CONJOINT ANALYSIS BASED METHODOLOGIES FOR THE EX-ANTE EVALUATION OF REGULATORY IMPACT[1]

Carlo Lauro[*], Germana Scepi[*] and Giuseppe Giordano[**]

[*] *Dipartimento di Matematica e Statistica, University of Naples, Federico II, 80126 – Napoli, Italy*

[**] *University of Salerno, Fisciano (SA), Italy*

Abstract

The activity of evaluation of Public Intervention, or Regulation activity, is actually considered from public administration as a strategic element of political and administrative action. This gives rise to the development of several methods for the ex-ante evaluation of the effects of normative regulations, both on citizens and enterprise activities and on organization and operation of Public Administrations. However, the proposed methodologies not taking into account the complexity and the multidimensionality of the phenomenon, often offer a partial and qualitative point of view. Here we propose several statistical methods based on the classical Conjoint Analysis model. Our aim is to measure and evaluate the sustainability and the expected benefits of regulation respect to different designed alternatives. Mainly, we propose to apply a strategy that - integrating the Conjoint Analysis with graphical factorial representations - allows getting several purposes such as to synthesize individual judgments and to underline the different evaluation preference structures expressed by several groups of judges. The developed methodologies will be applied on real data.

Keywords: Conjoint Analysis, RIA, Multidimensional Data Analysis.

1. INTRODUCTION: FRAMEWORK AND AIM

The evaluation of Public Intervention or Regulation activity (study of quality and efficiency of the intervention in terms of gap between the performance and the aim) is actually considered from public administration as a strategic element of political and administrative action.

---

[1] *This paper is supported by a PRIN project 2006 (Multivariate statistical models for the ex-ante and the ex-post analysis of regulatory impact) coordinated by Carlo Lauro.*

The Italian law *28 November 2005 n. 246 defines the Regulatory Impact Analysis (RIA) as "the preventive appraisal of the effects of normative regulations, both on citizens and enterprise activities and on organization and operation of Public Administrations"* (P.A.). *The same law states that "the Verification of the Impact of Regulation (VIR) consists in the appraisal of the attainment of the purposes and in the evaluation of the costs and of the effects produced by normative actions"*. These two tools appear extremely important and innovative, since they concur ex ante to set up the regulation actions on rational basis and to verify, ex post, their effectiveness and efficiency.

However, the applications of RIA (and VIR) have been rather limited because the developed methodologies allow mainly to evaluate economical and legal aspects, while, for example, the "satisfaction" it is not considered at all. Furthermore, these approaches don't consider the complexity of the phenomenon "impact" characterized by several dimensions such as: *the Utility/Social Welfare, the Effectiveness, the Efficiency, the Sustainability, and the Pertinence.* The *Utility/Social Welfare* checks the incidence of the intervention on the satisfaction of needs; the *Effectiveness* compares realization indicators with indicators related to their goals; the *Efficiency* checks financial resources, structural resources and human resources necessary to the achievement of goals as well as compares the obtained results with the employed resources; the *Pertinence* checks the adequacy of the specific aims and the way to realize them with respect both to the real status and to the foreseeable changes of needs. The *Sustainability* analyses the capacity of preserving, during time, the obtained results.

All these dimensions should be evaluated and integrated for obtaining a real evaluation of the impact of a regulation. It becomes so necessary to supply the P.A. with statistical methods able to consider both the multidimensionality and the complexity of the phenomenon. These methodologies have also to take into account variables of different nature and not manifest or directly observable.

Our leading hypothesis is that the ex-ante assessment of the effects of normative regulations and the ex-post verification of its impact could be pursued in the framework of a statistical design. The statistical framework allows to define a complete strategy of research.

Each step of the proposed strategy will focus on a different issue of the complex activity of evaluation. For instance, the study of the effects are faced in the scope of Design of Experiment; the data collection, the optimization and the simulation phase are settled according to a Conjoint Analysis experiment; the final synthesis and the graphical representations are pursued in the framework of Multidimensional Data Analysis.

The use of a statistical approach based on the Conjoint Analysis model (C.A.; Green, Srinivasan, 1978) seems particularly appropriate since, starting from the definition of several stimuli, it allows decomposing the different evaluation dimensions. Moreover, it enables to estimate the average utility coefficients of different factor-levels and to define groups of judges on the basis of their response similarity. In particular, we apply a strategy, called *Factorial Conjoint Analysis* (FCA; Lauro, Giordano, Verde; 1998, Giordano, Lauro, Scepi, in press), integrating the C.A. with graphical factorial representations (see par.2). This approach allows reading the results of C.A. directly on graphical maps by means of several well known interpretative rules.

