Logistics service quality and customer satisfaction in B2B relationships: a qualitative comparative analysis approach

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Abstract

Purpose – This study aims to investigate the logistics service quality (LSQ) from a supply chain quality perspective. The purpose is twofold: (1) to investigate how business customers perceive the LSQ dimensions in business-to-business (B2B) relationships, with a particular focus on the role of logistics service providers and (2) to analyse the manner in which such dimensions, when combined, lead to high levels of customer satisfaction.

Design/methodology/approach – Data collected through a survey of a sample of Italian food companies are analysed using a qualitative comparative analysis approach. The analysis explores ways of achieving customer satisfaction through different combinations of LSQ dimensions and not only via a "single recipe," as in most symmetrical methods.

Findings – The study describes how seven dimensions of LSQ lead to achieve customer satisfaction, particularly highlighting and discussing how the different LSQ constructs lead to gain high customer satisfaction via different configurations. This approach is unique in identifying not only linear relationships among variables as traditional statistical methods do, via a configurational approach.

Research limitations/implications – Most academic studies in the related literature investigate service quality from a quality management and a supply chain management perspective. This study fills the existing gap in the analysis of B2B relationships, focusing on the role of third-party logistics (3PL) service providers.

Practical implications – The study presents useful implications for practitioners, describing several ways in which 3PL service providers can combine LSQ dimensions to perform a continuous improvement of customer experience and to gain higher levels of customer satisfaction.

Originality/value – This study fills the existing gap in the analysis of B2B relationships, using the lens of quality management and supply chain management perspectives, and focusing on the role of 3PL service providers.

Keywords Logistics service quality, Supply chain management, Customer satisfaction, Qualitative comparative analysis (QCA)

Paper type Research paper

1. Introduction

The relationship and the existence of similarities between quality management (QM), logistics and supply chain management (SCM) have been addressed in the literature. For example, Vanichchinchai and Igel (2009) and Peng *et al.* (2020) highlighted how these processes share the same ultimate goal: ensuring customer satisfaction. The primary goal of logistics and SCM was traditionally related to the effective management of the physical flow that connects production with customers. From this perspective, logistics and SCM share

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with total quality management (TQM) theories the focus on product quality, faster delivery and efficiency (Tortorella *et al.*, 2015; Vanichchinchai and Igel, 2009). Research on logistics and SCM has increasingly focused on creating service quality, delivering quality and improving customer service and satisfaction. This trend indicates the potential convergence of TQM and SCM theories and practices, which is also recognised under the term supply chain quality management (SCQM; Parast, 2020; Foster, 2008) and its evolution into supply chain quality integration (SCQI) (Zhang *et al.*, 2017; Huo *et al.*, 2016). From this perspective, companies can achieve success not only by providing high-quality products and services but also by offering proactive, customised service levels and developing strong relationships within the supply chain (Vouzas and Katsogianni, 2018; Carter *et al.*, 2015).

In parallel, to be more competitive, many companies outsource their activities, which enables them to improve their operational efficiency, reduce costs and strengthen their focus on their core competencies (Autry and Moon, 2016). The present study aims to fill the existing gap suggested by Zhang *et al.* (2017) about how organisations assess and manage part of an integrated system of supply chain quality, which is logistics service quality (LSQ). This study also extends the knowledge about service quality in the domain of logistics management and SCM, by addressing the analysis of customer service phenomena related to logistics and, in particular, how, when and in what ways logistics management drives customer service outcomes (Stank *et al.*, 2017).

Thus, it becomes necessary to understand the processes occurring between manufacturing companies and service providers, given the heavy reliance on third-party logistics (3PL) in this area (Vouzas and Katsogianni, 2018; Govindan *et al.*, 2015; Shaharudin *et al.*, 2014; Sharif *et al.*, 2012). A growing number of companies have begun to realise the importance of implementing integrated SCM supported by their 3PL providers to assure and improve service quality (Maloni and Carter, 2006). This integration is performed in response to the pressure for filling customers' orders faster as well as for improving efficiencies in serving them.

