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RESEARCH: MULTI VALUE QUALITATIVE COMPARATIVE ANALYSIS (MVQCA) METHOD
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**COMPARATIVE ANALYSIS APPLIED TO RESEARCH ON THE
IMPLEMENTATION OF PUBLIC POLICY : THE MULTI-VALUE
QUALITATIVE COMPARATIVE ANALYSIS (MVQCA) METHOD**

**ANÁLISE COMPARATIVA APLICADA À PESQUISA SOBRE IMPLEMENTAÇÃO DE
POLÍTICAS PÚBLICAS: MÉTODO MULTI VALUE *QUALITATIVE COMPARATIVE*
ANALYSIS (MVQCA)**

**ANÁLISIS COMPARATIVO APLICADO A LA INVESTIGACIÓN DE IMPLEMENTACIÓN
DE POLÍTICAS PÚBLICAS: MÉTODO MULTI VALUE *QUALITATIVE COMPARATIVE*
ANALYSIS (MVQCA)**

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ABSTRACT

Objective: The aim of this article is to describe and explore the applicability and adequacy of the MultiValue Qualitative Comparative Analysis (mvQCA) method to investigate aspects of public policy implementation, more specifically, in the description of a typology of interorganizational coordination in the implementation of federal public programs, with a focus on the production of knowledge about comparative methods that can deal with typical challenges of social science research, such as causal complexity and the diversity of variables involved in the analysis of public policies.

Methodology: This research uses a qualitative strategy of the content analysis type, via a case study in which the mvQCA was applied. The case studied deals with the description of a typology of interorganizational coordination in the implementation of federal public programs.

Results: This analysis indicates the adequacy of the method for studies of public policy, especially in multiple variable contexts and in methodological designs that integrate supporting methods.

Practical implications and originality: this analysis demonstrates the potential of the mvQCA method to enable the use of complex analytical structures and the construction of empirical typologies in research on public policy implementation.

Key Words: Comparative Analysis. QCA. Implementation. Public Policy. Interorganizational coordination.

RESUMEN

Objetivo: Describir y explorar la aplicabilidad y adecuación del *método Multi Value Qualitative Comparative Analysis* (mvQCA) para investigar aspectos de la implementación de políticas públicas, más específicamente en la descripción de una tipología de coordinación interorganizacional en la implementación de programas públicos federales, con un enfoque en la producción de conocimiento sobre métodos comparativos que puedan hacer frente a los desafíos típicos de la investigación en ciencias sociales, como es el caso de la complejidad causal y la diversidad de variables involucradas en el análisis de las políticas públicas.

Metodología: A través del análisis cualitativo del tipo análisis de contenido, aquí son exploradas las opciones metodológicas que guiaron el caso investigado.

Resultados: El resultado del análisis indica la adecuación del método para los estudios de políticas públicas, especialmente en contextos de complejidad causal y de forma más robusta cuando utilizado en diseños metodológicos que integran métodos de apoyo.

Factor de originalidad y Aplicación práctica: El análisis indica el potencial del método mvQCA para posibilitar el uso de estructuras analíticas complejas y la construcción de tipologías empíricas en la investigación sobre la implementación de políticas públicas.

Palabras clave: Análisis comparativo. QCA. Implementación. Políticas públicas. Coordinación interorganizacional.

RESUMO

Objetivo: descrever e explorar a aplicabilidade e adequação do método *Multi Value Qualitative Comparative Analysis* (mvQCA) à pesquisa de aspectos da implementação de políticas públicas, mais especificamente na descrição de uma tipologia de coordenação interorganizacional na implementação de programas públicos federais, com foco na produção de conhecimento sobre métodos comparativos que possam lidar com desafios típicos da pesquisa em ciências sociais, como é o caso da complexidade causal e a diversidade de variáveis envolvidas na análise de políticas públicas.

Metodologia: Envolve estratégia qualitativa do tipo análise de conteúdo, via estudo de caso, no qual foi aplicada a mvQCA. O caso estudado trata da descrição de uma tipologia de coordenação interorganizacional na implementação de programas públicos federais.

Resultados: O resultado desta análise sinaliza a adequação do método aos estudos de políticas públicas em especial em contextos múltiplas variáveis e em desenhos metodológicos que integrem métodos coadjuvantes.

Implicação prática e fator de originalidade: a análise aqui empreendida demonstra o potencial do método mvQCA para viabilizar o emprego de estruturas analíticas complexas e a construção de tipologias empíricas na pesquisa acerca da implementação de políticas públicas.

Palavras-chave: Análise comparada. QCA. Implementação. Políticas públicas. Coordenação Interorganacional.

1. INTRODUCTION

Studies in the field of public policy present an ongoing challenge, due to the causal complexity typical of the social sciences. Analyses using quantitative methods are often not suitable for the context or research objectives. For reasons of feasibility, the usual qualitative analysis methods require a strictly limited context and variables, which makes the power of generalization more limited than would be desired for the production of significant theoretical advances.

In terms of the relevance of comparative analysis for the study of public administration issues, Brans (2010) emphasizes that analyses of this type are central to the scientific method in political science. Indeed, they are central to public administration studies in general, due to the need to produce research findings with a greater power of generalization. A desirable power of generalization can be achieved by systematically investigating similarities and differences between countries and historical periods. This can be helpful for investigating the effects of different contexts on organizational structure and behavior and their effects on the production of different results, with impacts on society.

Focusing on the production of knowledge of comparative methods that can address the typical challenges of social science research, this paper aims to describe and explore the applicability and suitability of the multi-value Qualitative Comparative Analysis (mvQCA) method for investigating aspects of public policies implementation.

Through a qualitative content analysis, this text addresses, more specifically, the application of the mvQCA for creating a typology of interorganizational coordination in the implementation of federal public programs, considering its causal complexity and the diversity of variables involved.

The analysis undertaken here investigates how the above-mentioned method enables the use of a complex analytical framework to describe interorganizational coordination in the implementation of federal public policies.

This analytical framework includes five perspectives of analysis: the structural perspective, the process perspective, the performance perspective, the consistency of action perspective, and the political perspective. It also contemplates different contexts, actors, and coordination mechanisms involved in the implementation process.