The starting point of the proposed approach consists in collecting different opinions of judges, for examples citizen or experts, by means of structured or semi-structured questionnaires administered with focus-group techniques or through sampling surveys.

In particular, different regulatory stimuli, described by several attribute variables (core indicators), are submitted to judges for detecting their opinions on the basis of different possible criteria, such as sustainability, efficiency, expected benefits and so on. We propose to evaluate among the proposed stimuli also the "counterfactual hypothesis", i.e. the *status quo.* This makes it possible to quantify the net impact of a new regulation.

The data collection is a critical step in the C.A. based methodologies because the most common procedure, the so called *full profile* method, forces to deal with a small number of categorical variables (and with a small number of categories). This scheme could be too rigid and several relevant indicators can be neglected, in particular when we deal with a phenomenon difficult to define and to measure such as the regulatory impact. For these considerations, we suggest the use of a fractional factorial design as a screening design.

Moreover, given the high idiosyncratic nature of the experiment, it could be interesting to introduce in the classical C.A. scheme some external information (par. 3). This information can be either seen as a priori information on the characteristics of judges, or as variables not previously involved in the determination of the stimuli and affecting the choice of judges. In this paper we suggest a strategy for taking into account these external information.

One of the key issue of a regulatory analysis is that different criteria, such as efficacy, efficiency, should be taken simultaneously into account when evaluating the impact of a regulation. Therefore, we suggest to analyze simultaneously different responses obtained by ranking (rating) several alternatives according to different criteria. The aim is defining the ideal regulation by a synthesis of the estimated utilities associated to the different criteria. The original methodology is the Multicriteria Conjoint Analysis proposed in Lauro Giordano, Romano (2007), and in Giordano, Lauro, Scepi (in press). We highlight how the application of this methodology to the Regulatory Impact Analysis (par. 4) seems to be a very promising tool.

For evaluating the performance of the different proposed methodologies, we show some examples (par. 5) based on survey data on the Evaluation of possible Alternative Italian University Systems.

2. FACTORIAL CONJOINT ANALYSIS FOR RIA

The impact of regulation can be designed and ex-ante evaluated by means of a statistical approach. At this aim, we consider a statistical method introduced with the aim of studying and showing the preference structure of consumers: the Conjoint Analysis method (Green, Srinivasan, 1978). This method is based on theoretical models developed in interdisciplinary contexts. The principal object of C.A. is the estimation of the importance of each characteristic describing a product/service for each single consumer. In this method, the preferences of consumers, expressed in rankings or ratings, are considered as dependent variables in a multivariate regression model where the explicative variables are the discrete levels of different factors characterizing the product/service of interest. By estimating the partial utilities for each consumer it is possible to define a model for each single judge, to calculate the importance for each factor and, to define groups of homogenous consumers having similar utility models.

Conjoint Analysis seems to be useful for detecting the sustainability and the expected benefits of a regulation, in accordance with a design of different regulation stimuli, because it allows both to decompose a complex phenomenon, taking into account the different dimensions, and to measure different utilities associated to the features of these dimensions.

Therefore, in the Conjoint Analysis viewpoint, we consider the following main matrices:

– the design matrix **X** (in Fig. 1)**,** where the stimuli (rows) are the set of q regulatory options (scenarios) described by different levels (in columns) of p factors, such as organizational, financial, economic and social aspects and so on.

The total number of levels is the sum of the columns $K = \sum_{i=1}^{p} k_i$.

	x_1	…	x_{k1}	x_2	…	x_{k2}	x_p	…	x_{kp}
S_1	1		0	0		1	1		0
S_2	0		1	1		0	1		0
	⋮	…	⋮	⋮	…	⋮	⋮	…	⋮
S_q	0		1	0		1	1		0

Fig. 1: The experimental design matrix.

– the matrix (in Fig.2) **Y** ($q \times J$) where we collect the opinions of *J* judges (here group of experts, opinion leaders, citizens, or users directly affected by the intervention of the Public Administration) with respect to the different *q* regulatory options. The judges (in columns) express their opinions ranking/rating the proposed stimuli (in rows) with respect to each different criterion, such as the expected benefits, the expected public utility, indirect net benefits, and so on.

	G_1	G_2		G_j		G_J
S_1	1	3		q		q-1
S_2	q	2	⋮	5	⋮	2
	…	…		…		…
S_q	3	q		2		1

Fig. 2: The response matrix.

The results of the different C.A are retained in the matrix **B** holding the estimated utilities for the *j* judges and each level k_i of the core dimensions.

