

TYOLOGICAL ANALYSIS AS ANALYSIS METHOD OF MARKETING DATA

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Abstract. *In order to investigate the market and its related variables, of perceptions, attitudes, opinions or customer's behaviour respectively, marketing research has not got other capture tools than field observation and questionnaire inquiry, and neither data measurement/interpretation devices other than statistico-mathematical methods known as „data analysis”. Progresses recorded in the past years concerning development of methods and their implementation by means of some complex data processing systems but easy to handle, provided the marketing research a powerful introspection tool. This paper shows one of the descriptive methods of data analysis and its applications for marketing data.*

Keywords: hierarchical classification, marketing data, typological analysis.

1. Introduction

Marketing has as a key goal the orientation of a firm's activities according to its customers' current and future needs. It necessarily assumes the existence of a well organised information system, but also the knowledge of some modern analysis, processing and interpretation techniques of the so complex information in the field of marketing.

In the studied literature, **data analysis** is mentioned as being one of the most important stages within a research survey preceded by another stage having the same importance namely, **preliminary analysis** known as **exploratory data analysis**.

The **data analysis** methods are many, their classification is done according to the nature of surveyed variables and existing information a priori concerning the nature of the cause-effect relations in which variables are involved, the data analysis methods can be grouped in two major categories:

- **Interrelation analysis methods (descriptive)**
- **Dependence analysis methods (explanatory)**

When there isn't the possibility of separating the variables in two subquantities, one of dependent variables and another of independent variables the **interrelation analysis methods** are used and whose main goal is to set *the cause and to what extent* the surveyed variables are connected among them and to also measure *the interdependence rate, to identify the variables with relevant significance, to identify categories and or classes or variables.*

2. Typological analysis – theoretical and methodological considerations

Known in the literature as **group analysis**, **cluster analysis**, **numeric taxonomy** or **classification analysis**, this method *aims to classify a heterogenous quantity (made of objects, individuals or cases) in relatively homogenous groups, according to a series of variables or interdependence relations between them* (Malhotra, 2004, p. 539). *This classification is thus carried out to ensure the homogeneity of objects within groups and a higher differentiation among groups, the statistic principle on which is based is that of minimizing the variation between the statistic units (intraclass inertia) in order to gather them in classes and maximization of variation between classes (interclass inertia).*

The typological analysis (Giannelloni, J. L. and Vernet, E., 2001, p. 395) *is established on the distances between individuals* that can represent people, marks, products, regions etc., input data being presented as a picture of distances, selection of the calculation methods being one of the stages related to the making of typological analysis, the method being adapted to the type of data involved in the study (metric, ordinal or nominal).

Compared to the other descriptive methods of data analysis, the typological analysis has a predominantly heuristic character and is not based on complex statistic tools, being much different than those. As a working method, the typological analysis aims the similitude reports between objects, and is used when there isn't any a priori assumption and we are in the stage of the exploratory analysis of research.

The stages covered in the application of the typological analysis method are represented in Figure 1.

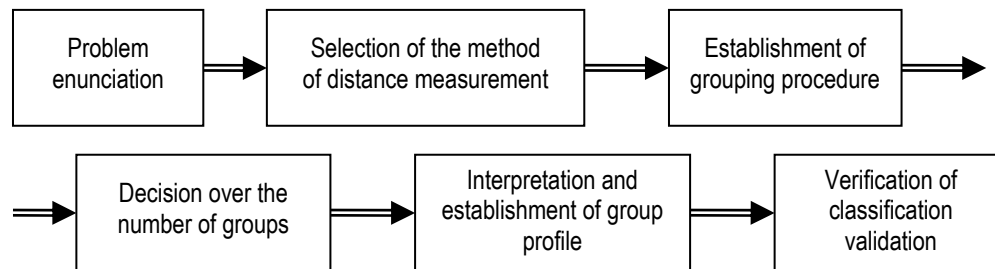


Figure 1. Stages of making the typological analysis

(Adaptation after Malhorta, N., *Études marketing avec SPSS – 4e édition*, Ed. Pearson Education France, Paris, 2004, p. 545)

The stage of *problem enunciation* should have the following *basic principle*: the set of selected variables should aim the identification of some similarities between objects / cases to answer the issue of the marketing research.