Services offered by 3PL providers have developed from movers and box handlers to blends of greater complexity, combining new value-added services (Leuschner *et al.*, 2014; Large *et al.*, 2011). The management of a variety of value-added services has become equally complex and has led to varying performance outcomes (Rafiq and Jaafar, 2007; Mentzer *et al.*, 2001). With an increasing number of companies expanding the scope of their outsourcing strategy, it is critical to pay close attention to the ways in which they and their 3PL providers manage relationships and hence increase service quality.

For 3PL providers, ensuring customer satisfaction is a key goal of service delivery. Today's customer is increasingly concerned and influenced by the "experience" that occurs throughout the service process.

For these reasons, TQM should be focused upon the improvement and the consistency of that experience, moving beyond "content" (i.e. product-related issues) to embrace "context" (i.e. the wider experience, including service). According to Tennant (2017), TQM strategies and tools are mainly devoted to two scopes: to reduce errors and defects along processes and to improve the reliability of decision-making tools for assuring continuous improvement. This research contributes to this second scope, by offering an approach to evaluate LSQ dimensions, based on a value-driven TQM from supply chain actors' point of view.

Previous studies indicate a strong link between customer satisfaction and profitability (Stank *et al.*, 2003). However, a customer satisfaction orientation (Luo *et al.*, 2010) in a supply chain represents a far more complex issue than managing customer satisfaction within a single firm, even as it offers the potential for increased benefits to participant firms. The literature has already identified the various antecedents of customer satisfaction derived from LSQ and has exclusively focused on the "net effects" of these antecedents. By contrast, extant literature suggests that the LSQ concept may be more complicated (Murfield *et al.*, 2017). Specifically, the complex system of interconnected, interdependent parts of the supply chain (i.e. suppliers, producers, retailers, logistics providers, etc.) is difficult to model at an

aggregate level (Carter *et al.*, 2017). However, as the complexity theory suggests, real-world relationships can be nonlinear, i.e. the same "predictor" can produce different effects (Urry, 2005). Then, the complexity theory suggests that these relationships can be more complex than a simple positive or negative correlation would indicate (Russo and Confente, 2017).

We, therefore, posit in this research the following question:

What configurations of LSQ dimensions lead to customer satisfaction?

We address this question by analysing survey data on how the different LSQ constructs of managing the customer–3PL operations in business-to business (B2B) markets can lead to achievement of high levels of satisfaction via different combinations of such constructs. In doing so, we adopt the qualitative comparative analysis (QCA) Wagemann *et al.* (2016).

Below, we first provide the literature background of the service quality, SCQM and LSQ concepts of interest. We continue to present the details of the empirical approach. Finally, we discuss the implications of the results then explore limitations and future research opportunities.

2. Literature review

2.1 Service quality and supply chain quality management (SCQM)

Service quality has been described in the QM and service management literature as a multidimensional construct, characterised by technical, functional and image dimensions (Kosmol *et al.*, 2018; Leischnig *et al.*, 2017; Parasuraman *et al.*, 2005; Grönroos, 1990; Lehtinen and Lehtinen, 1982).

In particular, the technical dimension is related to process outcomes, the functional dimension addresses how the service is supplied and the image dimension is related to the potential influence of the organisation's image on consumer perceptions. From a technical and compliance perspective, international standards, such as the ISO guide 9001 regarding the QM system, require collecting and providing quality system documentation that considers several pieces of information regarding the supply chain actors and their performance (ISO 9001/2015).

From a managerial perspective, previous research in QM has emphasised the importance of providing a comprehensive view of quality issues, both internal ones, such as processes, and external ones, such as customer orientation (Foster and Ogden, 2008; Sadeh, 2017; Kano *et al.*, 1984). In doing so, the QM perspective aims at creating excellence in products and service via the interaction of systems such as processes, machines, individuals, equipment, etc. (Deming, 2000), suggesting in-depth analysis of the multidimensional service quality construct (Peng *et al.*, 2020).

Service quality has been also investigated taking the SCM perspective. In fact, past research on SCM has adopted a system approach, which encompasses upstream and downstream processes regarding internal and external efficiency and effectiveness of processes (Bowersox *et al.*, 2007). This involves the effort and collaboration between the companies of the supply chain that work together to gain customers' satisfaction. Under this perspective, Foster (2008) and Parast (2020) defined SCQM as a systems-based approach to performance improvement that leverages opportunities created by upstream and downstream linkages with suppliers and customers, assuring an effective implementation of QM across the supply chain and advocating more in-depth studies (Parast, 2020). SCQM can be seen as an extension of SCM that is designed to allow firms to strengthen their competencies through *ad hoc* QM practices (Kuei *et al.*, 2011).

