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SUMMARY

The abstracts are grouped by session, and randomly ordered within each session.

Plenary Session

AMMI Model and its Applications

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The Additive Main effects and Multiplicative Interaction (AMMI) model is a combination of two simple models, namely AOV (Analysis of Variance) and the PCA (Principal Component Analysis).

AMMI analysis has been most widely used in experimental studies to understand the behavioral patterns of genotypes in varied environments.

However, the present study aims to extend the scope beyond genetic models to understand similar models based on satisfaction levels of students under different environments.

Keywords: Additive Main effects and Multiplicative Interaction Model, Students Satisfaction

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Statistical Information and Social Innovation

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In the last few years, ISTAT has made great efforts to renew and adapt itself to the changes of the new National and International context in the technological, communicative and informative field in order to pursue its mission "to serve society through the production and communication of statistical information, analysis and forecasts of high quality in order to develop a deep knowledge of the Country and to facilitate decision-making processes of all the stakeholders of society". The innovation in the field of statistics has been led by the need to meet a growing demand of information and, at the same time, to reduce the burden on respondents in the face of/because of limited financial resources. In this context, the use of information coming from administrative sources and sample surveys, through the ICT development, made it possible to greatly reduce the cost of statistics production. Moreover, the introduction and use of Internet, the creation of new products and the new method of combining and using information, have become crucial in the modernization of information systems. In this context, ISTAT has started a programme of technological, methodological and organizational innovation, called " Stat2015", in order to meet the growing demand of a new, fast and with greater spatial detail statistic information, and to pursue its mission.

In relation to gathering data and metadata, a new efficient and advanced system has been developed for the digital acquisition of the data, so as to alleviate the burden on respondents and optimize the use of administrative data and of the new data sources, integrating previously separate investigations and by different detection techniques through the sharing of concepts, classifications and definitions. Besides the use of CATI and CAPI techniques in household surveys, whose immediate effect is the reduction of paper questionnaires, projects as the portal of companies and institutions have been started: they allow not only the increase of the efficiency of data collection processes but also to define "flows of return" to companies and institutions. 2010-2012 general censuses, conducted with highly innovative technological, methodological and organizational structures, are the first steps in this direction.

For the phase of data dissemination, the web 2.0 communication has been enhanced and developed (according to the data sharing and open data principles), allowing access to information in personalized and automatic mode, safeguarding the meaning through the link between data and metadata.

These projects include the I.Stat database and the development of telematics systems where the main database is sometimes integrated with additional data provided by Sistan entities.

Moreover, for the results of the census and the description of the indicators, the offer of micro-data for research purposes has been expanded and some new visualization tools have been developed (ISTAT eXplorer, Apps, GISTAT).

Keywords: statistical literacy, students, teachers, network of experts

Autoclassification area: Innovation in School and Society

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Foreign students: scenarios, best practices and critical issues

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The increase of the number of foreign students in the schools of the Apulia Region never stopped in the last decades. This increase followed the trend of the migration flows in our country and, in the last ten years, it went from 1.04% in 2003/04 (data from the survey realised by the Apulia Office of Education in collaboration with the Department of Political Science-University of Bari) to 2.51% in 2013/14 (MIUR). In this scenario, the Province of Bari, does the lion share considering that it receives almost half of the foreign students population of the whole region mainly concentrated in the chief town – Bari. More than this a number of unaccompanied minors particularly high makes this phenomenon more complicated. For these reasons, the education institutions have been pressed in rethinking and reorganising themselves on the base of the principles of the inclusion and integration.

Until the school year 2010-11 all the different schools were clustered in some poles (Centri Risorse Interculturali di Territorio - CRIT) that coordinated services like the teachers training and the monitoring of the interventions in favour of the foreigner students. These poles represented important points of reference on the territory also for documentation and advising. This kind of organization is still formally existing even tough, with the reform of the State balance in 2010, it has been weaken to the point that it has no more reasons to exist anymore.

What does it remain? Good practices in single schools especially in terms of student reception protocols where the stability of the teaching staff allows it. These good practices counterbalanced to a certain extent the drastic reduction of public investments in this field, however, they have not been sufficient to contrast the school dispersion. In fact, it has to be underlined that even if on one hand the general dispersion rate is decreasing thanks to some strategic decisions concerning the education policies, on the other hand, this same rate remains still too high (the double) for the foreign students.

What is it possible to do in such a weaken context? One possibility is to apply the indications and the guidelines of the Education Ministry that invite the schools and the local institutions to operate as a network.

Anyhow, it is the cultural perspective of the integration that pays for this radical change. If culture means the willingness to modify themselves through a continuous and mutual experiences exchange (Anolli L.), at the same time, the radicalisation of the conflicts does no longer induce the individual (foreigner or autochthonous) to consider a positive and dynamic relationship with “the other”. This context, of course, contributes to build walls masked with the rights claiming, leaving a little space to the progress and the innovation.

Keywords: Integration, Immigration, Education system

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RESCAP – Virtual Design of living environments for residual capabilities of subjects with cognitive impairment

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In this work, we have studied and implemented an innovative platform to support the design of living environment for subjects with residual capabilities and cognitive impairment. In particular, the project proposed an innovative Human Machine Interaction scenarios, where 3D Virtual Reality platform produces stimuli and Machine learning methods, such as Self Organizing Neural networks clustering, support the decisions. Virtual replica of living environment can be modified in real-time, introducing stimuli, in order to stress minimally the patients enrolled in their early phase of autonomy loss. Stress conditions were measured in an objective and quantifiable way through the EEG P300 signal latency elicited by several conditions.

Home automation strategies like innovative domotic have been proposed to support personalized structural changes according to psycho-physic evolution of the fragile subject. Light intensity changes, shutters height, wall light colouring and environmental music reproduction assessed useful environmental characteristics. Finally, a daily activity data gathering platform was designed to propose personalized changes according to information acquired by the patient itself, physicians, therapists and care givers.

Keywords: Cognitive Impairment, Virtual Reality, Event Related Potentials, P300, Home Automation, Self Organizing Maps and Clustering

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Perception of Road Traffic Safety among Young People. An empirical study

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The project Auto…controllo PSSG (Perception of Road Traffic Safety among Young), has been developed to study the issue of road accidents in Italy among people under 35. Although the number of road accident victims in Italy is yearly decreasing, in 2014 more than 3,000 individuals lost their lives in tragic events connected to this problem.

Official statistics confirm that young people represent a substantial portion of these victims, so that in the age group 20-40 traffic accidents are a primary cause of death. Similarly this is evident among the 200,000 injured and more, many of which seriously.

The Project PSSG aim at investigating the perception of youth about road safety, by administering an entry questionnaire in a first step and, after admitting a sample of respondents to a safe driving course, a second questionnaire much more complete.

The collected questionnaires at the present are almost 1,000 and undoubtedly represent an interesting picture of the Youth (particularly of Calabria, since the questionnaire has been administered online from a website of the University of Calabria).

From the data obtained by processing the questionnaires, we will try to draw a profile of young people based on their perception about road safety, in a frame of Multivariate Statistics, with particular reference to the Multiple Correspondence Analysis and the Cluster Analysis.

Keywords: Road safety, Survey, Clustering

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Quantitative assessment of the impact of the economic development level and quality of medical services on quality of life in the development regions in Romania

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The paper proposes to evaluate to what extent economic factors and public resources allocated to public health system at the development regions have direct influence on quality of life. To assess the quality of life two important components are taken into account: the average life expectancy and infant mortality rate. To assess the level of development of the region we resorted to GDP and for the evaluation of potential in the field of public health we have used the number of physicians, number of beds in medical units and medical units at the development regions level. For quantitative assessment of the impact of the two categories of factors we used panel models were infant mortality rates and average life expectancy is analysed according to the degree of population concentration in the regions, GDP, number of physicians, number of hospital beds and the number of units providing public services by development region. To measure the concentration degree of these features we appeal to Herfindal index and entropy. The results are relatively similar when the two methods for measuring the concentration are used. For evaluation of the models we used data sets from the period 1990-2013.

We present in the following the most important findings of the descriptive evaluation of the data series: during this period there was a steady increase in average life expectancy at national level and in the eight development regions; there was a considerable decrease in infant mortality at national level and in the eight development regions; amid the need to optimize public expenditures for health the number of hospital beds has been significantly reduced.

Using the estimated models we made the following comments: infant mortality rate is negatively correlated with the variable characterizing the economic development of the region, the number of beds and number of doctors per 1,000 inhabitants; life expectancy is positively correlated with the variable characterizing the economic development of the region, the number of beds and number of doctors per 1,000 inhabitants; specific factors in the regions have a significant influence on the rate of infant mortality and life expectancy.

Keywords: medical services, development level, quantitative methods, Romania

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Assessing the Health Care Efficiency by using Classification Analyses

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In order to reduce costs ensuring good standards, all the health institutions are increasingly encouraged to implement rational tools (able to fastly identify the inefficiency situations) for the better management of available resources and the best cost-benefit ratio.

This contribution aims to study and investigate efficiency in health organization using multivariate methods of data mining (first, segmentation analysis; after that, neural networks).

Its practical interest will be directed in particular to the assessment of organizational appropriateness in health care, in order to evaluate the incidence of the "day hospital" and "day surgery" procedures, analyzing their relevance in the health system as well as their appropriate level in the Apulian region.

One of the results of such analysis is to understand some decisional mechanism of the Health Care management, as well as the structure of inefficiency in the health network.

Keywords: Health Care, Organizational Appropriateness, Classification Analysis, Neural Networks

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Statistical techniques for performance evaluation

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In recent years there has been growing interest in the search for quality in the health sector. In the last few years the ex-post analysis of customer and patient satisfaction, efficiency of output, efficiency of performance have been added to the traditional studies regarding the ex ante quality of processes

These analyzes concerning both the construction of systems of evaluation of health systems both research in the strict sense. The use of logistic or multilevel models has been proposed for what interests the analysis of the effectiveness of health care facilities. Through these models of "risk adjustment”, the comparison between different health facilities is done "ceteris paribus" on the basis of outcomes "corrected" considering the different severity and condition of patients.

Multilevel models compared to logistic models allow taking into account the fact that the observations relating patients are hierarchical and therefore not independently distributed. The use of big data of administrative origin, of other outcomes than the mortality, of evaluations not only about hospitals, but also about departments, allows increasing the robustness of the results.

To effectiveness’s indicators of performance are flanked, in the evaluation of health systems, indicators of performance (upcoding, cream skimming and falls in hospitals), of technical efficiency, using stochastic frontier, of waiting time and of customer satisfaction.

As for research work is noted, for example, the opportunity to study the cream skimming and the upcoding showing their negative effects on technical efficiency, and to verify through methods of difference-in-difference the effects of policies to restrict them.

Moreover, it is proposed the analysis of the trade-off’s entity between effectiveness and efficiency of different hospitals in the department level.

It should be noted again the opportunity to analyze the influence of social interactions on the choice of hospitals by patients and to verify the relation with the quality. Finally, it is interesting to study the effects of freedom of choice and the information asymmetry of quality on the level of competition between hospitals belonging to the same region.

Keywords: Performance evaluation; Health; Multilevel models; Logistic models; Risk adjustment

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Object-Oriented Bayesian networks for service management: discussion and application

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Nowadays, the service quality management has become an increasingly difficult task to perform because of its complexity that may be due to several reasons such as the service features, the process organization and the multi-channel providing. In these cases, the top management needs to analyse problems from different perspectives, to evaluate possible improvement strategies at several levels and to take appropriate decisions. When many actors are involved in the decision making phase, top management responsibility is twofold: to supervise strategies developed by every agent; to correctly coordinate strategies in order to define priorities. Service management is thus a crucial and a strategic success key above all in the public sector. Bayesian networks (from now on BNs – Cowell et al. 1999) have been proposed as a tool for managing information coming from customer satisfaction surveys (Renzi et al. 2009; Salini and Kennett 2009). Thanks to their easy-to-interpret graphical representation, BNs facilitate communication between managers and statisticians. Moreover, they are a very useful statistical tool to perform what-if analysis: a variety of scenarios can be constructed to evaluate the impact of improvement actions. In 2015, Musella and Vicard proposed to use object-oriented Bayesian networks (from now on OOBNs - Koller and Pfeffer (1997)) for modelling a multi-faceted problem consisting in the integration and management of different quality aspects in a unique framework in order to allow the improvement strategies analysis in real time. They showed, by an application to an internal customer satisfaction survey, how to combine the perceived quality of different production areas and how to evaluate the impact on the global quality of improvement actions developed in one or more areas. The advantage of the model was due to the simultaneously occurring of the fact that each decision maker can be supported in the internal strategy (modelling a specific BN) and that the top management can check the effect of these strategies on the global quality. The model were limited to some basic assumptions mainly linked to the weights attributed to service areas and the relationships between areas. In this paper we discuss how to complicate the model in order to have a more realistic and applicable model and, in detail, we focus on the construction of latent indicators of global quality.

Keywords: Bayesian networks, Decision making, Global quality evaluation, What-if analysis

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Ordinal Principal Component for a Common Ranking of Stochastic Frontiers

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The Stochastic Frontier Analysis (SFA) is a parametric model to evaluate the production function on a set of units. SFA assumes a functional form on the production function and requires data to econometrically estimate the function. SFA also takes into account measurement errors, statistical noise and other non-systematic factors, that can offset the units from the production frontier. As an indicator of Technical Efficiency (TE), SFA considers one output in a continuous range from zero to one. When SFA is applied on the same input varying the output, we obtain different TEs for the same units.

In this paper we discuss the reasons that lead to the choice of the SFA instead of the Data Envelopment Analysis (DEA). Afterwards we introduce how to organize a Multiple SFA with the same input and different outputs in order to obtain a synthetic indicator of efficiency instead of many outputs in accordance with the hypothesis of the stochastic model.

The output values of each SFA are transformed into rankings. Then, we unify the rankings applying the (first) Ordinal Principal Component Analysis. The rankings obtained are more robust than those of the DEA for the very closely tested hypothesis. Our goal is to make more SFAs and unify TEs into a single list as for DEA.

It is useful to point out that the bottleneck of the whole methodology is to find a sub-optimal solution, because it would be impossible to search for the optimal one due to the number of permutations to be.

We experiment our approach on a real case study and discuss the main findings.

Keywords: Stochastic Frontier Analysis, Ordinal Principal Component Analysis, Technical Efficiency, Common Ranking

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An overview of the Data Envelopment Analysis and Stochastic Frontier Analysis

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The Technical Efficiency (TE) is a basic tool to determine the factors that slow down the production. The literature on the measurement of Technical Efficiency provides a range of methodologies. This paper reviews the main methodologies for measuring technical efficiency and presents an overview of the literature on the studies, comparing the main approaches. The purpose of this paper is not to be exhaustive but to provide a significant overview on the advantages and disadvantages on some of the core methods of measuring technical efficiency.

In order to estimate the TE, two main approaches are spread, the Data Envelopment Analysis (DEA) and the Stochastic Frontier Analysis (SFA).

DEA is a non-parametric approach which uses mathematical programming to identify the efficient frontier, and does not require hypothesis on the analytical form of the production function.

SFA is a statistical method that requires strong assumptions on the distribution of statistical random errors, and on the non-negativity of the random variables of technical inefficiency.

Most researchers measure the technical efficiency with a double measurement. They use the two methods to compare the results and to see if the estimates obtained are different.

This work, instead, wants to compare the assumptions that form the basis of the two methods in order to provide points of reflection to those who want to measure efficiency.

Keywords: Stochastic Frontier Analysis, Ordinal Principal Component Analysis, Technical Efficiency, Common Ranking

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Making feasible the comparison via simulation of the most popular scaling techniques

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In the social and behavioral sciences responses to questionnaires items are typically collected by means of the Likert-type scale format: when answering to a question, the participants are asked to choose among a given number, say K, of ordered response categories running, for example, from "never" to "very often", usually coded with the first K integer numbers. However, the statistical techniques commonly used for their analysis (e.g. Factor Analysis (FA) or Structural Equation Models (SEM)) assume data being of the metric type. A typical example concerns customer satisfaction survey, where responses given to a questionnaire are on Likert scales assuming a unique common finite set of possible categories. Psychometric literature on ordinal responses conceptualizes survey observed data as being expression of continuous unobserved underlying variables, whose true values lie in the mind of the specific individual. The Likert scale operates by means of a link function giving a conventional mapping from the stimula space (typically a continuous interval) to the first K integer values (discretization).Data collected during a survey by means of a questionnaire are, in general, expressed with reference to a Likert type scale, giving rise to non-metric data (ordinal categorical). However most of the statistical procedures used to analyse survey data (for example FA or SEM) require at least interval scale measures, that may be obtained for example by using proper scaling procedures. In order to compare, by simulation, the scaling techniques most commonly used in the literature, we consider necessary to achieve, in advance, an appropriate algorithm that best reproduces the discretization process followed by the respondents to the Likert questionnaire items. Accordingly, we propose a discretization procedure that, starting from a continuous random variable, describing all possible individual responses to a given stimulus, generates the corresponding categories, chosen among a finite set of integer values.

