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A decision model for the sustainable protection of human rights in Italian Prison System

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Abstract

The work starts from an analysis of the critical problems of the prison system in Italy. It aims to develop a decision-making model to address the issue of sustainable protection of human rights in prisons. It shows how, using the Saaty AHP procedure, it is possible to have an analytical reasoning guideline for the understanding of the validity of the various alternative choices, in order to facilitate the situation of the prisoners and their reintegration into society.

Keywords: human rights, empowerment Italian prison system, complex social systems, mathematical models, utility, AHP procedure.

1. Introduction

This research stems from the observation of the change in social institutions, no longer viewed as closed systems but considered as dynamic and complex social systems (Morin 1974; Prigogine 1979, Luhmann 1990; Sciarra 2007).
The interest for the improvement of the penitentiary system stems from the time when the ECHR has warned Italy to non-adherence art. 3 of the Convention, setting to 28 May 2014, the end of the time allowed for the legalization of the situation in prisons.

In our research we examine the Italian Prison System with the *intent to provide sustainable alternatives for Human Rights, designed to guarantee the rehabilitation of penalty as empowerment* (Art.27 Italian Constitution, article 6 European Prison Rules) and to promote, through activities sponsored and organized, the acquisition of professional and transverse skills to the contribute of reintegration into society, relational and work in the territory of the detainee (art. 26 European Prison Rules), maintaining constant mental, relational and physical situation of the individual in detention, organizing life in prison in the manner as similar as possible to the positive aspects of life in a free society and encouraging co-operation with outside social services and, to the extent possible, the participation of civil society in the aspects of prison life (Article 5:07 European Prison Rules: Fundamental Principles).
The paper aims to provide solutions based on scientific procedures to support the decision-makers for a rational choice that increases the proximity to European standards and bring down the current critical situation of the Italian prison system. Insights into the debate on the prison situation and the need to provide for substantial improvements are in (Brossat 2002; Castaldo 2001; Corleone, Fugiotto 2012; Gallo, Ruggiero 1983; Garland 1999; Rovelli 2006; La Greca 1995).

2. Some critical aspects of the prison system in Italy

"The prison system is seen as a complex system composed of many interacting subsets according intertwined paths and non-linear and multidimensional dynamics and using communication as a form of self-reproduction" (Luhmann, 1990). Changing elements within the system, it receives new information and organize themselves creating new dynamics and relationships. The current system is a closed system (with a stable set) which contains a number of critical issues.
A first criticality is overcrowding. The prison population is growing exponentially: in little more than twenty appearances in the bars have more than doubled, rising from 25,804 (31 December 1990) to 66,487 (31 May 2012) in the year 2011. Admissions to prison for violation of Article 73 of the Fini - Giovanardi law (unlawful detention) are equal to 33 per cent. Adding to these drug addicts in prison for predatory crimes or petty crime, it exceeds 50 percent of inmates behind bars today (Terzo libro bianco edited by Antigone, CNCA, Drugs and Society Forum of Reason, with the accession of the Judiciary Democratic Union Rooms Penalty).
The second problem concerns the living conditions of detainees. Except for a few positive situations such as prisons Bollate, Rebbibia, Gorgona, Volterra (where relapse thanks to the work and alternative sentencing is below 20 per cent compared to 70 per cent of the average), the material conditions in which they live prisoners are bad, Italy is

not on the top of the charts in terms of respect for the rights of detainees. The inmates more than the available cells are about 20 000.
The third critical issues concerning the achievement of the institution's prison. Who has deviated in prison should gain an awareness of the damage done and acquire the tools that agents of socialization such as family, school, outside school, the network of friendships of his experience had not been provided, or had provided as wrong and acquired the right tools such as education, awareness, self-esteem, motivation and the ability to perform an activity not delinquent, return to society and mend the social contract with civil society that the action had deviant broken. And the Constitution itself (art. 27, paragraph 3) says that the penalties should be aimed at rehabilitation, but the re-education must be understood in the sense of empowerment to life in society according to the values and positive rules of coexistence.
The fourth criticism is the strong disconnect between the prison institution and civil society. The prisoner after the sentence was served out does not have a new channel where merge, the choice with the highest probability is to return to old habits with the very high risk of returning to crime. Recurrence according to statistics is a very high percentage in Italy, this figure is to demonstrate that the institution has failed to prison, showing that in addition to being an institution very expensive for the state is not even functional. One of the most delicate moments for the detainee consists precisely in the passage outside the prison, in the process of social reintegration, as it should be built since the early days of detention. So the intent is to improve the condition of imprisonment, encouraging and supporting the reintegration working "out" of the person detained or criminal enforcement outside. We start from the principle that the restriction of freedom related to the detention cannot and should not set a restriction on the cultural sphere and in particular, the possibility of accretion of knowledge and skills.