This paper explores the methodological options that guided the case analyzed, which constitutes research on the characterization of interorganizational coordination in the implementation of federal public programs. The article is organized as follows: introduction; section 2, which presents the theoretical framework; section 3, which gives some methodological notes; section 4, which describes the research characteristics in the analyzed case; section 5, which discusses the case selection process; section 6, which deals with the operationalization and results of the investigated research, and finally; section 7, which offers some concluding remarks.

2. COMPARATIVE ANALYSIS APPLIED TO RESEACH ON THE IMPLEMENTATION OF PUBLIC POLICY

On the suitability of comparative analysis as a strategy for research on public policies, Peters (1998) clarifies that its importance lies in the fact that in the real world, due to the importance of governance and political institutions, the experimental manipulation of institutions and laws purely for the purposes of observation is unfeasible. Unlike other scientific fields that rely on empirical methods, comparative analysis is a better option, as it enables research in areas where experimentation is not possible.

Barzelay (2001) also highlights that the use of the comparative method is appropriate for research on administration and public policy. He affirms that convergence in research design could promote rapid advances in research in these areas, particularly in regard to the selection of explanatory structures and the use of comparative methods.

The comparative method involves investigating multiple units of analysis in order to highlight differences and similarities (Ragin, 1987). This type of research understands the unit of analysis as what, or whom will be compared (individual/collective action or structure). In the case described here, the multiple units of analysis refer to the processes of interorganizational coordination of the different public policies being analyzed. The elements of the analytical framework delineate outline processes, as shown in Figure 1.

Thus, it is possible to compare cases through the theoretical set method proposed by Ragin (1987). This comparison was conducted using the software called QCA, initially developed by Charles Ragin (1987), with the use of Boolean algebra.

Lasse Cronqvist later reformulated the QCA software (Cronqvist, 2019) and named it Tosmana (Tool for Small N Analysis). The Tosmana program provides an interface in Windows format. Its use enables both ordinal and categorical variables. Recent versions of Tosmana enable the use of categorical variables to apply multi-value minimization, which represents an incremental option to the use of only dichotomous variables. Nowadays, different software can operate this method, e.g., Tosmana, fsQCA, and the QCA packages in software such as R and STATA (Sandes-Freitas & Bizarro-Neto, 2015).

The QCA method uses Boolean algebra to perform a comparative analysis based on the presence or absence of conditions that characterize a given result of the dependent variable (named the outcome). The software reports, through logic equations, the necessary and/or the condition settings necessary for a given outcome. The method allows flexibility in its application, as it is available in three versions: a) Crisp set Qualitative Comparative Analysis (csQCA) with dichotomous variables; b) multi-value (mvQCA), which enables the use of dichotomous and categorical variables, and c) fuzzy set (fzQCCA), with variables in an interval scale (Ragin, 2000).

From a strictly methodological point of view, comparative analysis involves identifying some order in the complexity typical of the social sciences and its diversity of cases. For Ragin (1987), there are two possible ways to apply comparative analysis. The first is the attempt to construct useful empirical typologies in order to establish limits of comparison, by identifying differences and similarities between cases.

The second way to identify order in the complexity is to obtain distinct combinations of multiple decisive causes that present the same results in different cases. This use of the comparative method seeks to apprehend the occurrence of equifinality or multiple causalities, i.e., situations in which arrangements of different independent variables can lead to the same result in different cases (George & Bennet, 2005). Thus, comparative analysis enables the identification of causal complexity by identifying the necessary and or sufficient conditions for a given result (Sandes-Freitas & Bizarro-Neto, 2015).

The analytical framework used in the research examined aimed to establish the aspects that, in theory, would comprise the character of the coordinated collective action. This analytical framework was intended as a starting point to establish a reference of comparison that would be helpful for understanding the interorganizational coordination (Barbosa, 2010).

It should be clarified that this analytical framework used in the research referred to is only a theoretical simulation, as the notion of framework used here does not refer to its empirical reality as a faithful copy of it. This structure characterizes a simulacrum model, proposed to help explain the concrete reality (Bruyne, Herman, & Schoutheete, 1993). In other words, it is an attempt to simplify the reality by representing it in a structure that does not directly correspond to it, but that serves as a reliable and more explanatory representation (Demo, 2000).

Thus, the analytical framework under discussion is not intended to dictate relationships between its elements as an undeniable fact in its proposition. On the contrary, its purpose is to serve as a guiding instrument for empirical research aimed at testing relationships of dependence and causality, making theoretical advances possible.

As a result of this instrumental feature, the resulting empirical research may even indicate the falsifiability of the Framework, the intention of which is to serve as a basis for pointing out failures or new relationships. This possibility of verification is intrinsic to the theoretical construction which, rather than imposing itself as absolute truth, becomes subject to verification.

According to Barzelay (2001), the convergence in the use of similarly structured research projects, and the selection of their explanatory frameworks, are beneficial for the development of research. It is therefore helpful to develop and apply analytical frameworks.

To better understand the operationalization of the mvQCA method in constructing empirical typologies, it is necessary to explore the idea of analytical framework adopted by the study case that is the object of this analysis. The proposal of the study case is to address the theme of interorganizational coordination from five different analysis perspectives, in order to enable the examination of the chain of factors that form the basis of interorganizational coordination in the process of implementation of public policies (Barbosa, 2010; Barbosa, 2016).

Based on an analytical framework that involves all these perspectives, the approach to the theme provides a general overview of the various aspects that determine the interorganizational coordination, reflecting the complexity of government action.

For a better understanding of the construction of variables and the analysis operationalized by the mvQCA, Figure 1 (Barbosa (2010) and Barbosa (2016)) presents the approaches and aspects of the constitution of interorganizational arrangements and the elements that describe the character of coordinated collective action. Notably, several applications are possible in the description of the reality of the implementation of public policies, as observed in a study on state capacities, by Pires and Gomide (2016).

