THE TRIANGULATION OF SEARCH METHODS IN ORGANIZATION STUDIES: THE EXPERIENCE FROM A DOCTORATE RESEARCH

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Abstract

This paper aims to describe the use of triangulation of search methods in studies of organizations emphasizing the importance to integrate all research variables analyzed. Triangulation is a methodological approach to data analysis that combines the use of qualitative and quantitative methods. The main justification for the use of triangulation of methods is the search for greater confidence in the data analysis and validation of research results. Most research reports that use triangulation, indicates a combination of methods of study case and survey.

The study case method can add a richer context and holistic analysis of the results of the survey, helping to explain apparent anomalies emerging. While the survey method can improve the understanding of the incidence of a particular phenomenon or conceptual relationship between theory and practice reported in study cases. Triangulation is based on three pillars of data analysis: (1) a review of research concepts to guide the setting of variables analysed, (2) a qualitative and exploratory study to define guiding questions research and empirical studies in organizations, and (3) a quantitative and descriptive study to confirming the information from the qualitative. As a contribution, we present the experience of using triangulation of methods from a Doctorate research.

Key words: *triangulation, search methods, study case, survey, doctorate research.*

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1. Introduction

The triangulation method combines the use of qualitative and quantitative methods from a consistent theoretical construct. The main justification for the use of triangulation, is the search for greater confidence in the data analysis and validation of search results (CUNNINGHAM; YOUNG, LEE, 2000; MODELL, 2005; SHAH; CORLEY, 2006).

Considering increasing the confidence and legitimacy of the search results, the use of triangulation of methods aimed at improving (1) internal validity of the research variables, (2) external validity of the results and (3) the validity of the theoretical constructs used in the analysis.

A (1) internal validity refers to the credibility of the causal relationship between the dependent and independent variables. Triangulation can assuage the difficulties of analysis and enhance the opportunities for legitimizing relationship between the variables, highlighting the consistency or otherwise of search results with theoretical concepts and hypotheses formulated.

A (2) external validity refers to the unfolding of the analysis of the results of inferences for particular study populations. Triangulation increases the external validity by combining the analysis of empirical questions on study cases and analysis of results of surveys.

A (3) construct validity refers to the use of appropriate theoretical concepts to empirical measures of the phenomenon studied. Triangulation is the holistic way that uses a variety of patterns and issues for validity of the study. A good theoretical foundation used in the research facilitates the analysis and the transfer of results.

Seeking advantages as better understanding and application of the results, the triangulation of methods should be designed from a consistent theoretical construct to support the formulation of the problem and research hypotheses, and to assist qualitative and quantitative analysis (SHAH; CORLEY, 2006).

Most research reports using triangulation, indicates a combination of the methods of study case and survey. The survey method can improve the understanding of the incidence of a particular phenomenon or the conceptual relationship between theory and practice reported in study cases. While the study case method can add a richer context and holistic analysis of the survey results, helping to explain apparent anomalies emerging (MODELL, 2005).

2. Objectives

This article aims to describe the use of triangulation methods in a Doctorate research, showing in detail all the steps taken to achieve the proposed results.

Such research has tree steps to the triangulation of methods, as indicated in Figure 1. The first step, theoretical construction, involves defining conceptual guide all subsequent stages of the research. From an extensive literature review on the research topic, the

researcher is able to define clearly the research problem and consequently also define objectives and hypotheses.

The second, qualitative and exploratory account with defining research questions guiding and conducting two studies of empirical cases. The study case method allows researchers to handle a wide variety of evidence, beyond the conventional historical study, using documents, artifacts, interviews and observations (YIN, 2001).

The third, quantitative and descriptive, intended to verify the information by qualitative study case detailing a scenario by measuring some event or activity, using descriptive statistics to test hypotheses (HAIR JR. Et al., 2005, p. 83).

Therefore, an internal survey is conducted in each of the two organizations studied to refine the study of the research variables. At this stage, we conducted a survey in each of the inner two organizations studied to refine the study of the research variables. The hypotheses are derived from theory in order to guide the process and provide a list of what needs to be measured.

