Van De Tran et al /J. Pharm. Sci. & Res. Vol. 10(5), 2018, 1277-1280

ISSN:0975-1459
Journal of Pharmaceutical Sciences and Research
www.jpsr.pharmainfo.in

Using Q Methodology in Pharmacy Research: a Method Overview and a Pilot Study

Van De Tran[1,2*], Valeria Valeryevna Dorofeeva[1]

[1]*Department of Pharmaceutical Management and Economics, Peoples' Friendship University of Russia, 117198, Russia, Moscow, Miklukho-Maklaya st., 8/2*

[2]*Faculty of Medicine, Can Tho University of Medicine and Pharmacy, 902490, Vietnam, Can Tho, Nguyen Van Cu st., 179*

Abstract

Q-methodology is a unique combination of the strengths of both qualitative and quantitative research technique that allows researchers to investigate the subjective viewpoints, beliefs, attitudes, and experiences of participants on a research topic. However, Q-methodology has not been widely used in pharmaceutical research. Therefore, the purpose of this article is to provide a brief overview of Q-methodology to readers in the pharmaceutical field and present a pilot study on factors influencing pharmacy customer satisfaction as an actual example illustrating the application of this method. We hope to capture interest and encourage more researchers to use Q-methodology in pharmaceutical research in the future.

Key words: Pharmacy, Q-methodology, Qualitative method, Quantitative method.

INTRODUCTION

Q-methodology, also known as Q-technology or Q-sorting, is a unique combination of qualitative and quantitative research methods [1, 2]. Q-methodology—a powerful method—is used to study the "subjectivity" of people [3], points of view, opinions, beliefs, human relationships, etc. [4]. The technique was named "Q-methodology," as its goal was to contrast with the traditional method called "R-methodology," which used the multidimensional factor analysis in the study of psychological processes [5].

The Q-methodology emerged in 1935, when the English physicist and psychologist William Stephenson presented it in a letter to the "Nature" journal [6]. He was interested in finding new methods to study individual beliefs and attitudes. When developing the Q-methodology, he worked as an assistant to Spearman, who developed the factor analysis [7]. His contemporaries did not agree with his methods and seriously criticized its departure from the traditional factor analysis. As a result, the Q-methodology has not been used for a long time, but it was revived in the US during the 1970s and Britain during the 1990s and has been used widely up until now [8].

Currently, the use of the Q-method is significantly increasing in research in the field of psychology, social psychology, politics, etc. [9]. In the pharmaceutical field, the study using Q-methodology is limited. According to the data sources from Pubmed and Scholar, only two studies were found about Q-method application in the pharmaceutical field. Hazen et al. (2016) explored the viewpoint of medical and pharmaceutical experts on the role of clinical pharmacist in primary health care [10]. Renberg et al. (2010) described the different expectations of consumers in pharmacy encounters [11]. This paper aims to present an overview of Q-methodology and provide a pilot study as an illustrative example of its application in the pharmaceutical field.

CONDUCTING Q-METHODOLOGY

The procedure for conducting a study using Q-methodology consists of the following six basic steps: (1) developing a concourse on the research topic; (2) developing a representative Q-sample; (3) selection of P-sample; (4) conducting Q-sorting; (5) data analysis, and (6) factor interpretation (see Fig. 1).

Concourse

The concourse theory is generalized as "universes or populations of statements." It usually consists of a set of all possible aspects that are related to the topic of study [12, 13]. In other words, it is the synthesis of all the ideas, beliefs, attitudes, and opinions [14] that people say or think about research topics [8]. The goal of this approach is to reveal the diversity of opinions on the topic as much as possible [14].

The methods are often used for the development of statements in concourse: (1) qualitative methods, such as structured interviews and thorough interviews; (2) quantitative methods: the statements based on previous studies [15]. Often, a combination of both methods is applied by Q-methodologists to ensure that a diversity of all possible views on the research topic are obtained. For example, in the study by Hazen et al. (2016) [10], there was a concourse of 116 statements collected from interviews with pharmaceutical and medical experts and based on the literature, in line with the research aims.

Q-sample

The next stage is refinement, and the concentration of statements from the original concourse to obtain a representative set of statements is known as the Q-sample. The purpose of this step is not only to reduce the number of statements but also to maintain the representativeness of all the points of view contained in the concourse [16]. Representativeness in the conduct of the Q-methodology is related to the representativeness of the Q-sample. It is important that all key statements related to the topic of the survey appear in the Q-sample. Therefore, the development of a Q-sample requires diligent care and attention.

