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BEHAVIORAL COMBINATIONS THAT EXPLAIN COLLABORATION IN THE SUPPLY NETWORK

Combinações comportamentais explicativas da colaboração em redes de suprimentos

Combinaciones conductuales explicativas de la colaboración en redes de suministro

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ABSTRACT

This study aimed to investigate whether combinations of factors regarding organizational culture and the personality traits of purchasing managers and sales managers are relevant for explaining collaboration in the supply network (CSN). Our theoretical framework comprises Behavioral Operations Management, Organizational Behavior, and Supply Network. We used a self-administered electronic questionnaire based on instruments that are well-known in the literature. We used Qualitative Comparative Analysis with dichotomized conditions. CSN with suppliers had different associations with behavioral constructs than CSN with customers did, which shows there are behavioral differences between purchasing and sales managers. Our findings with regard to CSN suggest that the behavioral requirements for hiring purchasing and sales managers are different, and that customer relations are a priority within the organization.

KEYWORDS | Personality traits, organizational culture, csQCA, collaboration, supply network.

RESUMO

O objetivo deste estudo foi investigar se combinações de fatores da Cultura Organizacional (CO) e dos Traços da Personalidade de gestores de compras e vendas são relevantes para explicar a colaboração na rede de suprimentos (CRS). Utilizaram-se como referenciais teóricos: Behavioral Operations Management (BOM), Comportamento Organizacional e Rede de Suprimentos (RS). Aplicou-se questionário eletrônico, autoadministrado e baseado em instrumentos difundidos na literatura. A análise foi feita pela Qualitative Comparative Analysis com condições dicotomizadas. A CRS com fornecedores apresentou diferentes associações com os construtos comportamentais quando comparados com a CRS com clientes, evidenciando que há diferenças comportamentais entre gestores de compras e de vendas. A qualificação da CRS sugere que as exigências comportamentais para a contratação de gestores de compras e de vendas são diferentes, assim como as relações com os clientes são prioritárias dentro da organização.

PALAVRAS-CHAVE | Traços da personalidade, cultura organizacional, csQCA, colaboração, rede de suprimentos.

RESUMEN

El objetivo de este estudio fue investigar si las combinaciones de factores de la cultura organizacional y de los rasgos de personalidad de los gerentes de compras y ventas son relevantes para explicar la colaboración en la cadena de suministro. Las referencias teóricas son: Behavioral Operations Management, Comportamiento Organizacional y Red de Abastecimiento. Se aplicó un cuestionario electrónico autoadministrado y basado en instrumentos difundidos en la literatura. El análisis se realizó mediante Qualitative Comparative Analysis con condiciones dicotomizadas. La colaboración en la cadena de suministro con los proveedores mostró diferentes asociaciones con las construcciones conductuales en comparación con la misma colaboración con los clientes, que demuestra diferencias de comportamiento entre los gerentes. De esta manera, la colaboración en la cadena de suministro sugiere que los requisitos conductuales para contratar gerentes de compras y ventas son diferentes, así como las relaciones con los clientes son una prioridad dentro de la organización.

PALABRAS CLAVE | Rasgos de personalidad, cultura organizacional, csQCA, colaboración, red de abastecimiento.

INTRODUCTION

Since 1990 (Frohlich & Westbrook, 2001), the management of supply networks (SNs) has generated close and strong relationships (interdependence) with their suppliers and customers in order to achieve differentials for facing up to their competitors (Touboulic & Walker, 2015). Acting in a synchronized manner, SN partners seek to respond in a better and more sustainable manner to the requirements that are determined by the market (Barratt & Barratt, 2011; Busse, Meinlschmidt, & Foerstl, 2017). Studies show that the best performing SNs are those that manage to promote collaborative relationships between their components. Cao, Vonderembse, Zhang, and Ragu-Nathan (2010) and Tsanos, Zografos, and Harrison (2014) believe that collaboration in the supply chain (CSN) leads to resources being used and knowledge of suppliers and customers being acquired.

Organizations operating in this environment manage both intra-organizational and inter-organizational relationships when integrating with an SN (Flynn, Huo, & Zhao, 2010; Wang, 2016). But SN relationships are conducted and practiced by individuals who are immersed in the cultural elements of the organizational universe in which they find themselves. They also have certain characteristics that guide their behaviors and actions.