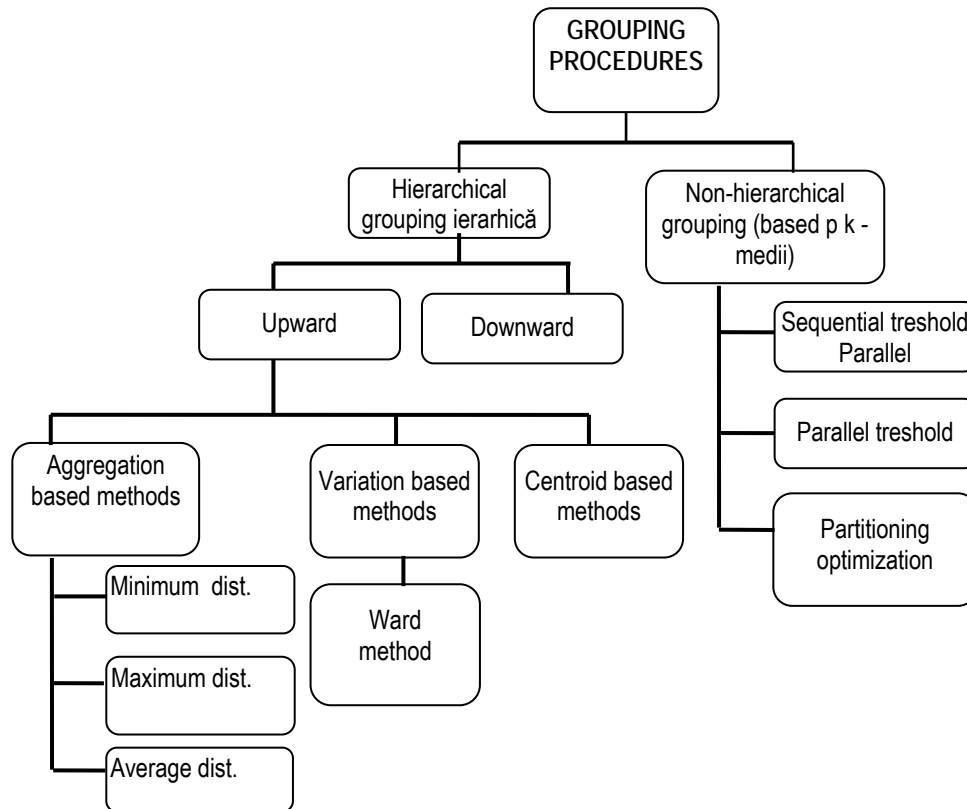


Figure 2. Classification of grouping procedures

(Adaptation after Malhotra, N., *Études marketing avec SPSS – 4e édition*, Ed. Pearson Education France, Paris, 2004, p. 547)

In case of the second stage, in order to measure similarities, calculation of the distances between objects is most often used. However, this method requires the previous knowledge of the type of scale used to measure the variables. According to it, for *nominal variables measurement of coefficient correspondence*, and *in case of metric variables, measurement of the distance or the configuration*. Other types of distances that can be calculated are: Euclidean square distance, *city – block distance (Manhattan or rectangular distance)* the *Cebîșev distance*, *Mahalonobis distance*– used with the methodological goal of removing the influence of the measurement scale and of multicollinearity in distance calculation. For the third stage there are several statistic grouping procedures shown in **Figure 2**.

The classification methods (Everitt, 1974, in Smajda, 1988) may contain:

- *ranking techniques* (upward or downward) that lead to a tree structure or a dendogram;

- *partitioning techniques* (with or without optimization) where, a classification criterium enables the definition of mutually exclusive classes also making a partition;
- *density techniques* or the research on how groups are made in searching the regions containing a relatively dense concentration of points;
- *various techniques* that cannot be classified in previous categories.

The most common methods in marketing are the upward grouping methods, while the non-hierarchical methods (nodal) (Spircu, L., Calciu, Spircu, T., 1994, p. 105) are usually used when the number of individuals is very high and these may classify – according to the group setting technique – in:

A. **Reallotment methods** wherein an object, allotted to a group at an i iteration, can be reallocated to another group at a subsequent iteration. The algorithms concerned end when there is not any object whose reallocation has as a result the improvement of the classification criterium used.

B. **Density searching methods** that assume that variables follow repartition laws whose parameters vary from one group to another. In this assumption the quantity of individuals is represented by means of a repartition density for the groups of individuals. It is searched to identify individuals belonging to the same repartition.

C. **Direct methods** classify individuals based on the proximity between the pairs of variables; more, they allow to classify simultaneously both individuals and variables.

D. **Methods of dimension reduction** (the oldest classification methods) exemplified by means of factor analysis of correspondences.