Two methods for developing a Q-sample are used to extract statements from concourse, namely the unstructured (inductive) and structured (deductive) methods [7]. In an unstructured method, there are a set of statements selected randomly without effort to ensure coverage of all sub-issues from the concourse [7]. According to this approach, the researcher chooses statements if there is a theoretical limit related to the topic of interest [17]. In a structured sample, statements are systematically and structurally selected based on theoretical considerations [17] with great attention on the coverage of sub-issues in the selection process of statements. The structured sample is often supported on the basis of use of the factorial design [7]. For example, in the research by Renberg et al. (2010) [11], the 3×3×3 matrix was developed from three dimensions: (1) quality assessment base; (2) focus of pharmacy encounter; and (3) power relationship. And in each dimension, there are three sub-dimensions. Based on the developed matrix, a Q-sample of 54 statements was formed by selecting three appropriate statements from concourse and then 27 combinations of the sub-dimensions of the matrix were filled in.

An appropriate size for the Q-sample is usually from 20 to 100 statements [18]. An ideal number in a Q-sample is usually between 40 and 80 statements [17, 19, 20]. Some studies were

performed in only a small number of 18 statements, while others carried out up to 140 statements [8].

The selected statements should present positive and negative sides as well as neutral opinions on the research topic. However, though the balance between the two sides is not necessarily equal, the transformation of a positive statement into a negative statement to reflect negative opinions is also not required. This is due to the fact that each statement carries both opinions in life [21].

Finally, the statements must be re-written in simple, short sentences with a clear and precise meaning that is consistent with the original statement [14] and desirable to keep the everyday language familiar to participants [12]. In the Q-methodology, the statements in the Q-sampling are not only presented in a writing form but can also include sculptures, works of art, images [7], records, and audio [16].

P-sample

A group of participants that performs the sorting of statements in the Q-sample is called a P-sample. Participants are recruited to represent the breadth of viewpoints in a target population [8, 14, 22], and not for the purpose of evaluating the distribution of opinions across the population [7]. Thus, in the Q-study, researchers not randomly selected respondents from a particular population [14, 23, 24], but, on the contrary, they intentionally recruited respondents with potentially diverse points of view in accordance with the purposes and orientation of the sample [7].

The nature of the statistical method in Q-methodology is the "inverted" factor analysis [25]. In the Q-method, respondents are considered as dependent variables in contrast to all the R-method studies where statements are considered as dependent variables [21]. Therefore, too many variables are not required to make the analysis process and the study results clearer [21]. The Q-methodology does not require a large number of participants [16, 24]. Between 40 to 60 participants are usually effective enough for most studies using Q-methodology [4, 8, 18, 26]. However, reliable results can be achieved with a much smaller number of participants [26]. Some Q-studies have been published with the participation of only 12 people [27].

Q-sort

Prior to the collection of data on Q-sorting, researchers need to develop a Q-distribution grid (for example, as shown in Fig. 2). The point scale can range from (-3 to +3); (-4 to +4) to (-5 to +5) [16] or (-6 to +6) [4], depending on the number of statements in the Q-sample [6]. For example, if there are less 40 statements, then a 9-point rating scale (-4 to +4) is used; for 40 to 60 statements, an 11-point scale (-5 to +5) is used; for more than 60 statements, a 13-point scale (-6 to +6) is used [21].

The Q-distribution grid is usually formed as a quasi-normal distribution (bell-shaped diagram), based on an assumption that there are a few answers where participants would choose the most agree and the most disagree [28]. Moreover, for a good approach, the kurtosis of distribution to make the pyramid flat or steep are also considered. The distribution should be flat in research on the experts' opinions or a more complex research topic. While the distribution should be steeper in research on the general public opinions with limited knowledge on the research topic or simple research issues, so that the majority of the respondents' answers appear in the middle of the pyramid [21].

The data collection through Q-sort gives several advantages over traditional questionnaires using the Likert scale. In the Q-sort process, the respondents cannot choose to agree to all questions or give negative answers to all questions. Participants must be sorted into a fixed and forced distribution [29]. Nevertheless, the use of different point ranges and distribution forms do not have a significant effect on the final results [30]. Thus, the point scale range and distribution shape of the Q-grid can be changed according to the convenience of participants [31].

