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Impact of Leadership and Organisational Culture on Operational Performance in China's Food Processing Small and Medium-sized Enterprises

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Abstract

As the global food processing sector becomes increasingly competitive and consumer expectations rise, more and more small and medium-sized enterprises (SMEs) in China are beginning to understand the need for excellent leadership in navigating these challenges and succeeding in the global marketplace. This study, which examines leadership's essential role in these SMEs' operational performance and the moderating and intervening effects of quality and safety cultures, is highly relevant to your field of expertise. The relationship between leadership, operational performance, and quality and safety cultures was examined using the Partial Least Squares (PLS) approach. According to the study, leadership directly influences operational performance and significantly impacts the quality and safety cultures of the firms. Moreover, these cultural contexts have moderating and mediating effects on the connection between operational performance and leadership. These results highlight how crucial it is to have strong leadership and robust quality and safety cultures to promote exceptional operational performance in China's SMEs engaged in food processing.

Keywords: leadership, quality culture, safety culture, operational performance, SMEs

1. Introduction

The function of leadership has grown more crucial in directing the strategic directions of small and medium-sized enterprises (SMEs) in today's quickly changing business environment (Eriksson, 2016). This is particularly important for industries like food manufacturing, where businesses must simultaneously meet consumer demands and uphold strict quality and safety regulations (Kuo & Hsiao, 2021).

With a significant impact on China's GDP and jobs, the food processing sector is vital to the country's economy (Maitiniyazi & Canavari, 2021). Effective leadership in this industry is more important than ever due to the rapid transformations driven by shifting consumer demands and technical breakthroughs. Leaders need skills to navigate these shifts, create a clear sense of purpose, and mould safety and quality-conscious organisational cultures. The necessity for a suitable organisational culture is highlighted by the high stakes involved in upholding food quality and safety requirements, which can range from major economic consequences to health hazards.

The relationship between leadership and organisational culture and operational performance in different contexts has been the subject of much research, but there is a clear lack of information in the literature about how these two factors interact in China's SMEs that handle food. There are still important unsolved questions: What effect does leadership have on operational performance in this industry, and what part do organisational cultures—especially those prioritising quality and safety—play in this dynamic?

This study seeks to close this gap by investigating the impact of leadership on operational performance and the functions of quality and safety cultures as moderators and mediators in China's food processing SMEs. By examining these connections, the study hopes to provide insightful information to academics, legislators, and corporate executives who are concerned with promoting robust organisational cultures and optimising operational outcomes in the food processing sector.

The paper is structured as follows: Section Two engages with the existing literature, laying the groundwork for the study. Section Three outlines the methodology, detailing the approach taken in the investigation. Section Four is devoted to presenting and critically analysing the findings, placing them in the context of broader academic discussions. The paper concludes by synthesising the key insights, proposing avenues for future research and considering the broader implications of the study's findings.

2. Literature Review and Hypotheses

2.1 Leadership

As a cornerstone for effective TQM execution, leadership embodies dedicated engagement, financial backing, and active oversight from top-level management across the organisation's entire management system (Dora et al., 2013). It involves the process of developing a future vision, such as the quality and safety plan or policies as well as rewards and punishments, then disclosing and communicating it to all levels of the organisation, motivating and encouraging subordinates, and engaging in strategy-supportive exchanges with colleagues and associates (Grinerud et al., 2021; Machfudiyanto et al., 2019; Rebelo et al., 2014; Shao, 2019).

2.2 Operational Performance in the Food Processing Industry

Operational performance is the capacity of the manufacturing company to enhance product quality, streamline production, and guarantee on-time delivery (Thanki et al., 2016). In the food processing industry, operational performance gains particular significance. The industry is characterized by a fine balance between timely production, maintaining product quality, adhering to safety protocols, and optimizing costs. Any inefficiencies can lead to substantial waste, given the perishable nature of food products and the critical importance of meeting health and safety standards (Luning & Marcelis, 2009).

