ANALYSIS OF MARKETING DATA – EVOLUTIONS OF TOPIC APPROACH

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Because data analysis as a free-standing field has experienced a much broader theoretical development than that of using the methods in practice, and in Romania, it is a field less approached in the literature, a short review (cronological) will be done in this paper – Romanians and foreigners – who apprached the field of data analysis, specifying for each of them the novelty character of approaching data analysis and focusing on the application of the data analysis methods in the field of marketing.

Keywords: data analysis, marketing data, evolution

JEL:M31, M39, C10, C40, C81

Introduction

We should mention that, almost all statistic papers in Romania contain at least a chapter dedicated to data analysis and issues related to it, the authors who detail this field being **C. Mitruţ, V. Voineagu, Al. Isaic- Maniu, T. Andrei, Elisabeta Jaba, G. Ciucu, V. Craiu, D. Porojan** etc., and in the Romanian literature there are also papers totally dedicated to data analysis, among the authors being: **Maria V. Ştefănescu, Gh. Ruxanda, Carmen Pintilescu**, **Liliana Spircu, T. Spircu, M. Calciu** etc.

Also, as data analysis is a field with a wide applicability concerning marketing issues and implicitly, the analysis of characteristics related to marketing data, there are authors and specialists in this field who provide – theoretical or practical references - in their papers to data analysis methods used in marketing, of these, the papers of the following authors are used: **I. Cătoiu, T. Dăneţiu** (whose doctoral dissertation is in the field of marketing data analysis with various software), **V. Balaure, J. C. Drăgan, M. C. Demetrescu** etc.**.

In the *foreign literature*, **data analysis** is a widely approached field, both theoretically, statistico- mathematically, and practically with concrete examples of data and fields where it has been used successfully, some of the surveyed foreign authors even mentioning the software used in data processing by means of data analysis methods. Foreign authors contain both names recognized as „parents" of data analysis methods, for instance, **G. Saporta**, **J.P. Benzécri, F. Benzécri, H. Fenneteau, C. Bialès, Bernard Grais, M. Vollé** or **N. Malhotra** for the marketing data analysis methods. Alongside these authors, the most quoted foreign authors in the surveyed papers are the following:

- f*or marketing data analysis methods*: **D.A**. **Aaker, V. Kumar, G.S. Day, J.M. Bouroche, T.C. Campbell, C.H. Davis, K. Dewar, Wen Mei Li, C.H. Davies, J. Delnero, D. Montgomery, M. Gauthy Sinéchal, M. Vandercammen, J.L. Giannelloni, E. Vernette, A. Smajda, J.P. Vendrine, N. Malhotra** etc**;

- *for data analysis methods in general*: **H. Elhoweris, N. Alsheikh, M. Volle, R.G. Waters, L.J. Haskell, W. Wolfe, Gilbert Saporta**, **J.P. Benzécri, F. Benzécri, H. Fenneteau, C. Bialès, Bernard Grais** etc**.

Evolutions of topic approach

The data analysis methods were elaborated long time ago, in **1930**, **H. Hotteling** laid the basis of the ***analysis of the main components*** and ***canonical analysis***, thus developing the works of **C. Spearman** and **K. Pearson** that were dating early the century, from the same period theories were retained (1935, W. Stephenson – Spearman's last assistant, the inventor of factor analysis) that afterwards were the basis of new data analysis methods. Also, the main principles of ***factor analysis*** belong to **Spearman** (1904), the word as such being introduced much later, in 1931, by **Thurstone** in the field of psychology and the origin of ***typological analysis*** are considered to be two articles published in 1938, by **Tyron** and entitled „*A technique to measure the similarities of spiritual structures*" and "*The general dimensions of individual differencies: typological analysis or multiple factor analysis* ".

If we order chronologically the surveyed literature we notice that, in 1960 – 1970, the approaches related to the field of data analysis are purely theoretical, being mathematical descriptions of the principle of the methods with very few practical applications.

Thus, in **1961**, in his paper, *The Q-Sort Method in Personality Assessment and Psychiatric Research,* **J. Block** makes the first references to this method and its applications in the field of psychiatric research.