Behavioral Operations Management (BOM) focuses on individuals and their behavior in organizations. The main purpose of BOM is bringing the issues people have in operations (Katsikopoulos & Gigerenzer, 2013) by way of an interface with organizational behavior and human resource management, which covers the psychology of individual decisions and the influence of the culture of the organization on the interactions between actors in these processes (Loch & Wu, 2007). This kind of relationship, and understanding individuals and organizational culture (OC) have been little explored, because studies on this paradigm tend to demonstrate the relationships that exist between organizations from a structuralist and rationalist perspective (Bendoly, Donohue, & Schultz, 2006; Kim, Choi, Yan, & Dooley, 2011; Siegler, Biazzin, & Fernandes, 2014). Individuals in the SN, however, personify these relationships at the micro-level, and attribute affective and/or professional characteristics to them. Individuals, therefore, are fundamental elements for achieving inter-organizational collaborative relationships (Tsanos *et al.*, 2014), and they reflect the behavior of the entire network (Galaskiewicz, 2011). OC has an impact on how individuals act in the organizational environment, including in the SN (Makhdoom, Anjum, Kashif, & Riaz, 2016), and it is either a facilitator or a hindrance when it comes to implementing organizational strategies (Barbosa, 1996; Hilal, 2006; Lacerda, 2011; Souza & Fenili, 2016), such as CSN. Since microanalysis of relationships is understanding the individual's role in the context of SN, this subject and the importance of the

individual and OC in a collaborative SN have received little attention from the academic community in the operations field. This study, therefore, aims to answer the following research question: How do personality traits and OC combine to explain CSN?

This article has five sections. The theoretical framework is discussed in Section 2, while in Section 3, we describe the methodology used for collecting and analyzing the data. In Section 4, we present and discuss the results, and in Section 5 we present the conclusions and recommendations for future research.

LITERATURE REVIEW

Behavioral Operations Management (BOM)

Economics research today is turning to human behavior, and this has determined the creation of behavioral economics (Thaler, 2016). Likewise, the operations field has sought to expand studies of individuals through

BOM. The seminal studies of [Gino and Pisano \(2007\)](#) aimed to incorporate the effect of human behavior in an analysis of activities and relationships within the scope of SN logistics and management ([Gino & Pisano, 2007](#); [Siegler et al., 2014](#)).

This appreciation of the individual's behavior goes beyond the objective solutions that SN management research commonly addresses. Human reality considers that individuals display irrational behaviors and are vulnerable to the influences of their social context. There is a possibility, therefore, that this “uncontrolled” behavior, which is difficult to predict and manage, may interfere positively or negatively with the management of the SN ([Touboulic & Walker, 2015](#)).

Within the theoretical concepts and structures of BOM, the individual's behavior reflects significantly on the results achieved in managing the SN. Several of the assumptions that are commonly used by quantitative models disregard the variability of the individual's behavior. Some assumptions consider that individuals: i) are not an essential factor for the focal issue; ii) are deterministic and predictable; iii) are not affected physically or psychologically by others; iv) are immutable; v) are not part of the customer's product, service or experience; and vi) are not affected by pride, loyalty or embarrassment ([Boudreau et al., 2003](#)).

Collaboration in the Supply Network (CSN)

This particular collaboration consists of suppliers and customers working together to achieve a mutual and continuous improvement ([Stank, Dittmann, & Autry, 2011](#)). For [Busse et al. \(2017\)](#), collaboration is based on transparency and information sharing between SN partners. Joint decision-making is a major collaborative factor in SNs ([Ramanathan & Gunasekaran, 2014](#)). The levels and types of collaboration in organizations are affected by dependency, resource uncertainty, and economic policy, which emerge in a specific relationship context, and develop through continuous interaction ([Heide & Miner, 1992](#)). For [Touboulic and Walker \(2015\)](#), collaboration is a strategy for SNs, but is not easy to implement. [Heide and Miner \(1992\)](#) believe that it is possible to identify CSN by way of four dimensions (Exhibit 1).

Exhibit 1. Dimensions of collaboration

Dimensions	Meaning
Flexibility	Level of accommodation of the parties to adjust to the needs of the partners
Information sharing	Level of availability of information that can facilitate the activities of the other party
Joint problem solving	Level of shared responsibility for maintaining their relationships and for jointly seeking solutions to problems
Restriction on the use of power	The level of renunciation of the exploitation of differentials of size and dependence in the relationship allowed the parties to use power.

Source: [Heide & Miner \(1992\)](#).

Collaboration provides SN partners with a combination of individual capabilities. Partners become complementary to each other and create values that they would not achieve independently ([Barratt & Barratt, 2011](#); [Cao et al., 2010](#); [Frohlich & Westbrook, 2001](#); [Touboulic & Walker, 2015](#)). According to the literature, the benefits of collaboration result in mutual advantages, such as reward sharing, risk sharing, and exchanging information ([Ramanathan & Gunasekaran, 2014](#)). It also improves efficiency, effectiveness, and market positioning ([Tsanos et al., 2014](#)), and provides advantages that are greater than in transaction-oriented relationships ([Alfalla-Luque,](#)

Marin-Garcia, & Medina-Lopez, 2015). Other benefits, such as higher levels of trust (Touboulis & Walker, 2015) and commitment, retention, an increase in the portfolio of customers, and improved performance have been associated with CSN (Gligor & Holcomb, 2013). Despite these benefits, only a few organizations (such as Honda and Toyota) have shown collaborative capacity to be a competitive advantage (Fawcett, McCarter, Fawcett, Webb, & Magnan, 2015).