The exposition of the methodology is accompanied and motivated by the analysis of preliminary simulations.

Keywords: Likert scale, Continuous variables discretization, Scaling

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A supervised analysis of the graduates' employment status

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Numerous studies on service delivery have made it possible to develop ad hoc statistical methods to measure performances.

In general, the concept of service performance is identified in the meanings of efficacy and efficiency. With regard to university education, the first meaning becomes more relevant than the second, if you just consider the socio-economic context (the job market) in which such education is engaged.

In the job market the assessment of efficacy is to be based primarily on objective data, such as the graduates' employment status over time. The question we want to answer in this paper is: which are the most important curricular features of the graduates who start work in a short time? An accurate picture of the Italian human capital is provided by the consortium AlmaLaurea through its survey of graduates, which is a special reference for all those who look to our higher education system as a key sector for development. In particular, AlmaLaurea supplies both a range of services to promote graduates' employment and also timely information on their characteristics, such as course of study undertaken, academic performance, IT and language skills, internship and study abroad held during the academic period, geographical and gender differences.

These features, in fact, are regularly detected by Italian universities, but they are often overlooked at the planning of their training offer.

In this paper we detect the most influential factors in defining the employment status of the second cycle graduates in the 2013 summer session of the University of Bari, one year after the end of their studies.

The collected information makes it possible to build a base of knowledge suitable to design a forecasting model of the employment status. In particular, by using a state-of-the-art machine learning methodology, we build a model from example inputs (i.e. the curricular features) in order to make data-driven predictions.

Keywords: Supervised classification, employment status, University of Bari, graduates' curricular characteristics.

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Composition of the variability in learning scores: geographical differences using three-levels models with heteroscedastic random effects

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This work, based on data from the national survey on learning INVALSI 2013, aims to study how the total variability of scores in Italian and mathematics tests of skill subjected to 5th grade Italian pupils, is divided into three components, between students, between classes and between schools, and to verify if this composition is depending on the geographical area considered. Then we want to see if any geographical differences in terms of variability is due to compositional factors "out of the control" of the schools, or also reflect differences in the effectiveness of the institutions themselves. For this purpose we use appropriate three-levels random intercept models with heteroskedastic random effects. The results show a low performance of the Southern regions than in Northern ones, and a considerable higher role to classes and schools in Southern regions in the explanation of residual variability, pointing out a serious issue of fairness in southern Italy. In fact, high variability among classes and schools raises doubts on the capacity of the system to guarantee equal educational opportunities, especially in a context of primary school.

Keywords: education, multilevel model, school performance, variability, learning

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Promoting and assessing statistical literacy among university students: the case of Tuscany

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The promotion of statistical literacy (SL) is one of the strategic goals of Istat, Italian NSI, both at central and at territorial level. In recent years the constitution of the "Territorial network of experts in promoting statistical literacy" and the full interaction between central and peripheral structures allowed to increase the availability of materials and to plan actions for several targets, from primary schools to university.

Despite all the efforts involved in promoting SL, since now little attention has been devoted to the question of the assessment of its level. This new line of research, illustrated in the present paper, has been developed for the first time in Italy thanks to the cooperation between the territorial Office of Istat in Tuscany and the statistical departments of the three University located in Tuscany (Pisa, Florence and Siena). Target population is represented by freshman students as a proxy of adults. The driving idea is to submit to students a questionnaire with a twofold objective: a) to promote SL: the form is presented in a charming way and is associated with various statistical messages; b) to measure SL: items are drown from international experiences and cover the three main dimensions of SL (numeracy, communicating and use statistical information in daily life).

A first prototype of the assessment form was developed and tested during 2014. A renewed version of the questionnaire (named QValStatM) was administered in the period from February to May of 2015 to more than 10,000 freshman students (all 1-st year students of the University of Pisa; students of Economics and Political science of the University of Florence; students of Economics, Business, Historical sciences and Philosophical studies of the University of Siena). In order to minimize cheating phenomena, the items were submitted according a random order. The response rate was 31% with significant differences between the various courses (maximum is 56% for students of Physics, minimum 22% for students of Medicine).

Results are of a certain interest. Distribution of scores has a negative skewness and is not normal ($P<0.0001$). The item with the highest number of corrected answers (88.3%) concerns interpretation of pie charts. On the opposite side only 40.9% of students are able to correctly calculate a percentage variation. In the range from 0 to 12 the mean score is 7.64 which states for a just enough level of SL. As expected the score is quite different between the various courses: more than 9 points for students of Mathematics and Physics, less than 7 for students of humanistic studies. There is also a significant gender effect (Male: 8.43, Female: 6.96). The analysis will be completed linking scores with data of target population held on administrative registers (registration files of students): place of origin, high school specialization, final grade and so on. Forthcoming promoting activities of Istat in Tuscany will be addressed on the basis of the assessment's results.

Keywords: Statistical literacy, Assessment, University students, Istat

Italian NSI for the school: A new project to promote statistical literacy in Italian regions

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A key activity of Istat, Italian NSI, is that of promoting statistical literacy. In recent years this goal was further strengthened through the constitution of a network of around 80 experts of the territorial offices and the activation of proper synergies with the former School of Statistics and Socio-Economic Analysis (ex SAES) [1, 2]. Components of the network operates in line with the objectives to both standardize and modernize the processes set down in the statistical agenda named Stat2015 and to emphasize local experiences in order to test and generalize them. Only in 2014 the network realized around 200 initiatives involving about 11 thousand participants.

The most part of the network activities are devoted to promoting initiatives for the school system (teachers and students) for primary [3], lower and upper secondary levels. Actions include the release of educational packages aimed at: i) allowing an intuitive approach to statistics; b) raising awareness of the role of Istat in the production of official statistics for the country and its territories; c) giving information concerning the role of metadata. One of the latest releases of the network is the "community of sharing experiences between Istat operators and teachers". The community is a place through which to discuss, share experiences and identify new approaches to the teaching of statistics across a process of cooperative intelligence. A particularly promising area of action is related to the use of virtual reality for the transfer of educational content.

The Territorial Office for Puglia, maintaining and further developing the main goals of the network, acts synergistic actions of disseminations in many schools of the region. Tools adopted are mainly those of the educational packages. Methods of administration are quite innovative. There is a specific attention to find instruments of linkage between teachers in order to share educational technology and skills to develop students' skills in the area of calculation, interpretation and graphic representation of data. A further instrument introduced to guide students towards critical thinking is that of laboratory. By means of laboratories students of secondary school are able to follow all the entire process of data production, starting from microdata to methods of synthesis.

Keywords: statistical literacy, students, teachers, network of experts

Autoclassification area: Education

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New poverties and public care interventions

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The essay presents the results of a research about new poverty situations carried out in the social district of Lecce. A quantitative and qualitative approach was used in this respect. The first part of the research aimed at identifying all services offered by the social district of Lecce to overcome poverty. During the second part of the research a focus group of all the social workers was held to define with them the new types of poverty and the impact of the services provided on poverty situations.

The services provided by social services can be divided into two types:

Monetary interventions, which can be divided into two types:

a. monetary assistance on a one off basis ("una tantum");
b. long term monetary interventions;

The second type of interventions are mainly continuative and of long duration, only in few cases these are services that can be used only when needed (home care, recreational activities for children, internships…).

The social workers have defined poverty as a complex phenomenon even when it occurs in forms of " simple", exclusively economic, property.

In addition to particular situations of social discomfort, there are the "new poverty" situations, represented by people on a fixed income and by the pensioners who might be in economic difficulties even when having an income and sometimes also owing their house.

The considerations by the insiders have led to the definition of aspects of poverty scarcely visible to "naked eye" because they are difficult to recognize even by those who live with them. We will call these types of poverty: poverty from prosperity, gambling property, poverty for off the book labour.

The poverty from prosperity is the poverty produced by the diffusion of values dictated by the desire to emulate lifestyles over someone's economic opportunities. Very often people have difficulty distinguishing the real necessities from those that are [desirable but] less necessary.

Gambling property involves those who are hoping to improve their economic condition trying to win through gambling and instead do nothing but generate a tremendous addiction.

The poverty from off the book labour is that which is paradoxically originated from the fight against illegal employment and tax evasion that has triggered a perverse mechanism now especially evident in the countries around Lecce.

The social workers recognize that the services provided are unable to have a positive impact on poverty because the interventions should be designed by looking at the person as a whole: the economic contribution is not always positive because it fills emergencies but does not offer adequate aid in situations of new poverties.

Keywords: New poverties, social inclusion, care interventions

Poverties and demand of social and health services of the families of Brescia

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1. Introduction

The negative impact of economic crisis is affecting families' incomes, changing and worsening their health and needs in terms of social and health services. To study in deep this situation locally, the University of Brescia carried out the biennial project "Demand and Supply of social and health services" (June 2014 – May 2016). The principal aim of this study is mapping supply and demand of social and health services in the Brescia city, focusing on childhood and adulthood health and needs.

2. Database creation and development

Data on families' characteristics and incomes from 2005 to 2014 were available consulting the civil registry, it includes information about every citizen living in the city and families. Data of income were available from 2005 to 2013 (still updating) and information on gross income and taxes were collected. An integrated data warehouse based on these two registries was created, linking subjects throughout tax code. Thanks to the linkage, it was possible to compute family income and consequently percentage of poor families. For the purpose of this abstract, we consider data since 2008 when the economic crisis started.

From 2008 to 2012, in Brescia the percentage of poor families growth from 14.4% to 16.6%, with differences between family types: the percentage of poor couples (17%) is lower of the national mean and decreases over time (from 5.6% to 5.1%); on the contrary, the percentages of poor single (42%) and poor parents with children (23%) are higher and increasing over time (from 18% to 21%).

3. Survey design and questionnaire

For the survey about the social and health services, 1,500 of 92,806 families living in Brescia were selected throughout a systematic random sample of census tracts of the city. The questionnaire was built and concerned (i) evaluation of social-health services used by the family and offered by public/private structure; (ii) evaluation of public transports used by the members of the family; (iii) evaluation of nursery school/kindergarten at least if infant was present or reasons why child/children didn't go to the nursery school; (iv) evaluation of recreational services for children and adolescents; (v) evaluation of quality of life (measured using SF-12 questionnaire), habits and use of social-health services offered by public/private structure for adults more than 50 years old. Survey is already ongoing.

4. Future perspectives

Once survey will be concluded, it will be possible to construct indicators of poverty, vulnerability and resilience of families, and link these with evaluations and needs of social and health services, to better understand the association between demand and supply of services, families' characteristics and economic status.

Keywords: health and wealth, vulnerability and resilience, quality of life research, administrative data integration, composite indicators.

Coverage and self selection bias in computer assisted web interviewing. Some results from surveys in the Italian health and social services system.

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The survey technique known as CAWI (Computer Assisted Web Interviewing) is today very popular, mainly for its low costs and the fast availability of the elaborated data. The main requisite to carry out a CAWI survey is the availability of the subjects email addresses, possibly updated. Despite the email availability is increasing, in particular context such as in organizations database, a number of issues still remain problematic, from correctness and validity of the available email address, that can be non updated or not active or not used, to anti-spam and other filters that can prevent the email message to reach the addressee, to some national laws about privacy that can require explicit consent to use the email address. Further, an increasing number of these surveys give to the subjects a short time to answer, i.e. only a few days. What is the scientific validity of these survey?

In the present work we wanted attempt to analyse the survey bias in a CAWI survey, and in particular we isolate three possible bias: 1) the possible bias of email coverage of population, 2) the possible bias of the final observed sample, and 3) the possible bias of a sub-sample of early respondents. Definitely, all this three bias sources are resulting from subjects self-selection. How to measure a possible bias in such sub-samples? Generally it is impossible to know what would have answered a subject that has not been reached, because he does not have or does not make available his email address or he prefers to not to participate, but we can use the information usually available in organization registries and verify if there are significant differences in the observed samples compared to the population.

This analysis has been applied to a CAWI survey carried out by the University of Verona and the Ordine Assistenti Sociali of Veneto (OASV), on the population of the social workers registered in Veneto. The target population is formed by all subjects of the OASV at end of July 2012 (n=2623) excluding the subjects retired before the start of the survey. A preliminary survey have been carried out in September 2012, to check the email database and to ask the subject's consent to participate: as result, the availability of 1395 email ad-dresses has been confirmed, but due to some consent negation, the target population was reduced to n=2563, and the population achievable by email is formed by n=1364 subjects.

The main survey started on 15/10/2012 and was finally closed at the end of December 2012. However, for the aims of this work, we consider only the period from the start and the day of the regional conference of OASV held in Verona on 19/11/2012. After the conference indeed, a number of new registered subject and of new emails have been added to the survey system, improving the final response rate, but confusing the evaluation of the survey bias that we are trying. Then we consider only the course between 15/10/2012 and 19/11/2012, and compare the "final" sample of respondents within 19/11/2012 (n=1116) and an "early" sample of respondents within 19/10/2102 (n=567). In this period, after the first email invitation to the survey, we sent four email reminders, selectively to the subjects that did not yet completed the questionnaire. The information know a priori that we have available in this case are: gender, age, place of birth, place of residence, registration dates. The preliminary results of the analysis are reported.

Keywords: computer-assisted interviewing, CAI, CAWI, survey bias

Family in 2025. Preliminary results from a Delphi approach.

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Family represents the most important resource of the Italian society. Nowadays, we know family structure and dynamics, including generational issues, but family is evolving faster and faster. The project aims at outlining the evolution of Veneto families in the next 10 years and underlining the main problems that families are going to deal with. We can suppose that political, social and economic facts that are arising in Italy will influence the forthcoming families, but we do not know how. The project starts with the collection of opinions and comments of qualified and privileged experts that will be involved in the project given their cultural and/or professional profile. Project topics concern demography, sociology, family dynamics, generational conflict, health and social assistance, labor market. Several focus groups about key themes regarding the family will be realized. The results will allow the construction of a Delphi survey. This will be based on several running surveys to 32 selected experts. Thanks to the Delphi survey we will gather experts' opinions, but not only; we will start an anonymous debate about the project topics (Delphi conference). Experts will selected among academics, journalists, manager of: local governments, social services, consumers' and families' associations, NGO. After the firsts focus groups the following topics emerged and are been considered in the Delphi survey:

i) the women's role in the family, also related to that jobs that require her presence in holiday days (i.e. shopping centre);
ii) the lesser availability of grandparents in their "babysitting" role, given the older age needed for retirement;
iii) the presence of several family models: homosexual couples, mixed couples, and so on;
iv) teenagers that even more communicate through multimedia, with their parents too.

Keywords: Delphi survey, family, experts, focus group.

Quality of university services and students' satisfaction

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Purpose – This study aims at investigating whether and how the perceived quality of the educational services affects students' overall satisfaction with their university experience. For this purpose, a Structural Equation Model (SEM) has been carried out by taking into account the following main dimensions, as possible determinants of the overall satisfaction: teaching and course organization, library services, refectories, classroom study, students' service office, educational infrastructure. More specifically, the perceived quality is evaluated by measuring the students' level of satisfaction with respect to a number of items characterizing each dimension, as well as for their overall university experience.

Our interest in this topic is justified mostly by the importance that students' satisfaction assumes as indicator of the quality of educational services but also for its relationship with overall life satisfaction and subjective well-being, as shown in some research. From a more general point of view, many stakeholders may be interested in the assessment of quality in higher education, such as potential and enrolled students, together with their families, academic and administrative personnel, but also employers, firms, institutions (government and public sector) and wider community. In particular, among others, students are the direct recipients of the provided educational services and can be considered as the "primary customers" of a university, even though they are required to pay tuition fees. Hence, the analysis of customers' satisfaction is a possible way to assess how a university institution is being efficient and satisfy its mission. Following this perspective, the quality of educational services can be tested by assessing student satisfaction, since students can be considered as the most important stakeholder of a university. Evaluating perception and expectation of students is then particularly important in a competitive context, as universities are becoming more student oriented and are expected to be accountable for the public funds received. Research studies in higher education dealt with expectations and perceptions of quality/ satisfaction using the SERVQUAL approach or alternatively the SERVPERF approach.

Design/Methodology/Approach – A web questionnaire was handed out to 12857 students enrolled at the University of Pisa in 2012. The level of satisfaction was evaluated for each item characterizing the services used by the students on the basis of a four points ordinal scale.

