Q FACTOR ANALYSIS (Q-METHODOLOGY) AS DATA ANALYSIS TECHNIQUE

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Data analyses involves the use of some statistical methods. Q methodology or Q factor analysis as it is named in the foreign literature, is a relatively new tool not only as approach but particularly following the quite recent rediscovery of its usefulness in those fields where psychometric knowledge of individuals have thorough implications. For marketing, consumers’ preferences, opinions, attitudes are subjective and this is the reason for which a Q factor analysis outlines subjective structures or even subjectivity itself. The purpose of Q factor analysis is to identify factors and based on them, several individuals can be compared, wherein variables are not grouped but respondents are discriminated among them. The paper shows the technical and methodological aspects of the Q factor analysis.

Key words: Q - methodology, data analyses, subjectivity

Presentation. Advantages of the method. Comparisons. Applicability

Q methodology or Q factor analysis as it is called in the foreign literature is a relatively new tool not only as approach (it was mentioned by William Stephenson in 1935 – Charles Spearman’s last assistant, inventor of factor analysis – and the parent and advocate of this method) but particularly following the quite recent rediscovery of its usefulness in those fields for which psychometric knowledge of individuals has thorough implications and its results have a higher usefulness by far, compared to other tools that are more standing and easier to use by researchers. Stephenson’s attempt was based on the main idea that individuals never act in social life according as “objectivity” but according to the way they perceive this subjectivity - therefore, according to their own subjectivity. Seventy years ago, the Q methodology proposed itself to use factor analysis as a quantitative analysis technique of some subjective data. For marketing, consumer’s preferences, opinions, attitudes are subjective and therefore, a Q – sort outlines subjective structures or even subjectivity itself, Stephenson’s concept being that of effective subjectivity. According to Stephenson, the purpose of Q factor analysis is to identify factors based on which several individuals can be compared, wherein variables are not grouped but respondents are discriminated among them.

This paper will not detail the Q methodology (it is widely approached and sustained by many examples both in foreign literature and by Dragoș Iliescu’s own experience in using this method described in the book with the same name), but will only mention the features that distinguishes it (and recommend it) as the R factor analysis, conventional, and the advantages that marketing research would have will be outlined, and implicitly market research if the factor analysis method would be used (in various types of research).

Q methodology provides a foundation for the systematic study of subjectivity and this is its main feature that recommends it to all researchers interested in qualitative aspects of human behaviour and that, in marketing has a major importance for any producer of goods or supplier of services because, from marketing research, human behaviour both means interrelationship with a product and with buying behaviour, a consumer’s consumption respectively. The Q methodology does not operate with a type population sample, of consumers, but with a type opinion sample, and what is more important for the quality of research based on the Q methodology is these opinions should be gathered from that public that has an opinion to say in that matter.

186 Idem, p.82
The principle of methodology consists in presenting a person a set of statements related to a certain topic, and then he is asked to order them, as usual based on a continuous “agree”– “disagree”, this operation is called Q sorting (in the foreign literature the most common name of the method is Q-sort), in fact, statements being not factual expressions but, exclusive, opinion problems, the topic concerned making ordering based on own preference, and thus implicitly based on its assigned significance from both approach of statement significance and relationship with these. Schematically a Q-sort with 32 items can be thus represented following its application within investigated respondents (figure 1).

At the same time, the Q factor analysis is a quantitative and qualitative research method. It is considered to be quantitative because it uses the factor analysis as a calculation method, and qualitative because of descriptive approaches that should be done for each factor tracked down.

Q methodology is signally synthetic (and not analytic as R factor analysis) as it does not break the whole in parts but keeps the parts up and evaluates the structure it is part of, a very important issue in marketing, as it is not important to know as thorough as possible, each consumer with his opinions, attitudes and preferences (in fact, a subversive issue for a firm) but to know as thorough as possible the segment of consumers it is part of, and hence those opinions, attitudes and preferences that are common. The basic principle of the R factor analysis is to explain the whole by its reduction into components (for instance, regression, multiple regression, variance analysis and so on) working based on the assumption that the whole is equal with the sume of components plus error. It is important for market survey, for marketing in general, for the study of consumer’s behaviour and factorized identification of variables but, identification of that vital factor will be much more effective (and this is the purpose of Q methodology) that group and segment the consumers, therefore we consider that, in marketing research, the two methods different as methodology (R factor analysis and Q factor analysis) should be used complementarily and not distinctly, and the results of such kind of analyses will be used complementarily, too.