Organizational Culture (OC)

OC has been widely studied in the social sciences (Makhdoom *et al.*, 2016), because it is a relevant variable, and acts as either a hindrance or a facilitator when implementing organizational strategies (Barbosa, 1996; Hilal, 2006; Lacerda, 2011; Souza & Fenili, 2016). OC is applied collectively, not individually, but has an effect on conditioning individuals (Lacerda, 2011; Oliven, 2009). OC is the set of beliefs that guide employees to understand those attitudes that are classed as being acceptable or unacceptable in the organization. It is transmitted by stories and other symbolic means, and helps employees understand the organization's *modus operandi* by emphasizing the values and norms that condition their behavior (Griffin & Moorhead, 2006; Lacerda, 2011; Robbins & Judge, 2013). "Culture" is a tacit way of perceiving, thinking, and reacting, and is one of the most potent and stable forces operating in organizations (Schein, 1996). OC becomes a part of the people, is accepted as being accurate, and exerts a powerful influence on employees (Fleury, 2009). OC, which is also defined as the collective programming of the mind, makes members of one group different from those in other groups (Hofstede, Neuijen, Ohayv, & Sanders, 1990). For Souza and Felini (2016), the concept of collective mind programming matches the concept of *habitus* proposed by Pierre Bourdieu. OC values can be understood in the context of the organization in which they were generated; they do not necessarily extend to reach other organizations (Fleury, 2009; Makhdoom *et al.*, 2016; Souza & Fenili, 2016).

The theory that defines the OC construct, which was developed by Hofstede *et al.* (1990) and used to study culture in different organizations, identified two of its dimensions: practices and values. The first dimension comprises elements that are visible to an observer: i) symbols (colors, verbal expressions, gestures, pictures, and others); ii) heroes (individuals who have characteristics that are admired by culture and serve as a model of behavior); and iii) rituals (collective actions that are hypothetically superficial, but essential for culture). The second dimension, values, is explained as being how people perceive the cultural meanings in the organization (Hofstede *et al.*, 1990). For the most part, the "values" element is unconscious and hardly ever discussed, but it is expressed through behaviors (Ferreira, Assmar, Estol, Helena, & Cisne, 2002). Hofstede *et al.* (1990) developed a questionnaire based on these two dimensions, and concluded that while values define culture in a precise manner, it is through practices that culture influences members of the organization.

Hilal (2006) and Souza and Fenili (2016) point out that there are ontological and epistemological debates about whether to measure OC or not. Scholars who support the qualitative approach defend the description of organizations, and believe that cases are particular. It is impossible to use standardized quantitative measures, which makes it difficult to replicate the study (Hilal, 2006). On the other hand, a quantitative approach allows the methodology to be applied in different organizations simultaneously, providing a basis for comparisons or generalizations. Hofstede (one of the best-known intercultural scientists) believes that approaches must be complementary (Cooke & Rousseau, 1988; Hilal, 2006).

Personality Traits

The most widely used definition of personality is that developed by Gordon Allport almost 70 years ago. According to the author, personality is a dynamic system that determines its adjustments to the environment. Personality is the sum of how an individual reacts and interacts with others (Robbins & Judge, 2013). For McCrae (2006), “[...] personality is the system by which a person’s innate tendencies interact with the social environment to produce the actions and experiences in an individual’s life” (p. 215).

The personality construct indicates patterns of behavior, attitudes, and emotions that are typical of a particular individual, thus differentiating one from another. These traits, however, have some constancy in a person and in different contexts, and some stability over time (Nakano, 2014). Personality is a group of characteristics that are relatively stable and differentiate individuals.

Psychologists have identified several personality traits and the different dimensions of these traits. These researchers began to observe the correlations between these features and their dimensions and grouped synonymous terms. As a result, they concluded that the big five factors (BFFs) encompass the various terms of personality traits. This means that “[...] almost all the traits proposed by different personality theories were related to one or more of the five lexical factors” (McCrae, 2006, p. 206).

The BFF model of personality is one of the most widely used for describing adult personality structure and psychometry (Nakano, 2014). It is considered to be an explanatory theory of human personality and enables personality to be described in a simple, elegant, and economical way (García, 2006; Silva & Nakano, 2011). The BFFs originated from the Theory of Personality Traits and is a conceptual and practical evolution, as they specify the basic dimensions of personality in a dense and replicable way (Nakano, 2014).

The BFFs can be applied in organizations and are considered relevant for understanding human behavior. They are defined and characterized in Exhibit 2 (Bartholomeu, 2017; Faveri & Knupp, 2018; Griffin & Moorhead, 2006; Robbins & Judge, 2013).

