

**How do TQM's critical success factors affect organisational performance? A configurational approach**

AHSAN, Ramjanul and SHARIAT ULLAH, Muhammad

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This document is the Accepted Version [AM]

**Citation:**

AHSAN, Ramjanul and SHARIAT ULLAH, Muhammad (2025). How do TQM's critical success factors affect organisational performance? A configurational approach. International Journal of Quality & Reliability Management. [Article]

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## **How do TQM's critical success factors affect organisational performance? A configurational approach**

### **Abstract**

**Purpose** – This paper aims to illustrate a possible combination of critical success factors (CSFs) that best enhance firm performance and compare configurations of CSFs in ISO-9001-2015 certified and non-ISO firms in Bangladesh.

**Design/methodology/approach** – The study sample comprises individuals from the service and manufacturing sectors and ISO-9001-2015 certified and non-ISO firms. We have collected data from 229 respondents from 134 firms, including 64.5% from ISO-certified and the remaining 35.5% from non-ISO-certified categories. In this exploratory study, we performed a fuzzy-set qualitative comparative analysis (fsQCA) to identify the combinations of success factors that enhance performance.

**Findings** - The Results of this study capture the causal complexity surrounding the CSFs and firm performance. We found six configurations for ISO firms and five for non-ISO firms that enhance firm performance. Besides, the necessary conditions for firm performance of ISO firms slightly differ from those of non-ISO firms. Thus, the empirical results highlight the importance of equifinality and complementary relationships between conditions relating to quality management systems to increase firm performance. A significant difference was found between ISO-9001:2015 certified firms and non-ISO firms.

**Research limitations/implications** – A significant limitation arises from the sample's inclusion of only Bangladeshi firms; a cross-cultural study could add new dimensions to the configurations. Understanding how these CSFs vary and need a longitudinal approach is essential.

**Originality/value** – Our configurational approach provides new insights into the complex dynamics of eight CSFs with a holistic approach. Instead of focusing on the additive linear net effects of CSFs on firm performance, we explain how the CSFs of TQM implementation combine into multiple combinations. By doing so, we show multiple equifinal pathways to firm performance.

**Keywords** Organisational performance, Critical Success Factors, TQM, Configurational Approach, ISO, Bangladesh

**Paper type** Research paper

## 1 Introduction

Since the inception of total quality management (TQM), it has received attention from practitioners and scholars regarding the achievement of significant improvement in employee satisfaction, customer satisfaction, continuous improvement, and financial performance (e.g., Bouranta *et al.*, 2017; Sila, 2007; Sila and Ebrahimpour, 2005; Talib *et al.*, 2013; Yu *et al.*, 2020). The performance effects of TQM depend, to a large extent, on how the concept is interpreted and implemented in practice (Madsen, 2020). Extant literature illustrated that the successful implementation of TQM depends on a set of factors, which we refer to as critical success factors (CSFs) (e.g. Georgiev and Ohtaki, 2019; Hietschold *et al.*, 2014; McAdam and Henderson, 2004; Niu and Fan, 2015; del Río-Rama *et al.*, 2019).

The CSFs are mutually dependent and influence each other but cannot improve firms' performance alone (e.g. Hietschold *et al.*, 2014; Liu *et al.*, 2021; Nguyen *et al.*, 2018). Several studies have explored the impact of various CSFs on firms' performance, including leadership and top management commitment (Gómez-López *et al.*, 2016; Hietschold *et al.*, 2014), human resource management (Delmas and Pekovic, 2018), process management (Marchiori and Mendes, 2020), continuous improvement (Lam *et al.*, 2015; Nguyen *et al.*, 2018), supplier management (Sila and Ebrahimpour, 2005), customer focus (Shafiq *et al.*, 2019), information analysis (Sila, 2007; Sila and Ebrahimpour, 2005), and training and learning (Salaheldin, 2009).

However, managers often apply multiple CSFs to enhance the performance of their firms (Hietschold *et al.*, 2014). In their study of Chinese manufacturing firms, Liu *et al.* (2020) argue that firms ignore the effectiveness of core quality management and, therefore, need the proper understanding and implementation of quality management systems. They further indicate the importance of developing methods to implement quality management practices. Shafiq *et al.* (2019) argue that the soft factors of TQM (such as human resources, culture, relationship management, and leadership) influence the firm performance through the hard factors of TQM (such as process, partnership, and resources). Although these studies explored the implementation of different CSFs, the effectiveness of potential CSF combinations on firm performance has largely been unexplored. This is a significant research gap because managers may use many possible CSF configurations to enhance performance (McAdam and Henderson, 2004; Shafiq *et al.*, 2019).

This implementation of quality management is reflected through the ISO certification and is considered the initial TQM implementation stage (Dale and Lascelles, 1997; Rashid and Taibb, 2016). Indeed, some recent studies highlighted that gaining ISO certification increases firm performance compared to their non-ISO counterparts (e.g., Daoud Ben Arab, 2021; Sweis *et al.*, 2019). Although these papers construed that ISO-certified firms reveal improved performance, mere certification would not ensure such a result. Hence, some previous studies identified that the adoption of ISO certification did not improve firm performance (e.g., Galetto *et al.*, 2017; Wang *et al.*, 2023), while some studies found there is no significant difference in the performance of ISO-certified and Non-ISO firms (e.g., Tamayo-Torres *et al.*, 2014). Even some studies argued that non-ISO firms perform better than ISO-certified firms (Singels *et al.*, 2001). Moreover, firms adopting ISO certification are subject to external pressures or compliance (Cai and Jun, 2018). This highlights the ongoing ambiguity regarding the factors influencing firm performance regardless of ISO certification, posing another significant gap. This inquiry is pertinent to all ISO-certified firms as these factors are relevant to them (e.g., Daoud Ben Arab, 2021; Sweis *et al.*, 2019).

To address the above research gaps, the research questions for this study are: (1) *which of the possible combinations of CSFs best enhances firm performance* and (2) *what combination of CSFs increases the performance of ISO and non-ISO firms?* This paper draws upon eight CSFs<sup>1</sup>: leadership and top management commitment, human resource management, process management, continuous improvement, supplier management, customer focus, training and learning, and culture and communication. Therefore, the authors intend to achieve the following objectives:

- (1) Investigate the possible combinations of CSFs that enhance the firm performance.
- (2) Examine the combinations of CSFs that increase ISO and non-ISO firm performance.

Implementing TQM ensures the organisation's continual improvement. However, Gómez-López *et al.* (2016) pointed out the need for further research to understand the TQM implementation holistically. This study responds to that call by incorporating the configurational approach (Fiss, 2011). Qualitative comparative analysis (QCA) is not new in quality management research. In this study, we apply Fuzzy set Qualitative Comparative

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<sup>1</sup> Although there are several TQM critical success factors (CSFs) identified in the literature, these eight have been consistently analysed and tested (Acquah *et al.*, 2023; Hietschold *et al.*, 2014; Ong and Tan, 2022; Sharma and Modgil, 2020). The primary focus of every firm is to meet customer requirements, and these CSFs serve as the blueprint to achieve this goal promptly and accurately while maintaining quality (Sharma and Modgil, 2020).