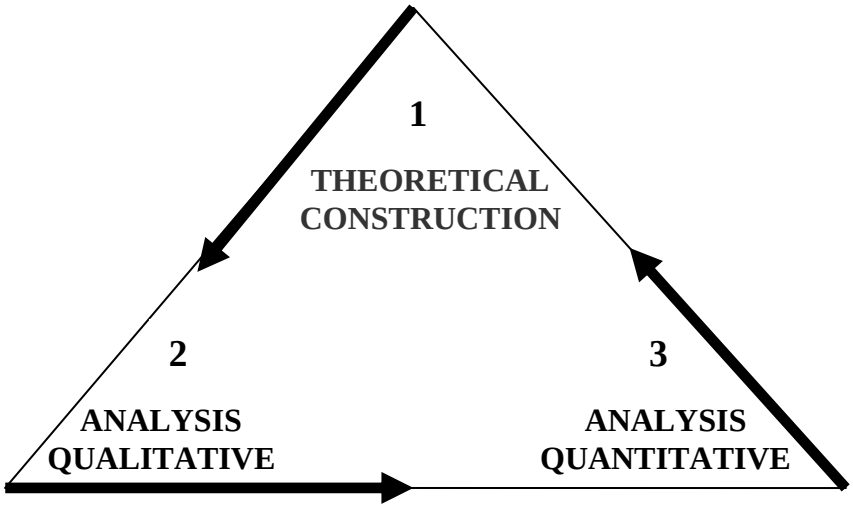


Figure 1 - Steps triangulation of methods used in the research

The research was conducted in two organizations chosen for answering the requirements of Doctorate research, the reputation in the market in which they operate, and also accepted the invitation to the survey. Other organizations were also contacted and were not willing to cooperate. The number of organizations is chosen with the intention to compare by their different characteristics and market context.

3. The experience of using triangulation methods

After the first stage of literature review, it was possible to perform the following steps, the qualitative and quantitative. These steps rely on a number of methodological details reported in Table 2.

STEPS	QUALITATIVE PHASE	QUATITATIVE PHASE
Purpose of the study	Exploratory	Descriptive
Search Method	Study case	Survey
Instruments data collection	a) Bibliographic search; b) Interviews c) Analysis of institutional documents .	a) Questionnaire
Analysis of results	a) Analysis of data collected; b) Analysis isolated from each study case; c) Interpretation and comparison of results from both study cases; d) Confrontation of study cases with the theoretical framework.	a) Univariate Analysis b) Bivariate Analysis c) Multivariate Analysis
Analysis strategy	a) Construction of explanation	a) Analysis of variable b) Correspondence Analysis c) Cluster Analysis

Table 2 - Methodological aspects in the proposed research

3.1 Qualitative phase

The qualitative study is the most appropriate for formative assessment. After all, a lot of information can not be quantified and must be interpreted more broadly than the simple element research (TRIVIÑOS, 1992).

The study also is exploratory by providing greater familiarity with the problem, making it more explicit and dismembering it into a hypothesis. According to Gil (2002), the exploratory study's main objective is the improvement of ideas or intuitions of discovery. In general, involves literature review, interviews with people who have or have had practical experience with problem analysis and researched examples that encourage understanding.

3.1.1 Search Method

The study case is the method chosen to compare theory with practice because it allows the researcher to deal with a wide variety of evidence. According to Yin (2001), each research strategy has advantages and disadvantages, depending basically on three conditions: the type of research question, the control over behavioral events, and the focus on historical phenomena. So, the study cases represent the preferred policy when raises questions of "how" and "why"; the researcher has little control over events and; the focus is on contemporary phenomena embedded in some real-life context.

Detailing, the scope of a study case can be defined as the empirical investigation of a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly defined. It is a technically unique investigation based on multiple sources of evidence to guide data collection and data analysis.

Another issue concerning the study case method is the amount of studies to be made. According to Yin (2001), the number of study cases may vary: single case or multiple cases.

Single cases are justified when the case represents a critical test of existing theory, when the case is rare or unique or when the case serves a purpose revealing. A key step in this unique case is set the unit of analysis (the actual case). Variations of single study cases have different strengths and weaknesses. The holistic design is advantageous when it is not possible to identify any logical subunit and when this theory underlying the study case itself is holistic in nature. The problems occur when the overall approach prevents the researcher to examine any specific phenomenon in operational details or leads to an abstract level of analysis, devoid of clear measures or data (Yin, 2001).