Exhibit 2. Big Five Factors

Factor	Definition	Characteristics
Agreeableness	ability to relate well with others	cooperation, understanding, and kindness
Conscientiousness	number of goals that each individual can focus on	organization, responsibility, and discipline at work
Neuroticism	frequent mood swings and excessive emotional sensitivity	anxious and worried
Extraversion	connection with the well-being felt in relationships	friendly and talkative
Openness	the malleability of a person's beliefs and interests	willing to listen to new ideas

Source: Adapted from John & Srivastava (1999), Bartholomeu (2017) & Faveri e Knupp (2018).

Variables and model development

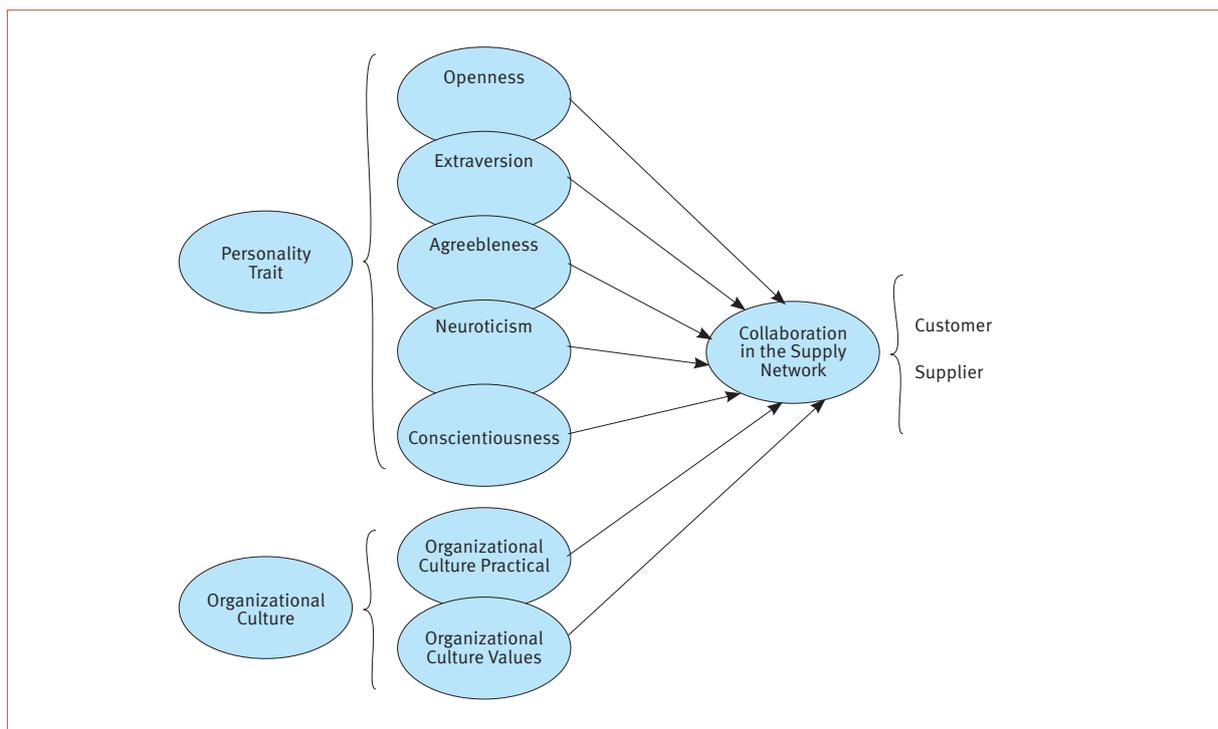
This research is based on the BOM perspective and brings questions involving people to the field of operations by way of an interface with OC and personality traits (Loch & Wu, 2007). This research defines OC based on studies by Hofstede *et al.* (1990) that have been used in several organizations and various countries (Fleury, 2009). Personality was dealt with by the BFF model (John & Srivastava, 1999). Hofstede *et al.* (1990) identified four elements that

were divided into two groups: i) practical, which comprises symbols, heroes, and rituals; and ii) values, which for the most part are unconscious and expressed through behaviors (Ferreira *et al.*, 2002; Hofstede *et al.*, 1990). OC, therefore, will be dealt with in terms of its dimensions - Values (Valoc) and Organizational Culture - Practical (Praoc).

The BFF model is relevant because of its application in several cultural samples, as it allows psychometric data to be collected (Bartholomeu, 2017; Faveri & Knupp, 2018; Griffin & Moorhead, 2006; Robbins & Judge, 2013). For John and Srivastava (1999), the BFF model is not a reductionist view of personality, since each dimension summarizes a large number of distinct characteristics. The BFFs are agreeableness (AGRE), conscientiousness (CONS), neuroticism (NEU), extraversion (EXT), and openness (OPE) (Exhibit 2).