Analysis (fsQCA) to explore the relationships between firm performance and various combinations of CSFs instead of testing hypotheses of linear relationships as usually done under the structural equation-modeling (SEM) to determine TQM CSFs (Salaheldin, 2009). The traditional analysis method, such as SEM, excels at examining linear connections between variables but falls short when demonstrating multifactor concurrent causality (Zheng *et al.*, 2023). However, using fsQCA allows us to observe combinations of variables and analyse the configuration of elements connected to outcomes (Fiss, 2011), making this method particularly applicable to the present study.

We make three main contributions. First, we provide valuable insights for both researchers and practitioners as they consider what combinations of CSFs require attention and effort to improve firm performance (Gómez-López *et al.*, 2016; Shafiq *et al.*, 2019). Second, we present a way to examine TQM CSFs holistically as a set of activities by applying fsQCA, a recently expanding methodological approach to the TQM study (Liu *et al.*, 2021). Third, we provide new theoretical insight into the factors that enhance the performance of ISO and Non-ISO firms (Wang *et al.*, 2023). The rest of the paper is structured as follows: In section two, we discuss the critical success factors; in section three, we describe our research methodology; and in section four, we discuss our results. Finally, we discuss our key findings and conclude the paper in section five.

## **2 Descriptions of the critical success factors (CSFs)**

Critical success factors (CSFs) comprise a set of overarching requirements that must be present to achieve an organisational goal (Wali *et al.*, 2003). Successful implementation of TQM depends on CSFs (Hietschold *et al.*, 2014; del Río-Rama *et al.*, 2019) and requires the integration of all processes of an organisation (Ong and Tan, 2022). TQM Practices are the specific actions and techniques implemented to achieve quality (e.g., quality audits, process improvements). TQM CSFs are the underlying conditions or enablers that determine the success of those practices (e.g., management support and employee engagement) (Hietschold *et al.*, 2014; del Río-Rama *et al.*, 2019). In essence, TQM practices are the tools, while TQM CSFs are the strategic drivers that ensure those tools are applied effectively and lead to quality improvement. CSFs constituting TQM configuration are a cluster of interlinked variables resulting in a connected whole and collectively determining an outcome variable (Ragin, 2008). Consequently, one factor alone is insufficient and ineffective in drawing a causal linkage, while the same factor exerts a significant impact in combination with other factors. The claim laying

the foundation for viewing TQM as a configurational phenomenon rests on the premise that TQM embodies a holistic approach (Marinkovic *et al.*, 2016; Wang and Meckl, 2022); a combination of antecedent conditions that simultaneously act as a configuration (Bertrand *et al.*, 2022; Cervelló-Royo *et al.*, 2022) and collectively enhance the successful implementation of TQM. Thus, the configuration of the complementary elements needs to be put simultaneously instead of their isolated presence, and in this case, the interplay between an outcome variable and its antecedents is often asymmetric instead of symmetric (Fiss, 2007; Park *et al.*, 2020; Ragin, 2008; Woodside, 2014). Nonetheless, CSFs for TQM implementation involve a contextual understanding that can result in multiple configurations of antecedent factors for an outcome to accrue and inhibit the implementation of one configuration wholly to another without considering the local effects and setting (Dilawo and Salimi, 2019). Furthermore, some CSFs are essential to various contexts, industries, products, and services (Aquilani *et al.*, 2017); hence, CSFs are dynamic constructs (Wang and Meckl, 2022).

Since TQM is a configuration of numerous CSFs, identifying the most critical CSFs for their firms is essential for managers to design the TQM architecture and pave the way for CSFs' successful implementation (Aquilani *et al.*, 2017). Even though several CSFs are identified in the literature, it is evident that these eight CSFs of TQM have been consistently analysed and tested (Acquah *et al.*, 2023; Ong and Tan, 2022; Sharma and Modgil, 2020). The CSFs of TQM include top management support, human resource management, process management, customer focus, supplier management, training and learning, continuous improvement, and culture and communication. The primary focus of every firm is to fulfil the customer requirements, and these CSFs serve as the blueprint to achieve this goal on time and accurately without compromising quality (Sharma and Modgil, 2020). Aquilani *et al.* (2017) reported that top management commitment or leadership is the essential CSF in all identified clusters. Any initiative to implement TQM requires top management support as TQM is a management philosophy (Hietschold *et al.*, 2014; Marinkovic *et al.*, 2016), and top management can convey the necessity of TQM adoption to employees (Das *et al.*, 2008; Mehra *et al.*, 2001). The absence of top management support is one kind of human barrier highly dependent on the successful implementation of TQM (Aletaiby *et al.*, 2021; Kumar *et al.*, 2020). Top management support acts as a baseline force showing direction for TQM implementation. One key avenue to exemplify top management support in TQM adoption in the organisation is through human resource management practices that play a significant role in firm performance (Pandey *et al.*, 2022). Kufidu and Vouzas (1998) argue that keeping the issues of human resources on the top

management agenda strengthens the effectiveness of quality efforts. People management practices create a TQM-friendly culture and communication (Bou and Beltrán, 2005).

On the other hand, high failure rates of TQM implementation result in organisations being unable to perform HRM functions efficiently (Yang, 2006). Sharma and Fisher (1997) reported that most organisational quality problems arise from employees' attitudes, resilience, mindset and work culture rather than knowledge and skills. Today's organisations face ever-increasing adaptive and technical challenges that provide the impetus for enhanced focus on training and learning so that employees can follow quality standards and deliver the best customer service (Chaşovschi *et al.*, 2021). Training and learning also play a crucial role in overcoming resistance to change. Process management as an element of TQM configuration lies in the argument that organisations are systems of many interconnected processes, and improving those processes enhances performance (Samson and Terziovski, 1999). Process management and continuous improvement of processes lie at the heart of organisational success, and therefore, organisations must identify critical processes, manage them properly and focus on their continuous improvement (Koval *et al.*, 2018; Niyi Anifowose *et al.*, 2022). The quest for continuous improvement of business processes asserts that TQM is a race without a finish. Another vital CSF of TQM configuration is customer focus – an orientation to meet customers' current and future needs (Ooi *et al.*, 2011; del Río-Rama *et al.*, 2019) and exceed customers' expectations for survival and growth (Abbas and Kumari, 2023). TQM is a customer-centric practice (Mehra *et al.*, 2001); therefore, superior customer focus is a source of competitive advantage, and thereby, a positive association exists between customer focus and firm performance (Ooi *et al.*, 2011). Supplier management is another essential element of TQM's CSFs. Suppliers are crucial in determining product quality and reliability. Solid and long-term relationships of a firm with its suppliers help to minimise defective products and quality control costs (Das *et al.*, 2008). Extant research also documents a positive connection between supplier relationships and the successful implementation of TQM (Rahman and Bullock, 2005; Valmohammadi and Roshanzamir, 2015).