Findings – Preliminary results give a valuable insight into how students perceive the quality of the services offered at the University of Pisa and how this may affect students' overall satisfaction with their university experience. The main dimensions positively affecting students' satisfaction are teaching and course organization (+0.888; p=0.000), and educational infrastructure (+0.303; p=0.001). This confirm our expectations since the several aspects considered to measure such dimensions are crucial for the university experience: organisation of lessons, learning materials, exams booking, receiving hours and information about courses, adequacy and degree of cleaning of classrooms, laboratories and other common areas, as well as presence of parking. Among the other dimensions, the quality of refectories, as measured by characteristics and variety of food, waiting time, opening hours, tariff of catering, also has a positive but weaker effect (+0.110; p=0.000). Instead, students' service office shows a more complex relationship with students' satisfaction: in fact, on one hand it has a weak negative direct effect (-0.095; p=0.000), whereas, on the other hand, it has a higher positive indirect effect (0.217×0.888=0.193), mediated by teaching and course organization. As a result, the total effect is slightly positive (-0.095+0.193=0.098). Finally, classrooms study are negatively related with student satisfaction (-0.200; p=0.010) whereas library services has no significant effect (-0.009; p=0.805); instead, as regard control variables, no differences were found by type of degree (first cycle vs second cycle) and gender while freshmen show a higher level of satisfaction.

Keywords Higher education, Service quality, Structural Equation Models, Student satisfaction

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Impact of mobility on competence development within EU international lifelong learning programs

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This article presents a study on the development of intercultural competences in students involved in international education, namely two LLP Intensive Programs (IPs). The data show the extent to which, according to EAHE priorities, an educational model based on mobility abroad may foster the acquisition of competences fitting for a global society. The starting point is a longitudinal study conducted over a six-year time-span on 196 students who attended two consecutive lifelong learning Intensive Programs including eleven Universities from eight European Countries.

Based on self-evaluative questionnaires submitted to the participants at the end of each edition, and by using multivariate analyses – namely explorative and confirmative factorial analysis, as well as structural equation models – the present longitudinal study worked out a pattern of indicators that measure the dimensions involved in learning, describing competence as a holistic, multidimensional process associated with mobility abroad and personal growth.

Keywords: Lifelong Learning; Mobility-based education; Cultural displacement; Structural Equation Models

Food style convergence between parents and children. Some empirical evidence

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This research investigates the food habits between parents and children.

In order to identify healthy and no healthy guidelines this study has been conducted using BMI and life style behavior, investigated through year 2013 ISTAT data (Multiscopo Survey).

A large body of literature deals with obesity, BMI, food habits and life style behavior for children. Probabilistic, non probabilistic sampling and census surveys, longitudinal, and cross-sectional data methodologies have been used for analyzing the risk of obesity in the primary age connected to demographic and social variables.

These researches do not lead to a unique framework. Each study has been conducted on questionnaire built up upon specific request and on a specific research demand therefore a general method has not been proposed yet.

As an example in several studies BMI has been self-reported, potentially misconducting results and leading to over or under estimates of empirical evidence on health and weight.

Furthermore in Italy (Istat surveys) the monitoring of health conditions is constant but led by different research units aimed to pursue their specific goals. In this direction previous studies (Bracale, Russo, Zavarrone et al., 2015; Zavarrone, Crocetta et al. 2014) based on a cross sectional data, collected in 2009 for the primary schools (n=16.822 pupils) in Milan, highlighted respectively that

a) risk of being overweighted for children is not properly addressed only by eating once a day vegetables through ordinal regression approach;
b) different grouping of foods and social habits provide a fragmentation for children in healthy and non-healthy habits through latent class approach.

The main hypothesis of this research are to replicate the hypothesis a) and b) on the data of Istat based on a probabilistic sample of the Italian population.

Keywords: BMI, children, obesity, food-habits, latent class analysis

Assessment of an E-Learning environment through CQT and statistical methods

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The development and the widespread availability of new technologies of communication and transfer of knowledge are changing more and more the society we live in, starting from the culture, values and way of thinking. In particular, the features offered by telematics can be used directly as resources within traditional educational processes or they can be used to create innovative training models based on collaborative two-way communication processes: the "e-learning" process.

The purpose of this research is to study some techniques of assessment of learning environment in distance education, which must take into account many factors: information technologies, logistic and organizational structures, flexibility and accuracy of design, effectiveness of the process and, in particular, the quality of learning. Such factors have to be evaluated in both aspects: objective and subjective quality. An experience of assessment of an Adaptive E-Learning environment (recently developed at the University of Bari) is reported here as example. Particularly, the subjective aspect of quality are evaluated by "beta-tester" users by using specific indicators, given by an online questionnaire implemented in the e-learning platform.

Keywords: Adaptive E-Learning; Assessment; Effectiveness; Quality, Indicators

An IRT-based approach to measuring the satisfaction level of the university students

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Over recent decades, higher education institutions have been placing increasing importance on student satisfaction as a measure of the quality of their courses, programmes and teaching. Also, each Italian public university has the mandatory task of monitoring and assessing the quality of its own teaching activities. Student evaluation of teaching is a widely and acknowledged instrument, used to map the quality of teaching in universities and improve the chances that desired learning outcomes will be attained (Emerson et al., 2000).

This article proposes an IRT modelling to ensure a rigorous measurement of the satisfaction level of a sample of 570 university students, attending the course of Business Economics, at the University of Pescara, for the academic year 2014-2015.

In particular, an explanatory IRT model is adopted to examine students' response data to a set of selected items of the questionnaire, administered to obtain accurate opinions on teacher traits, teaching materials, degree course organization, class facilities and overall satisfaction. The items are measured on four point Likert scale: definitely no, more no than yes, more yes than no, definitely yes. For the purpose of the analysis described in this paper also some students' personal details are taken into account.

Throughout this study special emphasis will be placed to the advantages of viewing the IRT models from the perspective of generalized linear mixed models (GLMM). Unlike traditional IRT models, the formulation of the IRT models within the GLMM framework combines the opportunity of measuring a latent variable with the possibility to explain the differences in the characteristics of persons or items, by introducing covariates potentially affecting how subjects respond to an item (see, among others, Kamata, 2001 and De Boeck & Wilson, 2004). Additionally, a multidimensional formulation of the IRT models is also adopted to account for the presence of more than one latent trait.

Consequently, the findings arising from this class of IRT-based approach allow us to describe and rank the items having a significant perceived satisfactory quality level as well as to build up specific trajectories of students satisfaction according to the predictors (such as, age, gender, type of high school attended, number of exams, etc..) deemed plausible to influence the students ratings.

Competing models, differing in terms of the variables included in the linear predictors, in terms of the random components and in terms of the underlying factor structure are formulated. Through a stepwise model specification we will be able to gain insights into the fixed and/or random effects expected to have a systematic and/or unpredictable influence on our data and show the effect of ignoring both the factor structure and the measurement precision of the latent traits. The results were obtained using the R package MIRT (Chalmers, 2012) which explicitly refers to the Metropolis-Hastings Robbins-Monro algorithm (Cai, 2010) for the parameter estimation.

Keywords: Multidimensional IRT models, generalized linear mixed models (GLMM), Student satisfaction, teaching quality.

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An analysis of student performances through a finite mixture IRT model

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We focus on the analysis of the performance of university students, with reference to first year compulsory courses, with the main goal of clustering students in ability classes on the basis of their performance. In the Italian university system, students are not required to take the exam at the end of the course, indeed they can choose when to take an exam. Thus, the performance of the students is measured accounting for two distinct elements: (i) the sets of enrolled exams; (ii) the result attained at the exam: failed, or achieved grade if passed. Note that, if a student does not enrol for an exam, then we have a missing value for the exam's result. We assume that such missing data are informative about the students' ability, thus the missingness cannot be ignored in the estimation process. In the analysis, we also consider some background characteristics of the students influencing their performance, such as high school grade and type.

We also aim at comparing the exams in terms of difficulty, discrimination (i.e., strength of dependence on the true ability level) and use of the grades. This is important for both student tutoring and course organization. The analysis is carried out on freshmen enrolled in academic year 2013/2014 at two degree programs of the School of Economics of the University of Florence, namely Management and Economics.

In this contribution, we propose a multidimensional latent class IRT model for the analysis of ordinal responses subject to nonignorable missingness. To this end, we extend to the ordinal response case the model introduced by Bacci and Bartolucci (2015), based on the assumption that two main types of latent traits control the observed response process and the missingness process: (i) latent traits (in general, more than one) which represent the abilities measured by the test items and (ii) latent traits (in general, a single one) denoting the tendency to provide a response on the test items. In our approach, exams are treated as items and we assume that a latent variable denoting the ability of students in Business Economics affects both the observed exam result and the fact of not observing a result, because the student did not take the exam. Besides, this latter element is also affected by an unobservable tendency to attempt an exam, which represents a sort of individual propensity to risk. Both latent variables are assumed to have a discrete distribution: in this way, it is possible to allocate students in homogeneous latent classes of ability. Moreover, the model allows for individual covariates. Model fitting is performed by means of an ad hoc EM algorithm.

Keywords: EM algorithm, multidimensional IRT model, non-ignorable missing, not at random missing, university student career

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Exploring the impact of differential item functioning items on Rasch measures

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An item shows differential item functioning (DIF) when something about the characteristics of a subject interferes with the relationship between his/her ability and item response. Formally defined, an item displays DIF if subjects of equal ability, but belonging to separate subgroups of the population, differ in their performance on that item. DIF can be classified as uniform (UDIF) and nonuniform (NUDIF). The aim of this study is to verify in what situations the impact of the presence of responses to DIF items in data used in the estimation procedure is strong enough to originate a significant biasing effect on the accuracy of the ability estimates. In order to achieve this aim, a simulation study is performed. A detailed description of the simulation design can be found in Golia (2015). The tools utilized in the study are the two-sample Kolmogorov-Smirnov test (K-S test), the absolute difference (AD) and the root mean square error (RMSE). On the basis of the results obtained with the simulation study one can conclude that when the questionnaire includes only one DIF item, regardless of the type of DIF, there is no evidence of a biasing impact of that item on the ability estimates, whereas when the questionnaire comprises more than one item showing DIF, particular types of DIF could have a more serious impact than others. When there is evidence of a substantial biasing effect on the estimated abilities due to the presence of DIF items, this biasing effect mainly affects the focal group members who, in general, get more biased ability estimates than the reference group members. Moreover, not only the type of DIF, but also the number of DIF items has an effect on the ability estimates. The finding of the previous study are used in the evaluation of the impact of DIF on the items that form a questionnaire devoted to measure the self-efficacy perceived by a sample of Italian social workers. A detailed description of the questionnaire and its analysis can be found in Golia and Pedrazza (2014). The final scale comprises 8 items on a 7-points scale. In order to verify if the test questions are fair with respect of some population characteristics of interest, such as age, type of employment contract, type of service and working years, a DIF analysis is performed. With reference to the age, two UDIF items are found with a negligible level of DIF. With reference to the type of employment contract, two items with non negligible level of UDIF are found, nevertheless the DIF is balanced, so one can conclude that they do not compromise the quality of the estimated measures. One considers the type of service, only one UDIF item with a negligible level of DIF is found. With reference to the number of working years; two UDIF items are found, but only one has a non negligible level of DIF so one can conclude that this item does not compromise the quality of the estimated measures.

Keywords: Uniform and Nonuniform Differential Item Functioning, Social Worker's Self-Efficacy

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The student university experience in graduand perspective: a multilevel Rasch approach

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During the last decade, the Italian Higher Education assessment has become more and more a crucial matter. In order to improve the quality of the University System, several reforms over time have regulated the monitoring of teachers and students performance, their assessment of the teaching activities at the end of each course and, just for students, at the end of their academic experience. Main goals concern the constant monitoring and improving of the university, Study Programmes, and single courses, paying attention on students' opinions.

This paper focuses on the assessment of the university experience in the perspective of those students that are graduating.

In most of the Italian universities, graduands have to complete a very detailed questionnaire about their experience at university. The questionnaire is administrated online by the ALMALAUREA consortium and it is structured in several parts. Section D is devoted to collect graduands opinions about several aspects of the attended Study Programme, including a general assessment of teachings, services, and facility. Usually, universities spread a technical report based only on the distribution of the answers, each academic year. The aim of our work is to analyse deeply the 'satisfaction' of the students.

Item Response Theory is a useful methodology that include several different models, such as the Rasch model family. It is very useful in managing ordinal data in a metric way, in detecting the students satisfaction and the ability of the set of items to measure properly the latent variable of Study Programme "quality". Obviously, the definition of quality of the Study Programme is a very big issue and this paper does not aim to define it. In our work, the "quality" can be considered as "satisfactory" in student perception.

The reported analysis is just a first step, due to the size of the data set. In fact, data refer to the questionnaire filled in by the graduands in 2014 at University of Palermo (Italy). It consists of 7721 records (questionnaires/students) and 391 variables. The correlation structure of the data suggests a multilevel approach due to different nested possible aggregation of the questionnaires/students (they can be grouped according to the Study Programme, the Study Programme level, the faculty, the group of faculties that are administrated together, and the university). In addition, items should be grouped by the aspect of the Study Programme that they are sharing (e.g. items that are pertinent to the facility, to the supplied services, to the teaching, etc.). Therefore, our attention initially is devoted to the first level degree courses of the faculty of Economics. One the goals is to study the pertinence of the adopted model: a multilevel Rasch model. Moreover, Differential Item Functioning is investigated too, taking into account gender, age, graduation status (on legal time or out of legal time), and the residence (out of town or not) of the students: some of these aspects could affect their university experience and then their opinions.

Keywords: Rasch, multilevel, graduand satisfaction, DIF

Wellbeing and stress in helping professions

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The aim of the survey on nurse-patient relationship is to study the nurse-patient relationship taking into account the nurses' personal feelings of comfort with touch in their daily activities, their competence and ability to provide caregiving, their well-being at work and their affective commitment to the hospital. It was carried out in 2014, involving 570 nurses working in North East Italy. This study considers the following eight variables: anxious and avoidant attachment style, self-efficacy in emotions regulation, self-efficacy, altruistic and self-serving caregiving, burnout and affective commitment to the hospital. For each scale, a measurement is obtained making use of the Partial Credit Model, which is a model belonging to the family of the Rasch models. The final scale for the anxious attachment style consists of 10 items on a 5-points Likert scale and the aspect that most easily generates anxiety is self-doubt and fear to lose others' approval. Taking into account the avoidant attachment style, the final scale consists of 7 items on a 5-points Likert scale and its average measure equal to -0.768 suggests that the nurses are not dismissive. Moreover, the aspect that most easily represents an avoidant attachment is others' intrusiveness and lack of trust. The emotional self-efficacy final scale consists of 6 items on a 6-points Likert scale and its average measure is 0.537, suggesting that the nurses score high in self-efficacy's perception in emotions regulation. Moreover, the most difficult aspect to overcome is the irritation toward unfairness. The perceived general self-efficacy final scale consists of 5 items on a 6-points Likert scale and its average measure is 0.963, suggesting that the nurses perceive themselves as effective and efficient. Moreover, the most difficult aspect to overcome is the capability to iron out thorny issues among colleagues.

The altruistic caregiving behaviour final scale consists of 6 items on a 5-points Likert scale and its average measure is 0.690, indicating that the nurses have a positive altruistic caregiving behaviour. The most difficult aspect is the capability to help a suffering patient. Considering the self-serving caregiving behaviour, the scale consists of 5 items on a 4-points Likert scale and its average measure is -1.116, indicating that the nurses do not have a self-serving caregiving behaviour. Moreover, the easiest negative behavior refers to the incapability to notice a request for help. The burnout scale consists of 5 items on a 5-points Likert scale; the most difficult aspect to agree with is the feeling of depletion felt at work.

The commitment final scale consists of 5 items on a 5-points Likert scale and its average measure is 0.855, indicating that the nurses have a high level of commitment. Moreover, the most difficult aspect to agree with is sharing the problems of the hospital. These eight measures have been standardized and used in the second step of the analysis, that is to find causal relationships between these psychological dimensions. In order to do that, a causal model has to be identify. It is specified in two parts: a statistical model and a causal graph, called Directed Acyclic Graph (DAG). DAG can be learned using the constraint-based or a score-based approach. In this study the score-based algorithm GES is used. The resulting DAG highlights a model of adjustment in helping professions: insecure attached subjects easily feel emotional exhausted facing distress at work and exhibiting a form selfish caregiving. Altruistic caregiving sustains general self-efficacy and self-efficacy in emotional regulation.

Keywords Partial Credit Model, Directed Acyclic Graph, nurse-patient relationship

Modelling the dependence in multivariate longitudinal data: an application in health and social services

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The aim of the work is to propose a new flexible way of modeling the dependence between the components of non-normal multivariate longitudinal-data by using the copula approach.

The presence of longitudinal data is increasing in the scientific areas where several variables are measured over a sample of statistical units at different times, showing two types of dependence: between variables and across time. In order to account both type of dependence the proposed model considers two levels of analysis.

First given a specific time, we model the relations of variables using copula. The use of the copula, allows to relax the assumption of normality.

In the second level, each longitudinal series, corresponding to a given response over time, is modelled separately using a pair copula decomposition to relate the distributions of the variables describing the observation taken in a different times. The use of the pair copula decomposition allow to overcome the problem of the multivariate copulae used in the literature which suffer from rather inflexible structures in high dimension.