The same study can contain multiple cases. The evidence from multiple cases are considered more compelling and the overall study is seen as more robust. A single study may represent a rare or unusual and multiple cases may require more resources and time (Yin, 2001). This study includes a comparative analysis of two study cases in organizations. Organizations with different characteristics were analyzed in order to compare its entirety and check for significant differences or not between organizations in managing research variables.

3.1.2 Data collection Instruments

Thus, based on Yin (2001) the research uses the following data collection instruments:

1. literature review and formulation of the guiding questions of the research;
2. gathering information through contact with people who have practical experience with the problem researched through interviews and questionnaires;
3. and investigation of institutional materials.

The literature review allows explore in depth the major authors and concepts related to research variables. More specifically, the literature gives an understanding of the "state of the art" of the issues involved in the research in order to create an initial theoretical basis for defining the guiding questions of the survey.

Information obtained by contact persons seek to understand how individuals perceive the practice of organizational variables. Contacts are always carried at least with people responsible for areas of interest in research.

Aiming to guide and facilitate the process of communication with participants, a previous script of questions is employed in both structured interviews and questionnaires completed by email.

The investigation of institutional materials available on websites and institutional documents provide access to data related to the main activities of the organizations investigated, in order to strengthen or compare data collected by interviews.

3.1.3 Conceptual Model

The data is based on material obtained by theoretical and by the organizations investigated. The results are discussed taking into account the ideas expressed by the subjects, as well as the latent content of these ideas, with reference to the descriptive and interpretative aspects in line with the proposed theoretical material.

Thus, the analysis of the results relies on study questions. These questions clarify what will be investigated (TRIVIÑOS, 1992) and are used to guide the interviews and allow better structuring of the data analysis (YIN, 2001).

Such questions allow the construction of the map to collect data related to the qualitative analysis of the research problem. For verification of guiding questions is conducted fieldwork in both organizations investigated in the qualitative phase.

3.1.4 Strategies for analysis of results

Results are obtained by analysis of data collected and presented as descriptive report. It analyzes the characteristics of the organizations individually from theoretical propositions, since the study is based on propositions that reflect a set of guiding questions formulated from the research of the revisions made in the literature on the subject studied and new interpretations that may emerge (YIN, 2001).

However, the research requires a deeper analysis of data, and for that is used the specific strategy of explanation building (YIN, 2001), whose goal is to analyze data from a study case constructing an explanation of the comparative analysis of the two study cases.

3.2 Quantitative phase

This phase of the study uses statistical analysis as strategy to analyze the results. The study proposes to determine whether the independent variables make it possible to predict the behavior of the dependent variables.

The statistical quantitative analyze applies to the study of random phenomena, those that repeat and are associated with variability, in order to evaluate a population from a probabilistic sample and test hypotheses (FACHIN, 2003).

Thus, a structured plan of descriptive research is designed and created specifically for measuring the characteristics described in a research question. The hypotheses derived from the theory generally serve to guide the process and provide a list of what needs to be measured (HAIR JR. Et al., 2005).

3.2.1 Search Method

The survey, a procedure for collection of primary data from individuals is used as a method of descriptive study. Data can vary between beliefs, opinions, attitudes, experiences and lifestyles.

Is carried out one internal survey in the two researched organizations, using a questionnaire to collect information about the population surveyed. The research is a cross-sectional study because the data are collected at a single point in time and statistically summarized (HAIR JR. et al., 2005).

3.2.2 Data collection Instruments

As collection instrument in this phase, a questionnaire encoded with closed questions is used, the most suitable for quantitative studies of surveys.

The questionnaire reliability is guaranteed by analyzing the degree to which measurements are free from random errors. The Cronbach's Alpha (α) measures:

1. the internal consistency reliability of questionnaires - consistency of the results of a survey of items, and
2. the inter-rater reliability - consistency in the estimate of the same phenomenon by different evaluators (FREITAS; RODRIGUES, 2005).

A pre-test questionnaire is conducted with ten people familiar with the research topic to check the clarity and reliability of the information described in the questionnaire responses.

The analysis of the questionnaire based on 21 variables of the research indicated a Cronbach's alpha (α) of 0.817, considered very good relative strength of association between the concepts enclosed covered (HAIR JR. et al., 2005). This level of reliability indicates understanding and consistency of respondents regarding the questions.

