, 1975; Medici, 1977).

c) *Data collecting and analysis* data collecting is carried out according to guidelines associated to the evaluation method: for example, in the simple market com-

Figure 1. The framework of the choice of the form of value.

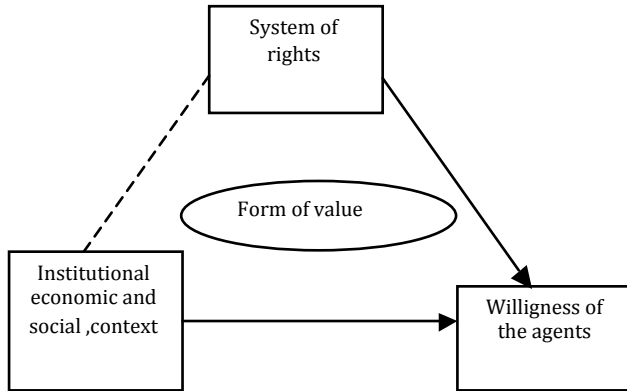


Figure 2. Choice of the evaluation procedure.

Economic agents	<i>Citizens</i>	Choice of the procedure	
	<i>Consumers</i>		
		<i>Low Complexity</i>	<i>High complexity</i>
		Characteristics of the good/service	

parison the data to be collected concern just price and characteristics of the good exchange, whereas in a choice experiment complex scenarios have to be submitted to respondents. Accordingly, the models of analysis are designed to elaborate the information collected in order to reproduce the working rules of the exchange (production) institution at stake.

The question addressed here is how the evaluation problem is in turn addressed and solved. The evaluation tasks are usually faced by the agents in the most of economic activities and are often relevant to undertaken further social activity as well.

The evaluation process provide a logical structure and an operational path to solve evaluation problem. Nevertheless, each step poses specific problems to be solved. The rationale for that is highlighted by the problem-solving theory in terms of the problem decomposition (Bransford, Stein, 1997; Simon, 1991).

Problems are usually defined by: a) a *problem domain* consisting of concepts, rules and principles and defining the problem elements; b) a *problem type* describing the combination of concepts and rules and the procedures for treating them in order to achieve the solution; c) *problem-solving process* depending upon the understanding and the representation of the problem type, including the understanding of problem state and goal state which with the operators define the *problem space* (Jonassen, 1997, p. 66).

Furthermore a key distinction is between well-defined and ill-defined problems. Well-defined problems are those problems whose goals, path to solution, and obstacles to solution are clear based on the information given. Ill-defined problems are characterized by their lack of a clear path to solution (Pertz *et al.*, 2003).

The problem solving activity is normally described as cycle:

- I. recognize or identify the problem;
- II. define and represent the problem mentally;
- III. develop a solution strategy;
- IV. organize her knowledge about the problem.

I highlight two general characteristics of the evaluation problem as a problem solving activity and then elaborate on those characteristics and the framework introduced.

A step toward the solution of problem is just its decomposition in sub-problem whose solutions be easier to find out. In distinguishing the selection of the form of value, the choice of the procedure and the data collecting and analyzing, the evaluation process has the general characteristic of being an useful logical instrument to decompose the evaluation problem.

A further general characteristics of the evaluation process as a problem-solving activity is the fact that while Scholars, especially in the Italian literature, emphasize the idiosyncratic nature of each evaluation problem, on the other hand the evaluation process is conceived as the means to lead the evaluation case to the prediction of economic theory. Under this perspective, for example, the market value is conceived as a source of solution of evaluation problems once the real life cases have been characterized according the theoretical representation of the exchange process. Analogously, the concept of cost can provide solutions to evaluation problems once the activities observed in the real life case have been characterized according the theoretical representation of the production process. In this sense the evaluation process primarily requires a classification of the real life cases with respect to a shared theoretical perspective.

Elaborating on the basis introduced, I submit the following propositions.

Proposition 1. The evaluation process is primarily designed to define a *problem domain* in which a main role is played by the Economic Theory.

The *domain* of an evaluation problem is defined by concepts drawn from three main sets: Economics, Institutions Analysis and Law.

The figure 4 summarizes the problem domain directly drawing from the standard appraisal methodology (Michieli, 1991; Medici, 1977).

Figure 3. Source of the domain of the evaluation problem

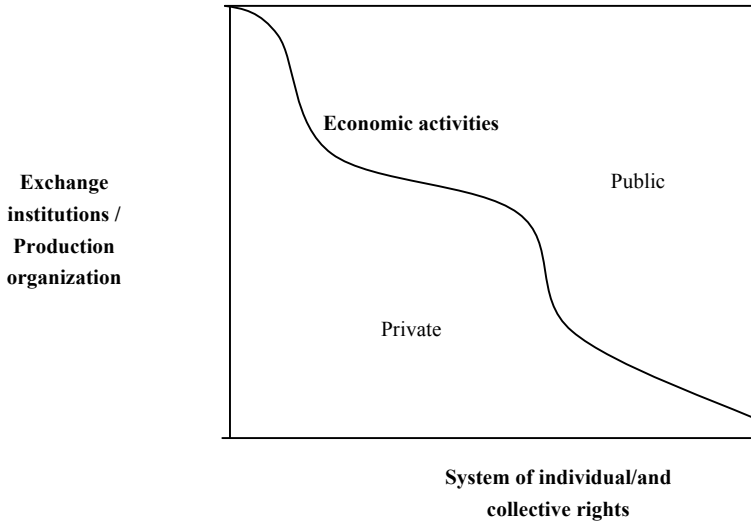


Figure 4. Problem domain of the evaluation process

<i>Dimension of the problem domain</i>	<i>Problem domain of the evaluation process</i>
Concepts	Economic theory, Law Conceptualization of good in terms of form of values
Rules	Comparison
Principles	Appraisal postulate