The result is a new extreme flexible multivariate longitudinal model, which overcomes the problem of modelling simultaneous dependence between two or more non-normal time-series.

The exposition of the methodology is accompanied and motivated by the analysis of real data in health and social services.

Keywords: multivariate longitudinal data, copula, pair copula

Self-efficacy and work-related stress: a SEM approach to measure the subjective quality of work in the social services

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The idea of self-efficacy is not new in literature, but since the mid-2000s we have witnessed a remarkable expansion in psychometric literature, mostly in the evaluation of the quality of work. At the same time, the issue of work-related stress has become central in the debate on health and safety at work, having been identified as one of the risks to be measured according to the European Framework agreement on work-related stress, and subsequently taken over by national legislation.

In 2014, the DMS StatLab of University of Brescia, conducted a survey on the quality of work attended by more then 1000 workers of an Italian Municipality. The issues to be considered were multiple, among them a large section has been dedicated to the evaluation of these two themes. Since the sample of respondents was very varied in terms of assignments and relationship with public, for what concerns the work-related stress we tried to investigate very diversified behaviours and aspects. Conversely, to evaluate the self-efficacy we used only one scale and we chose the one proposed by Pedrazza et al (2013).

For the analysis phase, we applied the Structural Equation Models. The objective is to build some indicators of work-related stress and self-efficacy, whose estimates could be used for clustering of workers.

As a first step, we estimated two separate models, by referring to the whole sample of respondents.

Afterwards, we deepened the analysis by referring to two groups of social workers included in our survey: nursery teachers and police officers. They represent two sectors of the public administration which are in strong contact with users and that are daily subjected to strong sources of stress (although very different in the two areas). Focusing on these two categories of workers, we considered whether their level of interaction with users and the sense of perceived danger could influence (or be influenced) by the level of perceived self-efficacy.

In the last step of the analysis, we clustered our sample according to the different estimated levels of efficiency and stress. The goal was to identify groups of workers facing particular stress levels or particularly low valuations of self- efficiency. This can be useful to the administration to plan interventions in support of these workers or to set up training programs to improve the personal perception of each individual with respect to these themes. The results deserve some further discussion.

Keywords Self efficacy, Job stress, Social workers, Structural Equation Model

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Corporate social responsibility and citizen satisfaction analysis in the public administration of the BAT district

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Purpose of the research

The Corporate Social Responsibility relative to the services offered by BAT district, comes from the need to measure the perception of citizens about the offer and the improvement of local services. One of the main problems related to social reporting in the public sector now is linked to the difficulty of defining an optimal system for measuring social responsibility (lack of data and social management system). In the Bat district we have observed the will to adapt the quality of their services to European standards and direct their development policies towards greater sustainability. In this way the province has conducted a three-year customer satisfaction analysis to assess the sustainability of their actions in the social, economic, institutional and environmental area. This survey was based on using a set of indicators identified by the EU as part of the research project European Common Indicators (ECI), coordinated and managed by Ambiente Italia (Research Institute) and funded by the European Community in order to assess the environmental sustainability of the work of the Public Administration. Although the investigation has offered several points for assessment, even beyond the terms of sustainability, however many aspects and many dimensions (because under the model of indicators) may have remained latent and unexpressed in the large amount of data collected. This condition is the theoretical assumption behind a statistical tool based on Structural Equation Model (MES) that combines the need for measurement of aspects not directly observable, such as satisfaction, and the opportunity to study the interrelationship between the variables defined.

Methodology

The Structural Equation Model provide a simplified representation of the real processes and graphics based on the multiplicity of causes acting on the dependent variable, but also the relationships between the different causes. This model seeks to address essentially to two questions: the measurement and causality. The structural equation model can be represented graphically by the Path Diagram, showing the causal relationships between the latent variables and the construct of reference. The model explores the causal relationships, represented by arrows oriented, between the latent variables , represented by circles . Path diagram in the overall satisfaction of citizens is referred to as Citizen Satisfaction Index (CSI) and its measurement is linked directly from the remaining seven aspects investigated by the Province. This model assumes that the CSI is measured by direct questions relating to satisfaction, yet also by questions about other aspects measured.

Main Result

The MES model defined the indicators of satisfaction of multidimensional nature, while defining a measure of the average score of satisfaction with various aspects and also their defined level of importance on the basis of public perceptions. This approach allowed to construct maps of the interventions in order to jointly assess the impact and the importance of growth factors in the BAT district.

Keywords: corporate social responsibility, citizen satisfaction index, social assessment, social services

Ordered Correspondence Analysis to Evaluate Sensory Data

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Taguchi's statistic has long been known to be a more appropriate measure of association the dependence for ordinal variables than to the Pearson chi-squared or Goodman-Kruskal tau statistics.

There are two advantages that make Taguchi's statistic a more appropriate measure of association. Firstly, the Pearson statistic (or Goodman-Kruskal Statistic) does not adequately take into account the ordinal structure of a variable while Taguchi's statistic does by considering cumulative cell frequencies.

Secondly, Taguchi's statistic is more suitable in studies where the number of categories within a variable is equal to, or larger than, 5.

The aim of this paper is to consider the Cumulative Correspondence Analysis in order to analyse a contingency table with an ordinal categorical variable. The data concerned the preferencies for black olives and are presented as counts on categorized liking scale. In particular, we have considered the case in which there is an asymmetric relationship between two categorical variables used as predictor variables (Urbanization and Region) and a ordinal response variable which is categorized into six ordered classes.

Keywords: Ordinal variable, Correspondence Analysis, Cumulative Correspondence Analysis, Taguchi's statistic, Singular Value Decomposition

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Orthogonal Multiple Co-Inertia Analysis in presence of ordinal categorical variables

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The data obtained in experimental as well as in observational situations could lead to different subsets of variables observed on the same set of units, and the multidimensional data analysis methods look for visualizing and understanding the relationships among them. This is achieved by the assumption that the observed data can be explained by a not directly observed small number of latent variables underlying the phenomena.

The observed sets of variables can be classified according to the symmetrical or asymmetrical role played in the analysis. In this dependence framework, where some variables are logically antecedent to the others, the asymmetrical relationship between two sets of quantitative variables has been studied in the multivariate regression approach by Rao (1964). In the meantime, the analysis of the dependence structure among two sets of quantitative variables, have been properly studied also by the covariance criterion which takes into account not only the correlation among variables but also the “inertia” of each variable. This aspect can improve the understanding of the relationships. We also highlight that the covariance criterion is at the basis of the Partial Least Squares regression method (PLS).

Vivien and Sabatier (2001) proposed an extension for the PLS method called Orthogonal Multiple Co-Inertia Analysis (OMCIA-PLS). This approach allows a "global" modelling of several data sets measured on the same individuals. The optimization of the covariance based criterion that is proposed for OMCIA-PLS amounts to resolving usual PLS providing extra objects and help to interpretation. In OMCIA-PLS it is anyway often necessary consider the nature of the data because we can have the concomitant presence of quantitative and categorical variables measured at different scale levels (interval, nominal or ordinal). It is necessary then to transform non-quantitative variables in such a way that they can be analyzed together with the other variables measured on an interval scale. Moreover, data relative to the quality perceived by a service or a product have often an ordinal scale. The problem is that all these kind of data are not directly comparable (Green, Tull, 1988). This aspect is often ignored, but, if there is not a transformation in the data, also the use of a simple index is not applicable, because the ordinal scale is only a preference ranking. In these circumstances it is then necessary to determine a criterion to convert on a metric scale ordinal measurements. There are different techniques that allow to obtain new scores for ordinal measurements. One of the most used is the psychometric approach of Thurstone (1999). This approach assumes the presence of a continuous underlying variable for each ordinal indicator. In this paper, according to this quantification criterion, we consider the empirical distributions of the variables involved in the analysis. If we have high frequencies on the first or the last modalities then it could be more efficient using the standardized exponential distribution instead than normal one, fitting better the data in this way. This leads us to suggest a mixed quantification based on all these theoretical distributions.

Keywords: Orthogonal Multiple Co-Inertia Analysis, Partial Least Squares Regression, Ordinal Categorical Variables, Quantification

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A visual mining approach for evaluating the Italian wine quality

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Assessing the wine quality is a challenging task due to the multifaceted nature of such a concept. Indeed, subjective valuations and objective features are mixed together in order to get fair judgments and effective ranking of wines. In order to assess the wine quality, chemical and sensory tests are commonly used. These tests usually collect a relatively high number of variables among which some certainly play the role of key factors underlying the essence of the wine quality. It is then extremely important to identify these fundamental attributes, since they can lead to significant improvements in the understanding process of the wine quality.

Using a data mining approach, in this paper we inspect the quality of Italian red and white wines trying to identify which of the sensorial and chemical-type variables have a major impact on it. In detail, we analyze the dataset used by Altroconsumo, an Italian independent consumer's association, obtained joining the data used for the Guida Vini from 2006 until 2012, containing 2031 wines grouped using a hierarchical cluster analysis based on sensorial variables. In this way we obtain a dataset with a hierarchical structure (wines in each group are homogeneous) and we try to predict the Global score of quality attributed by Altroconsumo to each wine, also identifying which variables have a major impact on it. To do this, we use an ensemble learning algorithm, called CRAGGING (CRoss-validation AGGregatING), well suited for data with hierarchical structure. Moreover, we extract a synthetic model from the ensemble (the Final Regression Tree) and we visualize what happens inside each terminal node using the heat maps.

Keywords: Heatmap, CRAGGING, Final Regression Tree, Cluster Analysis, Chemical and Sensory Analysis

"Teaching Statistics: ideas and tools": an initiative to support the teaching of Statistics for high school teachers in Tuscany

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The role of Statistics in the Italian school curriculum has been strengthened over several years. From a teaching point of view, this is due to the fact that, Statistics plays a key role in the educational process involving young citizens in the knowledge society.

The opportunity to become familiar with tools and methods of quantitative analysis from the early years of compulsory education and the opportunity to improve statistical thinking gradually during the course of their studies, promotes the growth of a critical reasoning among young people. For this reason, teachers have to face the challenge of teaching with reference to complex objectives, far beyond technical or computational skills: they have to teach their students Statistics as a set of competences for the analysis and the interpretation of different contexts and as a strategic tool to support decisions at various levels.

Despite Statistics and probability concepts are now included in the school curriculum, few teachers have formal training or applied experience with statistical concepts. Effective teaching of Statistics calls for teaching materials available in a standard format and guidance toward activities that are appropriate for students' maturity levels. Moreover, teachers need the ability to select relevant, useful, and meaningful applications. There is thus a need of resources to support teachers in their efforts to master the content and incorporate it into their classrooms.

In Tuscany several institutions have been active for years in the promotion of statistical literacy in the school system. Over recent years, the Department of Statistics, Computer Science and Applications "G. Parenti" of the University of Florence (DiSIA) realized initiatives for students and teachers, to promote Statistics as a knowledge tool for study and for an in-depth understanding of the territory. Istat, territorial office for Tuscany, promotes statistical literacy at a regional level, paying particular attention to younger generations and to the school system. To give new impetus to the educational system, in the school year 2014-2015 DiSIA and Istat, territorial office for Tuscany, jointly organized a training course for high school teachers, with the aim of proposing new teaching strategies and innovative tools, in order to support high school teachers facing the new challenges in teaching, in line with the guidelines provided for teaching Statistics in the new school curriculum and following international standards (Franklin et al., 2007; Conference Board of the Mathematical Sciences, 2010). The purpose of the present paper is to illustrate the initiative: objectives, contents and organization, and to present its main results and future developments.

Keywords: Teaching Statistics, Statistical Literacy, Effective teaching, Teaching support.

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MERLO project: a new tool for education

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MERLO (meaning equivalence reusable learning objects) is an international project, which involves experts in different fields from Canada, Israel, Russia and Italy. It focuses on a new pedagogical tool, which is based on shared meaning of semiotic representations in different sign systems. MERLO was developed, tested, and evolved since the 1990s by Uri Shafrir and Masha Etkind at Ontario Institute for Studies in Education (OISE) of University of Toronto, and Ryerson University in Toronto, Canada. Although MERLO was born into a different context, it is well suited for Mathematics and Statistics education: indeed many scholars, such as Duval, highlighted the importance of semiotic systems of representations and their coordination, as fundamental to learning in order to grasp the underlying meanings and to access to more abstract objects of knowledge.

The main research purposes to apply the MERLO approach to the teaching and learning of Mathematics and Statistics in the institutional context of Italian secondary schools. In particular, the objective is to provide teachers with new methods for teaching and exploring deep understanding of quantitative concepts, and to provide students with tools to determine their level of comprehension in formative assessments. In accordance with this, the research was carried out at two levels: a first level focused on teachers' training, and a second level involved experimentation with students.

The focus in this talk is on the Italian research experience in the area of Mathematics and Statistics education developed at the University of Turin and involving both researchers and teachers from secondary schools. This research experience is contextualised in a Master programme for prospective teachers educators, held at the University of Turin, Department of Mathematics. It involves Italian in-service teachers as practitioners and a group of 7 teacher-researchers. They worked together with researchers in order to improve the design of MERLO activities, which were classified into four main conceptual nodes (numbers, geometry, relations and functions, data and predictions) and into sub-concepts typical of the Italian curriculum. The MERLO activities produced by teacher-researchers of the group were tested with their colleague following the Master and then with students at their school. The research experience in the class is part of a national programme, called Piano Lauree Scientifiche (PLS). It was born in 2004 from the collaboration among the Ministry of Education, the National Conference of Headmasters of Science and Technology University Faculties, and Confindustria, with the aim of promoting the cooperation between schools and University and of orienting students towards scientific choices at university.

The presentation consists of an analysis of some research results and a presentation of meaning equivalence reusable learning objects (MERLO). The analysis of the results obtained from the experiment conducted in the Master programme context and at schools allows comparisons about concepts and between teachers and students. This kind of discussion involves statistical elements and provides an opportunity to talk about Statistics in an alternative way.

Keywords: MERLO, formative assessment, teachers professional development, mathematics and statistics education.

Statistics and probability in Invalsi tests

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It is about 14 years that INVALSI (National Institute for the Evaluation of the Educational System) organises standardized tests to evaluate the level of competences of Italians students at different school levels and with reference to different subjects. This paper deals with "Data end predictions" competences that in the Italian curriculum, but it is the same everywhere, are seen as part of the so called "mathematical literacy".

In particular the items proposed by the INVALSI tests are examined across time (from 2009 to 2014) and across school levels 2nd, 5th ,8th and 10th) to show the kind of questions proposed to students with the view to give an idea of the fundamental statistics and probably concepts covered by the test in time. The rate of correct answers are presented too along with the level of IRT parameters (Discrimination level and Item difficulty) to see the level of difficulty students have to face when replying the tests.

The attention focus on what topics have increased the frequency during the last tests the and how the questions change in type and in the cognitive process requiring to be solved (from literacy to reasoning to thinking). It is important that statisticians are fully aware of the type of questions presented in the INVALSI tests. They have to check that the items are correct, interesting and effective, and last, but not least, in accordance with the main pedagogical issues of Stat. Ed. Literacy and research at international level.

Keywords: Statistical education research, Statistical competences, INVALSI tests, IRT models

Statistics for Under 21

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Statistical literacy, defined on a worldwide scale as the skill of understanding and correctly using statistical data, may help people to become full citizens in the information age, i.e. individuals able to read and critically evaluate data and statistical information. This is even more important in our society, in which the daily stream of information has never been faster than nowadays, especially due to the extremely rapid development of the web.

Young people represent the citizens of tomorrow and schools are the best way to reach them. Therefore, Istat works with teachers in order to:
a) better understand the problems they usually face in in-class teaching statistics;
b) develop learning and collaborative environments, sustaining statistical knowledge.

New technologies are obviously required in order to catch the interest of digital natives but also a change in the didactic approach is essential. Focus must be paid to cooperative learning, inductive method and learning-by-doing, in order to develop interesting and motivating didactic tools.

Keywords: Statistics literacy, Young people, Cooperative learning

Textual analysis and Customer Satisfaction analysis: a proposal for integration

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Textual analysis is a cutting-edge technique that is becoming prominent in customer satisfaction analysis. It has been widely developed in the field of web communication, but, in our opinion, it has a great potential in classic customer satisfaction applications.

In our work, we propose performing a textual analysis in order to study the new image communication approach of pharmaceutical companies that want access to the Italian market.

For the last few years, the pharmaceutical market in Italy has required stakeholder-oriented policies, aiming at communicating the value of products proposed to market. This innovative approach requires a new vision of market access activities, especially inside the company. In order to study the implementation of this strategy, we propose analyzing the perception of this change of direction amongst companies' employee and management.