2.3 Leadership and Operational Performance

Numerous studies have underscored the correlation between leadership and performance. For example, Imran et al. (2012) demonstrated significant correlations between various leadership behaviours and the organisational performance of service SMEs in Malaysia, highlighting the critical role of leadership behaviour in influencing the performance of SMEs in the services sector. Similarly, a study focusing on the Coca-Cola Company in Nigeria provided further evidence of the profound impact of leadership on organizational performance, reinforcing the notion that effective leadership is a key determinant of success in business environments (Ibrahim1 & Daniel, 2019).

2.4 Quality and Safety Culture

Quality culture is a subset of the organisation's overall culture. It reflects the general approach, values, and quality orientation through organisational action (Roldán et al., 2012). In other words, an organisation's quality culture refers to its ideals, definition, and approach to quality-seeking. It is more than just having tools or methods for measuring quality, such as quality function development, statistical process control (SPC), continuous improvement cycles, experimental design, etc. (Roldán et al., 2012). Without a strong quality culture, it would be challenging to build continuous improvement in the organisation (Zu et al., 2011); the lack of a quality culture adds to the pressure on cost and implementation time (Grover et al., 2016). Moreover, the results of some research work indicate that the successful implementation of TQM depends on the organisation’s quality culture (Araújo et al., 2019).

Safety culture is another sub-component of organisational culture, which considers the influence of employees' attitudes and behaviours on the organisation's safety performance (Unnikrishnan et al., 2015). In food enterprises, safety culture is how all parties involved—owners, managers, and workers—think and behave in their day-to-day operations to guarantee the safety of the food they serve or create. Food safety and quality culture are widely recognised in the food industry. Having the right culture for food safety and quality is the key to the success of any food enterprise (Emond & Taylor, 2018).

2.5 The Interplay Between Leadership, Organizational Culture, and Operational Performance

The interaction between leadership, organisational culture, and operational performance has been the subject of much research. Leadership styles are known to shape organisational culture, which in turn affects operational performance. This is supported by Imran et al. (2012), who discovered that organisational performance is favourably and dramatically impacted by transformational leadership. That organisational culture is mediating the link between transformational leadership and performance. Suryaningtyas et al. (2019) also proposed that the relationship between resilient leadership and organisational performance is mediated mainly by organisational culture. However, particularly in the context of China's food processing SMEs, the mediating and moderating effects of quality and safety cultures in this relationship have not been thoroughly investigated.

2.6 Hypotheses

For food processing SMEs to operate successfully and maintain a culture of continuous improvement, leaders are essential in developing strategies, acting quickly, and fostering this culture (Jacobs et al., 2013; J. Meng & Berger, 2019). Establishing an atmosphere encouraging behaviours is essential for improving operational results and establishing a culture of quality, safety, and teamwork among workers. This can only be achieved through effective leadership. This culture is critical in the food processing industry because of the perishable nature of raw materials and the intricate operations that call for prompt decision-making, strict quality control, and severe safety procedures (Mohammad & Khalid, 2016). The leadership shapes the organisational culture, which greatly impacts how well SMEs function operationally. The literature that is currently available, however, shows a deficiency in thorough investigations that consider the implications of safety, quality, and leadership cultures in the context of China's food processing SMEs, particularly regarding their functions as moderators or mediators. As shown in Figure 1, a conceptual model has been created to fill this gap and clarify the research concept and hypotheses. It serves as the basis for the proposed research framework and the hypotheses investigated in this study.

H1: Leadership positively influences the operational performance of China’s food processing SMEs.

H2: Leadership positively influences the quality culture in China’s food processing SMEs.

H3: Leadership positively influences the safety culture in China’s food processing SMEs.

H4: Quality culture positively influences the operational performance in China’s food processing SMEs.

H5: Safety culture positively influences the operational performance of China’s food processing SMEs.

H6: The quality culture in China’s food processing SMEs moderates the relationship between leadership and operational performance.

H7: The safety culture in China’s food processing SMEs moderates the relationship between leadership and operational performance.