These coefficient matrices are usually derived by the OLS solution in the metric case. For enriching the traditional results of this technique, here we adopt the Multidimensional Approach to Conjoint Analysis originally proposed by Lauro, Verde, Giordano (1998) and namely the Factorial Conjoint Analysis (FCA) in Giordano, Lauro, Scepi (in press). This approach allows both to represent and to read directly on a factorial plane the relationships among the judges' opinions and the characteristics of the different proposed regulations.

The classical C.A. model can be written as a multiple multivariate regression model:

$$\mathbf{Y} = \mathbf{XB} + \mathbf{E} \tag{1}$$

where **E** is the $(q \times J)$ matrix of error terms for the set of J multiple regressions.

Indeed, the simultaneous estimation of the elements of the coefficient matrix **B** yields the same results as a set of J separate multiple regressions, since the relations within the multiple responses are not involved in the least squares estimation method. If we admit the possibility that the regression coefficient matrix is rank deficient, there are linear restrictions on the matrix **B**. Therefore, we consider the generalized inverse of $(\mathbf{X}'\mathbf{X})$.

The FCA consists in a Principal Component Analysis of the matrix **XB** (in 1):

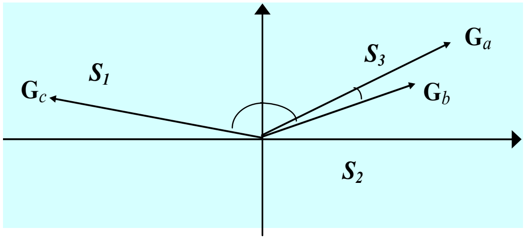
$$\mathbf{XB} = \mathbf{X}(\mathbf{X}'\mathbf{X})^{-}\mathbf{X}'\mathbf{Y} \tag{2}$$

In this way, the individual part-worth coefficients will be aggregated by means of a suitable weighting system (the principal component) reflecting the judges' heterogeneity. The coefficients in **B** take on different meaning according to the evaluation criterion of the different sets of regulatory options.

The factorial approach to Conjoint Analysis allows to represent on a two dimensional sub-space the relationships among the judges, the attribute-levels and a set of regulatory stimuli. Some interpretative rules will be applied for interpreting the FCA results on the perceptive maps (factorial planes):

a) each axis is a synthesis of the judge evaluations respect to the different normative options and it describes the aggregated utility attributed by a homogeneous group of judges to the levels in **X**. The first axis represents the maximal agreement pattern inter-judges. The successive axes allow to discover further pattern of opinions;
b) each level shows an utility coefficient. The factorial map shows the overall utility synthesized by the first two components;
c) normative options near each other, in the graphical representation, correspond to similar overall utility;
d) judges (citizens or experts) with similar opinions are represented as vectors laying in the same direction on the map (Fig. 3).

The main results of the factorial approach consist in: *i)* the possibility of synthesizing the individual judgments reconstructed directly by the utility model on the principal axes; *ii)* the power of furnishing an optimal synthesis of such judgments according to the perceived benefit; *iii)* the definition of two-dimensional graphics for the study of the existing relationships among normative options, judgments and descriptive levels (core indicators), with the further possibility to underline the different evaluation structures expressed by several groups of judges.



$\mathbf{G}_a$ and $\mathbf{G}_b$ expressed similar preference with respect to the regulatory options $\mathbf{S_2}$ and $\mathbf{S_3}$

Fig. 3: An example of perceptive maps.

The results of FCA can be improved by considering the *status quo* among the design stimuli in the matrix **X**.

The *status quo,* or counterfactual hypothesis, or zero option, is the hypothesis of absence of Intervention by the Public Administration. Its inclusion in the design matrix allows us to summarize the current context in a set of levels and to describe it in terms of scenario. Furthermore, the reconstruction of a scenario without intervention implies that judges evaluate the net impact of regulations or the net benefit. Therefore, the surplus of beneficiaries is seen in relative terms compared to the satisfaction /welfare of the counterfactual scenario. Obviously, it is necessary to *a priori* quantify costs and benefits related to the *status quo* scenario. The graphic representation of the *status quo* on the map allows to understand the utility assigned to a new regulation with respect to the current system.

3. DIFFERENT EXTERNAL INFORMATION IN FCA FOR RIA

In the evaluation of complex stimuli, such as a regulation option, it can be important to consider the possibility of having several external information on judges or/and on the stimuli.

3.1 INFORMATION ON JUDGES

When we have socio-demographic information on judges, the analysis can be enriched by considering them, directly, in the multivariate regression model (1). In particular, Giordano and Scepi (1999) suggest to consider the set of a-priori information on judges as external factors and the attribute-level describing the different stimuli as internal factors. Therefore, it is possible to introduce a new data matrix $\mathbf{W}(H \times J)$, where the H rows hold the socio-demographical characteristics of the *J* judges expanded in dummy coded row-variables.