We recorded the definition of market access given by the management and by a sample of Field Access Managers (FAM) of a big pharma company. Using textual analysis, we constructed perceptual maps of concepts used to define the market access policies of the company, and we positioned individuals on these maps in order to evaluate the differences in the perception of management and FAMs. Moreover, we provided a referral framework considering the definitions of market access given by literature.

The first component provided by textual analysis discriminates between strategic and tactic orientation. The management positions are in the middle, with few overlapping, between the strategic-oriented position of literature and the tactic-oriented position of FAMs, who are too far from the concept of value transmission.

The second component discriminates between the communicative and the normative attitude, showing a more dispersive positioning of both management and FAMs.

Our findings show that a distance exists between managerial and operational perceptions of company image. Our future research will strengthen our findings by taking into account an analysis of stakeholders' perception of the company image and its activities in market access in particular.

Keywords (Customer Satisfaction; Textual Analysis; Market Access; University advanced course)

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Latent Growth Curve Modelling for the analysis of longitudinal Customer Satisfaction

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Customer Satisfaction (CS) for banking services is, arguably, a construct that develops and changes over time for a number of different endogenous and exogenous factors (modification of customers contract terms, transparency of banking transactions and financial services, bank charges, customer relationships, changes of market conditions an so on). Despite valuable contributions in marketing literature have stressed the importance to study CS in a dynamic perspective, there are really few papers that deal with such topic. An analysis of longitudinal data, actually, would allow banks to monitor their positions more effectively, and would provide useful insights about how changes in customer perceptions on service performance affect its global evaluations of service quality. For these reasons, we propose a Latent Growth Curve Model (LGCM) for analysing CS, focusing our attention on the on the evolution of customers behaviour. LGCM is a statistical technique used in the Structural Equation Modelling framework for estimating individual growth trajectories observed over a period of time and it is particularly suitable in fixed occasions designs, where measurements are recorded for all individuals at the same set of times, usually regularly spaced. We performed LGCM analysis on a real case study: a Customer Satisfaction survey repeated three times on 27000 clients of an Italian bank. The submitted questionnaire was framed according to the system of measurement of service quality and all the items were measured by means of a ten points Likert scale, from 1 to 10. Due to privacy issues, it was not possible to match the data over time so a post-hoc segmentation was applied (Wedel and Kamakura, 1998 for a review) in order to create client profiles present in every wave and to reduce the number of entities into a manageable number of instances characterized by well-defined characteristics. The results obtained are really promising. Differences in baseline customer satisfaction are observed for some Employment position, Education, Age groups and for Gender. For example, about Job categories, the baseline satisfaction is significantly higher for Retired and Housewives but lower for Students, compared to the White-collars chosen as the reference category. Instead, regard Educational level, the baseline satisfaction is significantly higher for Middle school, Primary school and No title but lower for University degree, compared to High school chosen as the reference category. Such evidences highlights that, although the analysed segments react differently to stimuli to which they are subject, there is a clear sign of the changing needs which, if not recognized by the bank, could make it hard the future growth or even make it probable a decline in economic performance.

Keywords: Banking services, Customer satisfaction, Dynamic patterns, Latent growth Curve model, Latent variables

Semantics in support of decision-making: understand phenomena, develop strategies

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The Web is a huge virtual space where to express and share individual opinions, influencing any aspect of life, with implications for marketing and communication alike. Reviews and ratings on the Internet are increasing their importance in the evaluation of products and services by potential customers. Internet users often evaluate products or services online. Consumers tend to trust the opinion of other consumers, especially those with prior experience of a product or service, rather than company marketing. The influence of the Internet, especially via social networking, on people's purchasing behaviour has grown over the years. Monitoring the Social Media activities is a good way to measure customers' behaviour, keeping track of their Sentiment towards brands or products, of the impact of campaigns and the success of marketing messages, identifying and engaging the top influencers who are most relevant to the brand, product or campaign.

Given the relentless cascade of information on the Internet, in the last decade the field of automatic analysis of opinions has emerged, being not possible to keep up with the flow of new information by manual methods. Besides, being the most valuable information often hidden and encoded in pages which for their nature are neither structured, nor classified, nowadays everyone experiences a mounting frustration in the attempt of finding the information of interest, wading through thousands of pieces of data. The goal is always broadly the same: to know "who" is speaking about "what", "when" and in "what sense". The process of accessing all these raw data, heterogeneous both for source and language used, transforming them into information, is therefore inextricably linked to the concepts of automatic textual analysis and synthesis. Despite much progress in Natural Language Processing (NLP), the field is still a long way from a full Natural Language Understanding (NLU). In fact, understanding requires processing and knowledge that goes beyond parsing and lexical lookup and that is not explicitly conveyed by linguistic elements. Contextual understanding is needed to deal with the omissions. Ambiguities are a common aspect of human communication. Speakers are cooperative in filling gaps and correcting errors, but automatic systems generally are not.

This paper describes the methodology used to track the purchase drivers and resistances shown by users in the Health-care domain. Semantics can help analysts to cut through the information labyrinth, giving them the possibility to easily access all the potential comments of interest, to measure people's needs and habits, and keep track of their Sentiment about products. Concept extraction is applied through a pipeline of linguistic and semantic processes that share a common knowledge, guaranteeing a uniform interpretation layer for the diverse information conveyed in Social Media sources. All the conceptual descriptors and their relationships are visualised in a user-friendly graph: the Space of Concepts and their functional relationships are always represented as a network of visual elements that can be easily analyzed and interpreted, making possible to take account of complexity of public views.

Keywords - Natural Language Processing (NLP); Semantics; Sentiment Analysis; Opinion Mining; Social Network Analysis and Visualisation (SNAV).

Measuring the link between Customer Satisfaction scores and Financial performances

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The purpose of this study is to examine the relationship between Customer Satisfaction and company's financial performance. There are two main reasons why we believe this topic should be deeply investigated. Usually executives are interested in tangible changes to increase profits, therefore most of the times they will focus on operational levers and will neglect customer satisfaction ones, when sometimes they are easier and faster to action, and less expensive. During times of economic stress, relationships between customer and employee satisfaction, loyalty, and productivity become more critical since every single EUR spent will be challenged by the C-suite or the Board of Directors. Using the Service-Profit-Chain framework as a theoretical base, we will propose a statistical approach based on Structural equations to measure the links between a given Customer Satisfaction component, as well as the overall Customer Satisfaction score, and a set of financial KPIs, over time. Also, we will forecast the impact of Customer Satisfaction score positive and negative changes on the same set of KPIs. In the last years, many studies have shown and provided evidences of the relationship between a firm's overall customer satisfaction and operational and financial measures of performance. Researchers are mainly in the domain of accounting, operations management and marketing; given the different field of study those researchers have shown that customer satisfaction is linked to the company's financial and operation performances from divergent perspectives, which reinforce the point that the links are indeed there and strongly connected to the corporate performances.

Keywords: Customer Satisfaction, Structural Equation Model, Financial Performance

Corporate Social Responsibility Perception from a double perspective: Consumer versus Entrepreneur

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For some time business success has not been uniquely represented by the sharing of earnings with shareholders. The new demand is for organizations to include as well as economic results, those which are social and environmental. Consumer perception of corporate social responsibility (CSR) is determinant on the success of CSR practices and this perception is directly influenced mainly by individual value structures. However, few studies have analysed the influence of value structure on CSR perception by those who are consumers and potential entrepreneurs. To go deepen on that relation different questionnaires have been designed: a first questionnaire takes into account the social dimension of CSR while the second one includes the triple bottom line. The structural equation modeling approach has been applied to analyze the relation CSR and human values. The database consists of 1060 students on business who behave as consumer and potential entrepreneur. The main results of this study reveal which values influence more on the different dimensions of CSR. The moderator effect of gender on the relation human values and CSR perception do not reveal a great difference by gender on CSR perception.

Keywords: CSR, values, gender, consumer, entrepreneur.

The analysis of measurement models in Structural Equation Model: an application to socially responsible consumption

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The Structural equation model (SEM) is a statistical technique for simultaneously testing and estimating causal relationships among multiple independent and dependent constructs. In SEM framework, the focus of the research is mainly on the structural model rather than on the measurement model. This lack of attention has implication issues as construct misspecification, construct identification and construct validation. Starting from the most recent articles in terms of these issues, this research provides in the first part a review in terms of recommendations for formative and reflective measurement model. Particularly, we present a general framework that helps researchers to select and assess both formative and reflective measurement models with special attention for the statistical implication of the selected measurement model. In the second part, we present a survey regarding customer behaviours for Socially Responsible (SR) foods consumption. Particularly, we use a SEM to formalize the origins of behaviour regarding Socially Responsible foods consumption and detect the drivers of their purchase. In order to show the general framework proposed in the first part of the paper we point out our discussion on the measurement models used.

Keywords: Structural equation model, reflective measurement model, formative measurement model, partial least squares, socially responsible food consumption

Corporate social responsibility in the agri-food value chain: models of innovation in italian food industry

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In recent years a number of ongoing social, economical and institutional changes have progressively led, on the one hand, to the emergence of intricate competitive scenarios, and, on the other, to a more extensive role of the food industry in modern society. Two fundamental issues – the question of the environment and that of food safety – have prevailed upon the political and institutional scene, setting the conditions which have successively brought about significant changes in consumer demands and expectations, in policies, and in the strategies of enterprises and food processing systems.

Initially, in order to confront the environmental and social issues, steps were taken mainly in the institutional ambit. Norms and standards were introduced which the industries internalised as a added cost or bind that served to weaken their competitive potential. This took place in a scenario characterized by the emergence of new competitors who based their competitive edge on those very costs. Subsequently, in part due to the driving force of the European Union, a new phase began. The European Commission's Green Paper for Corporate Social Responsibility (2001), gave rise to an interesting political and scientific debate, which then led to the growth of a new collective conscience regarding the need for all the stakeholders in the economic system to adopt behaviour which was both socially aware and responsible. A new ethos of doing business has now been established. By introducing models of technological innovation which partake of the green economy, the food industries have voluntarily integrated concerns for the environment and food safety within their economic and productive activities, from the viewpoint of new, high-value methods of production.

Along these lines, in this paper, the food industry is (re)interpreted as a network of value-producing governance structures (multi-value enterprise) introducing ethical market opportunities, which represent a strategic competitive factor in advanced economies.

This paper aims to contribute to the theoretical debate agricultural economics by focusing the attention on the theme of corporate social responsibility. Although traditionally this was the object of business studies, the present-day evolution of society and of the markets places it at the very centre of the analysis of competitive re-positioning strategies, even in modern farms and food industries. This objective has allowed us to define new interpretive models for the food industry, and to extend the paradigm of 'value portfolio' (Marotta, Nazzaro, 2010, 2011) to this sector.

This theoretical model has been validated at an empirical level by means of an evaluative analysis of the sustainable and socially responsible innovations adopted by the Italian food industry. The empirical investigation was carried out by means of detailed analysis of case studies, taken to be representative of models of sustainable and responsible innovation and by means of in-depth interviews with managers of food industries and focus groups involving other actors belonging to this sector.

The findings represent a significant advancement of theoretical and application knowledge in the analysis of models of value production in the food system.

Keywords: social responsibility, value chains, food industry

Jel Classification: M14, Q13, Q18, Q55

Evaluating the Erasmus experience: evidence from students of the University of Bergamo

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Over the past 25 years, in most of the Italian and European universities, there has been an increasing emphasis in all activities related to internationalization. These activities have gradually increased in terms of number of students and teachers involved; they have become more complex and now cover many aspects of higher education. In recent years, even the University of Bergamo has aligned, making internationalization one of the main guidelines for its future development.

Following this line of interest, we have conducted an on-line survey addressed to students with credit mobility experiences. We prepared a questionnaire structured according to the following three main sections: i) Why spend a period abroad; ii) During the period abroad; iii) Coming back to Bergamo. We asked the students of our university to answer on the important choice factors to decide to study abroad and to decide the host country / university. They were required to compare the experience abroad to previous experience in their home university in terms of teaching and assessment methods, and average exams score. Finally, the respondents were asked to evaluate the impact of studying abroad on communication skills, ability to work in team and so on, and to judge the fulfillment of their expectations.

The aim of this contribution is to analyze how students evaluate the experience abroad, with particular attention to language difficulties encountered, the comparison between the teaching and assessment methods of the two universities (home and host). We also focus our attention on the answers related to the coming back: the realignment with the course of study, the change in relationship skills, language skills and work in team.

The questionnaire was sent to 1300 students of our university with credit mobility experiences (for an Erasmus and/or Exchange extra EU Program) in the last 6 academic years (from 2008/09 to 2013/14). After more than one reminder, the response rate is about 50%.

The analysis of the survey's results shows that most of the respondent students were satisfied by the experience abroad. In particular, it seems that the Erasmus and/or Exchange experience has been important not only to improve the characteristics related to the student's curriculum, but also to develop interpersonal and intercultural competences and, in general term, to grow as an individual.

Keywords Student mobility, Questionnaire, Variables' mapping.

Proposal of indicators for the evaluation of scholastic institutions

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In order to improve the quality of training and learning, every school has to implement a self-evaluation process, through which to identify the strengths to maintain and/or strengthen, as well as the critical elements in relation to which realize improvement actions. Such process should not be considered statically, but as a stimulus to continued reflections, with the involvement of the whole school community. In this aim, the survey's instruments here are four questionnaires: teachers (administered to all teachers of the school), ATA (administered to the whole non-teaching staff of the school), parents (administered to one of the parents of enrolled students who are attending) and students (administered to enrolled students, attending the 2nd and 5th classes).

This work aims to build indicators that are intended to clarify the qualitative characteristics related to specific content in the macro-areas of intervention identified by the Ministry of Education (called Context, Outcomes, Processes), in order to allow schools to make an overall self-evaluative judgment. Such indicators are built by means of multivariate statistical methods, i.e. factorial analysis. In order to assess their effectiveness and sensitivity, the indicators are tested on two secondary school degree (IISS "Marco Polo" of Bari and ITE "Vitale Giordano" of Bitonto), by using different questionnaires testing the same aspects suggested by the Ministry.

Keywords: Indicators, Education, Self-evaluation, Factorial analysis

Analysis of student mobility in the Italian universities. Comparison between catchment areas

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The Italian university system has been subjected to major regulatory review processes in order to optimize the educational program with respect to the changes in the working world, inducing changes in the behaviour of the student population, as well as the intensification of the competitions among different univer-sities. The present work starts from a brief representation of the national student mobility, given the choices of students in terms of educational sites compared with the province of residence. The comparison between catchment areas of universities makes possible to define universities "attractive" and territories “attracted”. The indicators of continuing the tertiary studies, of staying in the own province and the mobility in the input and output, allows the definition of thematic maps useful to summarize the interprovincial mobility in addition to the resources offered by universities in the province.

Keywords: Student mobility, Demand and supply for university education

A survey on the local public transport in Bari and Bologna

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Ensure the quality of services provided is the priority for private organizations and should also be the same for public companies and institutions. In recent years the public sector has undergone many changes both for regulatory reforms, both in the changing expectations of the citizens: they no longer suffer passively choices of the administration, but have ambitions to suggest their own point of view in order to improve the quality of services. The desirable solution would see the government ready to capture the needs perceived by its users, in order to provide a service more suited to meet the needs of more diverse citizens. Therefore, customer satisfaction plays a strategic role for companies providing a public service, as the cornerstone to reach the citizen loyalty.

With respect to the service of local public transport, in this work we tried to figure out the value given by a satisfied citizen. The effects are immediate, as positive image, increase in sales revenues, cost reduction: in general, these consequences are of key importance and it is equally interesting, in order to fully appreciate the positive effects, taking into account the consequences from the opposite situation, i.e. customer dissatisfaction: the effects are the direct economic costs due to inefficiency and loss of dissatisfied customers, but the worst consequence is the effect generated by a negative word of mouth that causes mainly damage to reputation and corporate image, as well as to the whole city in which a service of public transport wouldn't satisfy the citizens.

The survey carried out on satisfaction has been developed through the analysis of questionnaires administered in two major Italian cities: Bari and Bologna. The processing of these data made an interesting user segmentation according to the perception of service quality of local public transport offered by the respective municipal utilities. This was made possible through the multivariate data analysis, examining in depth the characteristics of the citizen-users sampled. Another objective of the survey was to estimate the amount of users acquired by public transport to the detriment of private one. This assessment, as well as the importance in itself, is necessary for a more thorough application of cost-benefit analysis and then to evaluate the economic viability of an investment in these systems, considering that the migration out of the urban centers, the increase in the number of cars and the faster movements that have given rise to scattered urban structures, which, in turn, produce higher volumes of motorized traffic. Since transport issues lie at the heart of urban development policies, a sustainable transport policy should consider them in its local action planning. At the same time it is necessary to introduce specific organization methods and innovative technologies in terms of energy saving and environmental protection. It is therefore crucial to raise awareness on the impact of the people's choices of transport on the quality of the urban environment.