ISO certification represents the initial stage of TQM (Dale and Lascelles, 1997; Rashid and Taibb, 2016). While some studies suggest that ISO certification leads to enhanced firm performance, others caution that certification alone does not guarantee improvement ((e.g., Daoud Ben Arab, 2021; Sweis *et al.*, 2019). Factors such as external pressures or compliance influence firms' adoption of ISO certification (Cai and Jun, 2018). Consequently, research findings vary; some indicate improved performance with ISO certification (e.g., Galetto *et al.*,

2017; Wang *et al.*, 2023), while others show no significant difference (e.g., Tamayo-Torres *et al.*, 2014) or even suggest that non-certified firms may outperform ISO-certified ones (Singels *et al.*, 2001). However, the level of TQM implementation varies for different ISO certifications. For instance, Martínez-Costa *et al.* (2009) found that ISO 9001:2000 certified firms apply TQM at a higher level than ISO 9000:1994 certified firms, even though it was unclear which firms perform better. Moreover, one of the previous studies carried out in Ethiopia revealed that among the practices of TQM only supplier management, continuous improvement and process management were found to have a significant and positive effect on the performance of the ISO 9001:2008 certified manufacturing organisations (Kebede Adem and Viridi, 2021).

Although the literature separately highlights the critical role of various CSFs of TQM for boosting firm performance, the literature has less emphasised the combination of factors that harness firm performance. Hence, this study develops three propositions: first, multiple combinations of critical success factors affect firm performance; second, combinations of critical success factors vary for ISO 9001:2015 certified and non-ISO firms; third, necessary conditions for improved firm performance differ between ISO and non-ISO firms. We empirically examined these propositions with fsQCA by taking data from Bangladesh.

### **3 Sample, data, and method**

#### ***3.1 Sample and data***

Bangladesh has been selected as the research context. This selection is because Bangladesh has shown strong growth and development and has contributed significantly to the global value chain by exporting products and services (The World Bank, 2024). Hence, providing quality products and services to customers is paramount in Bangladesh. Although several quality-related studies (e.g., Ferdousi *et al.*, 2018; Iqbal *et al.*, 2020) are carried out in the ready-made garments sector, we expanded our focus on the manufacturing and service industries. Moreover, in Bangladesh, ISO certification is adopted due to external pressures (BGMEA, 2024). This study is significant for Bangladeshi ISO and non-ISO firms as they can identify the combinations of these CSFs to improve their performance. Hence, we have identified both ISO and non-ISO firms, allowing us to recognise the success factors sufficient for firm performance in both categories. Most of the firms are ISO 9001:2015 certified.

While selecting industries, we considered three manufacturing industries, i.e., apparel, footwear, and pharmaceuticals, the three major industries in Bangladesh since these industries comprise many firms with the largest share in the country's employment and exports. Firms in

these industries also prioritise ISO certification as a compliance and global competitiveness benchmark. In the service sector, we selected the financial services and power sectors. To identify the respondents, we used snowballing and convenience sampling (Saunders *et al.*, 2020). Initially, we contacted employees who were easily accessible, were in our network and worked in the selected manufacturing and service industries [convenience sampling, Easterby-Smith *et al.* (2015, p. 231)]. As we did not need a specific group of participants [purposive sampling, Easterby-Smith *et al.* (2015, p. 231)], the only criterion for selecting these participants was the work experience in the above manufacturing and service industries. However, as this was insufficient, the researchers used other techniques to access the participants for this study. For those who participated, the researchers asked them to refer to someone in their network who may contribute to this study [snowballing technique, Easterby-Smith *et al.* (2015, p. 232)]. We administered both online and physical questionnaires depending on the availability of the respondents. Data was collected from December 2022 to April 2023 from those who consented to participate in this study, and the questionnaire took 20-30 minutes to complete. The participants could withdraw from the survey before or during the survey. Once the data was collected, it was anonymised, so it was impossible to identify the participants. The data represented these individuals' perspectives of these CSFs in their organisations without disclosing the firm's name. Therefore, we did not require gaining consent from these firms as the firm's names are not collected.

Most of the non-ISO firms are small, and they rarely have an online presence. Therefore, we collected data from respondents of non-ISO firms through a paper questionnaire. Finally, we have collected data from 229 respondents from 134 firms, including 64.5% from ISO-certified and the remaining 35.5% from non-ISO-certified categories. Among the participants, 14.41% were from small firms (31 < employees < 120), 13.54% were from medium firms (121 < employees < 300), and 72.05% were from large firms (employees > 300). Distribution of responses by industry category shows that 91 responses came from manufacturing firms, representing 39.7% of the responses; 129 came from service-oriented firms, which represented 56.3%, and nine came from firms operating in both the manufacturing and service industries, representing 3.9%. 191 participants were male, representing 83.4%, and the rest 38 participants were female, representing 16.6%. The number of males represents the work culture in Bangladesh, which is male-dominated (Ahsan and Cullen, 2022). However, this gap is offset. Among the respondents, 46.9% completed graduation, and 53.1% completed postgraduation.

The average age of the participants was about 33 years, with an average of 9.3 years of professional experience.

### **3.2 Measures**

*Outcome variable.* Firm performance was measured using five items (see Appendix 1). Example items are, *over the past three years, our financial performance has been outstanding, financial performance has exceeded our competitors', more profitable than our competitors, and the revenue growth rate has exceeded our competitors'* (Powell, 1995; Veselinović *et al.*, 2021). All performance items are measured using a five-point Likert scale, such as one representing 'not at all' and five representing 'to a great extent'.

*Antecedent variables.* TQM success factors were identified from already developed and operationalised constructs in the literature (Acquah *et al.*, 2023; Hietschold *et al.*, 2014; Ong and Tan, 2022; Sharma and Modgil, 2020). We adopted the scale from Acquah *et al.* (2023) and Hietschold *et al.* (2014) (see Appendix 1) to measure top management support (7 items), human resource (8 items), process management (5 items), customer focus (8 items), supplier management (6 items), training and learning (4 items), continuous improvement (8 items), and culture and communication (4 items). Moreover, we pre-tested these questions with ten practitioners and two academics working in the area of quality improvement to validate them in Bangladesh. They were directly contacted to get their first-hand response. The aim was to understand the representativeness of the questionnaire but also for the absence of procedural distractions, issues and other kinks. They have removed constructs such as benchmarking and social and environmental responsibility and merged some items, such as information and analysis, with culture and communication as the CSFs for TQM implementation. Finally, we used a five-point Likert scale to measure the responses, and respondents replied 'yes' or 'no' to identify the ISO 9001:2015 certification status.