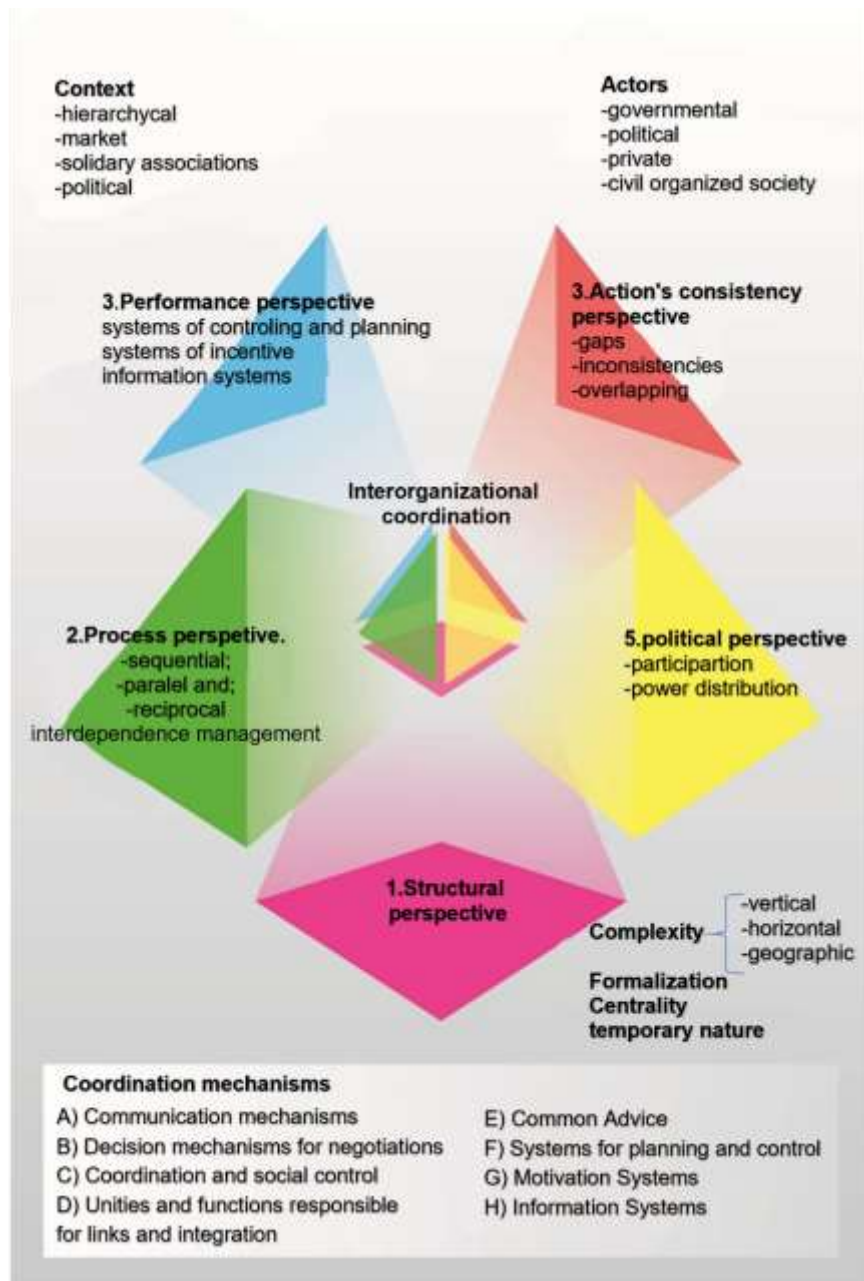


Figure 1. Interorganizational Coordination Framework
Sources: Barbosa (2010); Barbosa (2016).

The analytical framework considers context as a dimension of interorganizational relationships, understood as a significant and measurable aspect of some object/phenomenon. The reasons behind the constitution of interorganizational

arrangements for the implementation of public policy, meanwhile, are viewed as aspects of the context, and can be considered a condition variable in relation to the nature of the coordinated collective action.

The elements (context, reasons for the constitution of the interorganizational arrangement, and types of actors) determine the characteristics of how the interorganizational arrangement is set up. These characteristics describe the direction, temporality, formalization, and centrality of the relationships. They also describe the operational mechanisms of the interorganizational coordination.

The context of the interorganizational arrangement, and the types of actors involved, are determining factors of the interorganizational coordination. In theory, both aspects can combine in different ways. The reasons given for setting up the arrangements are: authority in the hierarchical context, exchange in the market context; common interest in the mutually beneficial association, and distribution of power and accommodation of interests in the political context.

The options related to the perspectives of analysis of interorganizational coordination arise from the combination of elements. These combinations might include: types of structures, modes of vertical/horizontal integration, temporality of relationships, centralization, formalization, management of interdependencies, distribution of competencies, monitoring of performance, distribution of power, mode of participation, and the relevant coordination mechanisms. Together, those elements define the nature of the coordinated collective action Barbosa (2010) and Barbosa (2016).

The elements of the proposed analytical framework are organized into levels. The first level highlights the contexts that influence the action of the interorganizational arrangement, which may be of a hierarchical, market, mutually beneficial association, or political nature. The interorganizational relationships of interest may be located in a single context or at the boundary between them, involving characteristics of more than one context. The context in which the arrangement is set is what determines the nature of its constitution

On the second level of the analytical framework are the variables that condition and determine the nature of the interorganizational coordination. These variables explain the vertical and horizontal integration, the types of interdependence, the distribution of competencies, and any redundancies, gaps, and inconsistencies in the implementation of public programs. Also at the second level are crucial variables, such as performance indicators and power distribution related to accommodating the interests of the different actors, and to the spaces of participation.

The other variables at this second level relate to the temporality of relationships – characterized as dynamic or stable – and the centralization of relationships within the interorganizational arrangement. The variables describe the structures and coordination mechanisms of the programs researched (Barbosa, 2010; Barbosa, 2016).

Finally, the description of the analytical framework reveals the complexity of the object of analysis, which is the most important aspect of the study of the potential for application of the mvQCA in the implementation of public policies, as an area of research.

3. METHODOLOGICAL NOTES

This paper is based on a case study. It describes and explores the applicability and suitability of the multi-value Qualitative Comparative Analysis (mvQCA) method for constructing empirical research typologies on aspects of public policy implementation. This application is done through qualitative strategy, including content analysis.

As mentioned in the introduction above, the interest that motivated this analysis was to produce knowledge about comparative methods that can address the typical challenges of social science research.