Therefore, the two data matrices, **X** and **W**, can be regarded as two different sets of explicative variables in two separated multiple regression models. The first one is the model (1) above defined and the other one is defined by considering the respondents as statistical units in the model:

$$\mathbf{Y}' = \mathbf{W}'\mathbf{D}+\mathbf{F} \tag{3}$$

where **D** is the $H \times q$ matrix of coefficients and **F** is the $J \times q$ matrix of error terms.

The coefficients in ***D*** can be analysed as in the same way of coefficients in **B** and interpreted as the effect of socio-demographical variables on the importance perceived on the regulatory scenarios

The interest is in showing the relationships between the judges' characteristics and the normative features. Therefore a matrix $\Theta(H \times K)$, showing the relationship between the two sets of explicative factors (the levels of characteristics describing the scenarios and the modalities of the socio-demographical variables), is defined as follows:

$$\Theta = (\mathbf{W}\mathbf{W}')^{-}\mathbf{W}\mathbf{Y}'\mathbf{X}\,(\mathbf{X}'\mathbf{X})^{-} \tag{4}$$

For obtaining a graphical simultaneously representation and for describing the characteristics of judges with similar opinions respect to the different normative options, a Singular Value Decomposition (SVD) of Θ, with respect to two different metrics (Gower and Hand, 1996), has been proposed.

3. 2 INFORMATION ON STIMULI

In RIA, we deal with a complex and multidimensional problem, and we are not always sure about the descriptions of the different options, using a small number of variables. For example, Balbi et al. (2009) suggest to integrate the model of FCA with textual information achieved by answers to an open-ended question. Here we propose to use quantitative information on stimuli as external information. Information can be variables, such as sustainability, economical effort, social impact, highly correlated with experimental factors, affecting the choice, not previously involved in the determination of the factorial components, but very useful for better understanding the underlying phenomenon.

The External information on the Scenarios can be used to show constrained solutions on the factorial map (i.e. technological, economical or sustainability frontiers). At this aim, we propose to use the Response Surface Methodology (RSM, Box and Wilson, 1951) as a further graphical resource to analyse and interpret the results of the Factorial Conjoint Analysis (Giordano, 2006).

In the framework of design of experiments the use of the Response Surface

Methodology allows to analyse the relationships between the response variable and a set of input factors. The analysis consists in successive steps of experimentation, modelling, data analysis and optimization. The aim is to obtain an accurate approximation of the response surface and to identify an optimum design region.

The typical graphical output is the three dimensional representation of the surface and the Contour Plot. A contour plot is a graphical technique for representing a three dimensional surface by plotting constant slices, called contours, on a two dimensional format. Given a value for the response, lines are drawn for connecting the value of the input variables where the value of response variable occurs. These lines are the iso-response values.

Here we propose to consider as initial dataset, the coordinates of the Factorial Conjoint Analysis and as the response variables, one of the external quantitative variables.

Therefore, the basic idea consists in overlapping the representation of the conjoint factorial plan with a response surface derived from our peculiar auxiliary "response variable". We call this kind of graphical representation *Response Surface Factorial Conjoint Map.*

The analysis can be useful synthesized in the following scheme (Fig. 4), where the principal plane is obtained by the SVD of the utility matrix **B** and the control variable is the external information on the stimuli collected in the matrices **Z**:

In RIA, the contour plot can be imagined obtained by an external information, for example the cost of different regulations as in Fig. 5.

We can jointly read the position of the different stimuli on the map and understand the different cost evaluation. In the section 5, we present an application of the Response Factorial Conjoint Surface on real data.

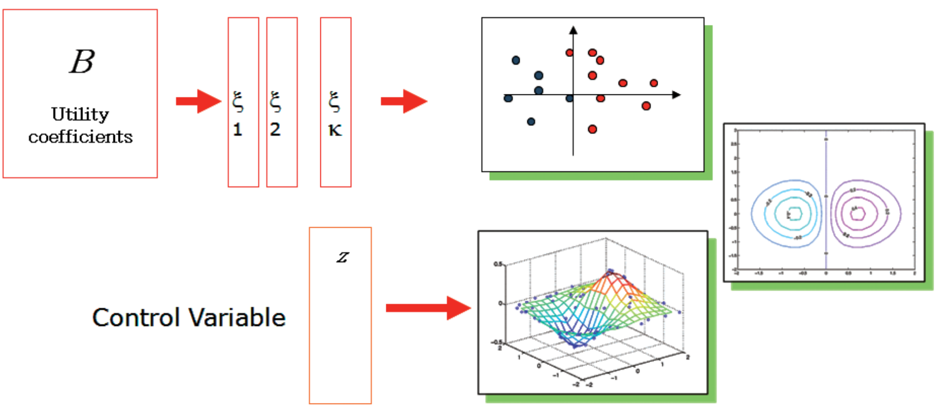


Fig. 4: The Response Factorial Conjoint Surface.