If stages of Q methodology would be represented schematically, it would be presented as in figure 2.

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The major advantage of this method that recommends it to use, is it uses one of the most powerful statistic technique, with huge exploring valences: factor analysis, the approach of the method is that, structures of subjectivity gathered from individuals are subject to a factor analysis and results in factors that only represent segments of subjectivity.

Q methodology, based on the correlation of people and not variables has a significant importance for marketing data thanks to the specific of market surveys and marketing in general, to make and segment the market namely to correlate people according to different variables.

The main background of factorizing individuals and not variables, hence the entire methodology is the concept of shared opinion. It is not enough to know that a consumer evaluates the brands of a certain category of product based on price, image of simplicity and readiness to find them at the point of sale, but we should also set which of these three dimensions is more important and to what extent is more important. As a result, if we succeed to set that, by far, easiness with which the consumer finds the desired product at the point of sale is most important, this issue will require the generation of a marketing strategy focused on distribution and sale components. If on the contrary, we will set that price is most important, making of a marketing strategy based on perception of price, promotions and price elasticity will be required. For marketing and market survey, the objective truth related to a product, the trade mark is not important because consumers never buy objectively but they buy or react positively to an advertising, a hitch-hike based on the way they perceive that product, advertising etc.

For a better visualization and comparison of the place concerning the Q methodology within the factor analysis methods, we will use Dragoș Iliescu’s mentions in his paper about this aspect, those related to the three dimensions respectively (named “modes” in the literature) the cube of covariations (respondents, variables, occasions) emphasizing that, though the factor analysis operates with three modes\(^{189}\), it factorizes only one (always considering one of them as being steady and the third as being the module providing a sufficient data rejoin) and quotes another author (Cattell) who structured the six types of factor analyses (table 1) used in various fields.

<table>
<thead>
<tr>
<th>Technique</th>
<th>Factorized module</th>
<th>Remarked module</th>
<th>Constant module</th>
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<td>O</td>
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\(^{189}\) Iliescu, D. – Q Methodology, Ed. Comunicare.ro, Bucharest, 2005, p. 76
The above mentioned techniques are related two by two, for example, the R technique (most common) takes into consideration data gathered on the same occasion (steady module), from several individuals (remarked module), that analyse them in connection with involved variables (factorized module). In contrast with R, Q technique, that is its pair, though it has the same steady mode (data gathered on the same occasion) considers several variables (remarked module) and analyses them individually, from where they have been collected (factorized module). Thus, the data matrix used in the Q technique will have individuals on columns and variables on rows, exactly the opposite of data matrix in R.

As opposed to this procedure, in the Q factor analysis, each individual is approached as a different experimental case and represents a factorized entity. Thus, instead of distributing a high number of people with a low number of items to evaluate (R technique), the researcher distributes to a low number of people, a high number of items that should be evaluated (Q technique). Consequently individuals are factorized based on responses to variables, and not to variables based on responses given by individuals.

The Q factor analysis is ideal for that research where the purpose is development of a typology (either consumers or other types of individuals), some authors comparing the Q methodology, in this regard, with the cluster analysis when this is carried out on individuals, the analogy consists of the fact that the goal of both techniques is to identify profiles, ideal types, types of individuals that respond similarly to a certain set of variables.

The primary feature of the Q factor analysis is its focus on the correlation and analysis of similitudes among individuals.

As regards the factor design, this technique can be used to evaluate – and eventually to create – typologies (a very important issue in marketing). Moreover, except extremely simple designs, wherein each individual meets a single discrete category, the method reveals each individual’s affiliation to several typological factors, to various extents.

In the literature and practice, two types of factor analysis are admitted, namely the exploring factor analysis – used to determine the number or nature of factors responsible for covarions among variables - and the endorsing factor analysis (it has to be mentioned that, one of the most common statistic software, SPSS, cannot operate this type of factor analysis, but only LISREL) – opposed as methodology to the first one, starts from an assumption that is previous to analysis, set by the researcher, and states exactly which variables will be correlated to generate certain factors and which factors are correlated among them and to what extent.