The SCQM literature initially identified two supply chain and QM areas of investigation: internal supply chain and external supply chain performance (Robinson and Malhotra, 2005). In addition, other SCQM studies highlighted how the QM practices related to the SCM domain (in particular, customer focus, quality data and supplier QM) lead to improved performance, upstream and downstream, requiring integration of the TQM and SCM theories and measurement approaches (Kaynak and Hartley, 2008).

However, recent studies indicated the need to further develop studies with a "holistic view of the supply chain, that investigates the cooperation between suppliers, producers and customers (to) bring further insights into the research on quality management effectiveness" (Zhang *et al.*, 2012, p. 21; Peng *et al.*, 2020).

2.2 Logistics service quality

Huo *et al.* (2016) extended the concept of SCQM to SCQI, to investigate how organisations implement a quality and performance management system with its upstream suppliers and downstream customers.

Studies regarding SCQI have also highlighted methods of assessing product quality, delivery quality, flexibility and cost of quality considering both the internal quality perspective and the external perspective, including B2B relationships with customers and suppliers (Zhang *et al.*, 2017; Huo *et al.*, 2016). Studies on service performance measurement are often industry-specific, focusing, for example, on the healthcare sector (Gustavsson *et al.*, 2016; Hu *et al.*, 2010), on omni-channels (Murfield *et al.*, 2017; Rao *et al.*, 2011), on medical equipment products (Ma *et al.*, 2019), on mass-market products (Zhang *et al.*, 2017), on pharmaceutical industry (Sharma and Modgil, 2020).

In the logistics and SCM domains, service performance has been described as a key driver for creating value and gaining competitive advantage (Stank *et al.*, 2003; Mentzer *et al.*, 1999, 2001). In particular, Stank *et al.* (2003) categorised logistics service performance into operational and relational dimensions, while Rafele (2004) proposed a framework for measuring logistic service performance, considering in particular three logistics quality dimensions: tangible components, fulfilment methods and informative actions.

With respect to measurement approaches, particularly referring to LSQ and its contribution to customer satisfaction, several studies have analysed B2B relationships and logistics service outsourcing. Maltz and Ellram (1997) investigated the total cost of relationships in logistics outsourcing decisions. Rahman (2006), Gotzamani *et al.* (2010) and Kuei *et al.* (2011) analysed the links between logistics service outsourcing and the theories of TQM and SCQM, highlighting the relationship between outsourcing, LSQ and operational/financial performance. Kilibarda *et al.* (2016) applied the SERVQUAL technique to logistics and freight forwarding, while several authors applied the Kano model to assess LSQ (Sohn *et al.*, 2017; Gustavsson *et al.*, 2016; Mikulic and Prebezac, 2011), confirming consistent convergence of TQM and SCM measurement systems.

However, in most of these studies, the unit of analysis is the buyer–supplier relationship. As highlighted by Bask (2001), in the logistics service providers' context, LSQ should be addressed not from this dyadic perspective, but in a "logistics triad", involving the buyer, supplier and logistics service provider in 3PL (Vouzas and Katsogianni, 2018; Sohn *et al.*, 2017). From this perspective, the complex nature of the relationships makes it difficult to assess outsourcing performance (Leuschner *et al.*, 2014; Knemeyer and Murphy, 2004), and few empirical studies address LSQ and customer satisfaction by considering 3PL providers (Selviaridis and Spring, 2007).

Customer satisfaction and service quality are related concepts, which have been largely explored in the QM and SCM literature over the past two decades. Although extant research appears to have underplayed the role TQM in customer-related outcomes, LSQ is likely to be relevant to evaluate LSQ dimensions, firms' responses to customer demands and ensuing customer value and customer satisfaction in the contemporary business environment. We, therefore, explore the theoretical reasons linking logistics service performance, quality and customer satisfaction considering the relationship between customer, producer and logistics service provider.