3.2.3 Sample Composition

The type of sample chosen for the survey is not probabilistic or intentional, since the researcher uses subjective methods to select the elements of the sample to represent the target population and for a specific purpose (HAIR JR. et al., 2005).

The target population consists of people of the surveyed organizations directly linked to the research problem. Two samples were constructed through the spontaneous responses of an internal survey conducted with employees of organization A (N = 54) and organization B (N = 51), separately.

3.2.4 Conceptual Model

The concept reflects an abstraction or mental construct or idea formed by the perception of some phenomenon. Once defined the concepts of research, it is possible to define the elements and their measurement variables that serve as substitutes for concepts. A surrogate is a variable that represents one single component of a broader concept, taken together, a concept measure various substitutes (HAIR JR. et al. 2005).

Seeking to verify the information surveyed in the study cases, is formulated a research hypothesis to be confirmed by empirical evidence through statistical techniques.

For data collection, the questionnaire is sent to employees directly involved in research activities, during field research in both organizations investigated. To verify the hypotheses, are used statistical analyzes of the data collected.

The measurement involves assigning numbers to a variable according to certain rules. "The numbers assigned reflect characteristics of the phenomenon being measured" (HAIR JR. et al., 2005).

After defining the search variables, is constructed a interval metric scale Likert with seven (7) points to measure the opinions of employees of the research organizations. For each point on the scale, is developed a label to express the intensity or importance of the views of respondents.

Besides the variables to measure opinions, also are used variables to classify the samples. Therefore, it is used a nominal and non-metric categorical scale to define the profile of the survey respondents from gender, area of expertise and seniority at organization.

The choice of scale is justified because the nominal type uses numbers as labels to identify and classify objects, individuals or events; while the non-metric categorical enables comparison of the objects evaluated using two or more response categories (HAIR JR. et. al. 2005).

3.2.5 Strategies for analysis of results

In this research, the joint assessment is made of the behavior of dependent and independent variables as the objective to verify the similarities between the two organizations studied and the main results compare with evidence of general literature.

As analysis strategies of results are used several techniques: uni-, bi-and multivariate. The tabulation and processing of data of statistical inference is supported by two specific software: SPSS - Social Package for Social Science and STATSOFT - Statistica.

Univariate analysis is done by verifying the measures of central tendency, which allows to identify the main means observed in relation to the given variable. The presentation of the data is done for descriptive overview to characterize each organization and highlight differences between them.

The bivariate analysis describes the behavior of the independent and dependent variables from the relationship between them. In the research, correspondence statistical analysis is used to be quite flexible and applicable to a wide range of issues and situations.

According HAIR JR et al. (2006), the use of correspondence analysis (CorrAn) is justified by "quantifying" qualitative data; apply in the examination of a range of categories such as Likert ranging from strongly agree to strongly disagree; and allow analysis in several research areas.

In detail, the CorrAn is a compositional technique riding a perceptual map based on the association between objects or attributes specified by the researcher. It has more direct application to the factor analysis becouse portrays matching categories of variables, particularly those measured in nominal scales. This correspondence is then the basis for the development of perceptual maps (HAIR JR. et al., 2006).