### **3.3 Method**

This mixed qualitative-quantitative technique based on Boolean algebra does not isolate the effects of individual explanatory variables on a dependent variable but allows investigation of the causal relationship between complex configurations of constructs and related outcomes (Fiss *et al.*, 2013; Ragin, 2008). This study adopted an exploratory research methodology. Hence, fsQCA enables the examination of equifinal combinations of conditions that could lead to the same outcome (in our case, firm performance). Indeed, there are a set of causes for any

outcome of interest. In our study, the fsQCA analysis thus allows us to account for all possible combinations resulting from the eight conditions identified in our configurational model.

Contrarian case analysis is performed to justify using fsQCA over typical variance-based (symmetric) analysis. Testing for contrarian cases confirms whether notable cases are not explained by the main effects of an antecedent on an outcome variable (Pappas and Woodside, 2021). These effects indicate an asymmetrical relationship that calls for fsQCA. Tables I and II demonstrate the results of the contrarian case analysis of the relationships between the antecedents and the outcome. To perform the contrarian cases analysis, first, we divided the variables using quantiles, i.e., dividing the sample into five equal groups. The sample needed to be divided in order to investigate the asymmetric relationships among the examined variables (Pappas and Woodside, 2021). As such, the first 20 percent of the observations are “very low”, 20–40 percent are “low”, 40–60 percent are “medium”, 60–80 percent are “high”, and 80–100 percent are “very high”. Then, we performed cross-tabulations across quantiles to represent the results for any two variables in a 5×5 table and show all combinations for all cases in the sample (Tables I and II). The top left and bottom right cases represent the main effects, while the bottom left and top right (grey area in Tables I and II) represent cases not explained by the main effects. These are contrarian cases in our sample.

For ISO firms, Table I indicates that 17.1% (i.e.,  $(1+2+5+1+4+3+6+3)/146$ ) of cases have low top management support (i.e.,  $< 3$ ) along with high firm performance (i.e., not  $< 3$ ) or high top management support along with low firm performance, running counter to the main effects. Similarly, in non-ISO firms, 18.1% (i.e.,  $(1+0+2+2+5+1+1+3)/83$ ) of cases have low top management support (i.e.,  $< 3$ ) along with high firm performance (i.e., not  $< 3$ ) or high top management support along with low firm performance, running counter to the main effects (Table II) indicating the existence of asymmetrical relationships.

[insert Table I here]

We also computed the effect size (Tables I and II) of the relationship between each condition and firm performance for ISO 9001:2015 certified and non-ISO firms, respectively.

[insert Table II here]

These effect sizes are pretty small. However, many contrarian cases and small effect sizes indicate the necessity for examining asymmetrical relationships and, therefore, support the need to perform a configurational analysis, i.e., the fsQCA method (Pappas and Woodside, 2021). Calibration is an essential step to perform the fsQCA, and to calibrate, we transformed

the causal conditions and outcome variables into fuzzy membership scores ranging from 0 to 1, where 5% defines being entirely out of the set, 50% represents intermediate-set membership, and 95% represents full-set membership (Ragin, 2008). However, we do not use exactly 1 and 0 as these would represent positive and negative infinity, respectively (Pappas and Woodside, 2021). Then, based on these scores, we constructed the truth table algorithm for ISO and non-ISO firms to recognise configurations that are sufficient to the outcome from those that are not by specifying the minimum recommended inclusion threshold at 0.8 (Bertrand *et al.*, 2022; Greckhamer *et al.*, 2018).

The fsQCA analysis gave three solutions: complex, parsimonious, and intermediate. Here, solution refers to a combination of configurations supported by many cases, where the rule of the combination leads to the outcome being consistent (Pappas and Woodside, 2021, p.11). Following the previous studies, we only report the intermediate and parsimonious solutions (Bertrand *et al.*, 2022). The intermediate solution is part of the complex solution and includes the parsimonious solution (Pappas and Woodside, 2021). Thus, we apply the intermediate solution to explore the configurations of top management support, human resource management, process management, customer focus, supplier management, training and learning, continuous improvement, and culture and communication of ISO and non-ISO firms' performance.

## **4 Results**

### ***4.1 Descriptive statistics***

Tables III and IV offer descriptive statistics of the final sample, which covers a significant range of scores regarding firm performance and the eight TQM CSFs. This provides us with diverse ISO and non-ISO firms for this study.

[insert Table III & IV here]

Reliability and validity of the measurement scale were assessed using Cronbach Alpha ( $a$ ) and average variance extracted (AVE), respectively. The threshold for  $a$  is that values should not be  $<0.70$ , while for AVE, values should not be  $<0.50$  ((Acquah *et al.*, 2023; Hair *et al.*, 2010). Tables III and IV indicate that  $a$ 's value ranges from 0.82 to 0.92 for ISO-certified firms and 0.70 to 0.92 for non-ISO firms. The AVE score ranged from 0.52 to 0.76 for ISO-certified firms and 0.56 to 0.77 for non-ISO firms. Hence, these scales proved to be reliable and valid.

## ***4.2 Identifying sufficient solutions for firm performance***

Using truth table analysis, we focused on identifying the causal recipes sufficient for firm performance (Ragin, 2008). Tables V and VI present the intermediate solutions for ISO and non-ISO firms. Here, the elements in the parsimonious solution are embedded in the intermediate solution, marked as significant symbols, and these elements are core conditions that have a strong causal relationship with the outcome, i.e., firm performance. On the other hand, small circles indicate peripheral elements. The dark circle elements are an enabler for the outcome, and the crossed-out elements may inhibit a firm from achieving the outcome. For example, the presence of TM (dark circle) means full membership in a high level of top management support (i.e., enabling role) exists. Its absence (cross circle) means that full membership in a high level of top management support does not exist in the configuration that results in firm performance (i.e., inhibiting role). Moreover, blank spaces indicate a do not care situation where the element may be present or absent.

[insert Table V here]

In fsQCA, two central measures provide parameters of fit: consistency and coverage (Ragin, 2008). Consistency measures the degree to which all configurations consistently result in high firm performance. All consistency values of configurations and solutions exceed 0.81 for the ISO firms (Table V), and all consistency values of configurations and solutions exceed 0.84 in the group of non-ISO firms, which is above the acceptable level of 0.8 (Greckhamer *et al.*, 2018; Ragin, 2008). These results indicate that these configurations are sufficient for high firm performance among ISO and non-ISO firms.

As a second fit parameter, coverage measures the extent to which each configuration accounts for the outcome. It shows the relevance and effectiveness of the solution for the outcome. However, a higher coverage does not mean the theoretical importance (analogous to R<sup>2</sup> in regression) (Ragin, 2008). However, there is no minimum threshold for this measure. The closer it is to one (1), the better (Bertrand *et al.*, 2022). Hence, firms can achieve higher performance with different paths (i.e., equifinality). There are six causal configurations for ISO firms and five for non-ISO firms.