As regards the upward hierarchical grouping [1], in **Figure 3** it is shown the simple bonding, full bonding and average bonding schemes and the Ward method and the centroid method (mentioning that the studied literature also describes *the flexible method of Lance and Williams* and *the median method*)

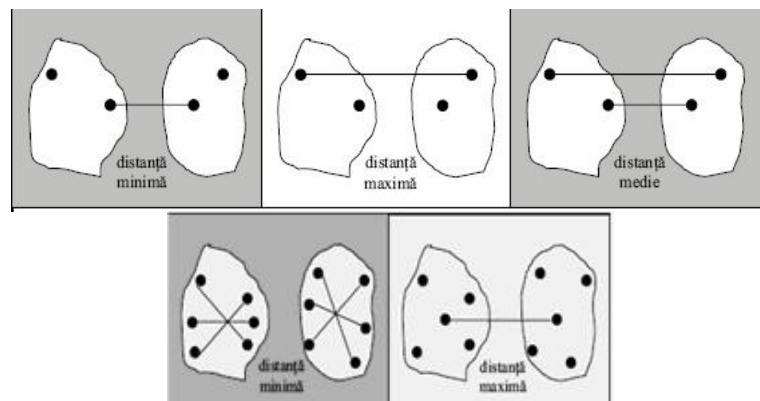


Figure 3. Procedures of hierarchical classification

(Source: Aaker, D. A., Kumar, V., Day G. S., *Marketing research – Sixth Edition*, ED. John Wiley & Sons, New York, 1998, p. 600)

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For the downward hierarhical grouping, A. Smajda (1988, p. 83-103) describes the following methods:

- **The Mac – Nawghton – Smith method** that is based on the fact that it does not entail that inlet data should be as a distance matrix and similarities and correlations are excluded, being prevailingly a heuristic method;
- **The Edwards – Cavalli – Sforza method;**
- **The Howard and Harris method.**

The stage of group explaining and validation (Spircu, L., Calciu, Spircu, T., 1994, pp. 112-113) mainly aims to find variables that play a major role in grouping. This issue can be done by describing each group both by means of *active variables* (of grouping) as well as *passive variables*. It can be asked if groups made are really different between them thus validation being necessary, another stage in classification analysis. There are several *procedures* of validation:

- Analysis tests of variance for each active variable (quantitative) can be used;
- Analysis techniques of discrimination can be chosen wherein the explained variable (nominal) is the type of group the individual belongs to;
- A classification iterative procedure can be applied on a quantity of individuals – witnesses up to the group stabilization.
- Indicators and notions related to typological data analysis are shown in Table 1.

Table 1

Indicators and statistic notions related to typological analysis

Indicator or statistical term used	Description
Grouping program	It provides information about objects or cases that are mixed, in each stage of hierarhical grouping processes.
Group centroid	It is represented by the average values of variables for all objects / cases of a certain group.
Group centres	There are starting points in making the groups non-hierarhic, and groups are built around them.
Proximity index between individuals	The number expressing the existing similarity or dissimilarity between two individuals considering all active variables that characterize them.
Group affiliation	It indicates whose group each object/case belongs to.
Active variables	Variables that serve the group making. Example: preference for certain brands
Passive variables	Variables that serve when explaining groups, describing classes but do not participate in their formation for instance age, socio-professional category, monthly income, Staregion etc
Dendogram	It is the tree-like graphic whereby groups are represented (how and when they form) in case of hierarhical grouping and it is read from right to left.

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Indicator or statistical term used	Description
Stalactite diagram	It is a graphic that shows any time, the affiliation of cases to groups; the name of <i>icicle</i> comes from how it is represented, with vertical variables and horizontal groups, interpretation being done upwards.
Distances between group centres	It shows how much pairs of groups are separated between them. The higher the distances are the more different the groups are.
χ^2 distance	It is used in case when variables are presented by frequency matrix thus transforming the probability matrix.
Euclidian distance	It is used when variables are ordinal obtaining the matrix of average ranks (most times the Spearman's rank correlation coefficient is used or, sometimes, the tangular distance).
Similarity/distance matrix	It contains values of distances between objects/ cases.

(Adaptation after Dănețiu, T., *Multivaried methods used in CAD analysis of marketing data – doctoral dissertation*, p. 67-68, Spircu, L., Calciu, M., Spircu, T., *Data marketing analysis*, Ed. ALL, Bucharest, 1994, p. 106 and Malhorta, N. - *Études marketing avec SPSS – 4e édition*, Ed. Pearson Education France, Paris, 2004, p. 542-543)

In the studied literature, in the quoted paper Smajda details the similarities ratios that can be calculated (Smajda, 1988, p.53 -67), respectively: **Jaccard and Tanimoto ratio, Rao and Russel ratio, Ochriai ratio, Yula ratio, Kubeyski ratio, Sokal ratio, Pearson ratio**, all starting from the number of positive coincidences between two comments, the number of negative coincidences, the number of coincidences and the total number of variables.