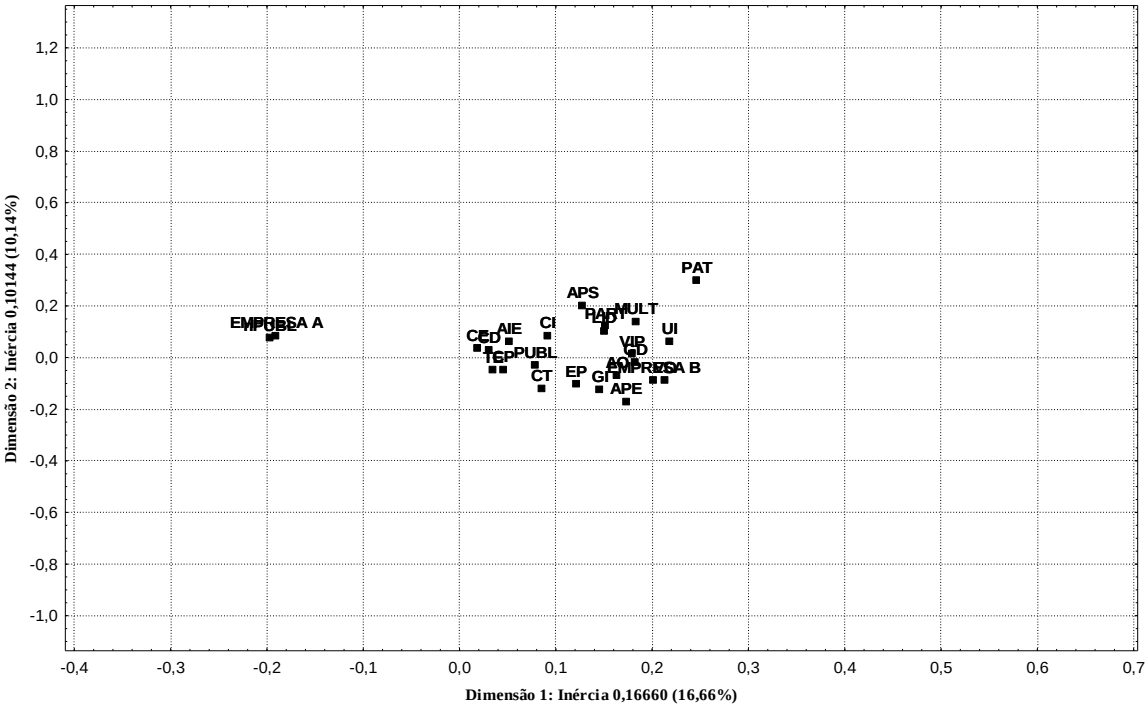
The benefits of CorrAn are supported in their unique abilities to represent rows and columns - organizations and variables - in the same space together. The In detail, the CorrAn is a compositional technique riding a perceptual map based on the association between objects or attributes specified by the researcher. It has more direct application to the factor analysis since portrays matching categories of variables, particularly those measured in nominal scales.

This correspondence is then the basis for the development of perceptual maps differs from other forms of interdependence in their ability to accommodate both non-metric data as nonlinear relationships. The categories are represented in multidimensional space, where proximity indicates the level of association between categories in rows and columns (HAIR JR et al., 2006).

After getting the perception of the respondents through the questionnaire, it is possible to assess the similarity or dissimilarity of concepts investigated. The goal is to discover if the analysis depends on only a few attributes.

For multivariate analysis, are use the multiple correspondence analyses (MCorrAn) and cluster analysis (ClusAn) of all independent and dependent variables of the two investigated organizations from the frame assembly with the perceptual variables according to the characteristic attributes most important of the two organizations together. These analysis aim to compare organizations and deepening the diagnosis of the research problem.

The MCorrAn reduces the amount of data to be analyzed and allows analysis of larger numbers of variables simultaneously, from an area of reduced dimensions with the minimum possible information (CUNHA JR., 2000; KACIAK E LOUVIERE, 1990), such as the example of Graph 1. The MCorrAn not only plots the categories of dependent and independent variables but also those of two organizations that represent the sample.



Graph 1 - Extended two-dimensional graph of multiple correspondence analyses

Cluster analysis (ClusAn) combines the similar features of the organizations researched. The technique discovers natural groupings among all variables of the research from the development of scales to measure the association between objects; the most used is the Euclidean distance between points (Silva et al., 2008).

According Hair Jr. (2006), ClusAn is used to create a natural structure between observations based on a multivariate profile. The technique gathers individuals or objects into groups, so objects in the same group are similar. The idea is to maximize the homogeneity of objects within groups, enabling:

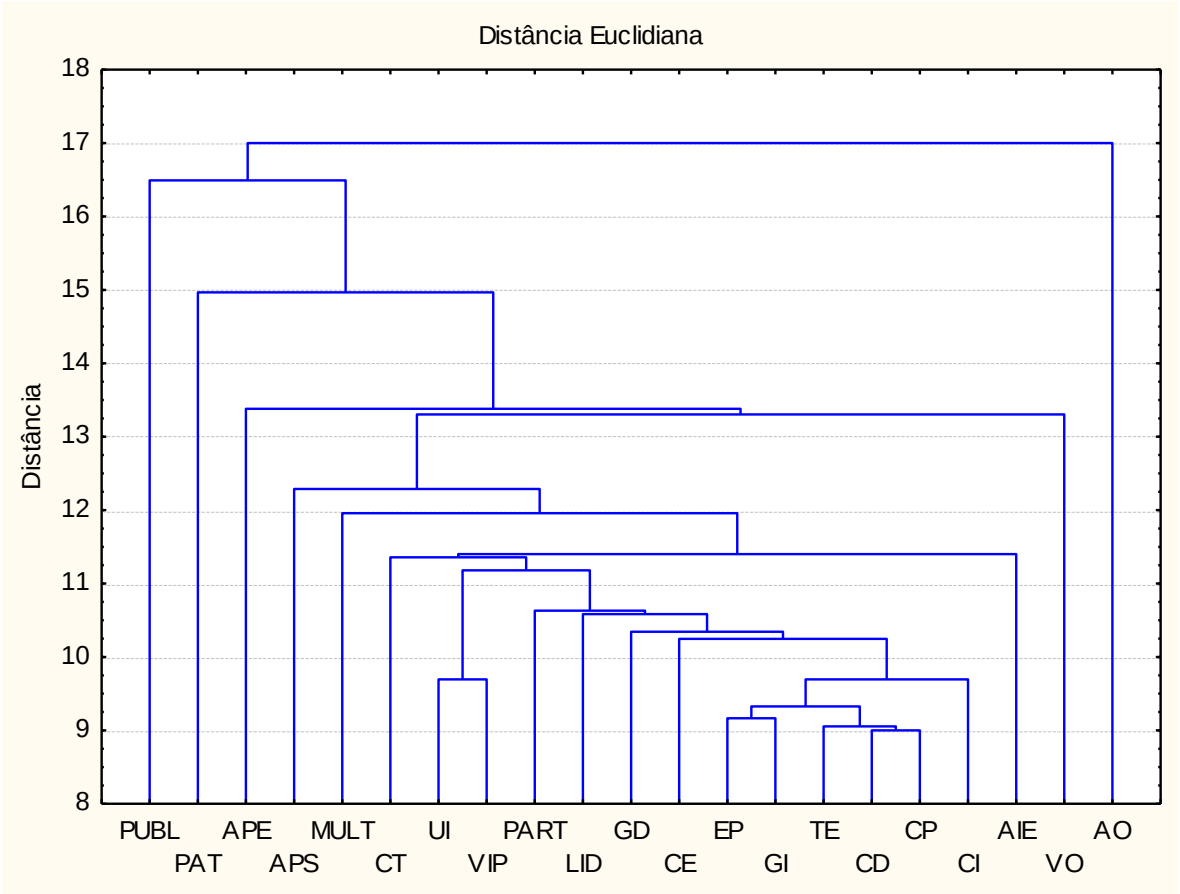
1. a taxonomic description of the search results with confirmatory and exploratory objective of a typology (theoretical classification);
2. simplification of data and observations from a defined structure;

3. identification of relationships between groups defined, which might not be possible with individual observations;
4. cluster profiles to complete matters of practical significance.

The ClusAn is the only technique that does not estimate the multivariate statistical variable empirically, but instead uses a statistical variable as specified by the researcher. The resulting clusters should then display high internal homogeneity (within the cluster) homogeneity and high external (between groups). Thus, if the classification is successful, the objects within the clusters will be close when graphed and different groups are distant (HAIR JR. et al., 2006).

The focus of ClusAn is the comparison of objects based on the statistical variable, not in the estimation of statistical variable itself. The cluster statistical variable is a set of variables that represent the features used to compare objects in a group context (HAIR JR. et al., 2006). In research, the formation of groups follows the hierarchical procedure of *Stepwise* style to form a whole range of solutions groups in a hierarchy structure with a tree with agglomerative nature, because the arguments are formed by combining existing ones, eventually, all individuals are gathered in a large congregation.

The dendrogram or tree chart is a results graphical representation of a hierarchical procedure in which each object is placed on two axes, showing graphically how the clusters are combined in each step of the procedure until all are contained in one cluster, like Graph 2 (HAIR JR. Et al., 2006).