When service performance exceeds expectations, the customer is highly satisfied or even delighted (Juga *et al.*, 2010), with a positive effect for developing a successful relationship (Skarmeas *et al.*, 2008). Anderson and Narus (1984, p. 66) defined satisfaction in B2B relationships as "a positive affective state resulting from the appraisal of all aspects of a firm's working relationship with another firm". However, LSQ has multidimensional attributes, and customers do not perceive service characteristics as equally relevant (Mikulic and Prebezac, 2011).

In this study, customer satisfaction is defined as the customer's positive emotional response to an evaluation of perceived differences between the actual experience with a service and prior expectations of it (Chu, 2002; Zeithaml, 2000). The assessment of past, current and future customer expectation is essential to measure service quality (Parasuraman *et al.*, 2005) and can be considered an important antecedent of customer satisfaction (Lewin, 2009; Zeithaml *et al.*, 1988; Oliver, 1980).

Rafiq and Jaafar (2007) have described the customer perception of LSQ and its relationship with customer satisfaction considering "functional measures" – particularly personnel contact quality, information quality and ordering procedures – as excellent quality indicators, which are most important for customers. In parallel, these authors consider "technical measures" – such as order quality, order release quantities and order accuracy – as less appropriate to address LSQ.

For the purpose of this study, the key variables that characterise the wide concept of LSQ have been summarized into seven dimensions: the "personnel contact quality (PQ)" (Mentzer *et al.*, 2001; Juga *et al.*, 2010) refers to the perceived customer orientation of contact people in the organization (seller); the "information quality (IQ)" (Rafiq and Jaafar, 2007) refers to the customer perception of the information provided about products and services, which must be complete and adequate; the "ordering procedures (OP)" refers to the adoption of efficient and effective procedures adopted by the supplier, as perceived by the customers (Rafiq and Jaafar, 2007); the "order accuracy (OA)" describes how customers perceive the delivery performance (Mentzer *et al.*, 2001; Stank *et al.*, 2003; Huo *et al.*, 2016); while the "order condition (OC)" refers to the perceived integrity, in particular the lack of damages due to handling (Mentzer *et al.*, 2001; Stank *et al.*, 2003); then the "order discrepancy handling (OD)" (Mentzer *et al.*, 2001) refers to the effective management of discrepancies in orders after their arrive; finally, the "timeliness (TIME)" (Mentzer *et al.*, 2001; Huo *et al.*, 2016) is orders arrived at the customer locations at the promised time.

The previous studies have examined the performance outcomes of the seven logistics service dimensions by focusing on linear effects and multiple regression analysis. However, complexity theory indicates that, "relationships between variables can be non-linear, with abrupt switches occurring, so the same "cause" can, in specific circumstances, produce different effects" (Urry, 2005, p. 4). This suggests that the relationship between these variables and customer satisfaction might not always be linear and in the same direction. Further, variables can produce different results when considered in combination with other variables. Previous studies have considered the customer satisfaction as an outcome of the LSQ in isolation and investigated how they individually impact customer perception (Mentzer *et al.*, 2001; Rafiq and Jaafar, 2007). Above, we provided theoretical arguments linking each one of the variables of interest to customer satisfaction and TQM research. However, QCA allows us to provide additional insights by investigating these elements together and uncovering the various combinations of these antecedents (i.e. combinations) that lead to customer satisfaction. The complexity theory indicates that different components in a configuration can have a positive or negative impact on the outcome variable depending on the presence or absence of other elements in the configuration (Ordanini *et al.*, 2014; Greckhamer *et al.*, 2018; Russo *et al.*, 2019). For example, Russo *et al.* (2019) show that negation of different antecedent conditions may contribute to high customer satisfaction; this is in line

with the complexity theory, which shows how the reality in business is too complex to be fully captured in any single model (Woodside, 2014). In a few words, QCA in combination with the complexity theory helps identify combinations of causal attributes (e.g. PQ, IQ, OP, OA, OC, OD, TIME) that lead to the same outcome, providing to have a deeper understanding of the relationships between variables. Therefore, we undertook a qualitative study, based on a QCA approach, to measure the overall satisfaction perceived by the customers of a 3PL provider in different B2B service settings.