3. Marketing data analysis of typological analysis

In marketing there is a high interest in the descriptive classification techniques of objects. In this field, objects or individuals can be consumers, products or brands of various products, commodity markets, etc. concrete examples as regards the application of this method of marketing data analysis being comprised in **Table 2**.

Table 2

Marketing applications of typological analysis

Purpose of research	Examples
1. Market segmentation	<ul style="list-style-type: none"> Segmentation tries to divide the quantity of consumers in groups of consumers, named segments or types. Each segment is made of individuals whose features are similar. Thus it is about to admit, within diversity of buyers, their behaviour, in order to build up specific strategies, adapted to each segment in the surveyed population. We can define groups of consumers according to different geographic, socio-demographic, psychographic or behavioural variables and then focus

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Purpose of research	Examples
	<p>over behaviour or characteristics of the components of these groups based on the information achieved in research.</p> <ul style="list-style-type: none"> • Segmentation according to the consumers' life style, in line with benefits targeted for products bought;
2. <i>Research concerning brands</i>	<ul style="list-style-type: none"> • The brands of the same product are surveyed, the perception of their characteristics being registered by the consumers. It results types made from those brands that, within all the features, has similar perceptions at buyers. The knowledge of these types (classes) enables the knowledge of competitive brands (these are brands from the same class) and consequently, a suitable commercial policy can be adopted (Spircu, L., Calciu, M., Spircu, T., 1994, p. 105). • Brand grouping, determination of a brand competitive kit and identification of some opportunities for new products, based on the analysis of attributes targeted by consumers as regards products and brands. Thus, as long as brands have been evaluated by means of these attributes, they can be grouped, and thus a better reporting to competition and consumers can be done.
3. <i>Marketing research concerning the launch of new products</i>	<p>To this end, test markets are studied (either districts, either cities or even countries) following characteristics such as: the number of inhabitants, buying power per inhabitant, average age of inhabitants, number of unemployed people, number of selling points, audience of radio and TV spaces, newspaper circulation etc. specific markets result where tests can be done concerning the launch of a new product.</p>
4. <i>The study of a population versus activities, interests and opinions</i>	<ul style="list-style-type: none"> • It leads to the determination of a typology or a classification of the life style. Individuals belonging to the same group (the same class) express the same type of activities, interests and opinions. • In order to group the clients with homogenous buying behaviour their classification is carried out starting from the amounts bought, the place of buying and the brand of products purchased (Giannelloni, J. L., Vermette, E., 2001, p. 397).
5. <i>Data reduction</i>	<p>A number of thorough analyses can be carried out. These analyses can be evaluated at group level and not individually (comment), such as the case of studying the behaviour differences between groups.</p>

(Adaptation after Spircu, L., Calciu, M., Spircu, T., *Marketing data analysis*, Ed. ALL, Bucharest, 1994, p. 112-113 and Dănețiu, T. – *Multivaried methods used in the CAD analysis of marketing data* –doctoral dissertation, ASE, 2005, p. 66-67)

Malhotra (2004, p. 542) also recommends it in the identification of the new production opportunities (classifying brands and products in groups, for example, we can determine the competitive ensembles of the market), in selecting the market test and summarizing data.

4. Conclusions

The issues of data analysis descriptive methods are in line with many *research objectives in the field of market analysis* and not only, and comprises:

- Identification of the rules governing the movement of phenomena and economic and social processes, of main trends and regularities specific to their evolution;
- Identification of main factors whose influence leads to the making of some phenomena and processes;
- Determination of extent wherein an amount of influence factors concur to the formation of a certain effect;
- Ranking of factors that drive a certain effect according to the importance and significance of their influence;
- Identification of the main possibilities and as a result of them, behaviour of phenomena can be influenced in a desired way;

In case of marketing data, the typological analysis has the major advantage that is applicable to qualitative, ordinary data, (most often used in practice in marketing research as analysis data), this classifying individuals in relation to their preferences compared to a certain characteristic.

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Note

In bibliographic information, these schemes are described as aggregation algorithms for proximity indices between classes, and are retrieved as the „*method of most closest neighbours*” for simple bonding, „*method of most farthest neighbours*” for full bonding and „*method of average bonding*” for average bonding.