In Table V, configuration one (1) signals that high levels of customer focus and low levels of top management support contribute to high firm performance. Path 2 indicates that ISO firms can achieve high performance when top management support, process management, training and learning, and culture and communication are low, combined with high human resource management and customer focus.

[insert Table VI here]

Path 3 shows another sufficient condition for the high firm performance of ISO firms: high levels of customer focus and low levels of top management support, process management, supplier management, and continuous improvement. Path 4 demonstrates the high levels of human resource management, customer focus, training, and learning, as well as low levels of top management support, supplier management, and continuous improvement, resulting in high firm performance. Finally, paths 5 and 6 illustrate a combination of a low level of top management support and a high level of customer focus, a high level of training and learning and a low level of continuous improvement to obtain firm performance, respectively. Configuration 4 has the most significant coverage (0.63), which is empirically the most relevant and effective in ISO firms achieving higher performance.

Comparatively, regarding the non-ISO firms (Table VI), path 1 shows that the configuration of a high level of supplier management and low level of top management support, process management and customer focus result in a high level of performance. Path 2 exhibits a high level of culture and communication without all other factors enhancing firm performance. Path 3 indicates that firms can improve performance by combining a high level of supplier management, low-level customer focus, and training and learning. Path 4 demonstrates that the presence of a high level of supplier management and the absence of a high level of continuous improvement with a combination of low levels of top management support, human resource management, process management, customer focus, and training and learning result in a high level of firm performance. Finally, path 5 shows that the high level of supplier management and culture and communication and low levels of top management support, human resource management, process management, customer focus, training and learning, and continuous improvement contribute to high firm performance. In these equifinal solutions, configuration 5 for non-ISO firms has the largest coverage (0.60), which is empirically most relevant and effective in a non-ISO firm's achieving high performance. However, these sufficient conditions do not reflect the factors necessary for the firms to obtain high performance.

#### ***4.3 Identifying necessary conditions for firm performance***

We focused on identifying the causal conditions with membership scores consistently greater than the outcome membership score. Table VII shows the results of the necessary analysis. We set the lowest acceptable consistency cut-off at 0.9 (Cervelló-Royo *et al.*, 2022). It demonstrates that the necessary conditions for firm performance of ISO firms slightly differ

from those of non-ISO firms. Top management support, process management, and customer focus are the necessary conditions for ISO firms whose consistencies exceed 0.90. However, top management and customer focus (i.e., quasi-significant – very close to the cut-off point) are the necessary conditions for non-ISO firms. Coverage can be interpreted similarly to the  $R^2$  in regression (Hughes *et al.*, 2019). This measure has no minimum threshold; the closer it is to one, the better (Bertrand *et al.*, 2022).

[insert table VII here]

Consequently, to a large extent, the presence of top management, process management, and customer focus for ISO firms (their combined TM\*PM\*CF provides a consistency of 0.981) and the presence of top management and customer focus for non-ISO firms (their combined TM\*CF provides a consistency of 0.941) leads to a high degree of firm performance. Furthermore, it also confirms the results obtained from the sufficiency analysis since these conditions are present in 4 and 3 solutions, respectively, for ISO and non-ISO firms.

## 5 Discussion

By identifying how specific success factors of TQM implementation interact and combine to influence the firm performance, this study provides significant implications for theory, research, and practice, which we discuss in detail in this section. Overall, study results support our central assertion that CSFs of TQM implementation need to be considered a configurational phenomenon (Shafiq *et al.*, 2019). Therefore, we addressed two questions in this study: (a) which of the possible combinations of CSFs best enhances firm performance? and (b) how do the configurations of CSFs differ in ISO 9001:2015 certified and non-ISO firms? This study makes several significant theoretical and methodological contributions to the TQM literature by answering these questions. Furthermore, this study applies NCA and fsQCA in TQM literature and provides empirical evidence of its methodological relevance.

Instead of focusing on the additive linear net effects of CSFs on firm performance, we explain how the CSFs of TQM implementation combine into multiple combinations. By doing so, we show multiple equifinal pathways to the firm performance. We explored these equifinal pathways in firms with ISO certification and no certification to understand whether the combinations of CSFs vary to achieve higher firm performance based on this ISO certification (Sweis *et al.*, 2019; Wang *et al.*, 2023). ISO firms must ensure that top management support, process management and customer-focus elements are in place to enhance performance.

On the contrary, non-ISO firms must use top management support and customer focus to improve performance significantly. This difference is because of ISO 9001:2015 certified firms' conformity to process management (Marchiori and Mendes, 2020). We identified six configurations for ISO firms (Table V) and five configurations for non-ISO firms (Table VI) sufficient for achieving high firm performance. These results suggest that a firm's adoption of several elements to enhance performance is contextually dependent. This finding is consistent with the equifinality premise (Gresov and Drazin, 1997) that multiple firm-level configurations are equally effective in achieving a desired outcome. For example, superior organisational performance can be achieved through a combination of factors, whether the firm has ISO 9001:2015 certification or not. The literature on CSFs suggests that not all factors need deployment to achieve superior outcomes (Gresov and Drazin, 1997).

Although these sufficiency conditions show different paths that firms can use to enhance performance, it does not indicate that these are the necessary conditions that firms must deploy for performance improvement. Hence, we identify the necessary conditions for firm performance in ISO and non-ISO firms. Our results show that ISO firms can significantly benefit from top management support (consistency 0.930), process management (0.901), and customer focus (0.940) to improve performance. On the contrary, non-ISO firms must have top management support (consistency 0.898 – quasi significant as close to the cut-off value 0.90) and customer focus (0.899 – quasi significant) to obtain superior performance. This result shows the importance of process management the ISO firms put while deploying their resources (Marchiori and Mendes, 2020; Sweis *et al.*, 2019), whereas both ISO and non-ISO firms must ensure top management support and customer focus are in place. This significantly reinforces the commitment of the firm's top management and customer focus (Liu *et al.*, 2021).

On the one hand, when top management is committed to quality, it is communicated with the employees throughout the organisational culture (Liu *et al.*, 2021). On the other hand, when top management is not committed to quality or lacks awareness of quality, it hinders the quality management practices and, consequently, the firm performance (Yang, 2020). Similarly, understanding customer needs and fulfilling these needs through data analysis improve customer service and assist firms in enhancing performance (Gomes *et al.*, 2020; Liu *et al.*, 2021). Therefore, although continuous improvement is essential for TQM implementation, we do not discount its importance. Instead, we propound that firms (irrespective of quality certificates) should focus more on ensuring top management support and focusing on

customers to improve performance. In addition, firms with quality certificates (ISO) must also incorporate process management.