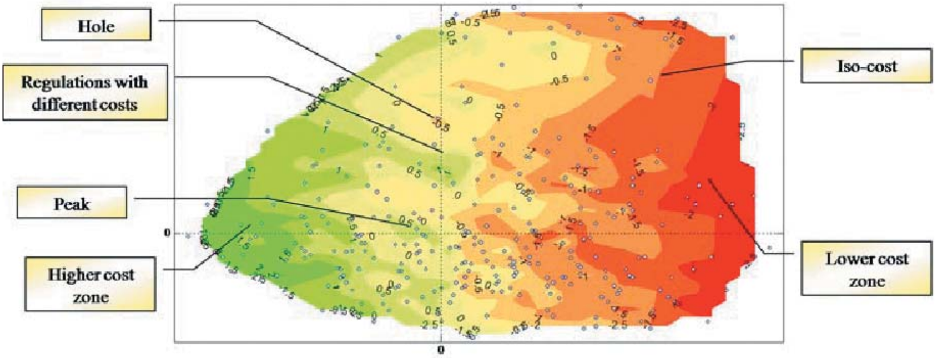
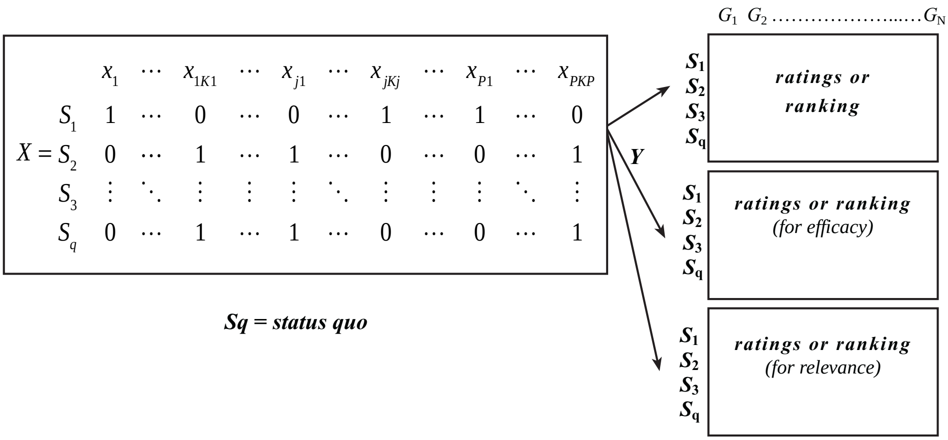


Fig. 5: An example of contour plot in RIA.

4. THE MULTICRITERIA FCA FOR RIA

In section 2 we proposed a strategy for evaluating the judges' opinions on several regulation options by considering one criterion of evaluation at a time. Here we want analyze simultaneously responses obtained by ranking (rating) several alternatives according to different criteria (such as efficacy, efficiency, relevance, an so on). The data structure is the following: we have one design matrix and as many response matrices as the criteria are. We can have different socio-demographic information on judges too.



If we extend the metric model of Conjoint Analysis (1), we obtain R coefficient matrices $\mathbf{B}_r$ $(r = 1\ldots R)$, where R is the number of criteria considered. The main problem consists in obtaining a synthesis of the estimated utilities associated to the different criteria. We propose to apply the Multicriteria Conjoint Analysis proposed in Lauro Giordano, Romano, (2007) and in Giordano, Lauro, Scepi (in press).

The Multi Criteria Factorial Conjoint Analysis (MCFCA) deals with a peculiar data structure were the design matrix is the same in different occasions while the response matrix changes. The MCFCA is a non symmetrical approach to the Multiple Factorial Analysis proposed by Escofier and Pagés in 1990.

Therefore we apply the Multiple Factorial Analysis to the coefficient matrices $\mathbf{B}_r$ and (according to equation 2) interpret it in the frame of a non-symmetrical data analysis. In particular, we carry out R PCA's, one for each separated criterion, and the first eigenvalue is retrieved. So we normalize each $\mathbf{B}_r$ and juxtapose them in order to obtain a unique matrix. A final global PCA is performed on this matrix. In this way a synthesis of the coefficients related to all criteria is achieved.

On this common plan, we can compare the different criteria and we can project the judges for analyzing their differences and similarities with respect to the different criteria. The relationships among the different criteria and between the criteria and the global solution can be analyzed by computing the partial inertia of each analysis for each dimension of the global analysis. In this way, we are able to understand the importance of each criterion in the definition of the global solution and we can define the ideal regulation by selecting the levels with the larger coordinates on the global plan.