Each statement from the Q-sample are randomly numbered and then printed on cards. Respondents are asked to sort cards in a forced quasi-normal grid in terms of their degree, from most disagreement to most agreement with the research topic. In this "forced" sorting process, only one statement is placed in one cell, and the subjective neutrality of participants is presented by statements sorted closer to the middle of the distribution [32]. This sorting process is also known as Q-sorting. The Q-sorts that are completed by the participants are considered representative of their views on the topics of interest.

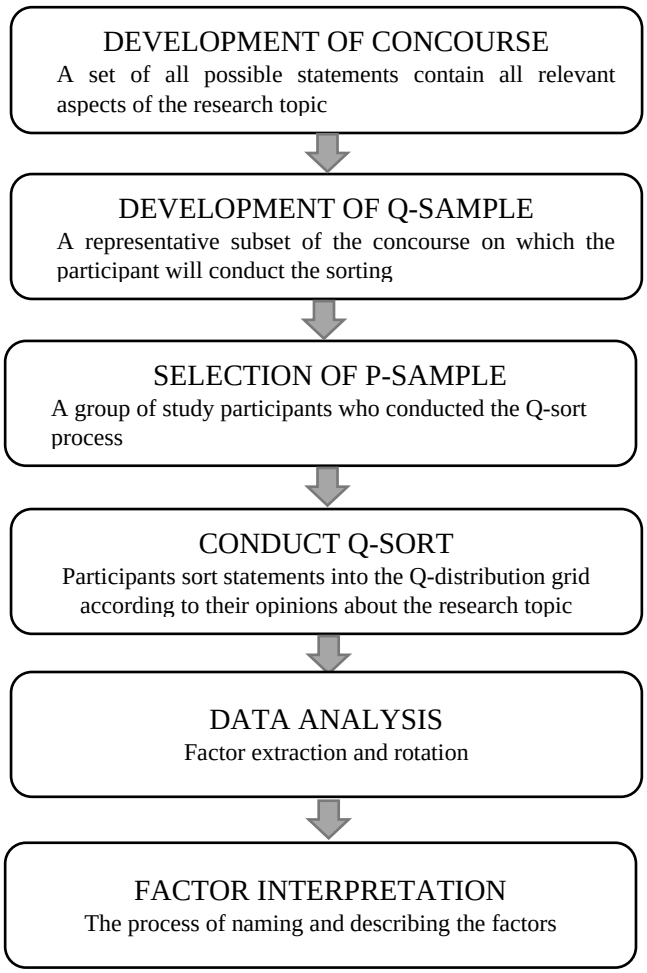

Fig. 1: Procedure for conducting a study using Q-methodology.

Data analysis

In Q-methodology, the by-person factor analysis aims to determine the number of participant groups (also known as factors), wherein each group has similar points of view [16, 33]. The points of view of the participants are grouped on the basis of the similarity of the sort or rank of statements on their Q-sort [1].

There are currently several specialized packages available for the data analysis using Q-methodology. PCQ is the best commercial product. PQMethod—effective software and available for free download from: http://schmolck.userweb.mwn.de/qmethod; Ken-Q Analysis is a web application, with which one can download for free from: http://shawnbanasick.github.io/ken-q-analysis. Such specialized packages are recommended, as they facilitate data entry and make data analysis processes simpler.