Keywords local public transport; customer satisfaction; statistical analysis

Measuring the well-being of staff of the University of Bari

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The Internal evaluation organ of the University of Bari, under art.14, paragraph 5 of D.lg 150/09, produces annually surveys on staff to detect the level of well-being and the degree of sharing of evaluation system, as well as the detection of assessing the hierarchical superior by staff.

The present work aims to illustrate the results of the survey on the well-being of the administrative staff of the University of Bari. Such survey was carried out using the model proposed by ANAC/ CIVIT. One of the objectives of the data analysis is to identify the areas of improvement of well-being and to set priorities for action through a summary representation of the positioning of the various welfare indicators within a map – so-called "map of priorities".

Through the use of binary segmentation trees you want to verify the influence of the explanatory variables on the overall level of well-being, measured through a synthetic indicator weighted so that each size/scope a weight proportional to the importance attached by staff.

Keywords: Organization well being; Anac model; Segmentation trees; Priority map

Models of governance and analysis of the efficiency of city cleaning service in the italian provinces

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The increase of always more complex necessities and the progressive evolution of the societies together with their underlying dynamics have modified the role played by Public Administration, which is nowadays responsible for providing fundamental services in the life of any individual-citizen.

This change has involved the need of Public Administration to evolve and rethink its own organizational structure on the basis of the principles of cheapness, efficiency, effectiveness and transparency in the same manner as a real private company.

The purpose of the present study is to analyze how municipal administration manage the collection and the removal of urban rubbish.

Phases of the study:

measuring the ability to manage the Local Public Service of collection and management of rubbish by means of the official websites of the country seat;

analyzing the efficiency of the most spread typology of society in order to have a rank of the municipalities which have provided the best service in relation to the cost.

The analysis of efficiency is carried out with the DEA method (Data Envelopment Analysis), which is not flexible parametric and can be used to analyze and measure the performances of multi input/output processes.

The aim of DEA analysis is to identify, in a determined set, the most efficient companies with respect to the production input/output. The most efficient companies will therefore be considered as the best practices in that sector and it will be possible to calculate the index of relative efficiency for the other companies as well.

Thereafter, the input oriented methods will be used to calculate the allocative efficiency by using as input measure the operating costs and as out-put measure the amount of collected rubbish, the recycling and the entire population: the final objective will be to understand whether, on the basis of the technology and given a determined level of output, it is used the exact combination of input which allows to minimize the relative costs.

Keywords: Cleaning service; DEA method; Urban rubbish

Subjective component is essential for the well-being definition?

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The aim of the paper is to contribute to the international debate on "going beyond Gross domestic product (Gdp)", looking for the adoption of further indicators, in addition to GdP, to measure equitable and sustainable well-being. Recently, the debate on how to measure the well-being, both for individuals and societies, has been an important issue for policy makers and public opinion. The changings of the last years (in life styles, economy, energy, environment) have pointed out the necessity to develop new statistical measures capable of guiding decision-makers, firms' and citizens' behaviors.

The statement is that economic parameters alone are unsatisfactory / inadequate to evaluate societies' progress and "should be complemented by social and environmental information and by measures of inequality and sustainability" (Istat-Cnel, 2014).

In Italy, the project "Equitable and sustainable Well-being" was born by a joint initiative of National Council for Economics and Labour (Cnel) and the Italian National Institute of Statistics (Istat) and it's still available to receive researchers' contributions to properly define the Well-being dimension. Well-being dimension is actually composed by 12 areas: Health, Education and training, Work and life balance, Economic well-being, Social relationships, Politics and Institutions, Security, Subjective well-being, Landscape and cultural heritage, Environment, Research and innovation, Quality of services. The dimensions are measured by way of 134 indicators in total, whose data come from different but official sources.

In the first part, the paper deals with some remarks about the objective and subjective indicators belonging to the set. Then, we verify if the subjective component is important for Well-being definition: we add and remove the subjective indicators by the set, to test the changes in the model. Through multivariate techniques, we demonstrate that subjective indicators are essential to complete the dimension of Well-being.

Keywords: Well-being, multivariate tecniques, synthetic indicator

Quantitative methods for assessing the differences in income among ethnic groups in Romania

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The differences in income among three ethnic groups (Romanians, Hungarians and Rroma) in Romania are assessed in the paper. The three ethnic groups actually account for 92.65% of the total population of Romania.

In order to analyse the differences among these three groups, quantitative models that point out the influence of various socio-economic characteristics are taken into account. In conducting the study, exhaustive data for the persons who, according to the tax returns completed, received a salary income ranging from 800 lei to 8000 lei in January 2013 were used. Ethnic Romanians, ethnic Hungarians and ethnic Rroma represent 91.55% of the total number of persons whose income ranges from 800 lei to 8000 lei. The socio-economic characteristics of the persons were recorded in the framework of the 2011 Population and Housing Census (2011 PHC).

The difference in income was broken down using the following methods: Oaxaca (1973), Reimers (1983), Oaxaca and Ransom (1994) and Cotton (1988).

The results obtained show us that the differences in income between Romanians and Rroma, on the one hand, and between Romanians and Hungarians, on the other hand, are due to the different demographic profiles of the groups compared. The results of the study indicate that between Romanians and Hungarians there are no significant differences in the income received.

Keywords: ethnicity, income inequalities, quantitative methods, Romania

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Statistical approaches to estimate sectoral economic performance in complex units

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The statistical estimation of the value added of the leading business groups in Europe and of large complex units (inclusive of foreign branches) could in the near future become a method or a source for the preliminary estimates of GDP at European level, or to be used for the further development of existing indicators of European growth. The legal forms by which an enterprise can settle abroad are mainly three: the representative office, the permanent establishment (or branch) or a new company. In the latter case, enterprises can opt for a corporation, a joint venture or a partnership, with different methodologies of calculation for economic variables. At the European level, there is a small number of foreign-controlled enterprises, but their contributions to economic performance are high in terms of turnover, value added, employment. However, it is often challenging to produce such data, because in standard accounting formats the distinction between national and foreign activities is not always requested and provided. The following case-studies explain how it is possible to solve some of the problems that arise when trying to calculate group accounts that are useful for establishing aggregate statistical indicators, starting from the accounts of the individual companies and branches. The solution method to be chosen depends on the availability of certain information (such as on intra-group exchanges), data concerning foreign production (in particular for enterprises involved in construction sector and operating in Internet), accounting criteria used in certain countries, vertical integration: when some of these are not available, one method can be chosen rather than another. As it is highlighted in the European System of Accounts (Eurostat, 2010) the center of predominant economic interest of an enterprise indicates that a location exists within the economic territory of a country where this unit engages in economic activities and transactions on a significant scale. We distinguish the following two cases: (a) activity is conducted exclusively on the economic territory of the country: units which carry out such activity are resident units of the country; (b) activity is conducted for a year or more on the economic territories of several countries: only that part of the unit that has a center of predominant economic interest in the economic territory of the country is deemed to be a resident unit of that country.

The following statistical, fiscal and administrative sources will be used to separate (purify) national production from foreign activity, which is not useful for the estimation of national (or European) gross domestic product: Balance sheet accounts, consolidated and not; Inward and outward Fats statistical survey; Fiscal data (e.g. IRAP for Italian enterprises); Social Security Database: in Italy, EMENS is the database of the declarations that Italian companies are due to submit for each employee to Social Security.

The paper will provide robust statistical methods of utilization such sources (and potentially also others).

(Note: The views expressed in this paper are those of the author and do not involve the responsibility of ISTAT.)

Keywords: Large complex units; Vertical and proportional integration; Purified national GDP

Research Evaluation in the Area of Economics and Statistics, Evidence and New Perspectives

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Recently, the issue of evaluation has assumed a central role in the context of the Italian university system. All activities that, in fact, take place in this framework, teaching, research and administrative management, and all subjects, individual and collective, who work there, are potentially subject to assessment, but here the focus is on what happens specifically for the evaluation of research.

In 2011, the launch of the National Quality Assessment Research (VQR 2004-2010), with reference to the research produced in seven years 2004- 2010, and the introduction of the *Abilitazione Scientifica Nazionale* (ASN), both activities that are carried out under the control of the national agency of university and research evaluation, *Agenzia Nazionale di Valutazione del Sistema Universitario e della Ricerca* (ANVUR), give rise to a heated debate in the academic world with different connotations in different scientific areas.

In this paper the main elements of VQR 2004-2010 are presented for which the results are now consolidated whereas no details of the ASN is given because, to date, the procedures of the last session (2013) does not yet been completed. Finally, some perspective lines that seem to be realized in the next evaluation (e.g. the SUA-RD, *Scheda Unica Annuale della Ricerca Dipartimentale*) are discussed.

Keywords: Education, Public Administration

Fuzzy analysis of students' ratings

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Assuring the quality of University courses is a fundamental objective of several agencies and networks, for instance: The Global Initiative for Quality Assurance Capacity (World Bank & UNESCO, 2007), The Bologna process (ENQA, 2009), national agencies (e.g., ANVUR; Accreditation Organization of the Netherlands and Flanders; Swedish National Agency for Higher Education). The University evaluation made by students promotes their participation in the decision making process (Bucharest Communiqué, 2012); however, it has to be considered with caution as a proxy of the quality of Bachelors and Masters, and has to be compared with other sources of information (e.g., the connection with the first employment).

We used the ANVUR questionnaire to collect students' opinion with respect to University courses. This is composed of 19 items exploring various areas of satisfaction. Students express their opinions on 4-point ordinal scales: "Definitely yes", "More yes, than no", "More no, than yes", "Definitely no".

We consider a latent construct, such as students' satisfaction with respect to University courses, aiming at proposing a general Fuzzy method to quantifying the information collected by means of questionnaires.

We use Fuzzy Sets (FS, Zadeh, 1965) to model latent constructs, adopting the probabilistic approach (Black, 1937) to set membership values, according to which degrees of membership are calculated as sample proportions (completely data-driven approach). First, we calculate membership functions as the proportion of students who answered "Definitely yes" to a certain question (a measure of excellence). Second, we calculate membership functions as the proportion of students who answered "Definitely yes" or "More yes than no" to a certain question (positive ratings). Third, we introduce, in the Fuzzy context, a satisfaction index, with the objective of summarizing information from ordinal modes of response in only one index, keeping into account students' satisfaction, dissatisfaction, and uncertainty. We also adopt Intuitionistic Fuzzy Sets (Atanassov, 1986), which represent an extension of FSs that enable to model not only the degree of membership, but also a suitable measure of non-membership (two-dimensional analysis), taking into account an additional source of uncertainty. In this way, using the mathematical model provided by IFSs, as well as highlighting areas of excellence within and between courses, we can also include in our analysis both areas of dissatisfaction and the degree of uncertainty related to each course. Finally, we calculate confidence intervals (CI)s and test statistical hypotheses on the membership / non-membership function using inferential confidence intervals (ICI)s (Tryon, 2009).

We extend the ICIs method by (i) using bootstrap-t and percentile procedures; (ii) proposing a generalization of ICIs based on p-values and q-values (their empirical Bayes counterpart, Storey, 2002). We apply these techniques to the evaluation of two MSc of a Public University.

We are working on (i) adopting this approach to compare students' satisfaction among Universities; (ii) proposing an Expert Fuzzy System.

Keywords (fuzzy analysis, questionnaire, University evaluation)

Research evaluation and publication choices of the Italian statisticians

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1. The research evaluation in Italy

The last Italian exercise of research assessment, which was named "Valutazione delle Qualità della Ricerca" (VQR 2004-2010), was carried out by the "Agenzia Nazionale di Valutazione dell'Università e della Ricerca" (ANVUR, 2013) on behalf of the "Ministero dell'Istruzione, Università e Ricerca" (MIUR) and has produced a number of effects. In fact, as well as for the research evaluation of structures such as the departments of universities, the VQR indices were used for the selection of the commissions of the "Abilitazione Scientifica Nazionale" (ASN) and to assess the composition of the PhD teaching committees; some universities have used them for the distribution of research funds. Although the procedures used by the "Gruppi di Esperti Valutatori" (GEV) designated by the ANVUR to evaluate the research have been criticized also for the "Area 13" (Baccini, 2014), till now is unknown what will be the new characteristics of the VQR 2011-2014. Therefore, two years after the publication of the VQR 2004-2010 results, may be interesting to see what impact they have had on the choices of researchers: in particular, we want to understand if and how they have changed the scientific journals which statisticians Italians have published the results of their research, considering the bibliometric specificity of this science field (Van Nierop, 2009).

2. The publication choices of the Italian statisticians

For the VQR 2004-2010, like other scientific societies also the "Società Italiana di Statistica" (SIS) has explored the theme of the research assessment with particular reference to the ranking of scientific journals (Carpita, 2014). In this work the results of the data analysis of the 9,107 articles inserted by the Italian statisticians in the CINECA database until 2014 are presented, in order to evaluate the impact on the choice of the scientific journals after the VQR 2004-2010. The aim is to analyze the bibliometric characteristics of these journals: This analysis is not easy, because researchers enter article information voluntarily and directly: for this reason, especially in the early years, the database contains several errors as well as publications of dubious scientific value.

Keywords: Bibliometrics, Statistics, VQR.

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The Italian approach in evaluating the quality of the academic teaching system: a critical review of the current government regulation.

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The italian national agency for the university and research evaluation (Agenzia Nazionale di Valutazione di Università e Ricerca - ANVUR) funded in November 24, 2006 with the Law 286 (art. 2, par. 138-140). In particular, the par. 138 cites: "Al fine di razionalizzare il sistema di valutazione della qualità delle attività delle Università e degli enti di ricerca pubblici e privati destinatari di finanziamenti pubblici, nonché dell'efficienza ed efficacia dei programmi statali di finanziamento e di incentivazione delle attività di ricerca e di innovazione, è costituita l'Agenzia Nazionale di Valutazione del Sistema Universitario e della Ricerca (ANVUR)…". With the same Law (art. 2, par. 141), the previous National Committee for the Evaluation of the University System (Comitato Nazionale per la Valutazione del Sistema Universitario - CNVSU) has ceased its functions. ANVUR organization and rules were defined with the DPR 76/2010. The Presidential Decree February 22, 2011 appointed the first board of directors that would to be in office for 4 years. Pending the appointment of the next board, we believe it is time to take stock and try to evaluate the work of those who have been called upon to rationalize the quality evaluation of the Italian University System (one should consider in this regard that AERES, the French equivalent of ANVUR, was closed because of excess of bureaucracy). In this work we will focus only on the aspects of the evaluation of university teaching envisaged in the ANVUR - AVA system. The AVA system was aimed, among its other objectives, to strengthen self-assessment of the quality and effectiveness of the university educational activities. In this paper, we will compare, in particular, AVA current regulations with what is actually achieved and achievable by the universities, both from a logical and technological point of view. Finally, regardless of the different techniques of assessments adopted by the various universities, it is hoped that the Agency may in the future provide a single system of analysis of the results of the evaluation process, flexible and open to innovative proposals coming the statisticians that deal with the assessment of the quality of teaching. Considering the number of Universities that, today, use the Statistical Information System for Evaluation of Educational SISVALDIDAT, the consensus obtained by its users and the positive opinion of ANVUR that already had the opportunity to evaluate its performance, we feel that SISVALDIDAT could be the system having the above-mentioned characteristics.

Keywords: ANVUR, assessment of the quality of the academic teaching, effectiveness, SISVALDIDAT

Outlier in linear and non-linear PLS regression: an application in environmental field

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In literature the problem of detecting "outlying" observations in regression model where the predictors could be affected by multicollinearity has been faced using robust procedures for Partial Least Squares regression model (PLS; Hubert et al., 2003; Serneels et al., 2005; Camminatiello, 2008).

The basic approaches to outlier identification are distance-based and projection pursuit methods (Filzmoser et al., 2008). In this paper we explore some different robust alternatives of PLS regression, their advantages and disadvantages, presenting a simulation plan which allows a clear comparison among the various methods.

The aim is to propose a robust approach by questioning if an observation is really an outlier, as its examination can depend on 1) the appropriateness of the model to be formulated and on 2) the suitability of the parametric tests considered.

Among the various approaches presented in literature to incorporate non-linear features into the linear PLS regression model, we will consider PLS regression via spline transformation of the predictor variables (Durand; 2001). In addition, we will discuss non-normal and non-parametric alternatives (Baringhaus and Franz, 2004) to the usual tests based on the squared Mahalanobis distance and Hotelling's T^2 (Mardia, 1975).

After the discussion of the simulation plan, to illustrate the usefulness of the robust PLS methods, the analysis will be made on environmental data.

Keywords: Linear and Non-linear Partial Least Squares, Robust Methods, Singular Value Decomposition, Parametric and Non Parametric Test, Environmental Data.

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Chemotaxonomy and Size Structure of Phytoplankton Communities to Assess the Water Quality via Non-linear Partial Least Squares Regression

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The evolution of water quality status requires the development of environmental screening tools that are rapid, reproducible and easily applied to large scale monitoring programs. In recent years, the High Performance Liquid Chromatography (HPLC) of phytoplankton pigments has been shown to be very informative to the community composition, as it holds the advantage to detect the small-size component, usually underestimated by microscopy (Garmedia et al., 2013).