3. Research method

QCA explores the relationships between the outcome of interest (customer satisfaction in this study) and all possible combinations of binary states (i.e. presence or absence) of its conditions (the independent variables – in this study, these are the LSQ constructs; Fiss, 2007; Ragin, 2000). QCA is based on the principles of set theory, formal logic and Boolean and fuzzy algebra, and it is gaining increasing importance in management studies owing to its usefulness in configuration analysis (see, e.g. Russo *et al.*, 2016; Leischnig and Kasper-Brauer, 2015; Ordanini *et al.*, 2014; Greckhamer *et al.*, 2008).

To summarise, this approach adopts Boolean algebra principles, explaining the impact of each component/variable on a specific outcome depending on the way in which such a component is combined with the other components (Woodside, 2014).

3.1 Data collection

Data were collected in the food industry, in particular, through an Italian 3PL company, which delivers food products in Italy, where it is a market leader, and in Europe. The food industry was selected because it is one of the most important ones in Italy and is very complex to manage because of the products and their conservation requirements, the applicable regulations and the logistics requirements.

The focus on a particular sector is in line with previous studies on customer satisfaction (e.g. Lam *et al.*, 2004; Shankar *et al.*, 2003) and allows collecting responses that are more accurate and can provide better internal validity, reducing error variance.

Data were collected via a survey from a sample of Italian and international customer firms, including small and large customers with different spending levels (Lam *et al.*, 2004). An online survey was structured, and the "Google Forms" platform was adopted to generate the survey link. The survey was divided into two parts.

In the first part, the main LSQ constructs were provided for evaluation. All these constructs had multiple items, and each item was evaluated using a seven-point Likert scale (1 = highly dissatisfied to 7 = highly satisfied). Table 1 summarises the LSQ constructs, providing details on the number of items and the source of each construct. In addition to these, a construct related to the outcome variable, *overall satisfaction*, was collected. This was

Table 1. LSQ variables

Variables	Items	Cronbach α	AVE	CR	References
PQ	3	0.84	0.50	0.74	Mentzer *et al.* (2001); Juga *et al.* (2010)
IQ	5	0.95	0.66	0.91	Rafiq and Jaafar (2007)
OP	6	0.92	0.58	0.83	Rafiq and Jaafar (2007); Stank *et al.* (2003)
OA	3	0.95	0.75	0.90	Mentzer *et al.* (2001); Stank *et al.* (2003)
OC	3	0.78	0.50	0.70	Mentzer *et al.* (2001); Stank *et al.* (2003)
OD	4	0.89	0.56	0.83	Extended from Mentzer *et al.* (2001)
TIME	3	0.75	0.50	0.70	Mentzer *et al.* (2001)

constituted by a three-item construct relating to the overall satisfaction respondents perceived when evaluating the LSQ of the 3PL companies. Furthermore, we checked the reliability and validity of the measures adopted in our study. Specifically, factor analysis (maximum likelihood; oblimin rotation) illustrated that the considered variables are distinct factors, that reliability ranges above the 0.7 threshold and that composite reliability (CR) and the average variance extracted (AVE) exceeded their recommended thresholds of 0.7 and 0.5, respectively. All the details are reported in Table 1.

The second part of the survey was related to demographic characteristics of respondents and companies.

3.2 Sample characteristics

The survey link was sent via email to a sample of 257 Italian and European customer firms of the 3PL Italian company. Finally, 150 completed surveys were collected. As regards the organisation dimension, respondents belonged to three categories of companies in terms of volumes/revenues: large companies (36% of the sample), medium companies (61% of the sample) and "smaller retailer customers" (3% of the sample). Respondents were mainly logistics managers (49%), and they were asked to evaluate the quality of the logistics service they receive from the 3PL company. Table 2 provides more details about the roles of the respondents.