The research model is shown in Figure 1. Its application evaluates combinations of the conditions of Praoc, Valoc, and personality traits - openness, agreeableness, extraversion, conscientiousness - for CSN (outcome). Neuroticism has a negative meaning, so we examine the impact of its absence on CSN.

Figure 1. Research model



Upstream and downstream relationships in the SN were analyzed and named “Supplier Model” and “Customer Model”, respectively. Although the literature states that there is an interdependent relationship between personality and OC (Oliven, 2009), this study intends to evaluate the combination of these variables for CSN. There is no intention to understand and measure the mutual causality between OC and personality.

METHODOLOGY

We conducted a survey using relationships in the SN as the units of analysis, and purchasing and sales managers as the observation units.

Sample and data collection

The population of this research is considered incalculable because of the significant number of potential respondents allocated to different organizations (Malhotra, 2012). We used non-probabilistic sampling techniques, either for accessibility or convenience (Hair, Babin, Money, & Samouel, 2005).

The sample size was calculated by G * Power 3.1.9.2. As there are no previous studies supporting this choice, we selected statistical test *f* at an effect size of 0.15. The size of the effect indicates the extent to which the independent variable influences the dependent variable (Espírito-Santo & Daniel, 2015). We assumed a significance level of 5% and a statistical power of 80% (Hair, Hult, Ringle, & Sarstedt, 2017), so the number of samples required for this study is 68 respondents.

The research instrument underwent a pre-test using a face-to-face app. We obtained 35 respondents, and the questionnaire and statistical analysis of the data were adapted to assess and define the model. Part of the final sample comprised pre-test respondents, who were fully qualified for this study.

The survey was transversal and unique (Malhotra, 2012) and used the SurveyMonkey® platform. The questionnaire (self-administered) was sent out between 9/12/2017 and 7/31/2018 to a database of 29,261 managers (database of researchers and the Logistics Research Center - Nipelog). We obtained 611 responses (2.09%), of which 452 were incomplete. The questionnaire was made available on Facebook and LinkedIn between 1/23/2018 and 7/16/2018, and was directed at the target audience of this research. We received 65 responses; of which 50 were incomplete.

Despite starting the collection with a robust base and using social networks, the total sample (Table 1) represents less than 1% of the initial base of contacts. The number of valid respondents, however, is above the sample size calculated by GPower for both models.

Table 1. Study sample composition

Model	E-mail	Facebook/LinkedIn	Pre-test	Total
Customer	91	2	13	106
Supplier	68	13	11	92

Research instrument

We used validated and disseminated questionnaires taken from the literature (Exhibit 3).

Exhibit 3. Research instruments

Constructs	Theory	Instrument
Personality	Big Five	BFI-44
Organizational Culture	Organizational Behavior	IBACO (reduced)
Collaboration in the Supply Network	Supply Network paradigm	Model of Heide and Miner (1992)

The Big Five Inventory (BFI-44) was used because, given the various instruments that had been established, it does not appear on the list of the Psychological Test Assessment System (Satepsi) as an instrument that can

only be applied by psychologists (Satepsi, 2016). It is also short, efficient, and easy to understand (John & Srivastava, 1999).

To assess OC, Ibaco was used, which “[...] represents an effort to build an originally national instrument designed to assess organizational culture through its values and practices” (Ferreira & Assmar, 2008, p. 128).

CSN was based on Heide and Meiner’s (1992) definitions. It is one of the studies referred to most by researchers in buyer-supplier relationships, having been cited in more than 800 studies (Brito, Sambiase, Ferreira, & Silva, 2017).

The questionnaire had closed questions and a six-point Likert scale was used; an even number was chosen because it eliminates the “middle point”, which can provide an easy escape. There is evidence, however, that some individuals who choose neutral scores do not necessarily consider themselves neutral with regard to the object being assessed (Matell & Jacoby, 1971).

The respondent’s perception was measured using the sliding bar, which provides decimal quantification. Because of this choice, numbers are not used, thus avoiding a tendency to continue with the same mark (Stone, Bleibaum, & Thomas, 2012). The scale ranged from “I totally disagree” to “I totally agree”.

Qualitative Comparative Analysis (QCA)

The QCA method was developed by Charles Ragin in the 1980s, in a comparative case study that used Boolean algebra and set theory (Marx, Cambre, & Rihoux, 2013). QCA aims to combine the best resources of the case-oriented approach with those of the variable-oriented approach. Each survey respondent manager is considered to be a “case” (Marx *et al.*, 2013; Rihoux & Ragin, 2009).

For Fiss (2007), QCA is a qualitative configurational method that seeks to understand how causes combine to create results. For Marx (2010), QCA allows the differences and similarities of condition configurations in a set of cases to be systematically compared, enabling researchers to explore the data and develop explanatory models in terms of Boolean dependencies. QCA, therefore, distinguishes the factors that are necessary and/or sufficient for the result (Blackman, 2013).