H8: Quality culture mediates the relationship between leadership and operational performance in China’s food processing SMEs.

H9: Safety culture mediates the relationship between leadership and operational performance in China’s food processing SMEs.

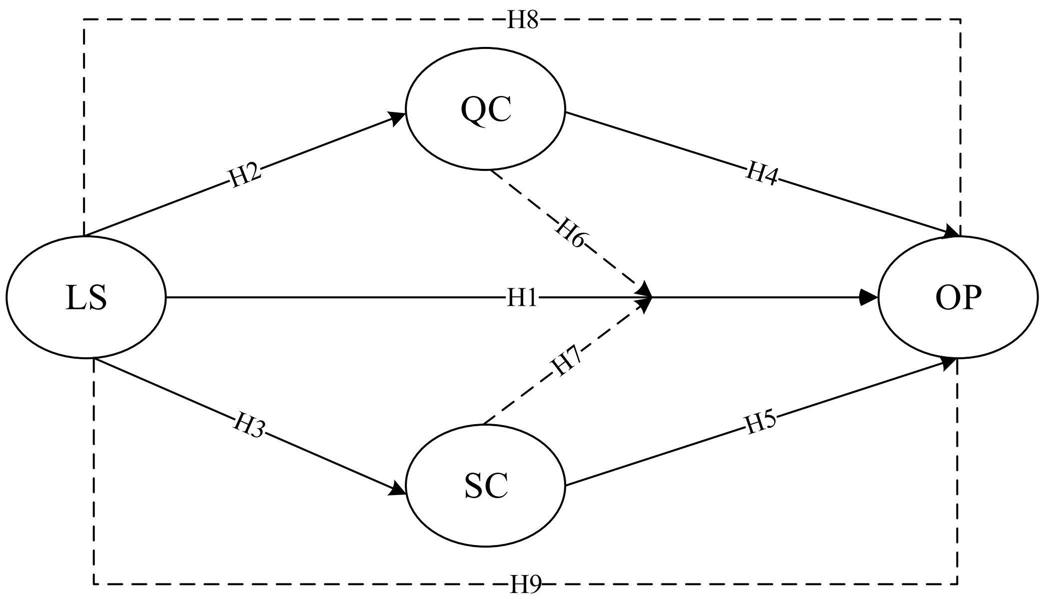

Figure 1. Research framework

3. Methodologies

3.1 Data Collection Methods

Data can be gathered using various techniques, such as the Internet, Google Forms, email, and in-person surveys (Javadikasgari et al., 2018). This study used a quantitative research approach, and participants filled out standardised questionnaires independently. Online and face-to-face data from Hengshui City in China's Hebei Province were gathered.

Because thorough data of these SMEs were available from various districts or counties, participants were chosen using stratified random sampling. This approach aligns with the methodologies employed in earlier studies like the one by Chakraborty et al. (2019). Stratification was used in the investigation, followed by simple random selection from each stratum, a method judged suitable for this research.

3.2 Questionnaire Design

To assure relevance and rigour, the questionnaire for this study was modified from other research (Georgiev & Ohtaki, 2019; Kaur et al., 2019; Sahoo & Yadav, 2018; B. B. Silva et al., 2019; Yadav et al., 2021). It underwent a review process, including talks with academic and food processing specialists to establish content validity. Their input resulted in customised modifications, improvements, and polishes, making the survey appropriate for China's food processing industry. A wide range of responders, including general managers, quality directors, and experts from SMEs, were consulted and included in completing the final draught. They contributed their viewpoints and thoughts. A Likert scale was used to measure the participants' responses, with options ranging from "1" for strongly disagreeing to "5" for strongly agreeing. This allowed a more nuanced understanding of the participants' attitudes and perspectives.