### **5.1 Theoretical Implications**

Our results provide new insights into the complex dynamics of eight CSFs with a configurational approach. Although existing literature focuses on the additive linear net effects of CSFs on firm performance, these CSFs are applied in combinations. However, no study has looked into combining the CSFs of TQM implementation to improve firm performance. We illustrate how these CSFs interact and combine in various configurations. In doing so, we unveil multiple equifinal pathways to achieving optimal firm performance. This unveiling of multiple pathways contributes to the enhancement of firm performance (Gomes *et al.*, 2020; Kaur *et al.*, 2021; Shafiq *et al.*, 2019; Wang *et al.*, 2023). This approach provides fresh insights into TQM implementation's dynamic and configurational nature, mainly through multiple equifinal pathways to performance improvement. The study's unique comparative analysis of ISO and non-ISO firms adds valuable new knowledge to the field of quality management.

Our results revealed that firms could enhance their performance by combining CSF due to firms' change of focus with time (Liu *et al.*, 2021). For example, ISO-9001:2015 certified firms (Table V, configuration 4) should focus more on meeting customer demand than merely implementing process management (Marchiori and Mendes, 2020). Although this process management is essential for ISO firms, internal (human resource management and training and learning) and external performance can be improved by focusing more on customers. On the other hand, non-ISO firms focus more on supplier management and culture, and communication can lead to superior performance (Gomes *et al.*, 2020; Kaur *et al.*, 2021; Wang *et al.*, 2023). Thereby, we advance the theoretical knowledge of CSFs of TQM implementation (Aquilani *et al.*, 2017; Gomes *et al.*, 2020; Hietschold *et al.*, 2014; Shafiq *et al.*, 2019) with ISO requirements (Chiarini, 2020; Liu *et al.*, 2021; Wang *et al.*, 2023).

### **5.2 Implications for Practice**

It bridges the gap between theory and practice by demonstrating how different combinations of critical success factors (CSFs) can enhance firm performance in both ISO-certified and non-ISO firms. The research has practical relevance for managers, particularly in guiding them on which CSF configurations are most effective in improving organisational performance, depending on their certification status. This insight is valuable for economic and commercial

impact, as firms can optimise resource allocation for quality management improvements. Managers must not make an either/or decision but instead implement a combination of CSFs. In other words, implementing a subset of CSFs would enhance performance. Moreover, these paths are equally effective configurations that lead to higher firm performance. However, while implementing the CSFs, managers must emphasise top management support and ensure that customer focus is in place.

In addition, the managers in ISO firms must adopt process management to enhance performance. Therefore, managers can be aware of the interdependencies of these CSFs that may constrain them from achieving higher performance (Kumar *et al.*, 2020). Organisations must focus on innovation to better understand customer needs and improve products. This innovation also enables them to outperform competitors. Top management should also support continuous value creation via employee training for swift transformation and goal attainment.

In terms of teaching, the study provides an excellent case for explaining the configurational approach to quality management and how fsQCA can be applied to analyse complex relationships between success factors. It also contributes to the body of knowledge by offering new insights into the dynamic nature of TQM implementation and the differing impacts of ISO certification.

The paper's implications are also relevant to policymakers, highlighting the conditions under which ISO certification leads to improved firm performance. This could inform policies promoting certification and quality management systems. The societal impact is mainly through improved organizational efficiency and performance, which could translate into better-quality products and services, thus positively affecting quality of life.

## **6 Conclusion**

The primary objective of this study was to establish the configurational combinations of CSFs to obtain superior firm performance. We applied fsQCA to establish these configuration conditions and employed NCA to determine the necessary conditions. CSFs play a significant but varying role in ISO and non-ISO firms. They minimise the manager's potential risk of allocating resources that could hinder the firm's performance. Therefore, an essential finding of this study is that CSFs contribute differently to the firm's performance depending on the quality certification (such as ISO 9001:2015).

### ***6.1 Limitations and directions for future research***

Of course, our study presents several limitations that future studies can address. A significant limit arises from the sample that includes only Bangladeshi firms; a cross-cultural study could add new dimensions to the configurations. Including other firm characteristics such as firm size, age, structure, knowledge management approach, and industry in which it operates would give new insights into the future. Moreover, as firms may adopt some CSFs at a specific time, their change of application of these CSFs does not reflect their change. Hence, it is essential to understand how these CSFs vary over time and need a longitudinal approach. In this study, we have only considered ISO-9001:2015 certification, which covers the quality management system. Future studies could explore how the other types of ISO certification, such as ISO-14001 and ISO-45001, focus on the environmental management system, and ISO-27001 focuses on information security management systems and improve the firm's performance.

We have found a different combination of CSFs for ISO 9001:2015 certified and non-ISO certified firms to improve organisational performance. Therefore, future studies will be fruitful if they explore various organisational factors such as ownership structure, access to finance, innovation and sustainability focus that may influence and strengthen the combinations of CSF and firm performance. We took a static perspective without focusing on these firms' evolution of TQM adoption. Another direction for future research would be exploring how the CSFs evolved.

**Appendix 1: Questionnaire**

No	Items	Scale				
		1	2	3	4	5
<b><i>Top management commitment and leadership</i></b>						
1	Our top management actively participates in quality management and improvement processes.					
2	Learns quality-related concepts and skills.					
3	Discusses many quality-related issues in top management meetings.					
4	Focuses on product quality rather than quantity and costs.					
5	Pursues long-term business success.					
6	Actively encourages change and implements a culture of trust, involvement, and commitment in moving towards 'Best Practice'.					
7	Our managers create awareness among employees on quality and clearly identify quality goals for employees to achieve.					
<b><i>HRM/Recognition</i></b>						
8	Our company empowers, motivates, supports, and encourages employees and fully develops their potential.					
9	Has a transparent and effective appraisal system for recognizing and rewarding employees for their efforts.					
10	Focuses on teamwork and team spirit, and ideas from work teams are actively used in assisting management					
11	Provides a safe and healthy work environment.					
12	Provides special training for employees to serve our customers well.					
13	Provides a participative environment for employees.					
14	Measures effectiveness of training and its impact on employees.					
15	Measures employee satisfaction and supplies feedback.					
<b><i>Process management</i></b>						
16	Our company identifies causes of scrap and rework					
17	Takes immediately corrective actions when a quality problem is identified.					
18	Improves systematically key processes to achieve better product quality and performance					
19	Controls manufacturing processes using defect prevention tools.					
20	Regularly monitors improvement in quality of products and processes.					