The water quality sensu within the Marine Strategy Framework Directive (2008/56/EC, MSFD) will be explained observing functional groups, chemotaxonomic composition, and cell size of the phytoplankton communities in different environmental conditions of the Adriatic sea, which represents an excellent area to study the spatio-temporal variations of primary production processes, in terms of biomass abundance and size structure.

In this paper, we aim to validate and support the study of the water quality sensu. We analyse the size-structure and pigment spectra of the phytoplankton communities based on the HPLC by using a suitable non-parametric and non-linear regression method. Among them, we propose to consider multivariate additive partial least spline regression (Lombardo, Durand and De Veaux, 2009) to assess the water quality as related to the Eutrophication (Descriptor 5) of the MSFD.

In particular we investigate the trophic status of the Adriatic sea by studying the dependence of the total chlorophyll a from various predictors like the salinity, the different size classes [micro- (> 20µm), nano- (20-2 µm) and pico- (< 2µm)], the Fp indicator (Mangoni et al., 2013) or the chemotaxonomic composition of phytoplankton assemblages, and the spatial site position.

Keywords: MSFD, HPLC Pigments, Size Fractions, Eutrophication, Adriatic Sea, Multivariate Additive Partial Least Squares Spline Regression.

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Statistical evaluation of driving cycle with slope variability

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Recently, the scientific community has assessed evidence that exposure to outdoor air pollution causes lung cancer and increases the risk of bladder cancer. Because air pollution in urban areas is mainly caused by transportation, it is necessary to evaluate pollutant exhaust emissions from vehicles during their real-world use. Nevertheless their evaluation and reduction is a key problem, especially in the cities, that account for more than 50% of world population.

A correct evaluation of pollutant emissions and fuel consumption by vehicles in real use and precisely geolocated in a road is an important activity and it is still open in the international scientific contexts. Several experimental campaigns were carried out with some cars instrumented for both the acquisition of kinematic data, polluting emissions in continuous, and GPS latitude, longitude and altitude data for the correct geolocalization and slope variation during a path.

In the context of qualitative and quantitative study of correlation between kinematic sequences/emission/geographical position, the aim of this paper is a statistical evaluation of slope variability on road paths during each journey performed by the instrumented vehicle. Therefore, through a multivariate statistical approach, this type of gradient analysis can permit correlation of the emission profiles and consumption for a specific road position and evaluate its influence on their behaviour.

Keywords: Driving cycle, emissions, fuel consumption, slope

Sparse PCA for compositional data: an analysis of a geochemical database

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The investigation of the content of chemical elements in floodplain or overbank sediments is fundamental in monitoring environmental changes and also in the prediction of potential environmental hazards. The statistical analysis of their concentrations assumes a fundamental role for the identification of background values.

With the principal goal to study the concentration of the pollution elements in the sediment sampled a procedure for sparse PCA is proposed. Taking into account the specific constraints of compositions as scale invariance, subcompositial coherence, permutation and perturbation invariance the proposed procedure produces clear for interpretation results in a objective way.

Keywords: Sparse PCA, Pollution, Sediments

An application of sentiment analysis: Analyzing Optima Italia customer's emails

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Sentiment analysis it's a powerful instrument to study mood of a large amount of customers that often uses social network or blog to communicate to the world their opinion.

Some study (Jansen et al., 2009) on the power of social network demonstrate that a lot of "posts" express opinions on a brand or a product. When we have to study sentiment in a market that is not accustomed to share opinions, like the Italian market of energy and telecommunication, or for a medium company without a stronger internet reputation, try to find the mood of the web it's very difficult.

In our paper we want to try solving this problem applying the sentiment analysis methodology to the emails received by customers. However, mood of customer emails is usually not positive, thus it could be useful to adopt scoring techniques to weights customer's moods.

This approach could be useful to extract more information about Customers Satisfaction.

Additionally we want to use the mood of the emails of a customer like another variable in a forecast model to predict the abandon of customers.

Keywords: sentiment analysis, emails, forecast model

Are bag-of-words approaches useful for harvesting contents?

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This talk takes into account some popular issues in ATD (analysis of textual data) within the specific frame of bag-of-words approaches (i.e. methods mainly focused on the lexical level and essentially based on word counts) and is aimed at linking them to sentiment and content analysis applications.

Main procedures involve several relevant choices that concern both the vocabulary of texts – in particular which and how many words should be considered – and the quantitative measures to be adopted. As regards the number of words, a recent tendency within ATD is considering all or most words in the vocabulary, whereas a second perspective envisages considering a limited number of words. Another question concerns which words should be considered, i.e. the quality of words. For example, in many IR (information retrieval) applications there is a widespread agreement that grammatical words as well as low-frequency words should be disregarded; whereas content mapping applications privilege methods capable of exploiting all the available information (e.g. traditional lexical correspondence analysis). Moreover, there is a plethora of applications in the psychological and social fields commonly envisaging an arbitrary selection – normally based on semantics – of the sets of words to be used for analysis (e.g., sentiment analysis, opinion mining, mood analysis, web reputation, sémiométrie).

Previous studies show that, although grammatical words are good markers of writing style, content words are more suitable for harvesting topics, but results are questionable and the scientific debate is still open.

Keywords: analysis of textual data, bag-of-words, content analysis, sentiment analysis

Natural Language Understanding, Real-Time and Media: a challenging triad perspective

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The Web is a huge virtual space where to express and share individual opinions, influencing any aspect of life, with implications for marketing and communication alike. Reviews and ratings on the Internet are increasing their importance in the evaluation of products and services by potential customers. In certain sectors, it is even becoming a fundamental variable in the "purchase" decision. Internet users often evaluate products or services online. Consumers tend to trust the opinion of other consumers, especially those with prior experience of a product or service, rather than company marketing. Social Media are influencing consumers' preferences by shaping their attitudes and behaviors. The influence of the Internet, especially via social networking, on people's purchasing behavior has grown over the years. Monitoring the Social Media activities is a good way to measure customers' behavior, keeping track of their sentiment towards brands or products, of the impact of campaigns and the success of marketing messages, identifying and engaging the top influencers who are most relevant to the brand, product or campaign. Social media are already an important marketing arena. Given the relentless cascade of information on the Internet, in the last decade the field of automatic analysis of opinions has emerged, being not possible to keep up with the flow of new information by manual methods. Besides, being the most valuable information often hidden and encoded in pages which for their nature are neither structured, nor classified, nowadays everyone experiences a mounting frustration in the attempt of finding the information of interest, wading through thousands of pieces of data. The goal is always broadly the same: to know "who" is speaking about "what", "when" and in "what sense". The process of accessing all these raw data, heterogeneous both for source, type, protocol and language used, transforming them into information, is therefore inextricably linked to the concepts of automatic textual analysis and synthesis, hinging greatly on the ability to master the problems of multi-lingualism.

Despite much progress in Natural Language Processing (NLP), the field is still a long way from a full Natural Language Understanding (NLU). In fact, understanding requires processing and knowledge that goes beyond parsing and lexical lookup and that is not explicitly conveyed by linguistic elements. Contextual understanding is needed to deal with the omissions. Ambiguities are a common aspect of human communication. Speakers are cooperative in filling gaps and correcting errors, but automatic systems generally are not. A mixed qualitative and quantitative approach can bridge this gap.

This paper describes the methodology used to track in real time the Sentiment and Opinions expressed by a growing number of people who originate contents on Social Media about the show they are currently watching on TV, having the ability to check if the audience agrees or disagrees with what they are seeing, detecting every few seconds which aspects in the TV show they are preferring. By an innovative approach, in 2014, RAI The Voice of Italy producers were able to cut through the information labyrinth in real time, having the possibility to easily access all the potential comments of interest, being able to measure audience's behavior, to keep track of their Sentiment about the jury, or the so-called "media manufactured stars" in this TV talent show. The content enabling platform used in this study identified the relevant knowledge in Twitter, by detecting semantic relations and facts in tweets. Concept extraction was applied through a pipeline of linguistic and semantic processes that shared a common knowledge, guaranteeing a uniform interpretation layer for the diverse information conveyed in Social Media sources. In the RAI The Voice of Italy study, all the conceptual descriptors and their relationships could be visualised in a user-friendly graph. In fact, the Space of Concepts and their functional relationships are always represented as a network of visual elements that can be easily analyzed and interpreted, making possible to take account of complexity of public views, in real time.

Rasch Analysis and measurement bias: modeling a response structure for the quality of teaching

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The ANVUR questionnaire is aimed at evaluating the quality of teaching as perceived by the students. In order to assess this information it is necessary for the level of quality associated with different aspects of teaching (items) to be placed along a unidimensional continuum. In only this way is it possible to make a quantitative assessment on the position occupied by individuals both in absolute and relative terms.

These questionnaires represent a useful qualitative description of the students' responses, however the sum of the scores relative to the various questions is quantitatively meaningless. In order to get a measurement of these responses it is necessary to move from an ordinal to a quantitative scale. A useful methodology to achieve this purpose is given by the Item Response Theory - IRT (Baker & Kim 2004), on which several statistical models have been based. The Rasch Model (Rasch 1960) is the simplest of these tools as it is characterized by a smaller number of parameters. As long as the data abides by the requirement of invariance of comparisons, this model yields a response structure through a linearization of the total scores.

The intent of this study is to determine, by means of a Rasch analysis, how the various aspects of teaching (items) contribute to the shaping of the perceived quality of education (unidimensional variable). In addition it is verified if personal characteristics, such as enrolment in specific courses, would lead to a different probability of providing a certain response to the questionnaire. To this end, besides the most common diagnostic tools used when dealing with the Rasch Model, the Differential Item Functioning (DIF) is also applied. This tool verifies whether, with regard to the ith item, the probability for homogeneous groups of subjects (with respect to a given qualitative or quantitative criterion) of giving a certain response varies only according to the value of the latent trait or it also varies depending on the values and levels of the personal factors of the respondents.

An evaluation study on students' international mobility experience

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The issue of international student mobility has assumed greater prominence in the last decades and has had a profound effect on policy decision-making in the academic education system of most countries. In fact, the number of students interested in spending part of their academic education abroad is on the rise.

This is not surprising, given the large benefits that they receive from studying abroad in terms of intercultural competences, as well as of quality in education, training and specialization.

In the light of these considerations the aim of this paper is to investigate the phenomenon of international student mobility at University of Salerno, analyzing the main results of a survey on a sample of students that have experienced a period of study abroad. In particular we explored latent dimensions of student profiles with regard to degree programme, field of study, geographical area and gender, and the impact of international mobility on improving students' competences.

Keywords International students mobility, Statistical evaluation, Academic education

On the use of IRT and multilevel models to analyse students' evaluations of university teaching

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Over the last decades, the assessment of the university teaching quality has assumed a prominent role in the university system with the main purpose of improving the quality of services offered to the students. In Italy, starting from the activities promoted first by the National Evaluation Committee of the University System (CNVSU) and now by the National Agency for the Evaluation of Universities and Research Institutes (ANVUR), students' evaluations (attending or not attending the courses) of university teaching are collected each year by means of a questionnaire. The latest questionnaire version established in 2013 by the ANVUR agency is compound by 11 items measured by four ordinal response categories, sectioned into three groups concerning course organization, aspects related to the teaching style and the student interest on the course's subject. Apart from minor changes permitted at local level, this standard of questionnaire will be adopted by all Italian universities in order to favor comparisons at national level.

As a result of this process, a host of studies on the evaluation of university teaching was devoted to the Italian system, covering different topics and combining case studies and methodological issues. Among others, various indices and statistical models were introduced especially by taking into account the ordinal nature of the students' ratings in the university course evaluations. More specifically, the usefulness of IRT and multilevel models was deeply exploited by considering both the multilevel nature of this kind of data and the effects on the assessment results of adjusting for course aspects and students' characteristics which make evaluations not directly comparable. The combined use of multilevel regression models and IRT approach allows to obtain measures on a metrical scale of students satisfaction, to assess the reliability of these measures on different segments of the latent trait, to remove the effects of factors which make comparisons across heterogeneous objects meaningless and to have measures of the contributions that the different subjects and/or institutions related to the process under evaluation have on the overall results.

Based upon this debate, the aim of the present contribution is to provide an overview of different methods used to summarize students' evaluation of teaching effectiveness and to examine their implications in courses ranking. The usefulness of these procedures reported in the literature will be discussed by empirical results on a real data set derived by the questionnaires compiled by students attending courses of all undergraduate programs offered by the University of Salerno in the academic year 2013/2014.

Keywords: IRT model, multilevel model, ordinal data, student rating, teaching evaluation

Recursive partitioning: an approach based on the weighted Kemeny distance

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In the framework of preference rankings, the interest can lie in finding which predictors and which interactions are able to explain the observed preference structures. The possibility to derive consensus measures using a classification tree represents a novelty and an important tool, given its easy interpretability.

This work proposes the use of a univariate decision tree for ranking data based on the weighted Kemeny distance. The performance of the methodology will be shown by using a real dataset concerning students' satisfaction of University of Palermo.

Keywords Classification tree, distance based methods, ranking data, Kemeny distance.

Machine learning techniques for stock market prediction

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A goal of the financial sector and of its stakeholders is to estimate the volatility of the stock market. This article proposes a modern approach to solve the problem by means an innovative analysis.

The focus of analysis is to improve the estimation of a market index carried through a ARIMA model and to estimate the level of influence of every independent variables (commodities and other principal financial variables) on a dependent variables (market index).

Also we are interested in how the set of independent variables is related to the dependent variables. This purpose has required the development of an ad hoc analysis procedure in which we implemented two multivariate algorithms: Artificial Neural Network and Random Forest. The application of two different techniques can evaluate a possible inaccuracy in the model estimation.

Keywords Volatility of stock market; Artificial Neural Network, Random Forest

The use of categorical statistical models in marketing information systems

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The objective of the following work is to highlight the importance of categorical models applied to marketing strategies. In the past, multivariate statistical techniques were used for quantitative data in marketing decision support systems (MDSS), but there are many qualitative variables in present day marketing research, and the elaboration of these variables requires the use of categorical statistical models.

In view of the scarcity of references in the literature to the contribution of applied categorical models to marketing, the scientific purpose of the present work involves the application of the methodology of categorical models to marketing management.

A marketing information system (MIS) is an integrated structure involving people, equipment, and procedures which has the purpose of collecting, classifying, analyzing, evaluating and distributing relevant, timely and accurate data for operators making marketing decisions. In the management of marketing information systems, the utilization of statistical techniques is fundamental for the elaboration of data. In particular, the use of the following categorical statistical models is most useful: categorical regression model, categorical principal components model, non-linear canonical correlation model, multiple correspondences model, multidimensional scaling model.

The categorical regression model is used to measure customers' degree of satisfaction in relation to the use of some products or services. The categorical principle components model is used in the field of marketing to analyse the preferences or opinions on the characteristics of products expressed by consumers. The non-linear canonical correlation model makes it possible to measure the correlation between different sets of variables. The multiple correspondences model is used in marketing strategies for the creation of positioning maps for product brands through the opinions expressed by consumers on the qualities of the products. The multidimensional scaling model is used to analyse the perceptions and opinions expressed by consumers on the greater or lesser similarity between product brands.

Socio-experiential determinants of financial advisors's performance

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The E.U. directive 2004/39/EC, known as "Markets in Financial Instruments Directive" (MiFID), tried to build a financial market that was able to protect investors, differentiating them according to their degree of financial experience, and then to improve the mechanisms of governance investment firms. A basic role in this system is played by financial promoters. Through questionnaires submitted to potential investors (called "MiFID Questionnaires"), the financial promoters classify them according to their characteristics, but sometimes they can "induce" toward different behaviors in the field of financial investments. The financial promoters, on the other hand, qualify themselves through performance averages of its customers.

The aim of this paper is to study the characteristics that can able the financial institution to distinguish a normal promoter by a "good promoter": personal characteristics or skills that can be related to the same promoter or to the savers which rely on him their own financial resources, or the interaction between the various actors. Such characteristics will be analyzed, using techniques such as multivariate classification analysis, in a sample of financial promoters operating within the territory of Bari, and who treated interests of thousands of investors.

Keywords: MiFID Profiles, Financial promoters, Determinants, Classification Analysis

The measurement of consumer behavior in purchasing decisions of innovative products or services through statistical and economic models

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The aim of this note is to highlight the importance of statistical-economic forecasting models for the deployment of innovative services through modern communication tools. We will analyse some communication tools and, in particular, the following: the communication trough the mass media, the interpersonal communication and the communication "through word of mouth". After having analysed the means of communication, we will measure the influence that consumers will experience in their purchasing decisions through the use of economic-statistical models

In the current landscape, in the companies, the importance of innovation strategies assumes a growing importance, so the ability to model the cost-effectiveness is essential.