5. AN APPLICATION ON THE POLICY EVALUATION OF THE ITALIAN UNIVERSITY SYSTEM

The survey aims to know the opinions of experts on several possible alternatives of the Italian university systems. A set of 22 judges (Opinion Leaders) has been interviewed on the policy evaluation with respect to three different traits (Fig. 6):

The different alternatives are designed by considering the following characteristics:

1) Management of the university system (Public or Private)
2) Teacher recruitment (Entrance Examination or Employment Contract)
3) Formative path (Standardized or Autonomous)
4) Formative target (Cultural or Professional
5) Legal value of the degree (Yes or No)

International Efficiency

It is the ability of the athenaeums to realize a trial formative able to satisfy the expectations of the students in terms of management and organization of the studies, the teachers quality, the interest and the flexibility of the studies.

External Efficiency

It is the ability of the athenaeums to realize products that have raised probability of success in the world of the job and sensitive impact on the society.

Competitiveness

Competitiveness among the athenaeums, that is expression of the organizational autonomy and the ability of the same to attract students and resources.

Fig. 6: Three criteria of evaluation.

The final experimental design have 8 different University System Scenarios (see Tab. 1).

It is asked, to each judge, to rate the 8 scenarios according to his/her own opinion on a selected criterion, e.g. internal efficiency. The more efficient is the system, the higher is the rate.

Tab. 1: The experimental design.

Scenario	Management of the university system	Typology of teacher recruitment	Formative Path	Formative Target	Legal value of the certificate
A	Public Management	Entrance Examination	Standardized Path	Personal culture	Legal value
B	Public Management	Entrance Examination	Autonomous Path	Personal culture	No Legal value
C	Private Management	Entrance Examination	Standardized Path	Professional	NoLegal value
D	Private Management	Employment Contract	Autonomous Path	Personal culture	No Legal value
E	Public Management	Employment Contract	Standardized Path	Professionale	Legal value
F	Private Management	Entrance Examination	Autonomous Path	Professional	Legal value
G	Public Management	Employment Contract	Autonomous Path	Professional	Legal value
H	Private Management	Employment Contract	Standardized Path	Personal culture	Legal value

We include in the design the “status quo hypothesis” as one of the possible alternatives (scenario A).

The first interesting result is the possibility to have for each judge an individual model which identifies the amount of preference respect to each trait. For example, for the *judge 16* we have:

	Management of the university system		**Typology of teacher recruitment**		**Formative Path**		**Formative Target**		**Legal value of the certificate**	
	Pub Management	**Private Management**	**Examination**	**Employment contract**	**STDP**	**AUTP**	**Personal Culture**	**Professional**	**Leg Val**	**No Leg**
International Efficiency	**0,00**	**-1,50**	**0,00**	**-1,50**	**0,00**	**-1,00**	**0,00**	**-2,00**	**0,00**	**-3,00**
External Efficiency	**0,00**	**-0,50**	**0,00**	**-1,50**	**0,00**	**-1,50**	**0,00**	**-4,00**	**0,00**	**0,50**
Competitiveness	**0,00**	**-0,50**	**0,00**	**3,00**	**0,00**	**3,00**	**0,00**	**0,50**	**0,00**	**1,50**

We observe that the part-worth coefficients have been identified by setting to 0 the levels of the counterfactual hypothesis. Therefore the estimates give immediate evidence of the impact worth. If the part-worth coefficients are negative, then the counter-factual should not be improved by changing its levels. For instance, for this judge, according to the Internal Efficiency criterion, the status quo correspondes to the ideal scenery (all alternative levels are negatively valued). The External Efficiency could be improved by changing the legal value of the certificate, whereas many more changes should be done in order to improve Competitiveness. Similar considerations arise from the utility function of the other respondents.

To see a whole pattern of their behaviors, we show the Factorial Conjoint Analysis map (Fig. 7) which allows to analyze the effect of any changes from the Status Quo, for each respondent. We may build three different maps: one for each criterion; here we focus on the *Internal Efficiency*. The vector-levels pointing to the right are related to the status quo scenarios.

The Opinion Leaders (showed by their first name) lying on the same direction do agree with the status quo, on the opposite side there are the experts that agree to make some changes.