In **1974, P.E. Green** (University of Pensylvania) and **D. S. Tull** (University of Oregon) within chapters 10- 13 of the paper – translated into French - *Recherche et decisions en marketing*, approach data analysis methods as: related data analysis - regression, the χ^2 test- discriminatory analysis, canonical analysis, factor analysis of related data, typological analysis, multidimensional analysis of perceptions and preferences presenting various aspects of a data matrix.

In **1977,** in the paper entitled *Analyse des données en marketing* **J. M. Bouroche** – in cooperation with other authors, members of the French Association of the Economic and Technical Cybernetics – approaches for the first time the marketing data analysis methods in market studies respectively for grouped proximity data, the metric

analysis on table of distances measured on the range scale and non-metric analysis, emphasizing the Kruskal algorithm and the Young and Torgerson algorithm. They also approached, for individual proximity data, the IDIOSCAL and INDSCAL algorithms used for data metric analysis and the NINDSCAL algorithm for the non – metric analysis. In the same paper, issues related to positioning in marketing are approached by using classification as a data analysis method, the preference analysis suggesting new methods such as: PREFMAP 1, PREFMAP 2, LINMAP, MDPREF, ANAPREF. The authors of this paper have also approached the field of marketing decisions as regards data analysis, proposing the combined application of two methods namely, proximity analysis and preference analysis. The paper also contains chapters related approaching the qualitative data both by means of descriptive and methods and explanatory methods related to data analysis being supplemented – in plenty – with examples of the conjoint analysis applied to marketing data.

In **1980**, **J. P. Benzécri** and **F. Benzécri** in the paper entitled *Pratique de l'analyse des données* approaches in detail (with the full presentation of mathematical and geometrical aspects) correspondence analysis, presenting in stages the use of this method for various examples processed by means of the FORTRAN programming language: socio-professional origin of the students in universities in Greece, development of Brazil's imports of industrial equipment in 1970 – 1975, family budgets, analysis of the table of marks achieved by the candidates to the Polytechnic School – analysis by column duality, school census in Lebanon, the discriminatory method applied to medical data in order to make a therapeutic decision, etc. **J. P. Benzécri** also has the merit of suggesting a new method (in another paper), the **correspondence analysis** respectively, in order to study not only to test the independence between variables as well as for the description of association (also called correspondence) between two qualitative variables. The proposed version facilitates the highlighting of connections existing among the ways, and on the other hand it provides the possibility of a graphic that is relatively easy to explain.

In **1988,** in the paper entitled *Segmenter ses marches – applications pratique de technique de segmentation dans le marketing* **A. Smajda** makes his contribution to the development of segmentation as a method of data analysis developing aspects related to the concept of market segmentation, segmentation technique, similarity measurement, classification method applied in segmentation, description and validation of groups and completion with an application of the segmentation method for the study of a product perception.

Beginning with **1990,** both abroad and in **Romania**, papers that relate to the field of data anlysis – and especially its specific for marketing data – experience a strong development first of all thanks to the development of the special programming languages and software dedicated to this field.

In **1991,** in the paper entitled *Le traitement des données en marketing – en 10 questions, 13 applications, 27 exemples et exercices commentés et corigés* **J.P. Vendrine** (University of Clermont) approaches the univariate analysis of quantitative, qualitative and ordinary data, the bivariate analysis for quantitative, nominal, and ordinary data, multivariate explanatory analysis for example the linear regression analysis - specifying by examples for nominal data in the field of marketing – and variance analysis with a factor and with multiple factors – approaching the issue of factor interaction and extension to several factors. It also approaches other explanatory methods such as: segmentation, discriminant analysis, applications of conjoint analysis, canonical analysis and some of the descriptive methods, mainly focusing on applications for the marketing data of analysis in main components, detailing this method for additional information and approached by additional analyses and also providing examples concerning the typological analysis for marketing data, completing the paper with the factor analysis of correspondence and the ordinal descriptive analysis in case of preference analysis and similitude analysis.