QCA can deal with multiple levels of causal complexity while retaining the holistic quality of the phenomenon being studied (Fiss, 2007). It was initially designed to handle small samples, but can be successfully applied when analyzing large databases (Fiss, 2007; Marx, 2010; Rihoux & Ragin, 2009).

QCA was chosen because, according to Blackman (2013), reality cannot be explained by bivariate or multivariate relationships based on the sum of the net effect of each independent variable because it is too complex. Configurational approaches, such as QCA, consider that the result (outcome) is caused by different logical combinations of conditions, which do not exercise their causal power in isolation (Fiss, 2007). Instead of analyzing the relationship between a variable that depends on other variables that do not interact with each other, QCA compares concrete empirical cases that are seen as logical configurations of explanatory conditions and associated with the presence or absence of a result (Marx, 2010).

Crisp-set QCA (csQCA) was used, which works with dichotomized conditions. In csQCA, the variables assume two values: 0 (false) or 1 (true). This binomial simplification means a loss of information since the original variables are continuous. Blackman (2013), however, recommends that dichotomized data should analyze whether a particular practice or contextual condition is relevant to the occurrence, or not, of the result. The number of cases in this study supports csQCA, as it allows for greater consistency while respecting the specification limits of this type of model (Marx & Dusa, 2010).

An essential consideration in csQCA is deciding on the breakpoints for coding conditions in a binary system, based on the original measurements on continuous scales (Blackman, 2013). This decision is an interpretation, reflecting the “qualitative” nature of QCA. The cut-off point of 3.50 on the Likert scale was considered (above the average of six points) for the dichotomization of data—the greater the respondents’ agreement, the greater the presence of the measured constructs. Therefore, values equal to or above 3.50 mean the presence of the variable, and values below mean the absence of the variable in each item and for each case.

RESULTS

We undertook a descriptive analysis of the sample from the perspective of the economic sectors and the size of the organizations in which the respondents work (Table 2). The service sector is the most representative in both models. The Brazilian Development Bank (BNDES) classified the organizations’ annual income according to their annual gross operating revenue.

Table 2. Descriptive analysis

		Customer	Supplier
Economic Sectors	Service	39%	46%
	Retail	28%	29%
	Industry	25%	22%
	Wholesale	8%	3%
Scale of Organizations	Large (larger than R\$ 300 million)	16%	12%
	Average (from R\$ 3.6 million to R\$ 300 million)	36%	35%
	Small (from R\$ 360,000 to R\$ 3.6 million)	25%	27%
	Microenterprise (up to R\$ 360,000)	23%	22%
	Non-profit (public agencies, NGOs, among others)	-	4%

Note. USD 1.00 = R\$ 4.0301 conversion rate 31/12/2019.

The truth table presents the logical configurations of causal attributes and forms the parsimonious explanatory sets of the dependent variable (Rihoux & Meur, 2009). In this first analysis, the truth table contained the results “1”, “0” and presented contradictions (i.e., logical configurations that were verified in both cases of collaboration and non-collaboration) that had to be solved. One way of solving contradictions is to add new conditions (Schneider & Wagemann, 2010), but as the original database was the survey, it was decided to relax the constraint of absolute consistency for each configuration (Ragin, 2000; Schneider & Wagemann, 2010). The consistency of the settings, therefore, was reduced to 0.75, as suggested by Ragin (2000).

Considering the two models under analysis, none of the isolated conditions is sufficient or necessary for obtaining a result in the truth table. We then analyzed the combination of conditions (conjunctions) through consistency and coverage. We generated the simplified configurations for both models by minimizing the conservative solution in Quine-McCluskey, available in the QCA package from R® software (Duşa, 2007). These logical expressions represent the alternative possibilities for explaining the result because they disregard all the

original configurations, which have no corresponding empirical cases. Tables 3 and 4 show the minimization of these sets from the Boolean logic for the Customer and Supplier Models, respectively.

The “settings” column shows the causal conjunctions associated with the presence of CSN. The consistency measure (the main validation criterion for CSN) indicates whether the conjunction is satisfactorily sufficient ($\hat{>}$ than 0.75). The coverage measure presents quantification of the empirical relevance of the causal combination in terms of the percentage of collaboration cases covered by the respective configuration. The single-coverage measure shows how many cases, in percentage terms, are only covered by that configuration (Betarelli & Ferreira, 2018).