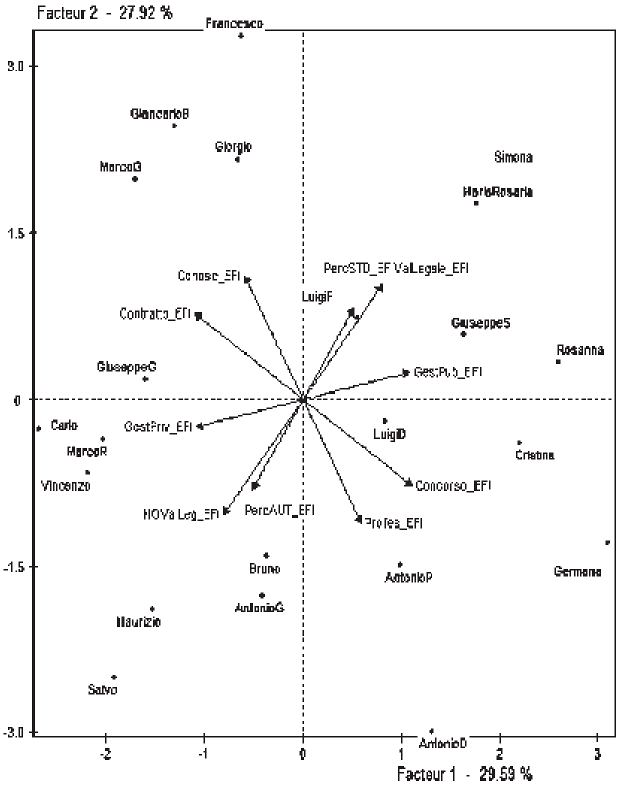


Fig. 7: FCA map of the Internal Efficacy criterion.

The set of respondents does not show an homogeneous pattern of preference. Indeed, different sets of judges appear to cluster together on the factorial plan. For each group we may define an ideal policy (scenarios).

However, the final choice should take into account all criteria. For instance, we represent the effect of the Competitiveness Criterion as a function of the Internal Efficiency. That is, the first two factorial axes of the FCA derived from the Competitiveness Criterion are used to form a grid of values expressed as a function of the axes derived from the Internal Efficiency FCA.

This method allow to build the map in Fig. 8 where surface contours express different levels of the Competitiveness values for each scenery. It appears that the surface increases along with the first factorial axis of the Internal Efficiency. Thus, on average, the policy A (the counterfactual hypothesis) has been evaluated as highly competitive from the same judges that have assigned it with high internal efficacy.

Fig. 8: Competitiveness Criterion ***(moving from the left to the right we may find the most competitive Scenarios).***

Finally, a global analysis is performed by means of the three-way analysis, looking for the best compromise of all criteria.

For sake of parsimony, we show the Multiple Factorial Analysis representation (Fig. 9) and the loadings (Tab. 2) of each criterion on the first three axes (that is the correlations between the individual axes and the axes of the global analysis).

Tab. 2: The importance of each criterion on the Compromise.

	F1	**F2**	**F3**
Internal EF	**40,283**	**20,892**	**47,660**
External EF	**33,749**	**32,340**	**23,006**
Competitiveness	**25,968**	**46,768**	**29,334**

It appears that, internal and external efficacy are correlated clearly, while Competitiveness is well represented on the second factorial axis. As to say, the Efficacies could be seen the leading criterion but, for a given level of efficacy, the Competitiveness seems to discriminate the different policies.

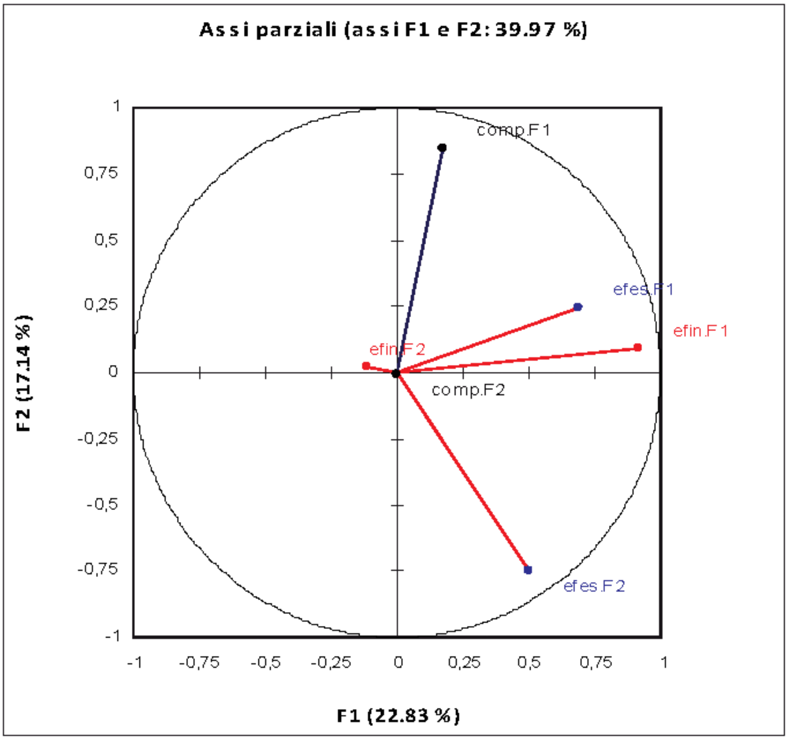


Fig. 9: The compromise plane.