The choice of case for analysis was based by the following criteria: a) focus on the analysis of aspects of public policy implementation; b) use of a qualitative comparative method, using the mvQCA methodology. In view of these two criteria, the chosen case is characterized as applied research.

The main methodological aspects that guided the study case were selected for description and discussion by content analysis, in order to analyze the applicability, limits, and potential of the mvQCA method in relation to each aspect. The aspects analyzed were: a) research characteristics; b) typification and selection of cases; c) operationalization of variables; d) research instruments; e) database survey and its construction strategy; f) description of the typology on empirical bases; g) Results obtained in the data analysis.

4. FEATURES OF THE OBJECT OF THE CASE STUDY

The exploratory and descriptive research that comprises the study case under analysis was carried out through the QCA method. Its purpose was to provide an overview of the theme and provide a foundation for future research. First, an overview was given of interorganizational coordination in the implementation of federal public programs. This overview was based on an analytical framework built on theoretical bases with five distinct component perspectives (Barbosa, 2016). The exploratory feature also refers to the fact that this is a theme that has been little explored, at least as a central research theme, in the Brazilian experience of implementing federal public programs.

In terms of temporal scope, the study case research was sectional, as it focused on a defined period. According to research assumptions and criteria, the temporal scope was restricted to public programs implemented during the PPA 2004 to 2007 (the federal medium-term strategic plan).

In terms of the nature and sources of evidence, the case study deals with the application of mvQCA based on qualitative evidence. It uses a combination of source of evidence, including both primary and secondary data. Primary data were collected through questionnaires (the main data collection instrument), semi-structured interviews, and telephone contacts, which were duly registered. Secondary data were obtained through document analysis, particularly management reports, evaluation reports, federal government transparency databases, and the Senate SIGA System¹.

5. TYPIIFICATION AND PROCESS OF CASE SELECTION

In the context of the analysis of public policy implementation, it is highlighted that the case study investigated adopts, as its unit of analysis, interorganizational coordination for the implementation of public programs.

To observe the phenomenon of interest, the study case methodology considers two types of cases. The first, used in the comparative analysis, refers to experiences of interorganizational coordination within the scope of implementation of specific federal public programs of a "finalistic" nature". These are "aimed at delivering goods and services directly to society" (Brasil, 2004b). They comprise a "set of budgetary and non-budgetary actions, sufficient to deal with society's problem, according to objective and goal."² This is because, due to the presumed scope of the actions of this type of program, it is hoped that these programs would involve a more significant number and a greater variety of interorganizational arrangements.

Each case used in the mvQCA comparative analysis represents an experience of coordinating a given action of the selected programs of PPA 2004 2007. During the research on the case studied, the definition of the interorganizational coordination case was refined, as it was found that federal public programs are managed and implemented through their component actions.

The research under analysis comprised twenty-four programs, initially chosen as a source of potential cases. All of them are within the scope of the priorities of the PPA 2004-2007. These were then narrowed down to sixteen programs, based on the responses to the questionnaires. Thus, the comparative analysis included thirty cases of coordination experiences related to these programs.

The number of coordination experiences observed, and the number of researched programs, was finally determined based on the responses to the questionnaires applied to distinct actors involved in interorganizational arrangements for the implementation of public programs. These included actors from agencies and entities of the federal, regional, and local governments and the third sector. No responses were obtained from representatives of the private sector. However, some information about their participation is contained in the data from the questionnaires, interviews, and documentary research.

The criteria for the selection of cases was the experiences of coordinating the programs prioritized in the country's development plan. These criteria were related to the presence of interorganizational complexity, due to the diverse composition of the members of the implementation arrangement.

The second type of case relates to public programs that make up the research, which were used as a complementary strategy to the case studies, seeking to further understanding of the phenomenon, through the analysis of

¹ These collection instruments are available in Barbosa (2010)

² Law no. 13,791, of December 27, 2019, Article 2 Paragraph XII

data relating not only to the experience of interorganizational coordination, but also to the process of implementation of the programs as a whole, which are part of the interorganizational coordination.

6. OPERATIONAL ASPECTS OF THE RESEARCH

According to the methodological report of the research analyzed here, the complexity of the object of analysis required the adoption of two complementary research strategies. The first, and main strategy was the comparative study. The second, complementary strategy was the study of multiple cases. This combination was designed to robustly describe the interorganizational coordination in the implementation of federal public policies, and to indicate possible variables or configurations of relevant variables for the success of the implementation.

The use of a complementary strategy was chosen because it was found that public programs are organized and implemented through a series of concrete actions that make programs and public policies operational³. It is through these actions that the interorganizational coordination processes in the implementation of public programs are developed. The object of interest, therefore, was the interorganizational coordination processes, seen by its various actors.

As proposed in the research design, after establishing the analytical structure on a theoretical basis, it was possible to investigate and describe the character of interorganizational coordination observed in the implementation of the programs that made up the study.

The comparative strategy used in the case of the investigated application involved three steps: a) identification of aspects of coordination in the implementation of actions of a specific number of federal public programs; b) comparative analysis of multiple cases with the analytical structure elaborated on theoretical bases to build the description of cases by variables observed in the empirical bases and; c) comparison of cases, using the mvQCA.

The description phase of the multiple cases was a complementary strategy aimed at obtaining a diversity of data relevant to the implementation process, with the programs themselves being the cases of interest in this stage. It started with the premise that the characteristics of programs and specific actions would affect their coordination process and contribute to the interpretation of the results obtained concerning these processes.

The conceptual framework that structured all the work of data collection and analysis is detailed in the description of the analytical structure given in Barbosa (2016). It also includes a structure of concept indicator codes. This analytical structure enabled both the focus on variables and the focus on specific cases of the QCA analysis.

6.1 Variables

The research under analysis defined nine condition variables and one outcome variable to describe the character of the interorganizational coordination. The variable *outcome* has an intentionally fixed parameter. The analytical framework also served as the basis for elaborating the codes used in the document analysis process, and interviews related to each of the cases studied.