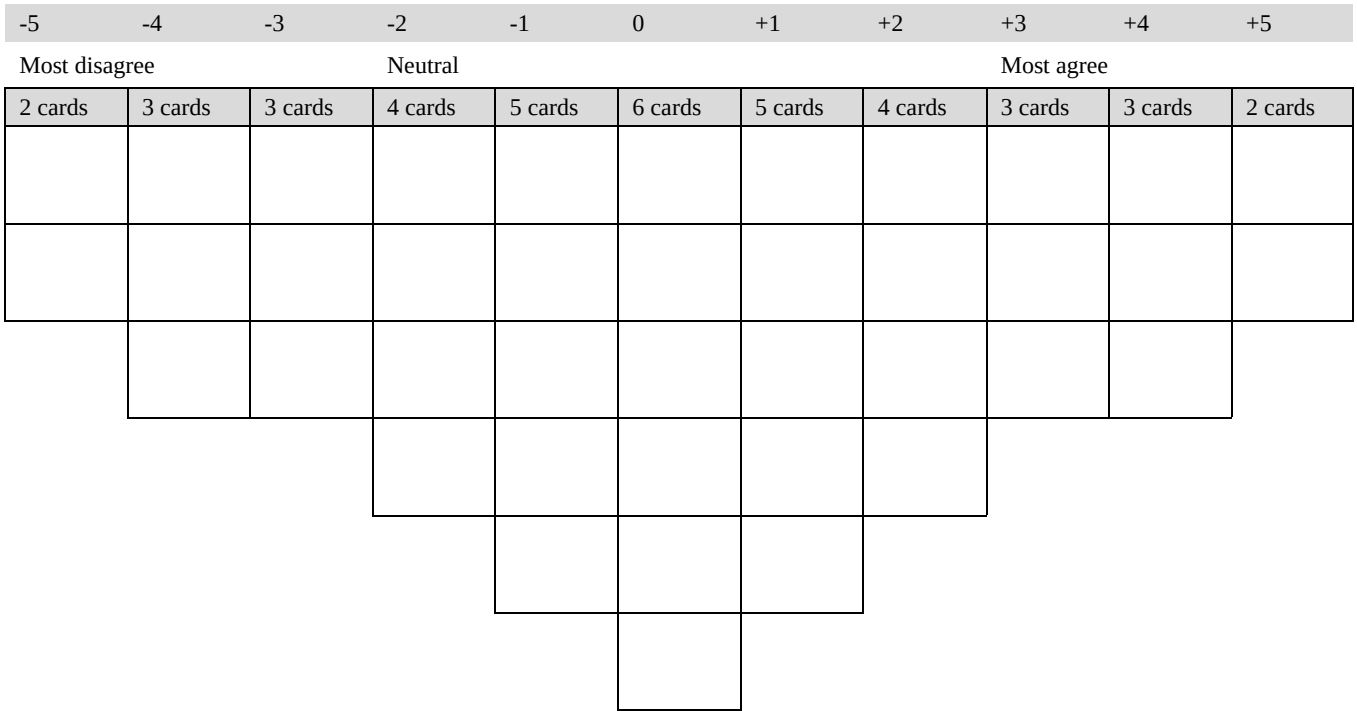

Fig. 2: An example of a Q-distribution grid designed for a Q-sample of 40 statements.

Factor extraction consists of the following two methods: principal component analysis and centroid method. The centroid method is preferable to the principal component analysis [25, 34], because it allows more participants to load on one factor [1]. Some of the following evaluation methods will be proposed to select an appropriate number of factors: (1) Kaiser criterion of retention of all factors with eigenvalues greater than 1.0 [8, 22, 25, 34, 35]; (2) Retention of a factor that has at least 2 Q-sorts with loading significant on that factor [8, 25]; (3) Scree test [36]; (4) a set of factors whose total variance is not less than 40% [35]. The significance (at $p<0.01$) of the factor loading is calculated by the following formula: $2{,}58/\sqrt{n}$, where n – number of statements in Q-sample [16, 20];

Most number of reasons are given for the factor rotation since this procedure makes the factor structure simpler, and, therefore, factor interpretation will be easier and more reliable [34]. There are two basic factor rotations: judgmental rotation and varimax rotation. Judgmental rotation is basically a process that most often leads to subjective results rather than objective, in which the factors are manually rotated by the researcher to a certain extent, and, then, the results obtained are analyzed by the researcher. This process is repeated until a suitable result is found [34]. With judgmental rotation, only two factors can rotate simultaneously, so that data from other factors that do not rotate can easily lose [37]. Varimax rotation is the most common method of rotation [37], which maximizes the variance of each factor loading by increasing high factor loading and reducing low factor loading, making the factor interpretation simpler [34].

Factor Interpretation

In the factor interpretation process, researchers usually give a name to each factor and collect the useful identified statements for the creation of a paragraph that describes the main views of the factor [8]. The quality of the interpretation depends on the understanding of the researcher, who relies on his accumulated knowledge, experience, and intuition to interpret the points of view arising from the factor analysis [7].

The process of interpretation for each factor is based on the use of the following data: (1) highest or lowest ranking statements; (2) useful statements with high or low ranking in the focus factor rather than other factors; (3) demographic information of participants who completed the Q-sort with a significant load on that factor [38].

A PILOT STUDY

This pilot study aims to describe the application of Q methodology to the pharmaceutical field. The study was conducted to investigate the factors affecting clients' satisfaction with the pharmacy services at community pharmacies in Russia. Concourse is developed based on a review of the literature related to the study of pharmacy customer satisfaction from the PubMed and Scholar database. As a result, the study found more than 120 relevant statements on the study topic. The development of the Q-sample was conducted by choosing the few appropriate statements for the following dimensions: pharmacy, drugs, knowledge and attitudes of pharmacists, and pharmacist behavior. The final Q-sample that was created contained 40 statements. A P-sample of seven pharmacy customers was recruited from community pharmacies in Moscow, Russia. They were asked to sort 40 statements into Q-distribution grid (see Fig. 2) in accordance with their level of satisfaction with the quality of community pharmacy services.