Table 3. Parsimonious configurations - Customer Model

	Configurations	Consistency	Coverage	Single-Coverage
1	PRAOC*VALOC	0.940	0.741	0.294
2	ope*cons*EXT*PRAOC	1.000	0.035	0.012
3	agre*OPE*CONS*neu*EXT	1.000	0.035	0.012
4	agre*OPE*praoc	1.000	0.012	0.000
5	agre*CONS*praoc	1.000	0.012	0.000
6	agre*NEU*praoc	1.000	0.012	0.000
7	AGRE*ope*neu	1.000	0.047	0.000
8	AGRE*ope*PRAOC	1.000	0.153	0.000
9	AGRE*cons*neu	1.000	0.047	0.000
10	AGRE*cons*EXT	1.000	0.059	0.000
11	AGRE*CONS*NEU*PRAOC	0.950	0.447	0.000
12	AGRE*NEU*EXT*PRAOC	0.953	0.482	0.000

Note. Capital letter = 1; Lowercase letter = 0; * = logical operator “AND”; + = logical operator “OR”.

Table 3 shows 12 paths that lead to the same result. Based on consistency, all these conjunctions are sufficient ($\hat{>}$ than 0.75) for the presence of CSN. Individually, however, conjunctions are not necessary for CSN. As all conjunctions are sufficient, those with the most significant coverage (Conjunctions 1, 11, and 12) were analyzed. As with Conjunctions 2 and 3, and despite having a single coverage percentage point above zero, we considered that this value represents an outlier since it corresponds to just one case in the sample. Another point is that the arrow represented in the conjunctions indicates a logical implication, and, therefore, the term on its left is sufficient for the term on the right.

PRAOC*VALOC +
 AGRE*NEU*EXT*PRAOC +
 AGRE*CONS*NEU*PRAOC \rightarrow CSN CUSTOMER

Therefore, the logical expression that simplifies the three selected conjunctions is:

PRAOC*(VALOC + (AGRE*NEU*(EXT+CONS)) \rightarrow CSN CUSTOMER

The logical expression for the Customer Model has both a simple path and a complex path, with Praoc condition present in both paths. Therefore, Praoc is a common factor that is causally relevant to CSN.

The simple path combines Praoc with Valoc and demonstrates that when the dimensions of OC are combined, they confirm their role in facilitating CSN. On the complex path, Praoc combines with some personality traits to achieve the result. Thus, in addition to the seller being organized and goal-oriented, the combination of Praoc with their ease of relationship and emotional stability results in CSN. Similarly on the complex path, the combination of Praoc with the vendor's affectionate and stable characteristics also results in CSN.

Table 4. Parsimonious configurations - Supplier Model

	Configurations	Consistency	Coverage	Single-Coverage
1	OPE*NEU*VALOC	0.919	0.567	0.067
2	ope*CONS*NEU*EXT*valoc	1.000	0.067	0.033
3	AGRE*VALOC	0.923	0.600	0.000
4	AGRE*ope*NEU	0.875	0.117	0.000
5	AGRE*OPE*neu*EXT	1.000	0.033	0.000
6	OPE*neu*EXT*valoc	1.000	0.017	0.000

The Supplier Model (Table 4) had six paths that lead to the result. As in the Customer Model, based on consistency, all conjunctions are sufficient for the presence of CSN. Since all conjunctions are sufficient, an analysis was also made of the conjunctions with the most significant coverage (Items 1 and 3). As for Conjunction 2, despite having a single coverage percentage point above zero, this value was considered to represent an outlier since it corresponds to just three cases in the sample.

OPE*NEU*VALOC +
AGRE*VALOC → CSN SUPPLIER

Therefore, the logical expression that simplifies the two selected conjunctions is:
VALOC*(OPE*NEU + AGRE) → CSN SUPPLIER

The logical expression for the Supplier Model has a simple path and a complex path, and the Valoc condition is present in both paths. Therefore, Valoc is a common cause for CSN. Furthermore, this condition must be combined with openness, neuroticism, or agreeableness to result in CSN.

The simple path combines Valoc with AGRE and demonstrates that the way buyers perceive cultural meanings, coupled with their ability to relate well, results in CSN. On the complex path, Valoc combines with OPE and NEU to achieve the result. This complex path demonstrates that the way buyers perceive cultural meanings, associated with a flexible and emotionally stable characteristic, also leads to CSN.

Discussion

The results of the models demonstrate that the conditions need to combine in order to explain the result (Fiss, 2007). More specifically, Praoc is always present in the conjunctions we analyzed for the Customer Model and

Valoc for the Supplier Model. This more relevant presence of each dimension in each model can be explained by the fact that Praoc comprises elements that are visible to an observer. Hence, by way of symbols, heroes (i.e., salesman of the month) and rituals, organizations seek to emphasize the importance of customer relations (Ferreira *et al.*, 2002). As relations with suppliers do not use elements that are visible to an observer, buyers perceive OC by way of the Valoc dimension, which, for the most part, is unconscious and difficult to discuss (Ferreira *et al.*, 2002; Hofstede *et al.*, 1990).

Praoc and Valoc, however, do not guarantee the result alone, but by alternative paths. It is evident that despite OC being applied collectively, its effects condition individuals (Lacerda, 2011; Oliven, 2009). There is also the possibility of generating CSN, even when Praoc and Valoc are absent.