As the research was developed around the implementation of federal public programs, the format of the interorganizational arrangement was fixed as a program type. Therefore, the format of the interorganizational coordination arrangements is not included in the analysis perspectives or the list of investigated variables

The variables characterized as non-dichotomous, with the possibility of simultaneously different values in the same case, were transformed into several dichotomous variables indicating the presence or absence of each possible value of the variable. As an instance of this operational logic, the variable "*reasons for setting up the interorganizational arrangement*" was converted into seven categorical variables that indicate the presence or absence of each of its possible values in the interorganizational arrangements studied.

It is also essential to clarify that not all the variables of the comparative analysis were defined as dichotomous ones. Some of them were converted into categorical variables, which assume coded values from 1 to 5. This conversion was only possible in the case of variables with different options of excluding values.

³ As defined by "Manual de Elaboração de Programas – Plano Plurianual 2004-2007/versão 2006 (BRASIL, 2004a) of the "Secretaria de Planejamento e Investimento Estratégicos (SPI) - Ministério do Planejamento".

These procedures that characterized the combination of the csQCA and mvQCA method occurred as a function of the requirements and operational availability of the QCA method and the respective software used in the analysis, which is described in section 6.4.

Thus, the condition variables were:

V1 - context (hierarchical, market, mutually beneficial association, political)

V2- reasons for constituting the arrangement (authority, common goal, overcoming fragmentation, exchange, economy of scale, optimizing results, common goal)

V3 - actors (governmental, political, private sector, and organized civil society)

V4 - temporality of relationships (stable, dynamic)

V5 - direction of relationships (vertical, horizontal)

V6 - centrality of relationships (centralized, decentralized)

V7 - formalization (high formalization, low formalization)

V8 – space of participation (democratic, restricted participation)

V9 - power distribution (concentrated, diffuse)

The variable *outcome*:

V10 - outcome (success/failure of the implementation)

At this point, it is necessary to explain that the outcome variable mentioned above refers to the result of the implementation of the public program. This variable is defined as dichotomous, and it expresses whether the program satisfactorily achieved its implementation goals, according to the Ministry of Planning's evaluation report.

It was observed that the understanding of the outcomes of the program, in the case studied, is related to whether it achieved the goals of the program, and not its impacts, as it was an evaluation of the process of the implementation of public programs, and not of the changes brought about by their intervention in the reality. (Draibe, 2004).

It is essential to clarify that for the purposes of the comparative study, the dichotomous values of the outcome variable were arbitrated as follows: a) results equal to or greater than the achievement of 80% of physical goals were considered satisfactory (success), and b) those below 80% were considered unsatisfactory (failure), considering the grading mechanism elaborated and applied by the Planning and Strategic Investment Secretariat of the Ministry of Planning.

This extensive set of variables characterizes the complexity inherent to the social sciences. It represents a challenge to the ability of the mvQCA method to synthesize both the common conditions present in cases of successful implementation and those present in cases of failure.

The ability to deal with this significant volume of variables demonstrates the flexibility and robustness of the method. Coherent and consistent results were obtained from the various analyses, and partial results, with subsets of variables from each component analysis perspective of the analytical framework, were made possible.

It is also worth noting that the method was able to deal with qualitative variables that characterize different aspects of public policy implementation simultaneously.

6.2 Research Instruments

The data collection process used multiple instruments, including a questionnaire, a document research script, a semi-structured interview script, telephone contact registration form, and spreadsheets showing budget forecasts and expenditure for public program actions (see Annex A in Barbosa (2010)).

This diversity of instruments was applied as follows: the data obtained through the questionnaire enabled the construction of a matrix that served for the comparative analysis, while the data from the documentary research, telephone contacts, interviews, and spreadsheets provided additional information to clarify the findings of comparative analysis, as valuable instruments to assist in the interpretation of the findings.

The questionnaire, as mentioned above,⁴ was elaborated based on the concepts of the analytical framework and applied by email. It was created using the PHP Surveyor software for questionnaire development and database generation.

In order to build the study case database, each question in the questionnaire, with the exception of the identification data, was designed to obtain data on the research variables. These variables can be found in one or more columns of the database, as some of them were transformed into dichotomous variables. This transformation process considered the presence or absence of each possible categorial value.

The Secondary data, collected through documentary research, were subjected to an indicator coding process, through a structure of codes related to the concepts provided by the theoretical reference (Miles & Huberman, 1994). Likewise, the interview data were organized using auxiliary data coding sheets⁵.

The codes act as labels to indicate the meanings of the qualitative data collected during the research. They provide a conceptual web with operational definitions that include essential meanings and their component characteristics⁶. This process allowed the construction of a data matrix, according to the requirements of the mvQCA.

Interestingly the qualitative data coding effort had multiple uses. The definitions presented in the code tables also supported the respondents when filling out the questionnaire. These definitions were presented in specific help fields in the electronic form. Likewise, the concept indicator codes helped organize and analyze the data.

Regarding the data collection instruments, it was noted that the mvQCA method admitted and benefited from the diversity of qualitative data sources, which fed the data matrix as dichotomous or categorical codes of each variable.

It is important to highlight that the complexity of the data collection process described above was not a requirement of the method. Also, it is observed, as a positive point, that the database can be just as important as the electronic questionnaires, When fed manually by the software, with data insertions from the complementary documentary research, which enables a diversity of source of evidence

6.3 The mvQCA method and the description of an empirical typology

Due to the adoption of two research strategies combined, the data analysis was also carried out using two distinct but complementary methods. The first involved analysis of data from the questionnaire, which describes each case through the mvQCA method. The second involved analyzing the data from the case study, obtained through documentary research, interviews, and telephone contacts, as described below (see relationships between analysis perspectives, variables, and data sources in Figure 2).

The first form of analysis was carried out by using the Tosmana software program for comparative qualitative analysis. It provides logical equations that present the necessary or sufficient conditions for a given result selected by the researcher (success or failure in the implementation of the public program).

⁴ See Apendix I in Barbosa (2010)

⁵ See Apendix K in Barbosa (2010).

⁶ See Apendix A to C in Barbosa (2010).