Factors were extracted using the centroid method and then rotated using the varimax method using PQmethod version 2.35 software. The results of the study identified two key factors that affected client satisfaction. These two factors account for 52% of the study's variance. Five participants contributed to the defining factor 1. Two participants contributed to the defining factor 2. Clients that belonged to factor 1 showed a very high satisfaction or dissatisfaction with the pharmacists' practice, as presented in following statements: "Before dispensing the pharmacist checks the name of the medicines and its dosage"(+5); "To avoid mistakes, the pharmacist provides information on the use of medicines in writing"(-5). Therefore, factor 1 was labeled "pharmacist's practice." Factor 2 was labeled as "the medicine"

because they were highly satisfied with the following statements: "I trust the quality of the medicine purchased at the pharmacy" (+4); "I get the necessary medicine in the required amount" (+4).

CONCLUSION

This paper presented the basic steps for doing the Q-methodology. A pilot study was then conducted as an example to describe the application of this method in the field of pharmacy. As a method that combines the advantages of both qualitative and quantitative research methods, the Q methodology is a powerful and useful method that could be very effective in pharmacy research. Using Q methodology will provide another research tool for researchers in the future to better understand the behavior, attitudes, and the perceptions of clients and experts in the pharmaceutical field.

REFERENCES

[1] Irie, K., Q methodology for post-social-turn research in SLA. *Studies in Second Language Learning and Teaching*. 2014, 4(1), 13-32.

[2] Onwuegbuzie, A.J., Frels, R.K., Using Q methodology in the literature review process: a mixed research approach. *Journal of Educational Issues*. 2015, 1(2), 90-109.

[3] Rani, B., Classification of the teaching skills based on Q-methodology using the perceptions of sec. school teachers. *International Journal of Educational Planning & Administration*. 2011, 1(2), 141-150.

[4] Nikraftar, T., The conceptions about managing coordination in Iranian governmental machinery: a Q methodology study. *Qual Quant*. 2013, 47, 2577–2596.

[5] Yoshizawa, G., Iwase, M., Okumoto, M., Tahara, K., Takahashi, S., Q Workshop: An Application of Q methodology for visualizing, deliberating and learning contrasting perspectives. *International journal of environmental & science education*. 2016, 11(13), 6277-6302.

[6] Brown, S.R., A primer on Q-methodology. *Operant Subjectivity*. 1993, 16, 91-138.

[7] Davis, C.H., Michelle, C., Q methodology in audience research: Bridging the qualitative/quantitative 'Divide'? *Journal of Audience & Reception Studies*. 2011, 8(2), 527-561.

[8] Simons, J., An introduction to Q methodology. *Nurse Researcher*. 2013, 20(3), 28-32.

[9] Mokry, S., Dufek, O., Q method and its use for segmentation in tourism. *Procedia Economics and Finance*. 2014, 12, 445-452.

[10] Hazen, A.C., Wal, A.W., Sloeserwij, V.M., Zwart, D.L., Controversy and consensus on a clinical pharmacist in primary care in the Netherlands. *Int J Clin Pharm*. 2016, 38(5), 1250-60.

[11] Renberg, T., Törnqvist, K.W., Sporrong, S.K., Lindblad, A.K., Pharmacy users expectations of pharmacy encounters: a Q-methodological study. *Health Expect*. 2010, 14(4), 361-373.

[12] Sæbjørnsen, S.E.N., Ellingsen, I.T., Good, J.M.M., Ødegård, A., Combining a naturalistic and theoretical Q sample approach: An Empirical Research Illustration. *Operant Subjectivity: The International Journal of Q Methodology*. 2016, 38(2), 15-32.

[13] Ramlo, S., Mixed method lessons learned from 80 years of Q methodology. *Journal of Mixed Methods Research*. 2015, 10(1), 28–45.

[14] Owusu-Bempah, J., How can we best interpret effective leadership? The case for Q method. *Journal of Business Studies Quarterly*. 2014, 5(3), 47-58.

[15] Gabor, M.R., Q methodology (Q factor analysis) – particularities and theoretical considerations for marketing data. *International Journal of Arts and Commerce*. 2013, 2(4), 116-126.