<b><i>Customer focus and satisfaction</i></b>					
21	Our company knows our external customers' current and future requirements				
22	Customer requirements are effectively distributed and understood throughout the workforce.				
23	We (company) have an effective process to resolve external customers' complaints.				
24	Customer complaints are used as a method to initiate improvements in our company's current processes.				
25	Systematically and regularly measures external customer satisfaction.				
26	Quality-related customer complaints are treated with top priority.				
27	Always conducts market research in order to measure customer satisfaction and to collect suggestions for improving our products.				
28	Our company has been customer focused for a long time.				
<b><i>Supplier management</i></b>					
29	Our company strives to establish long-term relationships with suppliers.				
30	Relies on a small number of high quality suppliers.				
31	Our suppliers are actively involved in our product design/redesign process.				
32	Has a thorough supplier rating system and suppliers are evaluated according to quality, delivery performance and price.				
33	Our suppliers are involved in our quality training.				
34	Provides technical assistance to our suppliers.				
<b><i>Training and learning</i></b>					
35	Our company encourages employees to accept education and training.				
36	Most employees in our company are trained on how to use quality management methods (tools).				
37	Provides training to employees in quality concepts, taking care of their needs and developing their competencies.				
38	Our company regards employees as valuable, long-term resources worthy of receiving education and training throughout their career.				
<b><i>Information analysis</i></b>					
39	Our company presents and transmits important information to employees.				
40	Our company collects and analyses data related to its activities.				
41	Utilize information to improve its key processes, products and services.				

42	Our company has precise data about the competition used to identify areas of improvement.						
<b>Continuous Improvement</b>							
43	The organization practices continuous improvement in all of its products, services, and processes						
44	The management ensures that employees are capable of taking initiatives and assimilating better ways of doing their jobs						
45	The organization designs processes to be 'mistake-proof' to minimize the chances of errors						
46	The organization makes extensive use of statistical technique to reduce variation in processes						
47	The organization gives clear, comprehensive and standardized job description, SOP and process instructions to employees.						
48	Benchmarking techniques are used to establish improvement standards and objectives						
49	Self-assessment process take place on a regular basis						
50	Continuous quality improvement is part of all employees' responsibility rather than of the quality department alone.						
<b>Culture and Communication</b>							
51	Attaches importance to start employee coaching with the concept of quality rather than the policy.						
52	All employees are ready and willing to be trained and educated with new concept on quality.						
53	Establishes long-term goals related to quality.						
54	Develops a company-wide culture of quality.						
<b>Firm Performance (Powell, 1995; Veselinović et al., 2021)</b>							
55	Over the past 3 years, our financial performance has been outstanding						
56	Over the past 3 years, our financial performance has exceeded our competitors'						
57	Over the past 3 years, our revenue (sales) growth has been outstanding						
58	Over the past 3 years, we have been more profitable than our competitors						
59	Over the past 3 years, our revenue growth rate has exceeded our competitors'						

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Table I. Contrarian case analysis results for ISO firms (n =146)

Constructs/Quantile	Firm Performance					Total count	Effect Size
	1	2	3	4	5		
Top Management support	1	10	10	4	<b>1</b>	<b>2</b>	27
	2	7	8	7	<b>5</b>	<b>1</b>	28
	3	4	8	7	12	5	36
	4	<b>4</b>	<b>3</b>	4	8	10	29
	5	<b>6</b>	<b>3</b>	4	6	7	26
Total count		31	32	26	32	25	146
Human resource management	1	6	7	5	<b>4</b>	<b>3</b>	25
	2	8	9	7	<b>3</b>	<b>1</b>	28
	3	10	11	4	5	8	38
	4	<b>2</b>	<b>3</b>	7	11	4	27
	5	<b>5</b>	<b>2</b>	3	9	9	28
Total count		31	32	26	32	25	146
Process management	1	14	6	4	<b>3</b>	<b>4</b>	31
	2	5	8	7	<b>4</b>	<b>3</b>	27
	3	2	3	2	7	2	16
	4	<b>5</b>	<b>12</b>	8	14	10	49
	5	<b>5</b>	<b>3</b>	5	4	6	23
Total count		31	32	26	32	25	146
Customer focus	1	14	5	4	<b>1</b>	<b>2</b>	26
	2	4	6	8	<b>8</b>	<b>1</b>	27
	3	7	11	5	5	6	34
	4	<b>4</b>	<b>8</b>	5	10	4	31
	5	<b>2</b>	<b>2</b>	4	8	12	28
Total Count		31	32	26	32	25	146

	1	13	3	5	<b>3</b>	<b>3</b>	27	
	2	6	9	8	<b>11</b>	<b>5</b>	39	
Supplier management	3	7	8	3	2	2	22	-0.014
	4	<b>3</b>	<b>7</b>	3	5	5	23	
	5	<b>2</b>	<b>5</b>	7	11	11	35	
Total Count		31	32	26	32	25	146	
	1	13	7	4	<b>2</b>	<b>4</b>	30	
	2	5	5	6	<b>2</b>	<b>1</b>	19	
Training and learning	3	2	11	4	13	7	37	0.115
	4	<b>6</b>	<b>6</b>	6	12	5	35	
	5	<b>5</b>	<b>3</b>	6	3	8	25	
Total count		31	32	26	32	25	146	
	1	10	4	8	<b>2</b>	<b>3</b>	27	
	2	10	11	5	<b>13</b>	<b>1</b>	40	
Continuous improvement	3	5	6	1	4	2	18	0.048
	4	<b>2</b>	<b>9</b>	5	6	12	34	
	5	<b>4</b>	<b>2</b>	7	7	7	27	
Total count		31	32	26	32	25	146	
	1	10	9	6	<b>1</b>	<b>2</b>	28	
	2	8	5	8	<b>5</b>	<b>2</b>	28	
Culture and communication	3	4	10	6	14	5	39	-0.035
	4	<b>5</b>	<b>7</b>	2	7	7	28	
	5	<b>4</b>	<b>1</b>	4	5	9	23	
Total count		31	32	26	32	25	146	

Source: Authors own work

Table II. Contrarian case analysis results for Non-ISO firms (n = 83)

Constructs/Quantile	Firm Performance					Total count	Effect Size	
	1	2	3	4	5			
	1	1	6	5	<b>1</b>	<b>0</b>	13	
	2	6	4	4	<b>2</b>	<b>2</b>	18	
Top Management support	3	2	1	7	6	1	17	-0.283
	4	<b>5</b>	<b>1</b>	2	4	5	17	
	5	<b>1</b>	<b>3</b>	3	2	9	18	
Total count		15	15	21	15	17	83	
	1	3	4	4	<b>3</b>	<b>0</b>	14	
	2	6	4	5	<b>1</b>	<b>2</b>	18	
Human resource management	3	3	1	8	7	1	20	0.150
	4	<b>2</b>	<b>3</b>	0	1	6	12	
	5	<b>1</b>	<b>3</b>	4	3	8	19	
Total count		15	15	21	15	17	83	
	1	4	7	3	<b>1</b>	<b>0</b>	15	
Process management	2	6	1	6	<b>3</b>	<b>2</b>	18	0.529