Proposition 2. The idiosyncratic nature of the evaluation cases is managed by the a priori definition of *problem type* (e.g. evaluation aimed at supporting the exchange, evaluation aimed at supporting damages litigation, transferring of property rights and so on) which are based on integrate conceptual structures drawn from Economic Theory and Law.

The standard appraisal methodology recognizes the specific nature of each evaluation problem. It is strongly recommended to avoid a calculative approach (Medici, 1977), whereas the role of the assessor is mainly concerned with the task of reproducing the working rules of the exchange/production institutions involved by the approach chosen.

Proposition 3. The validity of the evaluation process is improved explicitly adopting a problem-solving perspective (see the problem-solving cycle).

To make the argument supporting the *proposition 3*, I consider here two fields of analysis as examples of the possibility of applying a problem solving perspec-

tive to the evaluation process: a) the problem representation in the choice of the value aspect to be chosen to solve the evaluation problems; b) the anchoring effect in the case of the legal trial evaluations.

The choice of the value aspect and the representation of the evaluation problem. The choice of the economic aspect of the value is central to first step of the evaluation process. The doctrine states that in this stages the assessor has to consider the goods as well as the rights involved in the evaluation. This requires the assessor to apply her/his knowledge in order to identify accurately all the relevant information. A basic approach is then to recognize the problem type in the real life case. For example, in case of evaluation aimed at supporting an exchange process, the doctrine states that the economic value aspect is the market value. Alternatively, in more complex case the assessor is required to develop new solution under the guidelines and the constrains of the doctrine.

It seems clear then that the choice of the economic values aspect requires to recognize the content of the idiosyncratic real life case and to search for matching the case to the existing doctrine. I submit that this process can be expressed in terms of *problem representation* and that this: a) provides the assessors with a sort of practical guideline; b) provides a systematic and verifiable way of making the choice; c) favours the choice, reducing the errors. The case of the choice of the economic value aspect proposed by Campus and Romiti (1996) provides a clear example in this sense. This makes also clear that the problem representation in the evaluation process has to draw directly from the evaluation doctrine: a clear example in this sense is the analysis of legal evaluation proposed by Benvenuti and Marone (2002).

The Anchoring effect in the case of the legal trial evaluation. I make here an attempt to accounting for potential heuristics biases in evaluation of good and services by considering the case of the judgements required in the context of legal trials.

The evaluation doctrine can be thought of as an analytical framework aimed at providing the conceptual foundations of the practical judgements about uncertain values. Two sources of uncertainty are normally recognized: a) the lack of knowledge about the object to be evaluated (e.g. a good or a service) in terms of its legal and economic characteristics; b) according to the "predicting nature" of the value judgement; the intrinsic uncertainty which characterizes any future event.

The first source of uncertainty is a matter of technical knowledge in specialized fields (i.e., Law, Economic Theory and so forth), therefore as a practical guideline the assessor is committed to do her/his best in order to properly identify the good to be evaluated with respect to the necessary domains of knowledge. Of course the assessor collect information and elaborate on them in order to form the necessary knowledge progressively eliminating this uncertainty source. I rather concentrates on the second source of uncertainty.

The estimates of both monetary and non monetary values largely depend on judgements about set of quantities framed together under the light of the evaluation doctrine. Tversky and Kahneman (1974) showed that "people relies on a limited number of heuristic principles which reduce the complex tasks of assessing

probabilities and predicting values to a simpler judgemental operations. In general, these heuristics are quite useful, but sometimes they lead to severe and systematic errors" (Tverski, Kahneman, 1974, p. 1124). One heuristic employed to assess values is that of "adjustment and anchoring" (Tverski, Kahneman, 1974, pp. 1128). Often individual express their judgment starting from a quantity (suggested by the formulation of the problem or derived from a partial computation) and then adjust it in order estimate the value. Normally the adjustment is non sufficient.