The first stage in this method was to describe the interorganizational coordination of each case by comparing the case with the analytical framework. This involves describing the conditions present in each case, in terms of dichotomous or categorical values for each variable obtained through the responses to the questionnaire. The described cases were then compared, using the theoretical set method proposed by Ragin (1987), i.e., the QCA. This method uses Boolean algebra to perform the comparative analysis, based on the presence or absence of conditions that lead to a specific outcome. The QCA reports configurations of necessary and or sufficient conditions for a given result, through logical formulations,

The study case research method explored the csQCA and mvQCA versions. This latter version supports the use of both dichotomous and categorical variables. Essentially, it uses ordinal or categorical variables to build a matrix in the form of a truth table. The matrix then expresses the combination of conditions of each case and its associated result. Each row describes a case, showing the presence or absence of conditions (condition variables), as well as a result (outcome variable) associated with each specific case.

From the research data and the use of the Tosmana software program, designed for comparative analyses, it was possible to make comparisons by fixing the result variable and the condition variables. It is notable that the software used in this research enables any of the variables to be indicated as outcome variables, and the rest as condition variables.

The presentation of Tosmana (Tosmana, 2) highlights the fact that the software allows comparative analyses in studies involving a large number of variables and several N (number of cases, although the QCA was initially designed to analyze a few cases (between 5 and 50)).

The study case dealt with thirty cases of interorganizational coordination experiences in the implementation of sixteen federal public programs (N=30). It used ten original variables, which were transformed into thirty-eight dichotomous or categorical indicator variables. Therefore, the method proved capable of dealing with this complexity. It also demonstrated the reliability of the findings and its ability to achieve the research objectives.

It should be pointed out that the comparative analysis made possible by Tosmana, as a qualitative analysis method, occurs in logical and not arithmetic terms. The applied Boolean algebra allows researchers to establish which combination of different conditions can lead to the same result. The method is, therefore, a helpful tool to investigate the causal complexity of a given phenomenon (RAGIN, 1987).

A plausible situation, considering the high number of cases and variables, is obtaining long and complex equations for which logical minimization is necessary. Another option is minimization by applying the concept of prime implicant used by Ragin (1987). This is a Boolean expression that implies another, if a second-term member is a subset of the first⁷.

Regarding the use of prime implicants, the Tosmana software enables analyses with automatic selections of prime implicants. It also provides options that enable the selection of logical equations to explore partial analysis.

Finally, Boolean analysis through QCA allows us to observe which conditions or sets of conditions are differential for specific results. Thus, we can establish patterns or types of condition configurations depending on the similarities and differences found. In the case analyzed, this means observing the patterns and types of interorganizational coordination found. Therefore, it is possible to establish a typology described on empirical grounds by identifying different variables configurations that lead to the same result.

According to Ragin (1987), the concept of Property space supports the construction of typologies by QCA. This concept was developed by Lazarsfeld in 1937 and elaborated by Barton (1955). Through it, types are proposed as a function of combinations of their component attributes.

By applying the method, the condition variables operate as attributes. The specific combinations, of the presence or absence of each attribute in each case, determines specific types associated with a given result that can be repeated throughout the analysis of several cases.

⁷ More details on minimization methods can be seen in Ragin (1987) and Barbosa (2010).

Thus, it was possible to explore the relationships between the attributes that describe the interorganizational coordination and the results of the public policy implementation contained in the periodic evaluation reports, in terms of the achievement of goals (secondary data). Clarifying and corroborating these relationships was a task undertaken in the second form of analysis, as described below.

As mentioned earlier, two complementary forms of analysis were developed. The second relates to case studies on public programs for which data were obtained on the experiences of interorganizational coordination in their implementation. The study provided for the use of code structure related to the concepts of theoretical reference, with identification of indicators of these concepts. These indicators allowed us to identify, among the data collected, those related to the research topic and attributed meaning to it within the context studied.

To order and analyze the qualitative data from the documentary research, summary sheets⁸ were developed. The information contained in these sheets was isolated and coded to enable data analysis.

The merit of the qualitative examination is, above all, its ability to enable data triangulation. It considers the collected data by different methods, in this case: the questionnaire, documentary research, and interviews. The purpose of this process is to corroborate the conclusions by comparing the evidence provided by different data collection sources, in order to build the reliability of the research and its conclusions (Miles & Huberman, 1994).

The method consists in comparing each case with the theory, and comparing cases among themselves, which justifies the option for comparative analysis of multiple cases. This research strategy is aimed at increasing the generalization of the findings, and obtaining more sophisticated descriptions and consistent explanations. All this occurs through the overview of processes and their results in multiple cases (Miles & Huberman, 19904).

Perspectives	Variables	Data source
structural	Horizontal and vertical dimensions; Geographic dispersion; Formalization, centralization, and temporality of relationships in the implementation process.	Questionnaire
Process	Interdependence management (parallel, sequential, reciprocal)	Document research
Performance	Performance assessment; coordination mechanisms; planning and control systems; incentive systems; information systems	Questionnaire and data from the case studies
Consistency	Gaps; inconsistencies; overlapping on government action	Data from the case studies, mainly documentary research
Political	Power distribution; Participation, Negotiation, and decision-making mechanisms	Questionnaire and data from the case studies

Figure 2. Interorganizational coordination perspectives, variables, and data sources

According to the case studied, in general, the analysis process using the Tosmana software starts with the selection of the identification variable, the conditions variables, and the outcome variable.

Once these variables have been defined, it is possible to request that the selected alternative of the outcome variable (0 or 1 or categorical values) be explained, excluding or including contradictions, as well as cases with no input value in the outcome variable (missing outcome), and logical remainders. Logical remainders fulfill a particular function in the analysis, as they are used to obtain parsimony in the results of logical equations, where necessary. Although they are configurations of conditions present in the cases studied, their use involves performing a minimization that includes them. This inclusion is possible because, in logical terms, they represent configurations of conditions that also configure the result that the researcher is seeking to explain (considering specific regions of the Venn diagram). Thus, it helps reduce the conditions that explain the selected result (Rihoux & Meur, 2008).

⁸ As presented on Appendix L in Barbosa (2010)

It should be noted that apparently, and as expected, in a scenario where there is a diversity of cases with a numerous set of variables, parsimony can be affected to the point where differential variables become less clear. Thus, the resource of logical remainders proved to be especially useful for obtaining balanced equations in relation to the apprehension of complexity and indication of sharper differential variables.