3.3 Sample Size

The research's target population consisted of SMEs manufacturing food in Hengshui City, Hebei Province. The Market Supervision Administration reports that 303 of the 306 food processing businesses in Hengshui City meet the criteria for being SMEs. To determine an adequate sample size for this study, the G*Power version 3.1.9.7 software was employed (Memon et al., 2020). Utilising the parameters for a one-tailed test in G-Power, the study required a power of 0.90 and a medium effect size of 0.50, leading to a minimum sample size of 172 businesses, with an alpha level set at 0.05 (Erdfelder et al., 2009). However, the intention was to surpass the minimum, aiming for a more robust sample. Consequently, 259 surveys were finalised and readied for analysis after collecting the data.

3.4 Data Analysis Methods

In this study, primary data analysis was conducted using IBM-SPSS to detect outliers, handle missing values, and assess normality. PLS-SEM 4.0.9.2 was employed for hypothesis testing and is renowned for its precision in predicting component correlations (Leguina, 2015). Both measurement and structural models were appraised using Smart PLS via a one-stage approach, adhering to the guidelines set forth by Hair Jr et al. (2021). The variables involved in the measurement are detailed in Table 1. This methodological rigour ensures a comprehensive and accurate analysis of the data.

Table 1. Measurement variable description

Variables		Definition of Measurement	**References**
Leadership	LS1	Top management defines the quality and food safety objectives.	(S. L. C. da Silva & Amaral, 2019; Georgiev & Ohtaki, 2019; Siegel et al., 2019; Uzir et al., 2022)
	LS2	Top management places a bottom-up communicatio towards quality and safety management.	
	LS3	Top management promotes quality improvement.	
	LS4	Top management invests in employee training.	
	LS5	Top management provides the necessary resources to carry out activities efficiently.	
	LS6	Top management emphasises the importance of customers.	
Operational Performance	OP1	Operational costs are reduced.	(Georgiev & Ohtaki, 2019; Kafetzopoulos et al., 2013; Liu et al., 2021; Vafaei-Zadeh et al., 2020)
	OP2	Product quality is increasing.	
	OP3	Product stock is reducing.	
	OP4	Lead or cycle time is reduced.	
	OP5	Productivity is improving.	
	OP6	Management process effectiveness is increasing.	
Quality Culture	QC1	Have strict food quality management standards.	(Emond & Taylor, 2018; Jose & Shanmugam, 2019; Ning & Gao, 2021)
	QC2	Explicit of the prioritisation of quality.	
	QC3	Implements the emergency report and response system for major food accidents strictly.	
	QC4	Try to find the correct root causes when there are food quality issues.	
	QC5	Committed to Quality Excellence Program.	
	QC6	Improves quality according to customer requirements continuously.	
Safety Culture	SC1	Employees have a positive attitude towards food safety.	(de Andrade et al., 2020; Fujisaki & Akamatsu, 2020; Jespersen et al., 2019; Nyarugwe et al., 2016)
	SC2	Employees have adequate food safety knowledge.	
	SC3	Employees always obey the food safety procedures in production.	
	SC4	Have strong risk awareness for food safety.	
	SC5	Have regular meetings or get-togethers to report or discuss food safety performance	
	SC6	Have food accident disposal plans and relevant organisation construction.	

4. Data Analysis

Of the participants surveyed, 40.54% held executive roles such as general manager or Chief Executive Officer (CEO) within their respective SMEs. The remainder occupied managerial positions in quality management, food inspection, and production. This composition underscores that our respondents predominantly hail from the senior management echelons, possessing intricate knowledge concerning leadership dynamics, organisational performance, and cultural nuances. Distributing the SMEs by size reveals that micro-enterprises accounted for 29.73%, small businesses comprised 67.18%, and medium-sized enterprises represented a mere 3.09%. Furthermore, when assessed for operational longevity, 38.22% of these SMEs exhibited a tenure of 5-10 years, 29.23% spanned 11-20 years, and a noteworthy 15.06% thrived in the industry for over two decades. This data delineation indicates that a significant segment of SMEs within the food processing realm have sustained their operations for an extended period, surpassing a decade.