The results show that organizations treat their relationships with customers and suppliers differently, and that those sales or purchasing managers who collaborate with the SN have different personality traits. This finding corroborates Nakano (2014), who stated that the traits present a degree of constancy in a person and in different contexts.

OC also has different influences on the models, its influence being on the predominant customer model rather than the supplier model. When the Praoc and Valoc dimensions are combined in the customer model, they are sufficient for achieving the result. In the supplier model, the Valoc dimension is combined with some of the personality traits to cause the outcome.

These results also show that when personality determines adjustments to the environment (Robbins & Judge, 2013), the personality traits of the purchasing and sales manager result in different interferences for CSN. This is because personality traits appear in both models, but for the expected result in the supplier model, one of its dimensions was always present in the conjunction combining with Cova, unlike in the customer model, which has a conjunction in which OC is sufficient for the result.

These behavioral differences can be significant, as the salesperson focuses on reaching their billing and profit goals. The buyer, in turn, is pressured to negotiate better terms (e.g., price, delivery and payment terms, quality) for the organization. OC, therefore, may be used for strengthening relationships, with customers and promoting the collective programming of the minds of the members of this group, which is what makes sales managers different from purchasing managers (Hofstede *et al.*, 1990).

Griffin and Moorhead (2006) state that an individual's personality traits guide their perceptions and actions. Although the traits suggested by different personality theories are related to one or more of the five lexical factors (McCrae, 2006), the traits do not individually control the decisions of individuals because the way they act in a situation is the result of their personality traits and their interrelationship with OC.

Realization of the importance of combining OC and individuals for CSN helps expand and strengthen BOM (Tsanos *et al.*, 2014), demonstrating that human and organizational behavior are influencers of CSN (Tatham, Wu, Kovács, & Butcher, 2017). The organization's ability to manage and integrate the network of inter-organizational relationships is inextricably linked to the behavior of the individuals who lead this relationship (Stank *et al.*, 2011).

CONCLUSION

This article presents a behavioral analysis of inter-organizational relationships in the SNs of 198 organizations located in Minas Gerais. Of this sample, 106 respondents are sales managers, and 92 are purchasing managers. The personality traits and OC constructs were used to collect data on how human and organizational behaviors

combine to explain CSN. The results reveal different combinations of personality traits and OC that result in CSN. These combinatorial differences are evident between the customer and supplier models, and also within each model. The results showed one kind of collective programmed mind for relationships with customers and another for relationships with suppliers. Even considering the personification that exists in inter-organizational relationships, OC is more relevant than personality traits in the customer model.

Theoretical and managerial contribution

From the theoretical perspective, we suggest expanding studies on human behavior in the operations field (Loch & Wu, 2007). Assuming that relationships in SNs are conducted and practiced by individuals, the results showed that in relationships with customers OC exerts a powerful influence on managers, as it guides their actions. Since relationships with customers and suppliers are different, behavioral differences are identified in purchasing and sales managers, including personality traits. The results and the literature indicate that OC is a vital impact attribute in customer relations. With regard to suppliers, OC is perceived, but its practice and manifestation are not preponderant, because its presence is combined with some personality traits for CSN. In both models, however, the individual has a behavioral impact on CSN and is an essential element, either as a replicator of OC, or as a business enhancer, due to their characteristics. Finally, we believe that this study helps expand research in BOM.

From the managerial perspective, the analysis makes practical contributions, because it focuses on the individual as an observation unit in SNs (Katsikopoulos & Gigerenzer, 2013). It also encourages organizations to consider micro-relationships by directing their efforts towards collaborative engagement in the SN.

In the context of personality traits, the study reveals how important it is to consider behavioral attributes (which differ) when hiring sales and purchasing managers, thus contributing to the strategic value of CSN.

Limitations and future studies

As a limitation, this study analyzes the subject in an aggregated way, and disregards the specific qualities of organizations, such as the specificities of their relations with customers and suppliers, their operating market, and their financial performance. As Hilal (2006) suggests, therefore, to overcome these limitations, it is suggested that the cases be analyzed in more depth.

In future research, we recommend investigating whether behavioral characteristics improve the organization's financial performance in the SN, and whether OC and personality traits influence trust in SN relationships.

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AUTHORS' CONTRIBUTIONS

Roberta de Cássia Macedo, Ricardo Silveira Martins, and Jonathan Simões Freitas worked on conceptualizing and theoretical-methodological approaches. Roberta de Cássia Macedo conducted the theoretical review. Data collection was coordinated by Ricardo Silveira Martins and performed by Roberta de Cássia Macedo. Roberta de Cássia Macedo, Ricardo Silveira Martins and Jonathan Simões Freitas participated in the data analysis. All authors participated in the writing and final review of the manuscript.