	3	1	3	8	1	3	16	
	4	<b>4</b>	<b>3</b>	2	5	4	18	
	5	<b>0</b>	<b>1</b>	2	5	8	16	
Total count		15	15	21	15	17	83	
<hr/>								
Customer focus	1	5	4	2	<b>0</b>	<b>0</b>	11	0.465
	2	7	2	9	<b>0</b>	<b>2</b>	20	
	3	0	7	3	6	1	17	
	4	<b>2</b>	<b>0</b>	5	5	8	20	
	5	<b>1</b>	<b>2</b>	2	4	6	15	
Total Count		15	15	21	15	17	83	
<hr/>								
Supplier management	1	5	6	4	<b>0</b>	<b>0</b>	15	0.330
	2	3	3	11	<b>2</b>	<b>2</b>	21	
	3	0	2	5	4	1	12	
	4	<b>6</b>	<b>3</b>	0	4	6	19	
	5	<b>1</b>	<b>1</b>	1	5	8	16	
Total Count		15	15	21	15	17	83	
<hr/>								
Training and learning	1	2	6	7	<b>3</b>	<b>1</b>	19	-0.413
	2	3	2	7	<b>2</b>	<b>2</b>	16	
	3	3	2	4	4	2	15	
	4	<b>5</b>	<b>2</b>	3	4	3	17	
	5	<b>2</b>	<b>3</b>	21	2	9	16	
Total count		15	15	14	15	17	83	
<hr/>								
Continuous improvement	1	2	5	7	<b>2</b>	<b>0</b>	16	-0.139
	2	4	3	5	<b>2</b>	<b>2</b>	16	
	3	4	1	7	6	1	19	
	4	<b>4</b>	<b>5</b>	2	2	3	16	
	5	<b>1</b>	<b>1</b>	0	3	11	16	
Total count		15	15	21	15	17	83	
<hr/>								
Culture and communication	1	5	5	5	<b>0</b>	<b>0</b>	15	-0.117
	2	1	4	8	<b>2</b>	<b>1</b>	16	
	3	5	1	5	5	7	23	
	4	<b>4</b>	<b>4</b>	3	5	3	19	
	5	<b>0</b>	<b>1</b>	0	3	6	10	
Total count		15	15	21	15	17	83	

Source: Authors own work

Table III. ISO firms (n =146)

QCA sets		Average	Median	Std. Dev.	Minimum	Maximum	<i>a</i>	<i>AVE</i>
Outcome	Firm performance	18.86	19.0	4.51	5	25	0.92	0.76
Conditions	Top management support	28.03	29.0	4.48	17	35	0.84	0.52
	Human resource management	29.56	29.0	5.82	15	40	0.87	0.53
	Process management	19.07	19.0	3.37	8	25	0.82	0.59
	Customer focus	31.86	32.5	5.15	13	40	0.87	0.53
	Supplier management	20.88	21.0	4.54	6	30	0.82	0.53

Training and learning	14.72	15.0	3.18	4	20	0.84	0.68
Continuous improvement	29.05	29.0	5.30	10	40	0.87	0.53
Culture and communication	14.98	15.5	2.95	7	20	0.82	0.66

Source: Authors own work

Table IV. Non-ISO firms (n = 83)

QCA sets		Average	Median	Std. Dev.	Minimum	Maximum	<i>a</i>	<i>AVE</i>
Outcome	Firm performance	16.49	17.0	4.92	5	25	0.92	0.76
Conditions	Top management support	26.81	27.0	5.38	14	35	0.86	0.55
	Human resource management	27.48	26.0	6.22	15	40	0.88	0.56
	Process management	17.81	18.0	3.78	9	25	0.80	0.56
	Customer focus	29.11	29.0	6.41	12	40	0.91	0.66
	Supplier management	20.34	20.0	3.76	12	30	0.70	0.57
	Training and learning	14.25	14.0	3.53	6	20	0.85	0.69
	Continuous improvement	27.23	28.0	5.88	14	40	0.90	0.77
	Culture and communication	13.92	14.0	2.94	4	20	0.78	0.61

Source: Authors own work

Table V. Configuration of achieving high firm performance (ISO firms n=146)

	1	2	3	4	5	6
Top management support	●	●	●	●	●	⊕
Human resource management	⊕	●	⊕	●	●	⊕
Process management	⊕	●	●		⊕	⊕
Customer focus	●	●	●	●	⊕	⊕
Supplier management			●	●	⊕	⊕
Training and learning	⊕	●		●	⊕	●
Continuous improvement	⊕		●	●	⊕	●
Culture and communication	⊕	●	●	●	⊕	⊕
Raw coverage	0.08	0.22	0.17	0.63	0.05	0.04
Unique coverage	0.02	0.05	0.03	0.42	0.004	0.002
Consistency	0.87	0.91	0.96	0.90	0.81	0.82
Solution coverage	0.749					
Solution consistency	0.891					

Source: Authors own work ● means the condition is present; ⊕ means the condition is absent; blank space means the condition is not relevant; large symbols refer to core conditions; small symbols refer to the peripheral condition

Table VI. Configuration of achieving high firm performance (Non-ISO firms, n = 83)

	1	2	3	4	5
Top management support	●	⊕	⊕	●	●
Human resource management	⊕	⊕	⊕	●	●
Process management	●	⊕	⊕	●	●
Customer focus	●	⊕	●	●	●
Supplier management	●	⊕	●	●	●
Training and learning	⊕	⊕	●	●	●
Continuous improvement	⊕	⊕	⊕	⊕	●
Culture and communication		●	⊕	⊕	●
Raw coverage	0.16	0.08	0.08	0.16	0.60
Unique coverage	0.04	0.02	0.01	0.02	0.45
Consistency	0.89	0.90	0.88	0.87	0.84
Solution coverage	0.703				
Solution consistency	0.843				

Source: Authors own work ● means the condition is present; ⊕ means the condition is absent; blank space means the condition is not relevant; large symbols refer to core conditions; small symbols refer to the peripheral condition

Table VII. Necessity analysis

Condition	Outcome condition: Firm Performance			
	ISO firms		Non-ISO firms	
	Consistency	Coverage	Consistency	Coverage
TM	<b>0.930</b>	0.836	<b>0.898</b>	0.705
HR	0.837	0.845	0.789	0.743
PM	<b>0.901</b>	0.855	0.867	0.761
CF	<b>0.940</b>	0.843	<b>0.899</b>	0.760
SM	0.787	0.873	0.821	0.775
TL	0.839	0.857	0.785	0.708
CI	0.854	0.859	0.770	0.733
CC	0.870	0.853	0.856	0.756

Source: Authors own work TM: Top management support, HR: Human resource management, PM: Process management, CF: Customer focus, SM: Supplier management, TL: Training and learning, CI: Continuous improvement, CC: Culture and communication. Consistency cut-off = 0.9