Once this has been done, the results can be requested. The software will then present a report indicating the possibilities of summing the conditions that explain the result indicated, by selecting the option *explain outcome 0 or 1* (see example in Appendix A).

The result report contains the minimization value for the successful implementation case (in the example, value 1 of the outcome variable). It also presents the list of variables that were part of the analysis, the reduced truth table pointing out cases where the data are equal across an entire line. At the end of the report of results, the result is also shown as a Boolean algebra expression.

It should also be noted that it is possible to carry out the most diverse types of comparison according to the selected type and number of variables. The research also reported partial analyses showing sets of variables from each of the analytical framework perspectives, as well as analyses containing all the variables.

6.4 Results of the study case using the QCA method

The analysis of results section shows that the comparative analysis using mvQCA indicates that the political perspective is a differentiating factor for the success of the implementation. This is taking into consideration the whole set of variables. The results suggest the relevance of the variables that comprise the political perspective, especially those that describe the relationships in the decision-making process (Barbosa, 2010; Barbosa, 2016).

When explaining the success of the public policy implementation, the mvQCA shows the results equation above. The comparison using all variables indicated the following conditions: the presence of relationships with program managers of the “exchange of information and joint decisions” type, or relationships with program coordinators of the “subordination relationship and information exchange relationships” type, or the presence of some discretion in the decision-making process. (see Appendix A).

Results equation (considering all variables and *outcome* success)

Result: (all)

Rel Gerte{3,4,6} + Rel coordor {1,3} + proc decis{1,3} + Dec e Neg{1}

To determine the robustness of the findings, an analysis was carried out to explain the opposite result (implementation failure). It consistently signaled, as a differential condition, the absence of participation and power-sharing. When explaining the failure outcome, the mvQCA presents the following conditions: subordination relationship and absence of relations with program managers, absence of discretion in the distribution of resources, absence of coordination mechanisms of the types of decision and negotiation mechanisms and coordination units and functions, as well as the absence of influence from interest groups.

It is emphasized that the nuances of the method, in terms of necessary and sufficient conditions, indicate that the influence of interest groups is not a factor for success. However, its absence, associated with the absence of relationships with other implementers, is present in the explanation of failure. In the few cases where respondents reported the influence of interest groups, this occurred in the indication of beneficiaries or the allocation of financial resources.

This situation indicates that the explanation of the result is based on combinations of conditions, and not on the presence or absence of any one, isolated condition. Therefore, the method demonstrates sophistication when dealing with causal complexity (combinations of conditions), with coherent and plausible results.

The comparative analysis also indicates low participation as a differential condition for explaining failure in public program implementation. This result is due to the absence of relationships and coordination mechanisms that enable this participation. It is also due to the absence of discretion in the decision-making process, as a consequence of the low participation of other implementers in the process of interorganizational coordination of the implementation.

Data from the study case indicate that there was, at that time, low interaction between the federal level and the other implementers, especially at the local level. However, the research findings point out interactions as relevant aspects to explain the success of the implementation. The task of explaining this apparent contradiction was given as a recommendation for future studies

Nevertheless, an analytical effort based on the theoretical framework indicated that this situation might be related to a movement of democratic expansion towards the construction of a more consistent social participation, as indicated by Frey (2000). This idea considers that the participation mentioned above is not yet consolidated, but is in movement. However, there are already signs of its relevance, as evidenced in the comparative analysis of the research data.

The characterization of interorganizational coordination in the implementation of social public programs in Brazil indicates a management model that is largely based on authority, typical of hierarchical contexts. As the analysis points out, this arises from the institutions that formalize the mode of government operation - that is, by constitutional, directive, or operational determinations, as well as by legal and normative determinants - which define, for instance, the formal structure of coordination of plans, policies and National programs (Barbosa, 2010; 2016).

From a structural perspective, interorganizational coordination was characterized by complexity and typically formalized relationships. It was also described as having a stable character with a vertical structure. However, some traces of horizontality were present in it, as well traces of dynamism or even instability in arrangements that grant autonomy to regional or local governments in the application of resources.

In the different combinations of variables, the structural aspects did not appear to be differentiating conditions. However, the analysis does not indicate that these can be neglected. Therefore, they are minimum requirements for the implementation to function properly.

Regarding the process perspective, the comparative analysis indicated, as common terms of coordination, the management of parallel and sequential interdependencies, coordinated by plans and standardization, coherently set in an accentuated hierarchical and formalized context.

The results also indicated that in the implementation process, reciprocal interdependencies, commonly found in contexts of mutually beneficial association, continue to be more visibly explored. According to the international literature, this kind of interdependence can offer gains in synergy, while probably demanding more significant interorganizational coordination effort.

Based on the wider context, the study clarifies that the coordination framework, in respect to processes, may be associated with the continuity of the implementation patterns over time, in the establishment of public policies, as systems that share common structures, such as policies on work, health and education. These standards can, potentially, be gradually modified over time by outside pressures related to the context of performance of the implementation.

The comparative analysis in respect to the performance perspective denoted that there were guidelines for performance, defined based on indicators and goals to be achieved. However, interorganizational coordination, in this perspective, remained incipient due to the lack of a robust monitoring process, which has the features of a more *ex-ante* and *ex-post* control than of a coordination providing simultaneous performance adjustments through effective monitoring.

Besides being a relatively recent experience in Brazil, the inflection seen in the PPA 2012/2015, which does away with the obligation to indicate goals for each action in the national budget plan, contributes to the perception that the practice of performance-oriented state actions is not yet consolidated.

Finally, the use of the QCA in the analysis of interorganizational coordination, from the perspective of the consistency of state action, can be perceived, though it appears to operate much more at the institutional level. The data from the case studied therefore suggest that the signs of gaps, inconsistencies, and overlaps in federal public programs are failures originating in institutional arrangements.

Besides pointing out the failures mentioned above, the political aspects related to the need to accommodate interests and the participation trigger negotiations to correct them through institutional adjustments. These aspects reaffirm the relevance of the political context in the inter-organizational coordination of public programs implementation.

In order to explore the mvQCA on an exhaustive analysis of the analytical framework elements, as proposed in Figure 1, the findings regarding coordination mechanisms in the implementation of federal public programs are described below.