3. A decision model for individuate criteria and their weights for the evaluation of the prison system

The purpose of this case is to activate an analytical reasoning guideline for the understanding of the validity of the various alternative choices, to facilitate the situation of prisoners and their reinsertion into society. Moreover the aim is to identify the most effective strategies to improve and make practical and sustainable in the Italian prison system.
In order to compare the degree of functionality and utility of the alternatives that regulate and affect trend Prison regarded as "complex social system" (Luhmann, 1990) we use the Analytic Hierarchy Process (AHP) introduced by (Saaty, 1980) and applied and applied to decision-making in many papers (see e.g. Maturo, Ventre, 2009a, 2009b).

Let us recall (Knuth, 1973) that a *directed graph* or *digraph* is a pair G = (V, A), where V is the set of *vertices*, and A is a subset of V×V, called the set of *arcs*. The vertices will be indicated with Latin letters. A pair (u, v) of vertices belonging to A denotes an arc with initial vertex u and final vertex v; an n-tuple of vertices $(v_1, v_2, ...,v_n)$ denotes a *path* of length n-1, formed by the arcs (v_i, v_{i+1}), i = 1, 2, ..., n-1.

Using AHP the decision making problem is represented with a digraph G = (V, A), called *AHP-graph*, with the following five properties:

1. vertices are distributed in a given number n > 2 of levels, numbered from 1 to n;
2. there is only one vertex with level 1, called the *root*;
3. for every vertex v different from the root there is a path passing through v and having the root as initial vertex;
4. each vertex of level i < n is the initial vertex of at least one arc and there are no outgoing arcs from vertices of level n;
5. if an arc has the initial vertex of the level i then his final vertex has level i+1.

In this paper we assume n = 5. The vertex of level 1 is the *overall goal*, the vertices of level 2 are the *specific objectives*, in simpler notation, the *objectives*, the vertices of level 3 are the *sub-objectives*, the vertices of level 4 are the *criteria*, and finally the vertices of level 5 are the *alternatives* or *strategies* of the decision problem.

A decision maker or a committee assigns a score to each arc following the AHP procedure proposed in (Saaty, 1980, 2008). The score given to an arc (u, v) indicates the extent to which the vertex v satisfies the objective (resp. overall goal, sub-objective, criterion) denoted by u. Scores are non-negative real numbers and the sum of the scores of the outgoing arcs from one vertex must be equal to 1.

For every vertex v different from the overall goal, the score of the vertex v is the sum of the scores of all the paths that connect the overall goal with v.

Let $x_1, x_2, ...,x_p$ be the final vertices of the arcs leading out from a vertex v. If a decision maker, D, considers x_r to be preferred to (or is indifferent to) x_s, then he/she is requested to estimate the importance of x_r with respect to x_s using one of the following linguistic judgments: *indifference*, *weak preference*, *preference*, *strong preference*, *absolute preference*.

The linguistic values are expressed as numerical values following the Saaty fundamental scale: *indifference* = 1, *weak preference* = 3, *preference* = 5, *strong preference* = 7, *absolute preference* = 9. The scores 2, 4, 6, 8 are used for intermediate valuations.

If the object x_r has one of the above numbers assigned to it when compared with object x_s, then x_s has the reciprocal value when compared with x_r. A pairwise comparisons matrix $A = (a_{rs})$ with p rows and p columns is associated to the p-tuple $(x_1, x_2, ...,x_p)$, where a_{rs} is the number assigned to x_r when compared with x_s.

Then one calculates the principal eigenvalue λ_1 of the matrix A and, among the eigenvectors associated with λ_1, selects the one with all components $w_1, w_2, ..., w_p$ non-

negative and sum $w_1+w_2+ ...+w_p$ equal to 1. The real number w_r is the score given to the arc (v, x_r) by the AHP.

Before accepting definitely weights w_i, we must control the consistency of the judgements expressed by the decision-maker. In fact the evaluations of the decision maker D may be inconsistent, because there may be problems in the allocation of the values of matrix A in terms of the transitivity of preference relations between the elements of the set $\{x_1, x_2, ...,x_p\}$.

Saaty suggests checking the consistency by calculating the number

$$\mu = (\lambda_1-p)/(p-1).$$

If this number $\mu \leq 0.1$ then consistency is considered acceptable, otherwise the decision maker is asked to revise the judgments, or give some motivation which justifies the inconsistency.

In our specific research on the prison system we define the overall goal (GO) as:

"*Make functional and sustainable the protection of human rights in the prison*".

Moreover we assume the following three objectives:

O1 = Security; O2 = Empowerment; O3 = Sustainability.