[16] Tiernon, P., Hensel, D., Roy-Ehri, L., Using Q methodology in quality improvement projects. *Journal of Obstetric, Gynecologic & Neonatal Nursing*. 2017, 0(0), 1-8.

[17] Paige, J.B., Morin, K.H., Q-sample construction: A critical step for a Q-methodological study. *Western Journal of Nursing Research*. 2014, 38(1), 1 – 15.

[18] Ha, E.H., Attitudes towards rotating shift work in clinical nurses: a Q-methodology study. *Journal of Clinical Nursing*. 2015, 24(17-18), 2488–2497.

[19] McClelland, S.I., ''What do you mean when you say that you are sexually satisfied?'' A mixed methods study. *Feminism & Psychology*. 2014, 24(1), 74–96.

[20] Martin, S., Daniel, C., Williams, A.C.D.C., How do people understand their neuropathic pain? A Q-study. *PAIN*. 2014, 155(2), 349–355.

[21] Kamal, S., Quantifying human subjectivity using Q method: When quality meets quantity. *Qualitative Sociology Review*. 2014, 10(3), 60-79.

[22] Hermelingmeier, V., Nicholas, K.A., Identifying five different perspectives on the ecosystem services concept using Q methodology. *Ecological Economics*. 2017, 136, 255 –265.

[23] Dziopa, F., Ahern, K., A systematic literature review of the applications of Q-technique and its methodology. *Methodology*. 2011, 7(2), 39–55.

[24] Logo, E., Petruska, I., An empirical study from industrial design engineering Students' product experiences with intelligent every day used product. *Acta Polytechnica Hungarica*. 2014, 11(1), 173-192.

[25] Churruca, K., Perz, J., Ussher, J.M., Uncontrollable behavior or mental illness? Exploring constructions of bulimia using Q methodology. *Journal of Eating Disorders*. 2014, 2(1), 22.

[26] Yao, L., Xu, X., Ni, Z., Zheng, M., Use of Q methodology to assess the concerns of adult female individuals seeking orthodontic treatment. *Patient Preference and Adherence*. 2015, 9, 47–55.

[27] Cairns, R.C., Understanding Science in Conservation: A Q Method approach on the Galápagos Islands. *Conservation and Society*. 2012, 10(3), 217-231.

[28] Zabala, A., Pascual, U., Bootstrapping Q methodology to improve the understanding of human perspectives. *PLoS ONE*. 2016, 11(2), 1-19.

[29] Serfass, D.G., Sherman, R.A., A methodological note on ordered Q-Sort ratings. *Journal of Research in Personality*. 2013, 47, 853–858.

[30] Brown, S.R., *Political subjectivity applications of Q-methodology in political science*, Yale university press, New Haven and London 1980.

[31] Akhtar-Danesh, N., Baumann, A., Cordingley, L., Q-methodology in nursing research: A promising method for the study of subjectivity. *Western Journal of Nursing Research*. 2008, 30(6), 759-773.

[32] Perz, J., Ussher, J.M., Gilbert, E., Constructions of sex and intimacy after cancer: Q methodology study of people with cancer, their partners, and health professionals. *BMC Cancer*. 2013, 13(1), 270.

[33] Hooft, S.M.V., Dwarswaard, J., Jedeloo, S., Bal, R., Four perspectives on self-management support by nurses for people with chronic conditions: A Q-methodological study. *International Journal of Nursing Studies*. 2015, 52, 157–166.

[34] Akhtar-Danesh, N., An overview of the statistical techniques in Q-methodology: Is there a better way of doing Q analysis? *Operant Subjectivity: The International Journal of Q Methodology*. 2016, 38(3-4), 1-8.

[35] Kelly, S.E., Moher, D., Clifford, T.J., Expediting evidence synthesis for healthcare decision-making: exploring attitudes and perceptions towards rapid reviews using Q methodology. *PeerJ*. 2016, 4, 1-23.

[36] Cattell, R.B., The scree test for the number of factors. *Multivariate Behavioral Research*. 1966, 1, 245–276.

[37] Akhtar-Danesh, N., Mirza, N., Relation between manual rotation and abductive reasoning in Q-methodology. *Open Journal of Social Sciences*. 2017, 5(3), 198-204.

[38] Watts, S., Stenner P., Doing Q methodology: Theory, method and interpretation. *Qual Res Psychol*. 2005, 2.