REFERENCES

BALBI S., SCEPI G., INFANTE G. (2009), The role of textual data in a statistical approach for the evaluation of the regulatory impact, in *Electronic Proceedings of NTTS'09 Conference*, Lussemburgo, Eurostat eds.

BOX G.E.P. and WILSON K.G. (1951), On the experimental attainment of optimum conditions (with discussion).

ESCOFIER, B., PAGÉS, J. (1990), Multiple factor analysis. *Computational Statistics and Data Analysis*,18, 121-140.

GIORDANO G. (2006), "A New Dimension in the Factorial Techniques: the Response Surface", *Statistica Applicata - Italian Journal of Applied Statistics*, Vol. 18, n.2, 361-375

GIORDANO G., LAURO N.C., SCEPI G. (2010), Factorial Conjoint Analysis based Methodologies, accettato per la pubblicazione su *Classification and Multivariate Analysis for Complex Data Structures"* Springer series on "Studies in Classification, Data Analysis, and Knowledge Organization" (B. Fichet, D. Piccolo, R. Verde, M. Vichi eds.).

GIORDANO G., SCEPI G. (1999), Different Informative Structures for Quality Design, *Journal of Italian Statistical Society*, 8, 2-3, 139-149.

GOWER J.C., HAND DJ. (1996), *Biplots*, Chapman & Hall.

GREEN P.E., SRINIVASAN V. (1978), Conjoint Analysis in consumer research: issues and outlook, *The Journal of Consumer Research*, 103-123.

GREEN P.E., SRINIVASAN V. (1990), Conjoint Analysis in marketing: New Developments with Implication for Research and Practice, *Journal of Marketing*, 25, 3–19

LAURO N.C., GIORDANO G. and VERDE R. (1998), A Multidimensional Approach Conjoint Analysis, *Applied Stochasttic Model and Data Analysia,* 14, John Wiley &S. 265-274.

LAURO N.C., ROMANO E. and GIORDANO G., (2007), Clustering model based representation of symbolic objects, *Special Topics Contributed Paper of the 56th Session of the ISI International Statistical Institute*, 22-29 August, Lisbona

ROMANO E., GIORDANO G. and LAURO N. C.(2006), An inter-models distance for clustering utility functions, *Statistica Applicata*, 17, 2. RCE Muldimedia.

SCEPI G., LAURO N.C. and GIORDANO G. (2008), The ex-ante evaluation of regulatory impact by Conjoint Analysis: some developments in *Book of Short Abstracts of the 7th International Conference on Social Science Methodology RC33* – Logic and Methodology in Sociology, Jovene Editore

DIFFERENTI APPROCCI BASATI SULLA CONJOINT ANALYSIS PER LA VALUTAZIONE EX-ANTE DELL'IMPATTO DI UNA REGOLAMENTAZIONE

Riassunto

L'attività di Valutazione degli interventi pubblici e, più in generale, della Regolamentazione è attualmente riconosciuta dalle amministrazioni pubbliche quale elemento strategico dell'azione politica e amministrativa. Nel contesto normativo nazionale un primo tentativo di recepire la nuova cultura della valutazione delle politiche pubbliche si è concretizzato nell'imposizione dell'Analisi di Impatto della Regolamentazione (AIR). L'AIR impone il ricorso ad una serie di metodi per la valutazione ex-ante dei provvedimenti regolativi che possano avere un'incidenza significativa sulle condizioni di vita dei cittadini e sull'attività delle imprese. Le metodologie proposte in questo contesto si limitano tuttavia ad aspetti di tipo economico-giuridico e offrono una visione parziale che non riesce a cogliere la complessità e la multidimensionalità del fenomeno oggetto di analisi. In quest'ottica, nel presente lavoro si propongono una serie di metodologie statistiche basate sul modello di Conjoint Analysis. Tale approccio sembra, in questo contesto, particolarmente appropriato in quanto, in relazione a diversi scenari di regolamentazione, consente di decomporre le dimensioni della valutazione e di stimare i coefficienti medi di utilità delle diverse modalità delle variabili caratterizzanti i diversi scenari di regolamentazione. Le differenti metodologie presentate nel lavoro vengono applicate a dati provenienti dalla somministrazione, ad un gruppo di esperti, di un questionario relativo alla valutazione di sistemi universitari alternativi.