Among all the suitable models, the model of F. Bass (1969) is efficient for measuring the effectiveness of the communication tools used for the promotion of innovative products. The model is widely used by companies for their quantitative analysis of the sales deriving from the innovative products put on the market and it has proven to effectively support the commercial management of the companies in planning and programming of sales. The Bass model is a considerable tool for measuring the diffusion process of innovation of a product among the potential customers.

Another important contribution is offered by the model of information dissemination developed by Rogers (1983) that is based on the Gaussian distribution, where the curve is the frequency of consumers buying a product over time. If can be detected the cumulative number of buyers, the result is a S form pattern (sigmoid).

Rogers argues that the curve of purchase is normally distributed because of a learning effect due to the interpersonal interaction existing in the social system. The number of buyers increases as soon as the process of interpersonal influence acts on those who are not buyers and this leads Rogers to identify the diffusion process essentially with a communicative nature.

Keywords: Economic statistical model, Marketing research

Application of the Balanced Scorecard in the Health Sector with Generalized Redundancy Analysis

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The concept of the Balanced Scorecard has had broad application by the health sector internationally, including Hospitals systems and national healthcare systems or organizations. Methodologically, the most natural context for Balanced Scorecard conceptualization and estimation deals with Structural Equation Models with latent variables and specifically, within the Structural Equation Models framework, a new methodology called Generalized Redundancy Analysis can be applied for this task. In this work the methodology of the Generalized Redundancy Analysis will be briefly introduced, followed by the model specification on how it can be adapted to our purpose. Finally, an application will be provided, involving several public and private Lombardy Region Hospitals, whose performances are measured on various crucial KPIs.

Keywords: Balanced Scorecard; Redundancy Analysis; Structural Equation Modelling; Component Analysis

Latent Growth Model: some empirical evidence

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This research investigates the constructs of students statistical literacy (SSL) in a cross sectional perspective for three academic years (2013, n_1=378; 2014: n_2=402; 2015: n_3=332).

Wallmann (1993) defined the statistical literacy construct as “the ability to understand and critically evaluate statistically results that permeate our daily lives coupled with the ability to appreciate the contributions that statistical thinking can make in public and private professional and personal decisions” and has been investigated in previous studies (Gal, 2004; Watson et al. , 2003) through ad hoc questionnaires.

In this study, SSL construct can be considered as latent dimension subjected to the growth process and measured through the observed variables linked to the passed exams. In detail the analysis uses the scores generated from an e-learning tool (MathXL) in 11 repeated occasions for each student conjointly demographic and social aspects. The growth of statistical literacy is investigated both in a linear and nonlinear latent growth modelling.

Keywords: Statistical Literacy, Latent growth model

The higher-order Composite Indicator Legitimacy to violence

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The purpose of this study is to present and compare three main approaches to higher order construct PLS-Path Modeling presented in literature, Repeated indicators, Two-Step and Hybrid Approach, through an application in psychological field.

In this paper, we use the psychological concept of Legitimacy to Violence as higher-order Latent Variable (LV) structural equation model, estimated through the PLS-PM approach. Then we illustrate how the gender's variable influences this latent concept.

The higher-order Composite Indicator Legitimacy to Violence is determined by five sub-dimensions: justification for the peer violence, beliefs sexist and justification of domestic violence, justification of intolerance and violence against minorities, hostile sexism and benevolent sexism. The higher-order model presented is reflective both at the measurement and at the structural level. The three approaches are performed by Gaston's 'plspm' package in R programming language.

The higher-order construct has a good and significant impact on the lower-order CIs, only the Benevolent Sexism's path coefficients are low compared to other blocks, in particular for the Hybrid approach, even if they are significant in each approach. The amount of variability of the MVs captured by the Legitimacy to Violence construct is very scarce when the Repeated Indicators and Hybrid Approaches are adopted; conversely, communality is enough good when the higher-order construct is measured through the Two-Step Approach. Looking GoF would be preferred Two Step Approach, as it has a higher GoF's value than the others.

Gender is introduced in this study as a moderator of the relation between lower-order dimensions and higher-order Legitimacy to Violence. Significant differences between women and men are present in dimensions of justification for the peer violence and beliefs sexist and justification of domestic violence.

Keywords Composite Indicators, Partial Least Squares Path Modeling, Higher order latent variables, Moderator variable

The potential of Latent Class Analysis as a tool for quality assessment

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In a great number of surveys oriented to evaluate the quality of a service or individuals' performances, a set of manifest variables are used to gather information on unobservable variables, also known as latent variables . Usually the manifest variables are a set of categorical (often dichotomous) items which measure the same dimension of the unobserved phenomena under investigation. Latent Class Analysis (LCA) is a multivariate modelling approach to deal with manifest indicators which allow us to pursue different goals: a) to classify units (e.g. individuals or institutions) in homogeneous clusters (latent classes) on the basis of their responses to a set of manifest variables which measure the underlying latent trait; b) to assess how the class membership probabilities are related to relevant units' covariates and to study the structure of the item association at different levels; c) to shed light on the characteristics of the latent classes in which units are classified in terms of item response probabilities and class membership probabilities conditional upon individuals' covariates.

In this work we present two examples in which LCA has been adopted in educational field: to analyse (a) students' family cultural endowment in primary schools and its relationship with achievement and (b) students' evaluation of the quality of degree programs at the university.

A long sequence of quantitative studies has been carried out to upon the relationship between socio-cultural background of individuals and their educational attainment. These researches consider the cultural resources of the individuals as a (latent) causal variable (observed by means of proxy variables) that affect individuals' educational attainment or their literacy in different subjects. Using survey data provided by the Italian Institute for the Evaluation of the School System (INVALSI) we aim to classify fifth grade pupils on the basis of their cultural behaviors and to match this information with the achievement score of each pupil.

Using data from a survey on students' evaluation of the quality of degree programs, we adopt LCA to classify students in classes which share a similar intensity of the underlying latent trait and we advance a proposal to build up an adjust indicator of the quality of degree programs in students' perception by quantifying the intensity of the trait in each class.

The advanced indicator is suitable to compare degree programs taking into account the variability in the evaluations due to evaluators' characteristics rather than to real differences in the performances of the degree programs.

Keywords Latent Class Analysis, Education, Performances, Adjusted Indicators.

Using Supervised Latent Variable Models to Predict Media Coverage of Health Science Articles

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News coverage of medical research is followed closely by many citizens and affects the practice of medicine. Yet, the process by which a scientific article becomes "newsworthy" is not well understood. In fact, the validity of health care journalism is a product of both the quality of the coverage as well as the choice of stories covered (Selvaraj et al., 2014).

Given the overwhelmingly large volume of scientific articles published every day, media are constrained to select only a handful of "newsworthy" articles for coverage. Hence, the choice of stories covered is an inherently biased process, and it is interesting to explore what predicts media coverage of health scientific articles. In particular, we are interested in which article's features are associated with being picked up.

We experiment on the JAMA corpus (Wallace et al., 2015), comprising 846 positive instances, defined as articles for which JAMA editors created a press release, and 9,914 'negative' articles constructed via matched sampling. Previous approaches have been mainly focused on regularized logistic regression, in order to discover single tokens which are highly predictive of mainstream media coverage of a scientific article. Here we adopt a more structured approach, in that we advocate the use supervised Latent Dirichlet Allocation, where each document is paired with a response and the goal is to infer latent topics (rather than single tokens) predictive of the response (Blei & McAuliffe, 2007; Lakshminarayanan and Raich, 2011).

With the help of efficient computational methods for approximating the posterior distribution of latent topic structure, we are able to characterize which topics make a scientific article newsworthy, providing a novel approach to characterize the biases of media reporting health scientific articles.

Keywords: Latent Variable Models, Scientific Research, Health and Social Services

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Factorial analysis for performance evaluation in research of top 25 Countries in the World

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In this paper we carry out an end-to-end bibliometric performance analysis of the top 25 Countries using data from the latest (2014) release of the Scimago Institutions Rankings (SIR). We track six variables through the following chain: input-output-excellence-outcome-productivity, as proposed by Savithri and Prathap (2015). Factorial analysis then allows us to extract two orthogonal variables representing the quantity and a quality/productivity dimensions respectively. The main results show that the quantity dimension is size-dependent while the quality and productivity dimension is size-independent. Factorial analysis allows to cluster the Countries in six groups according to their high-medium-low performance.

Then, factorial analysis has been replicated using the whole set of SIR indicators in order to verify the contribute of other variables (Leadership, Specialization, Internationalization, Impact) in defining the overall research performance of a country. We found that: a) the Countries can be grouped in three clusters, according to size and quality performance; b) the addition of other SIR indicators in factorial analysis, in term of cluster and performance, leads to similar results to those obtained using the factorial analysis carried on the end-to-end chain variables.

Keywords Performance analysis, Bibliometrics, Indicators, Quality, Quantity, Exergy, Factorial analysis

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A proposal of an indicator to evaluate research activities based on Scimago Institutions Ranking (SIR) data: an application to Italian High Education Institutions

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In this paper we propose a synthetic indicator for evaluating Italian universities' scientific research using Scimago Institutions Ranking (SIR) 2014 data. It is an annual report published by Scimago Lab., a Spanish company which produces some bibliometric indicators using Scopus databank, an Elsevier product, for several kinds of research Institutions. Differently from other world university research ranking, such as University Ranking by Academic Performance (URAP) or Performance Ranking of Scientific Papers for World Universities (NTUR), SIR doesn't supply a league table of Institutions, preferring not to carry on an indicators aggregation to obtain a global ranking. Starting from some indicators computed by SIR, after having analysed the distribution shape, fitted parameters of some statistical models, calculated an appropriate standardization, we aggregate the indicators to get a Synthetic Indicator (from now, SI) of research evaluation. The obtained synthetic indicator has been used to rank Italian Higher Education Institutions (from now, HEIs). This ranking has been compared first with the ranking of the National Agency for the Evaluation of Universities and Research Institutes (ANVUR), based on the Evaluation of Research Quality (VRQ 2004-2010) results, and then with the ranking based on the assignments of the competitive allocation model (research share of FFO) yearly attributed to the Italian HEIs by the Ministry of University and Research (MIUR).

The results of the analysis show a moderate positive correlation between SI and the VQR 2004-2010 indicators, the standardized mark (r=0,543) and FFO per capita (r=0,487).

The original contributions of the paper are i) the creation of a Synthetic Indicator, with a Gaussian distribution, summarizing the SIR variables; ii) the highlighting of a convergence between ANVUR evaluation, based on peer to peer and bibliometric analysis but using only few publications, and the analysis proposed in this paper, which uses bibliometric data from Scopus, but related to all the publications in the same period.

Keywords: research evaluation, performance indicators, ranking, bibliometrics, Scimago

SMEs and Trust in Justice

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Changes in the international context concern physiologically small and medium enterprises, that become more vulnerable. So these firms are particularly exposed to the consequences of the crisis. In literature (Schivardi and Pagano, 2003) there is a redundancy on the limits connected with the reduced size of the Italian firms that often doesn't favor their capacity to innovate products and production processes, their aptitude to exploit new technologies and their ability to increase the efficiency. Many local SMEs have tried to react to these circumstances through informal and often peculiar forms of organization and mutual relations. They are relational structures able to counterweigh the disadvantages of small dimension. This result is achieved by exploiting both the production flexibility associated with the reduced size, and the economies of specialization - arising from the processes of division of some stages of the production process - and the economies of scale, resulting from the sharing of other production phases. In a previous study we investigated these kind of relations. We examined a sample of Apulian SMEs operating in the textile sector that presented spontaneous peculiar links among firms with positive results in terms of productivity and competitiveness. The recent economic crisis highlights the validity of this organizational model in developing an appreciable resilience in particularly negative economic trends. In other studies (Beck, et al., 2006; Gurrieri and Lorizio, 2014) emerge that the state of justice has significant effect on the choices of firms. SMEs in particular often make inefficient choices at firm level to avoid the inefficiency of justice. We believe that these effects are amplifying during the crisis.

Starting from these considerations, in this work we try to test whether firms resilient to the crisis have/or not confidence in justice. We investigate the firms of the work of 2008, manufacturing enterprises operating in the textile sector in the Apulia region, that are resilient to the crisis, and therefore efficient economically. These firms answered to a semi-structured questionnaire, consisting of questions both qualitative and quantitative.

The received answers allow us to draw a figure of entrepreneur-type common to the resilient firms: young, with a large number of women, high educational qualification, widespread knowledge of English, particularly active in the local economic, social and institutional context. From the questionnaires we can draw a figure of social entrepreneur, who presents particular personality (Shaver K.G., 2003), and psychological and cultural attitude (Omorede A. et al, 2014). Moreover, the answers show a fairly uniform situation: firms surveyed don't exhibit a particular confidence in justice, in the (long) times of justice and in the procedures adopted. The first analysis shows a number of interesting and sometimes surprising aspects. It reveals a clear "gender" difference about the confidence in justice, a feature that seems to be more associated with the female than male figure. An analogous result was expected about "age", because we supposed that younger entrepreneurs were more confident. Unexpectedly, trust in justice appears instead disconnected from the age of the entrepreneurs. So, it is possible to assume that the economic crisis is associated to a crisis of trust in the justice by the interviewed entrepreneurs. This element assumes more relevance because it comes from firms resilient to the crisis.

Keywords: Entrepreneurship, SME's, Justice

About Territorial Differences in Italian Civil Justice: an Empirical Analysis at Sub-District Level

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The Italian system of justice has been characterized by several critical elements as confirmed by several studies carried out in the recent decades. The system performance is below European averages in many respects. Moreover, among the different weaknesses we are interested in the existence of relevant differences in the system performance at territorial level with particular reference to the civil sector (cfr. among others: World Bank, 2013; Council of Europe's European Commission for the Efficiency of Justice – CEPEJ, 2012; Bripi et al, 2011; Carmignani e Giacomelli, 2009).

The last reform of the Italian judicial system (D.l. 155/2012) has reorganized the whole system organisation with specific reference to the geographic profile.

The reform of judicial geography provided for the closure (i.e. unification) of about a thousand of offices of small size. This reform aims to purse a double goal: (i) a savings in the expenditure; (ii) a better performance of the system (i.e. improving the efficiency).

This paper aims to provide analysis about some characteristics of the 135 sub-districts post-reform in order to underline the presence of differences or similarities at territorial level. In order to purse this objective we use multivariate techniques. The judicial sub-districts post-reform are 136, but with reference to the 2013, the sub-districts named Napoli and Napoli-nord are considered as a unique unit.

The examined sub-districts characteristics that we examine are referred to two different contexts: (i) the judicial system (i.e. human resources; productivity; level of litigiousness; disputes duration; etc.); (ii) the territorial system (i.e. several indicators which refer to the socio-economic structure). The sub-districts are original territorial units that don't correspond to the administrative territorial units so, in order to build the database; we had to refer to data at municipality's level.

The data used come from various sources: General Statistic Directorate of the Ministry of Justice; Istat; Ministry of Finance and National Welfare and Assistance Fund for Lawyers.

Keywords territorial differences; judicial reform; multivariate techniques

Changes in crime typologies and efficiency of criminal justice in recent years: some unexpected relationship

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The causes of crime are various, and variously related to each other: by example, economic conditions certainly play an important role in the growth of crimes against property, while political and legislative choices can stimulate, in one way or another, the evolution of crimes against the Public Administration. However, even if the statistical study of the specific causes of crime seems impractical, it is possible to correlate its dynamics with other phenomena looking for possible matches.

Therefore, in this paper we seek a possible relationship (presumably non-linear and surely influenced by contextual, unobservable factors) between the spatial-temporal evolution of the most common crimes and the legal system's ability to cope with the workload arising, i.e. the efficiency of the criminal justice system, using available data on a regional basis.

Keywords: Crime; Justice; Appellate Courts; Temporal Series

The School of the Future

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The challenge for each Educational System is denoted by a sensible turnabout of the traditional paradigm. The hardest mistake is to frame school into a teaching-based system. The mistaken paradigm deals with the following statement: School is devoted to teaching. Home is devoted to learning. The urgent reality owes the learning advancement by means of suitable strategies. The only purpose of school is close to the learning devotion, not to the teaching one. By the way, teaching is a basic aspect in the learning process, though it is only a part of it. A further aspect views the reputation of school as the place devoted to creativity. Very often the huge creativity of students is mortified at school, thus conveying a deep anxiety about mistaking performances. The purpose of school is to lead and support students in showing their creativity. The basic purposes may be conveyed by assessing both the paradigm makeover and the creativity advancement. Technology is a suitable support to both activities. Nevertheless, technology is only a tool, the availability of which is due to the truthful acquainted support to the purposes of a reliable school system. By this way technology is a profitable chance to improve learning. This is the challenge each world-wide Educational System might grant for a sensibly positive feed back.

Keywords: school, learning, teaching, creativity, future, technology