In the legal trial evaluation three judgements are required from three distinct assessors, according to the distinction among the two parties and the Judge. Consider the simple case of the evaluation of a good in terms of market value by through the direct comparison. Each of the three assessors has the faculty of collecting her/his data and making the evaluation. The yardstick of the data analysis is fixed in terms of principles of data normality, even though this does not necessarily arise from the statistical pattern of the data collected (for example, the data "samples" may so small that it may impossible to study their distribution). Each assessor is thus committed to express her/his preliminary judgement about the normality of the data collected. In comparing the data bases of each of the three assessors one expects that the difference among them are *random* and *quite small*, as they should come from the same "normal" distribution. But if the three average values are different, the assessors have to establish: a) what is the source of the variance; b) if the variance is compatible with the assumption of normality; c) if the variance can be then admitted to the purposes of the evaluation process at stake. Especially the last point implies to require the assessor to express a specific judgement: provided the normality of the data, the difference may determine difference in the estimates which may not converge to compatible and coherent values. The analysis of anchoring effect could allow the assessor to exclude a potential source of error in this stage of the evaluation process. In the context of the anchoring effect analysis an anchor is an arbitrary value that the subject (the assessor, in our case) is caused to consider before making a numerical estimate (Jacowiz, Kahneman, 1995). I submit that there are at least four sources of anchoring in the case of data collecting aimed at the evaluation purposes:

- *beliefs due to past experience*, by definition the professional experience plays an important role in framing the understanding of a given evaluation problem; the knowledge progressively formed by systematic practice in a given working environment tends to endow the assessor with systems of beliefs about the operating of the market forces, the expectations of the agents, the technology in use and so on. The trends of the market prices of the good and services are also often observed in this context of *experience framed, tacit knowledge*. As a consequence, a specific effort is required to the assessor in order to avoid the collection of data which *necessarily* confirm her/his a priori knowledge;
- *errors in identifying the relationships between the characteristics of the good and its market value* the relationship between the characteristics of a good and its market price becomes more complex with the complexity of the good in itself; as a consequence, if the analysis does not capture appropriately the relationship between characteristics and market value, the data collected may be concentrated in

values intervals which do not reflect the *true* value of the good and which may strongly differ from the data set of the other assessors;

- *errors in the characterization of the good to be evaluated*, if the assessor fails in characterizing the good - e.g. she/he may omit some characteristics or badly express them – it will be impossible to form a data set coherent with the remaining two samples;
- *errors in the market analysis*, errors in the analysis of the market trends directly affect the validity of the data set.

The four sources mentioned may determine the emerging of systematic difference among the data sets collected by the assessor and negatively influence the possibility of correct convergence (or divergence) among the three judgements. Actually, the four causes can give rise to a dataset whose average values are not justified by the normality but rather may act as anchors originated by the “problem formulation”. The problem-solving approach to the evaluation process then suggests to measure the potential anchoring effect by the *Anchoring index* (AI) proposed by Janowitz and Kahneman (1995):

$$AI = \frac{M(H) - M(L)}{H - L} \quad (1)$$

where:

AI = anchoring index

M(H) = median of the data set with higher anchor

M(L) = median of the data set with lower anchor

H = higher anchor value

L = lower anchor value

This index cannot be calculated without an a priori knowledge of the anchors. Nevertheless, it makes clear that the larger is the difference $[M(H) - M(L)]$ the larger is the anchoring effect, whatever be the real anchors H and L. Thus the larger is the difference $[M(H) - M(L)]$, the more probable is that the datasets have been formed under the influence of one of the sources of errors mentioned and that, in turn, an anchoring effect is negatively influencing the evaluations comparisons aimed at supporting the legal trial. As the characteristics of the goods are at the basis of their similarity, a further possibility is to classify the datasets with respect to the difference $[M(H) - M(L)]$ and a similarity index (Martino, Musotti, 1990). Each of the three data sets can be thought of as an outcome of the individual formulation of the problem by each assessor. The idea is to consider the largest and the lowest medians of the datasets collected $[M(H) - M(L)]$.

The two dimensions (anchoring and similarity) give rise to four possible classes of data sets (Figure 1). The critical circumstance is that in which a high anchoring is associated with a low similarity.

The example suggests that the evaluation process should require a preliminary classification of the datasets according to the criteria proposed in the figure 1.

Figure 5. A classification of the datasets: anchoring and similarity.

Difference [M(H) – M(L)]	HIGH	II <i>Reject the samples</i>	III <i>Investigate the market</i>
	LOW	I <i>Use samples correcting for similarities</i>	IV <i>Use directly the samples</i>
		LOW	HIGH
SIMILARITY			

4. Conclusions

In the present paper I made an attempt to show as the logical structure of the evaluation process and the that of the problem-solving can be intertwined at least in some critical steps. While the this reflects the current nature of the evaluation process, it could also be useful in order to enhance the effectiveness and the validity of the evaluation process. Two example are given which are intended to this purpose. Further development could be achieved in the study of the similarity judgement and of the evaluation process in case of lack of market information as in some cases of complementary market value. One the main implication of the study is that the evaluation process can be thought as an institutional device aimed at promoting the economic activities. Actually, it is widely recognized that the institutions are rules of the game allowing the agents to economize on their cognitive resources and then coping with complex problems in a satisfying way (Simon, 1991; Etzioni, 1988). Vatn (2009) showed that a connection exists between the institutional context and value appraisal, a connection which stems out also from the nature of the rationality at stake in the evaluation process. Integrating the evaluation process along this direction emphasise its nature of institutional framework.

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