The logical equations resulting from the mvQCA pointed out, as relevant factors for the successful implementation of a public program, the presence of decision-making and negotiation mechanisms, common advice or planning systems, and information systems. However, none of these are necessary or sufficient in themselves.

The explanation of failure, in turn, using the same set of variables, does not present a possible logical minimization based on the research data. Even so, it cannot be affirmed, even by analogy, that the opposite situation to that seen in the explanation of success for these variables is a valid explanation for the failure. Due to this impossibility, the study indicates that these are relevant mechanisms for success, but not determining aspects.

According to the survey data, coordination mechanisms were observed in diversified groupings having as a common core communication mechanisms - independent of their form and information systems.

It is notable that the software used in the mvQCA analysis even allows comparison between cases for each variable. In this process, it was observed that only one of the researched cases presented the use of incentive mechanisms in the implementation process. According to the data analysis, this finding is consistent with an unconsolidated performance control, as indicated above, considering that incentive systems are an alternative to increase performance instead of a result of it. Once again, the method demonstrates its sophistication.

By highlighting the political perspective as the differential one for successful implementation, the survey data suggest the importance of developing relationships quality for public policy implementation.

It should be emphasized that the concept of participation used in the political perspective analysis is not restricted only to social participation external to government, as the participation of the implementers themselves, in decisions and actions of public program implementation, was also shown to be relevant.

According to the initial assumptions expressed in an analytical framework that included the idea of causal complexity, the application of the QCA in the analysis of aspects of public policies implementation signaled as relevant a set of condition variables.

This set of variable conditions describes an interorganizational coordination that includes the distribution of power through the acquisition of powers of discretion, the occurrence of participation in shared decision-making, or the possibility of participation through the exchange of information between the actors involved in the process.

Thus, the mvQCA method allows identifying nuances of causal complexity. Moreover, it proves helpful in analyzing complex analytic structures, provided they are supported by robust coding.

Additionally, it is notable that the recommended practice of checking the consistency of the findings, through the analysis of the opposite result for the outcome variable (taking into account the same variables), simulates a counter-test experiment, which contributes to the robustness of the conclusions and the breadth of generalizations.

7 CONCLUDING REMARKS

The applied research results allowed us to infer that the most important aspects of the interorganizational coordination process are balancing the needs related to the distribution of discretion, participation and accommodating the actors' interests in the implementation process, even in hierarchical contexts.

Concerning the interorganizational coordination mechanisms used in the implementation, these are underused, suggesting a limited management process, from an instrumental point of view.

Based on these observations, and as an agenda for future research, the study proposes an investigation into the importance of sharing common values and references to stimulate better implementation results, as Jobert (2004) pointed out. This stimulus would represent a step toward the implementation pattern observed.

From a methodological point of view, the research results indicate that applying the comparative method proposed by Ragin (1987) provides sophisticated analyses. It encompasses the causal complexity present in social sciences, albeit with some limitations. The first relates to the use of truth tables that expose combinations of factors associated with a given condition, when the reality can be even more complex, and the variables could contain more nuances.

However, it is possible to state that the use of mvQCA represents an advance in qualitative analysis. It enabled simultaneous and predictive analysis, considering multiple cases and numerous sets of variables that enable nuances in the results to be identified.

Another limitation that deserves to be highlighted is that the comparative analysis, as proposed, despite making explicit a set of conditions associated with a given result, does not determine causal relationships. Thus, research projects that intend to go further require complementary qualitative analysis methods, such as those outlined in the case under analysis, to provide more robustness to the explanations related to the research findings.

Concerning the feasibility of the research in the case analyzed, there was a limitation in the case selection process, as the process involved three field research campaigns, which led to a reduction in the initial intended number. However, given the adequacy of the comparison method using Boolean algebra and logical equations, this reduction did not adversely affect the results, as that the method does not seek a probabilistic generalization.

On an operational basis, applying QCA through Boolean algebra using logical remainders to obtain greater parsimony in logical minimization might represent a weakness. However, the use of this resource is satisfactorily supported by the set theory and mathematical logic, as explained by Rihoux and Meur (2008).

Finally, it was observed, in the results of the case analyzed, that the findings from the different sources and complementary methods used were coherent and consistent. Thus, the analysis of the results indicates that the mvQCA method is helpful and suitable to enable the use of complex analytical frameworks and the construction of empirical typologies in research on public policy.

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Appendix A – General Analysis for the outcome *Successful*

Tosmana Report

Algorithm: Graph-based Agent

File: C:\Users\Leonardo\Desktop\DOCTORADO\dados da pesquisa de doutorado\banco de dados 3.xml

Settings:

Minimizing Value	1
including	R

Truth Table:

v1:	area	v2:	prior
v3:	metas	v4:	Tipo de Ator
v5:	Gov F	v6:	Gov E
v7:	Gov M	v8:	I Priv
v9:	3º set	v10:	outro
v11:	det legal	v12:	Det Hqa
v13:	Int Com	v14:	Meta cmn
v15:	sup frag	v16:	troca
v17:	Eco Scla	v18:	Otim resul
v19:	Dipt formlz	v20:	Regras formlz
v21:	Rel Gertev22:		Rel coordor
v23:	Rel demais	v24:	teprariad
v25:	dispo rec	v26:	proc decis
v27:	Mec Comv28:		Dec e Neg
v29:	Ctrle Social	v30:	Unid Funç
v31:	Ass Cmn	v32:	Sis Plan Ctr
v33:	Sist incen	v34:	sist inf
v35:	Med dsmp	v36:	grp int
v37:	infl	v38:	rest org

O: sucesso id: id

Result: (all)

Rel Gerte{3,4,6}+ Rel coordor {1,3}+ proc decis{1,3}+ Dec e Neg{1}
 (x1+x2+x4+x11+x12+x21+x23+x26+x27+x30+x31) (x5+x6+x8+x10+x11+x12+x13+x21+x26+x28+x29)
 (x8+x10+x24+x25+x26+x27+x29+x32) (x1+x2+x5+x7+x8+x12+x22+x23+x25+x31)

Created using Tosmana Version 1.301

Note: Includes all variables

Source: BARBOSA (2010)