Technical aspects of Q factor analysis

As a conclusion to the aspects mentioned in the previous subsection we can state the Q factor analysis is that method that drives existing interrelations and similitudes between a number of respondents, in relation to the common variation on a certain topic, either it is their opinion about a certain product or topic, structure of personality or the psycho-attitudinal model.

Without detailing the mathematic-statistic aspects of the factor analysis methodology, in general, however, we will outline that one of the main differences between R factor analysis and Q factor analysis, from the technical point of view, is that, the first uses analysis on main components as calculation method, and the Q methodology uses the method of Thurstone's centroid analysis, in his paper. Dragoș Iliescu thoroughly presents the centroid factor extraction algorithm in order to apply a Q-sort of 150 items at an organization in order to investigate the area of organizational psychology in a Romanian firm, correlation matrix comprises respondents included in Q-sort both on rows and columns.

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1\(^{90}\) Iliescu, D. – Q Methodology, Ed. Comunicare.ro, Bucharest, 2005, p. 78 - 79

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Also, related to technical aspects, to determine the moment of extraction suspension, the Q methodology uses two rules:

1. Proper saturation
2. Scree test on which scree plot is based

Another important technical aspect in factor analysis is that related to factor rotation, and in case of Q factor analysis, the X, Y, Z vectors represent extracted factors and points represent the questioned Q-sort respondents, rotation preferred in Q-sort being the judgement rotation enabling the researcher to follow his theoretical assumptions, impressions, opinions, beliefs and temporary assumptions.

Factor rotation in factor analysis used for marketing data and particularly for the Q methodology used in marketing is very important as it helps in setting those clusters (groups), segments that have attitudes, opinions, totally different attitudes, totally opposed among them, as it help us very much that, those groups (clusters) that in original centroid extraction seem to be a little neutral compared to other two clusters for instance, after factor rotation affiliation to one of the factors is completed. As a technical comment in carrying out the Q methodology,

1. extraction of factors and rotations should be done independently from the researcher’s working suppositions as regards operation. Then,
2. factor rotation should be determined by the nature of data that is available and the purposes of investigation that takes place.
3. as factors are extracted and rotated in the preferred manner, they provide the researcher information about similarities or differences of respondents (that are similar and how strong similarity is).

Technical aspects related to the approach of factor significance are also important and have characteristics in case of Q factor analysis. The similarity of respondents by using Q methodology reflects exclusively opinion similarities and certainly not demographic regularities what is much more important in order to know the consumer as regards marketing research.

The issue of using the Q methodology consists in measuring significant differences in statements (items) i.e. to measure how different factor scores of Q-sort statements are, namely to practically set what the relationships among statements and various Q-sort factors (opinion segments, consumers’ groups are. Brown, quoted by Dragoş Iliescu, called them (when he referred to assignment of consensus or differential statements), “molecular suppositions of Q methodology” and represents the most simple manner of testing suppositions, available on Q factor analysis, to identify those statements that distinguish factors among them respectively.

The Q factor analysis assumes that, as a final stage of analysis and technically, the average category score for each factor is calculated by means of formula:

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z_c = \frac{\sum_{i=1}^{nc} \left| z_i \right|}{n_c}
\]

where \( z_i = Z \) score of statement
\( c = \) category
\( n_c = \) number of c category statements

There are two types\(^{191}\) of Q factor analysis, mentioned in foreign literature:

1. Non-structured Q-sort, wherein variables are included. These variables are chosen without taking into consideration the basic structures, such items from different sources (or from only one source) are inclined to be representative for a single population of items or a single field, Kerlinger suggesting that basic items can come from measurements of personality and scale of attitudes.

\(^{191}\) Campbell, T.C. – Investigating structures underlying relationships when variables are not the focus: Q-technique and other techniques, paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, April 1995
• **Structured Q – sort**, variables also come from a single field, but are selected to be representative for a certain particular theory issued by the researcher.

**Literature**