In **1993**, **H**. **Fenneteau** (professor at the University of Montpellier) and **C. Bialès,** in the paper entitled *Analyse statistique des données – applications et cas pour le marketing* approach the statistic analysis of univariate data and the bivariate data on each type of data – ordinary quantitative and metric quantitative, nominal qualitative and ordinary qualitative, as well as the statistic analysis of multivariate data, every analysis being sustained by practical examples for marketing data.

In **1994**, the first paper is published in Romania. This paper approaches the marketing data analysis as a distinctive field, in the approach of authors **Liliana Spircu, Mihai Calciu** and **Tiberiu Spircu** in the paper entitled *Marketing Data Analysis*, that apart many practical examples of data analysis methods and commands of using the SPSS software for marketing data processing with data analysis methods, of the MINITAB software, and functions of the EXCEL – WINDOWS package for data processing.

In **1996, Maria Viorica Ştefănescu** in cooperation with one of the most important foreign authors in the field of data analysis, **Gilbert Saporta** approaches the data analysis as regards data processing in the paper entitled *Data analysis and data processing – with applications at market surveys and opinion surveys*, work that shows many examples of applying the methods of data analysis (univariate analysis, bivariate analysis, multivariate analysis, canonical analysis , correspondence analysis, classification methods) taken over from the French literature and accompanied by the related data processing algorithms with SPAD.N, SPAD.T. This paper is developed and elaborated afterwards, in 2000, by the author, by means of her lecture entitled *Data Analysis– case studies*- held within the Academy of Economics in Bucharest.

One of the most important papers in the field of market survey after 1990 was published in 1996, too. The paper was carried out by professors **J.C. Drăgan, J. C.** and **M.C. Demetrescu,** being entitled the *Practice of Market Survey – research techniques in marketing* and shows, as advanced methods for data analysis and given as examples for marketing data, group aggregation, factor analysis, discriminatory analysis, metric and non-metric multivaried scaling and analysis of compensations between consumer's preferences.

In 1997, the fourth edition of the paper entitled *Analyse de données* of **M. Vollé** is published in France. It presents as factor analysis methods: the method of factor analysis, analysis in main components, correspondence factor analysis, multiple correspondence analysis, discriminatory analysis, canonical analysis, generalized canonical analysis. The paper also contains methods of automatic data classification, of which the following is approached: formal aspects of classification, classification starting from qualitative comments, classification in a metric space, the downward classification method, methods of data partitioning.

In **1998,** the sixth edition of the paper entitled *Marketing research* having as authors **D.A**. **Aaker, V. Kumar** and **G.S. Day,** paper that, as the authors mention right from the beginning, the chapter related to marketing data analysis is more rigorous compared to the previous ones and contains real applications of the data analysis methods for marketing data. The paper approaches the methods of data analysis compared and grouped thus: analysis of regression and correlation, discriminatory analysis and canonical analysis, factor analysis and cluster analysis, multivariate scaling and conjoint analysis. The paper chiefly distinguishes for the fact that, apart the examples of the methods for marketing data (examples come from well-known companies such as, Ajax, Pepsi – Cola), makes comparisons between different methods, mentioning the features of their application for the specific of marketing data, for instance comparison of regression analysis with discriminatory analysis or between factor analysis and discriminatory analysis etc. Another major contribution of the paper is that, for approximately all quantitative and qualitative methods used for marketing data, authors also make connection with the opportunity of using internet either for collection or processing of collected data.

Beginning with the year **2000**, the literature in **Romania** enriches with new valuable papers, doctoral dissertations promoting either new data analysis software, or new data analysis methods, and it should be noticed that, in the papers related to the field of market research and marketing in general are either mentioned or detailed with examples of their application in **Romania**. Internationally this phenomenon is much more intense, the data analysis methods being applied for various types of data.

In **2001, Gheorghe Ruxanda** published the paper entitled *Data Analysis* that distinguishes in the literature in **Romania** by means of a careful and rigorous approach, with mathematical rigour and detailed presentation of statistical support that data analysis methods are based on, for the time being this paper makes reference to the analysis method in main components.