3.3 Data analysis: a qualitative comparative analysis (QCA)

As aforementioned, this study adopts a QCA approach to analyse the data for capturing the complexity of the phenomenon and its relationship with other dimensions. These goals are very difficult to achieve by adopting statistical analysis that explores only symmetric relationships, as in certain circumstances, asymmetric tests are required to better understand a complex phenomenon. This is in line with the principle of causal asymmetry Fiss (2007) introduced. In addition, this study does not aim at merely understanding the relationship between one single antecedent and the related outcome, but also strives to explore the existence of one or more combination/s of variables that provide the same level of an outcome *Y* (in this study, *Y* is customer satisfaction derived from a high level of LSQ). This approach is in line with the configuration theory, which suggests that the same set of causal factors can lead to different outcomes depending on how such factors are arranged (Ordanini *et al.*, 2014). Such theory is based on three principles: (1) an outcome of interest rarely results from a single causal variable, (2) causal variables rarely operate in isolation and (3) the same causal variable may have different effects (in same cases, opposite) based on the context (Greckhamer *et al.*, 2008). These principles support the tenet of equifinality determined by the complexity theory, which states that an outcome can be reached through different combinations of variables (Ragin, 2000).

Role	*n*	Percentage
Owner/CEO	12	8%
Supply chain manager	11	7%
Logistics manager	73	49%
Procurement manager	5	3%
Sales manager	11	7%
Accountants manager	4	3%
Other	34	23%
Total	150	100%

Table 2.
Respondents' role

To implement this analysis, fuzzy set QCA (fsQCA) software [1] was used. fsQCA represents a useful means to screen and identify the configurations of variables sufficient to reach a high level of an outcome. This procedure consists of four steps as elaborated by Fiss (2007):

3.3.1 Defining the property space. It refers to deciding the variables to be included in determining an outcome. In addition, it is necessary to provide information about the combinations of attributes, consisting of all combinations of binary states (presence or absence) of the X attributes that could determine the outcome. These combinations are illustrated in Figure 1, which is defined as a "truth table". This figure shows all the possible configurations of attributes (in this study, these are the LSQ constructs) in their combinations of presence (high scores of X are assigned 1) or absence (low scores of X are assigned 0) in determining the outcome variable (for high values of satisfaction, 1 is assigned).

3.3.2 Set-membership measures. This second step of the analysis consists of setting membership measures for the attributes. The conventional set (which is called the "crisp" set) is dichotomous, i.e. a case can be "in" (present = 1) or "out" (absent = 0). However, the fuzzy set membership scores can specify membership in the intervals between 0 and 1. For instance, some are fully "in" the set (fuzzy membership = 1.0), some are "almost fully in" the set (membership = 0.90) and others are neither "more in" nor "more out" of the set (membership = 0.5, also known as the "crossover point"). We calibrated the measures of this study specifying three qualitative anchors: the threshold for full membership (1), the threshold for full non membership (0) and a crossover point (0.5; Ragin, 2008). The endpoints and the midpoint of the seven-point Likert scales served as the three qualitative anchors for calibration of full membership (value 6), full non-membership (value 3) and the crossover point (value 4). Such calibration was applied to all the seven-point Likert scale constructs.

3.3.3 Consistency in set relations. In this third step, the conditions to reduce the numbers of rows and combinations are fixed: (1) the minimum number of cases required for a solution to be considered and (2) the minimum consistency level of a solution (Ragin, 2008). "Consistency" is defined as the degree to which cases correspond to the set-theoretic relationships expressed in a solution. Considering the minimum number of cases required to identify a solution, this study considered the threshold of 2 (Ragin, 2008). We set the cases that led to high levels of satisfaction, specifying satisfaction (SAT) equal to 1, which represents the presence of the outcome of high levels of satisfaction. After this, it is necessary to consider only the consistent combinations that have a consistent value of minimum 0.80 (Ragin, 2008).

3.3.4 Logical reduction and analysis of configuration. In the last step of the analysis, after having checked for consistency, we should also ensure an adequate level of coverage. Coverage reflects the relevance of the combinations, and we can understand it as a sort of R^2 value extracted from correlational methods (Woodside and Baxter, 2013). The accepted threshold for coverage was fixed at 0.10.