The objectives are explained by the following sub-objectives:

S1 = Do prevention;
S2 = Openness to other institutions;
S3 = Social Security;
S4 = Encourage the reconstruction of social relations;
S5 = Facilitating return to work;
S6 = Economic Sustainability;
S7 = Environmental Sustainability;
S8 = Social Sustainability;
S9 = Awareness of negative values of criminal action..

Each of the objectives is explained by the previous sub-objectives. The sub-objectives S1-S2-S3 are especially relevant to O1; S4-S5-S6 to O2; S6, S7, S8 to O3.

An Interdisciplinary Committee of Experts (ICE) has expressed the opinions concerning the pairwise comparisons between objectives, those of pairwise comparisons between sub-objectives with respect to each objective, and, finally, between criteria with respect to each objective.

Using the Saaty method we obtained from these evaluations, in order, the following numerical matrices:

(1) the matrix of pairwise comparison between the objectives and the column vector W_O of the weights of the objectives;

(2) the 3 matrices of pairwise comparison among sub-objectives with respect to each objective and the matrix S with 9 rows and 3 columns where column j is the vector S_j of weights of the sub-objectives with respect to the objective O_j;

(3) the column vector W_S of the weights of the sub-objectives with respect to general objective (OG) calculated as the product matrix $W_S = S\ W_O$.

To make measurable the-sub-objectives, the following criteria are defined:

C1 = number of hours employed by the activities of the volunteers
C2 = frequency activities by inmates
C3 = number of annual events organized by the inmates and for the civil society
C4 = attendance at training courses addressed to internal staff
C5 = number of activities related to environmental issues
C6 = number of agreements open with external bodies and institutions
C7 = ability of externalization of the costs of activities

Executing the pairwise comparison of the criteria with respect to each sub-objective, by means of the procedure AHP we obtain:

(1) the 9 matrices of pairwise comparison among criteria with respect to each sub-objective and the matrix K with 7 rows and 9 columns where column j is the vector K_j of weights of the criteria with respect to the sub-objective S_j;

(2) the column vector W_K of the weights of the criteria with respect to general objective (OG) calculated as the product matrix $W_K = K\ W_S$.

4. Comparison of strategies for the improvement of the prison system

Let us consider the following alternatives (or strategies):

A1 = no change in the actual system;
A2 = decriminalization and alternative sentences to prison;
A3 = construction of new prisons;
A4 = increase internal activity;
A5 = participation projects and EU funding.

A group of experts on the prison systems (PSE), following a quantitative scale of scores or a qualitative scale of ratings, assigns to each pair (alternative A_i, criterion C_j) a score m_{ij} that represents the degree to which the alternative A_i satisfies the criterion C_j.

Let $M = (m_{ij})$ the matrix of scores. The product matrix $P = M\ W_K$ is the column vector of the global scores of the alternatives.

Usually, but not necessarily, the scores m_{ij} are obtained with the AHP procedure.

Executing the pairwise comparison of the alternatives with respect to each criterion, by means of the procedure AHP we obtain:

(1) the 7 matrices of pairwise comparison among alternatives with respect to each criterion and the matrix M with 5 rows and 7 columns where column j is the vector A_j of weights of the alternatives with respect to the criterion K_j;

(2) the column vector P of the global scores of the alternatives with respect to general objective (OG) calculated as the product matrix $P = M\ W_K$.

Some changes and insights may be needed if you want to interpret the scores as a utility. In this case can be necessary to introduce a suitable *utility function* u: R $\rightarrow$ R, with the following properties:

(1) u is strictly increasing;

(2) u(0) = 0, u(1) = 1;

(3) if x is a score then u(x) is the utility of x.

So, for every pair (alternative A_i, criterion K_j), if m_{ij} is the score of the pair, then $u(m_{ij})$ is the utility. Let $U = (u_{ij})$ the matrix of utilities. The matrix product $U_A = U\ W_K$ is the column vector of the utilities of alternatives with respect to the general objective.
Based only on the utility the best alternative is the one with highest utility.

5. Numerical results and interpretations

Applying the AHP pairwise comparison among the 3 specific objectives the ICE group has obtained the weight vector of the objectives:

$$W_O = (0.701489, 0.239906, 0.0586048). \quad (4.1)$$

We can see that the first objective (O1 = Security) is by far the most important; the second objective (O2 = Empowerment) has an appreciable importance, and the third (O3 = Sustainability) is little relevant.
Starting from matrices of pairwise comparison of the 9 sub-objectives with respect to each of the objectives, the following matrix, of weights of sub-objectives respect to the specific objectives, was obtained:

S = {{0.210545, 0.0188228, 0.375279}, {0.116142, 0.0103613, 0.0337127}, {0.086234, 0.037783, 0.0192451}, {0.158281, 0.230332, 0.0750579}, {0.141063, 0.275858, 0.123293}, {0.0181602, 0.0161078, 0.0106305}, {0.0193384, 0.0181384, 0.0375557}, {0.138008, 0.053289, 0.0890815}, {0.112228, 0.339308, 0.236144}}

where S is written in the form of arrays, as a set of rows, according to the symbolism of the Mathematica software.
The matrix product lines for columns $W_S = S\ W_O$ provides the weights of the sub-objectives in relation to the overall objective (OG):

$W_S = S\ W_O$ ={0.174204, 0.0859338, 0.0706844, 0.170689, 0.17236, 0.0172265, 0.0201181, 0.114816, 0.173968}.