Internationally, in 2001 the paper of authors **J.L**. **Giannelloni,** and **E. Vernette** was published. Its title was *Études de marche – 2e edition,* that approaches the analysis of association and causality, chapter where they refer to adjustment by means of the regression method and testing of adjustment quality for marketing data, associations between non-metric variables, and between the nominal and ordinal variables respectively, multivariate analysis, where in the presentation of data tables used for these analyses, the Burt's table or disjunctive in full is shown. The types of questionnaries are also presented being customized for various types of data in case of similarity analysis, for similarity data respectively, for data expressing preferences, and the presentation of main issues inevitable to questioning similarities is carried out.

In **2003, Tudorel Andrei** made his major contribution to the specialty literature by means of the paper entitled *Statistics and econometrics*, due to the profound approach of aspects related to the statistic inference in case of the method of simple and multiple regression, the presentation of some new statistic tests that can be applied to the simple regression analysis (the Jarque – Bera test) presentation of new non-linear regression methods (the CES function), of statistic tests used in case of conventional regression (the CUSUM and CUSUMSQ tests) as well as the detailed approach of self-regressive linear processes.

Also in **2003,** the paper entitled *Data Analysis*, author **Carmen Pintilescu,** was published apart data analysis methods, this paper (analysis in main components, factor analysis of correspondents, hierarhical classification) this paper also presents applications of these methods.

In **2004, N. Malhotra** republished the fourth edition of the paper entitled *Études marketing avec SPSS*, paper that distinguishes itself by the fact that, all quantitative methods applied in the field of market research, the author mentions the commands related to the SPSS software for marketing data processing, and also by the manner of structuring, phasing and specificity of each method (descriptive or explanatory) and implicitly of each statistic notion in data analysis. Apart the conventional regression methods and regression with „mute" variables, aspects concerning the relative importance of explanatory variables for marketing data, applications of factor analysis for common factors in case of marketing data multivariate analysis of similarities and preferences and conjoint analysis are also presented.

Among Romanian authors, there are papers that I used for documentation and an author with a paper that presents a novelty in the field of data analysis – the ***Q methodology (Q factor analysis),*** is **D. Iliescu** respectively**.** Aspects presented in the paper published in **2005** relate to: *introduction in Q methodology -Q sort as a data collection*

technique, Q factor analysis as data analysis technique, interpretation of significance of factors, examples and its usefulness. Apart his merit to detail aspects related to this method, D. Iliescu comprises in his paper, examples concerning the application of this method both for marketing research and advertising (he used this method to divide the attitudes and readers concerning advertising) as well as for data from political research and political marketing, using the Q methodology to divide political expectations.

Also in **2005** the doctoral dissertation entitled *Multivariate methods used in the analysis of computer aided analysis of marketing data*, presented by **T. Dăneţiu** whose major contribution was that he provided examples on various software that can be used for data analysis methods, their limits and advantages being singularized on different methods of data analysis.

Conclusions

Until the 60s these methods have developed and improved to versions that however remained unapproachable in practice as they were requiring a very high volume of calculations. Appearance of software and PCs have opened the access of practitioners to the data analysis techniques.

Especially the methods of factor analysis were the basis for the development of other methods, for instance **factor analysis on distance tables and disimilarities** (that have the same purpose as the main component analysis but the difference is that initial data is different, knowing only distances or disimilarities between individuals and not the variables describing them), **analysis of Euclidean distance tables**, to this effect developing the **MDSCAL algorithm of J.B. Kruskal** that uses ordinal information and the **INDSCAL model** (*INDividual Differences SCAling*) developed by **J. D. Carroll** enabling the analysis of several distance tables (the second model developed by the same author is **IDIOSCAL).** Other developed factor methods are:

- ACP of instrumental variables (ACPVI),
- **ACP with orthogonality restriction,**
- ACP with partial covariances.

Among other authors that contributed significantly to the development of the descriptive methods of data analysis (especially the non-metric analysis) we can quote the following: **F.W: Young**, **W. S. Torgerson** - the latter is related to one of the first software used for data analysis, then **TORSCA -** , **J.C. Lingoes, L. Guttman** and **V.E. McGee** respectively.

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