Graph 2 - Dendrogram of dependent and independent variables (*Ward method*)

The results validation includes the researcher attempts to ensure that the solution of clusters is representative of the general population, and also, be generalizable to other objects over time (HAIR JR. et al., 2006). So, are considered in the research grouping all dependent and independent variables to be able to confirm the results of multivariate analysis and to create one taxonomy from search results.

4. Conclusions

To better explain the triangulation of methods, the paper presents an account of its use in research organizations. Triangulation emphasizes the importance of theoretical construction consistent with the combined use of qualitative and quantitative methods in order to maintain consistency between the definition and application of theoretical concepts used in study cases and surveys.

In this case, the literature review of Doctorate research should seek a broad investigation of authors linked to theoretical concepts to enable reflections and analysis of practical results consistent with the "state of the art" scientific productions of the main theme.

The results obtained in the search are performed through the triangulation of qualitative and quantitative methods, with the intention of securing the trust and legitimacy of the findings.

After the analysis of qualitative and quantitative phases, it proposes taxonomy for integration between the dependent and independent variables with confirmatory character of the concepts proposed in the literature review (Figure 2).

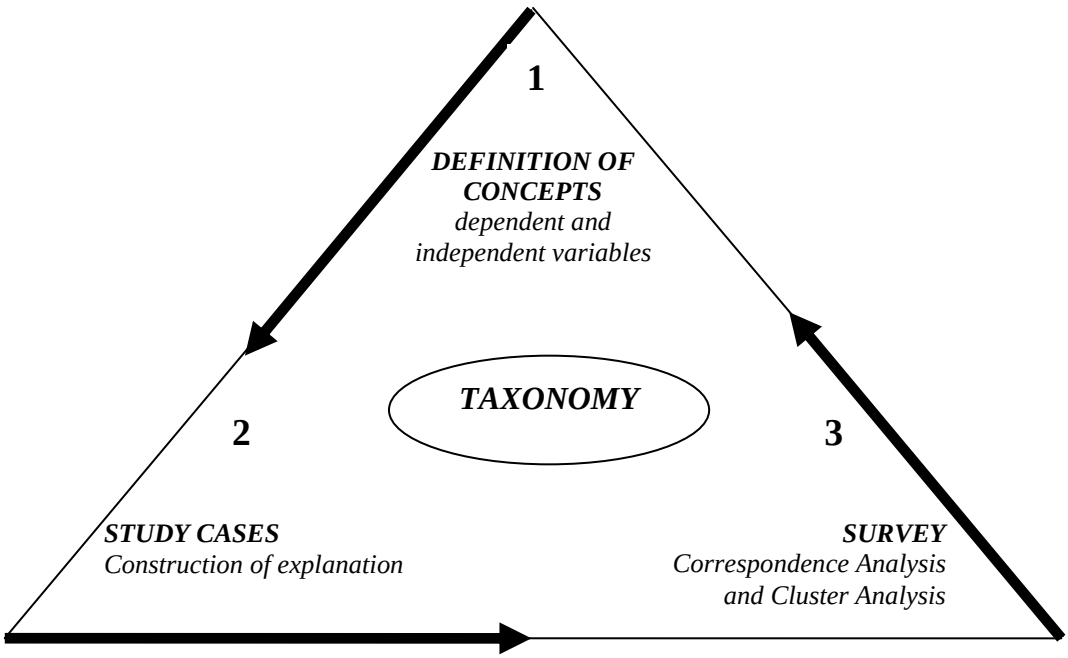


Figure 2 - Steps of triangulation of methods to create taxonomy

In according with the research literature review, the concepts have already studied levels of integration depending on the characteristics of the variables analyzed. Thus, it is

suggested taxonomy based on three stages of integration: 1. Basic Integration, 2. Integration Intermediary and 3. Full Integration. These stages are consequential levels of influence of independent variables on the dependent variables in the analysis of the two organizations surveyed.

Regarding the analysis of the insertion stages at investigated organizations, realizes that the groups formed are justified by the confrontation between the qualitative results with the results of the multivariate analysis.

Finally, it is worth mentioning that the triangulation of methods used is only one of the existing procedures for review of research organizations. In this context, it is hoped that this paper will contribute to the continuity of organization research, conducting new experiments, as well as foster new discussions.

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