Considering the matrices of pairwise comparison of the 7 criteria with respect to each of the 9 sub-objectives, we obtain the following matrix of the weights of criteria with respect to the sub-objectives:

K = {{0.0193747, 0.386979, 0.30797, 0.394857, 0.398621, 0.324729, 0.350582, 0.480537, 0.432027}, {0.120967, 0.140464, 0.326152, 0.307225, 0.296758, 0.0507793, 0.255167, 0.253751, 0.277414}, {0.438888, 0.194726, 0.111967, 0.159067, 0.156213, 0.267424, 0.140961, 0.133148, 0.138008}, {0.123086, 0.0510161, 0.134084, 0.0556341, 0.0421014, 0.092107, 0.106297, 0.0677873, 0.0765999}, {0.0419385, 0.0331615, 0.0599921, 0.0344155, 0.0543661, 0.0913312, 0.0839389, 0.0256042, 0.0437637}, {0.224516, 0.169263, 0.03461, 0.0337087, 0.0365445, 0.0582101, 0.0312976, 0.0217028, 0.0160938}, {0.0312298, 0.0243895, 0.0252258, 0.0150922, 0.0153963, 0.11542, 0.0317562, 0.0174693, 0.0160938}}.

The product matrix $W_K = K\ W_S$ provides weights of the criteria with respect to (GO):

$W_K = K\ W_S$ = {0.337482, 0.243191, 0.201919, 0.0768906, 0.0434562, 0.0750801, 0.0219818}.

We can see that the first 3 criteria, i.e. C1 = number of hours employed by the activities of the volunteers, C2 = frequency activities by inmates, C3 = number of annual events organized by the inmates and for the civil society, appear quite relevant in relation to others.

The PSE group, comparing with respect to each of the 7 criteria, the 5 alternatives considered in the work, provided the following matrix of the scores of the alternatives with respect to criteria:

M = {{0.0913342, 0.0660496, 0.0686204, 0.0359509, 0.0781356, 0.119082, 0.0546436}, {0.114649, 0.182208, 0.161627, 0.146451, 0.224403, 0.573814, 0.0783393}, {0.0316899, 0.0325174, 0.0467189, 0.0470879, 0.034023, 0.0504581, 0.0320414}, {0.493732, 0.321783, 0.395071, 0.44181, 0.390304, 0.41451, 0.274705}, {0.268595, 0.397442, 0.327963, 0.328699, 0.273135, 0.273135, 0.273135}}.

The product matrix $P = M\ W_K$ provides the vector of the scores of the alternatives with respect to the overall objective. It is:

$$P = M\ W_K = \{0.0770437, 0.181455, 0.037628, 0.412745, 0.317176\}. \quad (4.2)$$

Are therefore of little importance the alternatives :

A1 = no change in the actual system; A3 = construction of new prisons.

Instead seem very important alternatives:

A4 = increased internal activity; A5 = participation projects and EU funding.

Finally, the alternative:

A2 = decriminalization and alternative sentences to prison,

despite being much preferable to the A1 and A3 appears to be much less important of A4 and A5.

The alternative A4, in particular, seems to be the most effective for the achievement of the general objective.

The result seems to be in line with the proposals in the literature to increase recreation in prison (eg. Minoia 2006).

6. Conclusions and perspective of research

In general we must take account of policy guidelines and constraints, for which the ranking of alternatives may be subject to appropriate amendments.
Furthermore, in the case of qualitative judgments, scores are represented by fuzzy numbers and we have to compare fuzzy utilities.
In this paper our point of view is choose an alternative that maximizes a linear combination of the utility of the three objectives O1, O2, O3, where the coefficients of the linear combinations are the weight of the objectives.
A different point of view is to establish a threshold value for each criterion / objective / sub-objective and consider as valid alternatives all and only the ones that exceed the threshold.
By the time the research was only methodological, designed to find theoretical models that can evaluate the effectiveness of possible alternatives. The next step will be to check the results found on the field, doing interviews and observations to prisoners and operators, in prisons, starting with small samples to fit the theoretical model.

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