4.1 Assessment of Measurement Model

4.1.1 Reliability and Validity of the Measurement Model

Factor loadings (FL) elucidate the variance inherent in each indicator (Reinartz et al., 2009). The literature recommends that for optimal reliability, factor loadings should exceed 0.70, which signifies an acceptable level of reliability (Hair et al., 2021). Internal consistency reliability depends on how closely related the indicators measuring the same construct are to one another by assessing composite reliability (CR) and Cronbach's Alpha (CA) (M. Meng & Agarwal, 2007). Acceptable values for these metrics range between 0.60 and 0.70, while values surpassing 0.70 are considered good (Leguina, 2015). The convergent validity is primarily gauged using Average Variance Extracted (AVE). An AVE value greater than 0.50 suggests that the items represent over half of the construct's variance (Jr. et al., 2017). The results are shown in Table 2.

Table 2. Reliability and validity of the measurement model

Indicators	LS	CA	CR	AVE
LS1	0.752	0.871	0.903	0.609
LS2	0.822			
LS3	0.831			
LS4	0.790			
LS5	0.747			
LS6	0.735			
OP1	0.802	0.908	0.929	0.686
OP2	0.808			
OP3	0.857			
OP4	0.826			
OP5	0.847			
OP6	0.826			
QC1	0.810	0.896	0.920	0.657
QC2	0.801			
QC3	0.836			
QC4	0.806			
QC5	0.803			
QC6	0.807			
SC1	0.807	0.879	0.908	0.623
SC2	0.817			
SC3	0.779			
SC4	0.741			
SC5	0.833			
SC6	0.757			

As shown in Table 2 above, the FL, CA, and CR exceeded 0.70, and all AVE values were higher than 0.50. All values are deemed satisfactory, demonstrating the measurement model's reliability and validity.

4.1.2 Discriminant Validity

1) Fornell and Larcker Criterion

The square root of each latent construct's AVE should be greater than its correlation with other constructs, according to the Fornell and Larcker criteria (Fornell & Larcker, 1981). Table 3 displays the results: bolded diagonal values indicate the square root of AVE, while plain off-diagonal values represent correlations among constructs. It is evident from Table 3 that the square root of each construct's AVE surpasses the off-diagonal values, meaning all constructs satisfy the Fornell and Larcker criterion and possess discriminant validity.

Table 3. Fornell and Larcker criterion

	LS	OP	QC	SC
LS	**0.781**			
OP	0.582	**0.828**		
QC	0.461	0.440	**0.811**	
SC	0.459	0.554	0.350	0.790

2) Cross-Loadings

Cross-loadings serve as the second criterion to gauge discriminant validity. Within this framework, an indicator's loading on its associated construct should surpass its loadings on other constructs (Henseler et al., 2015). Table 4 reveals that all indicator loadings (highlighted values) exceed their cross-loadings with alternative constructs, indicating distinctness among the constructs.

Table 4. Cross-loading

	LS	OP	QC	SC
LS1	**0.752**	0.433	0.315	0.338
LS2	**0.822**	0.482	0.340	0.333
LS3	**0.831**	0.523	0.413	0.384
LS4	**0.790**	0.467	0.395	0.380
LS5	**0.747**	0.371	0.340	0.314
LS6	**0.735**	0.430	0.342	0.392
OP1	0.473	**0.802**	0.330	0.399
OP2	0.464	**0.808**	0.328	0.451
OP3	0.511	**0.857**	0.386	0.503
OP4	0.480	**0.826**	0.364	0.428
OP5	0.465	**0.847**	0.398	0.467
OP6	0.494	**0.826**	0.376	0.498
QC1	0.347	0.359	**0.810**	0.272
QC2	0.333	0.417	**0.801**	0.316
QC3	0.414	0.351	**0.836**	0.312
QC4	0.364	0.303	**0.806**	0.253
QC5	0.336	0.337	**0.803**	0.304
QC6	0.434	0.366	**0.807**	0.246
SC1	0.438	0.440	0.306	**0.807**
SC2	0.389	0.479	0.258	**0.817**
SC3	0.411	0.499	0.273	**0.779**
SC4	0.250	0.398	0.261	**0.741**
SC5	0.341	0.419	0.278	**0.833**
SC6	0.302	0.364	0.285	**0.757**