Edit Truth Table

File Edit Sort

iq	od	pq	op	time	oa	oc	number	sat	raw consist.	PRI consist.	SYM consist
0	0	0	0	0	0	0	39	0	0.356873	0.001530	0.001538
1	1	1	1	1	1	1	8	1	0.957627	0.847716	0.854949
0	1	0	0	0	0	0	7	0	0.559547	0.003750	0.003750
0	0	0	0	1	0	0	7	0	0.617148	0.009748	0.009748
1	0	0	0	0	0	0	4	0	0.670377	0.010776	0.010776
1	1	0	0	0	0	0	3	0	0.647952	0.017734	0.017734
0	1	0	0	1	0	0	3	0	0.725557	0.016238	0.016238
1	1	0	0	1	1	1	2	1	0.870263	0.141594	0.145016
0	1	0	0	0	0	1	2	0	0.736820	0.009302	0.009302

Figure 1.
Truth table of potential combinations

4. Findings from the qualitative comparative analysis

Table 3 summarises the results obtained through the QCA, consisting of three combinations that the fsQCA software identified. The rows of the table show the LSQ dimensions that influence achievement of high levels of satisfaction. The columns show the presence or the absence of such variables in the three "recipes" that lead to reaching high satisfaction. Ragin and Fiss (2008) introduced this easy way to present results, and it shows black circles ("●") when the condition is present and circles with a cross ("⊗") when it is absent.

The *first solution* presents a combination of the presence of only *order discrepancy handling* and the absence of all the other LSQ dimensions. This configuration shows the case where customers are mainly satisfied with just one LSQ component and do not pay the same attention to the other variables. However, this configuration has a very low consistency compared with the other two solutions where more variables are present.

The second solution combines the presence of information quality, order accuracy, order condition, order discrepancy handling and timeliness with the absence of personnel contact quality and ordering procedure in determining high levels of customer satisfaction.

Finally, the *third solution* includes the presence of all the LSQ dimensions.

The unique variable present in all the three solutions, representing therefore a "core condition" to achieve customer satisfaction, is order discrepancy handling. This finding means that achieving satisfaction with this variable is crucial for gaining high customer satisfaction.

5. Discussion and implications

The research outcomes herein present significant theoretical and managerial implications.

First, for several years, quality improvement programmes have been mainly internally oriented. The key goal was "to get it well first time", with a particular emphasis on improving the product-related quality. Later, there came the understanding that reliability is also linked with ensuring the consistency and continuous improvement of customer experience, customer service and hence satisfaction. The taxonomies regarding SCQM and SCQI identified the attributes of QM in the supply chain domain, embracing several items, such as supplier quality, internal quality, customer quality, product quality, cost of quality, flexibility and delivery (Huo *et al.*, 2016; Kaynak and Hartley, 2008). Several studies have investigated the specific attributes related to service performance and service quality (Sohn *et al.*, 2017),

Configurations	Solutions 1	2	3
PQ	⊗	⊗	●
IQ	⊗	●	●
OP	⊗	⊗	●
OA	⊗	●	●
OC	⊗	●	●
OD	●	●	●
TIME	⊗	●	●
Consistency	0.55	0.87	0.95
Raw coverage	0.53	0.51	0.53
Unique coverage	0.14	0.04	0.14
Solution coverage		0.80	
Solution consistency		0.64	

Note(s): ● = core causal condition present; ⊗ = core causal condition absent

Table 3. Configurations for achieving high satisfaction

given the major attention recently paid to these topics. In fact, organisations increasingly invest in their capability to serve their customers, assuring high-level services, and to implement supply QM practices to improve their performance (Zhang *et al.*, 2017). This study highlights the need to look at quality through this wider lens – a lens that should encompass the LSQ along the whole supply chain.

Second, the third configurations allow us to derive further theoretical insights about specific LSQ dimensions. This research investigates in particular how the selected seven dimensions of LSQ lead to achievement of customer satisfaction, particularly highlighting a "nonlinearity" in the relationship between LSQ constructs and customer satisfaction. In detail, our finding indicates that it is not accurate to generalize that all seven LSQ dimensions will always results in positive outcomes for customers. This is true for solution 3 that represents the most rigorous application of the LSQ, while the other two solutions contradict existing LSQ literature, like solution 1 where just OD is essential to achieve customer satisfaction.

According to Tennant (2017), the evaluation of LSQ dimensions may be a key component of a value-driven TQM from supply chain actors' point of view. In fact, this study identified – by using a QCA approach – how different combinations of LSQ can lead to higher levels of customer satisfaction and to perform a process control toward continuous improvement.

Third, the results reveal the importance of applying complexity theory to derive some further theoretical insights. Until date, studies have focused exclusively on the "net effects" of these antecedents, thus not capturing the complexity of the links between LSQ antecedents and customer satisfaction. This study highlights a rich and comprehensive perspective on different combinations that lead to the same outcome. This is an important finding because it highlights the complexity of the factors that may affect perceived customer satisfaction, in the relationship between customers and 3PL service providers. While these performance outcomes are certainly well established, our findings should prompt scholars to more closely examine the performance outcomes of OD, as our findings indicate that this logistics quality dimension alone is sufficient to generate a high level of customer satisfaction. This is an additional insight into the LSQ and TQM context to capture the complexity of the operations between 3PL and the customer.

Fourth, this study highlighted that effective capability to handle order discrepancy represents a key competence for 3PL service providers. This LSQ dimension is present in all the three configurations that emerged in the analysis. In particular, in the first configuration, order discrepancy handling is the only LSQ dimension to appear as the determinant that inspires high customer satisfaction. In accordance with the SCQM studies that developed a Kano model in the triadic relationship with 3PL providers (Sohn *et al.*, 2017), the present analysis confirms that LSQ attributes have different roles in facilitating the achievement of customer satisfaction. In particular, the present study confirms that the capability to handle order discrepancy, coherently with the attribute "responses to customers" addressed by Sohn *et al.* (2017), can provide higher satisfaction.

Fifth, the results reveal a difference respect an omni-channel business-to-customer perspective, where timeliness is analysed as the key LSQ determinant (Murfield *et al.*, 2017), in the B2B perspective described in this study, specific combinations of quality and service dimensions play a key role. In fact, the LSQ dimensions, which appear to be relevant because these are part of – at least – two configurations, are: timeliness; the management of order accuracy and condition; and the respect of information quality. These evidences confirm the findings of SCQM studies (Vanichchinchai and Igel, 2009), where the issues of quality conformance and the focus on error-free deliveries are determinant from both a service quality perspective and a logistics management perspective.

This study presents three relevant managerial implications.

First, this research supports managers in focusing on the critical elements of "experience" as perceived by the customer, to address what really customers value. This study allows managers to better understand the value preferences of the key market segments and to focus on improving the performance of the processes that deliver those value elements. Managers might be keen on determining the specific LSQ dimensions they must prioritise to ensure the satisfaction perceived by their customers. This information can be relevant for developing a customer relationship strategy and defining the logistics and service agreements. In addition, this information can support managers in determining allocation of resources to achieve customer satisfaction in the case of 3PL service providers.

Second, an in-depth analysis of LSQ dimensions allow managers to consider – besides technical issues (i.e. product quality) – also service issues (i.e. customer service and satisfaction). As a result, managers could find a practical tool to invest in a service-based continuous improvement approach, where the emphasis could be on process re-engineering and process control to ensure the consistent delivery of a better customer experience and service.

Third, our findings might help companies in the challenge to satisfy customers with a micro-segmentation strategy in the B2B context. In fact, firms could split the supply chain into several micro-segments, based on a specific customer's needs, service levels and an effective allocation of company's resources and capabilities. Given these goals and competitive challenges, firms – in our case, 3PL service providers – must choose between different recipes that lead to the same result (i.e. customer satisfaction).

6. Conclusions

The study describes how seven dimensions of LSQ lead to achieve customer satisfaction, particularly highlighting and discussing how the different LSQ constructs lead to gain high customer satisfaction via different configurations.

While our methodological approach allowed us to provide some unique theoretical and managerial insights, our study is not without limitations, and it also promised lines for future research directions. The first is to investigate whether the length – in terms of time – of the relationship between the customer and the 3PL service provider may affect the customer satisfaction perception and behavioural loyalty. In addition, future studies should attempt to compare the results of QCA to the results of traditional regression analysis. Future research also could consider expand and delineate impacts on specific performance outcomes like loyalty, word of mouth, adaptability, resilience and agility. Future research should explore the research question in the context of other specific markets and specific industry as certain differences could exist. Finally, future research should test LSQ antecedents in different industries and conduct a longitudinal analysis of past, current and future perceptions to provide additional evidence of generalisability of the findings.

Note

1. For further information about the usage and guidelines of fsQCA, please visit the website: http://www.u.arizona.edu/~cragin/fsQCA/.

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Further reading

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