3) HTMT

Henseler et al. (2015) introduced the heterotrait-monotrait ratio (HTMT). HTMT is an advanced technique for identifying discriminant validity and estimating the genuine correlation between two latent variables. Henseler et al. (2015) suggested that an HTMT value beyond 0.85 indicates an absence of discriminant validity. As depicted in Table 5, all values fall beneath this cutoff, confirming that this model's HTMT criterion is met. Figure 2 shows the results of running SmartPLS with the whole model.

Table 5. Heterotrait-Monotrait ratio (HTMT)

	LS	OP	QC	SC
LS				
OP	0.650			
QC	0.516	0.486		
SC	0.512	0.612	0.395	

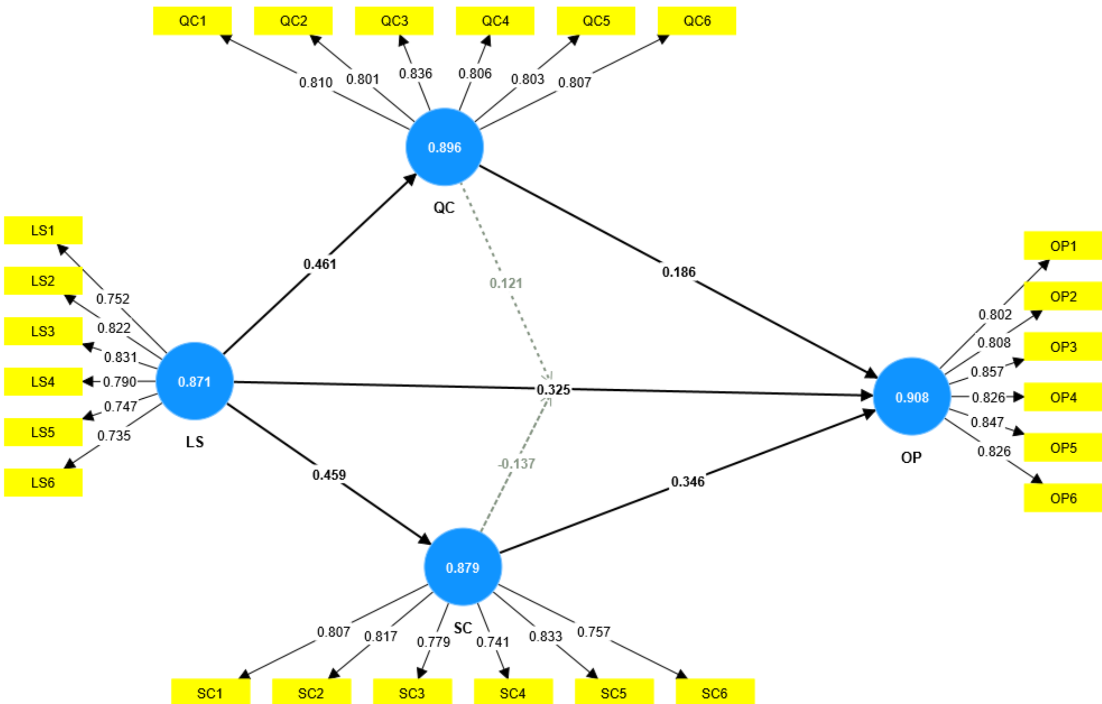

Figure 2. Full model with path coefficients and Cronbach's Alpha

4.2 Assessment of Structural Model

1) Path Coefficients

The hypothesised relationship between constructs is evaluated using the bootstrapping method. This assessment incorporates the path coefficient (β), t-value, and p-value. In alignment with Jr. et al. (2017), the β, t-value, and p-value are ascertained using a bootstrap with 5000 samples at a 5% significance level. Given that all postulated relationships in this research are supposed to be positive, a one-tailed test is utilised, following the recommendations from Kock (2015). The pivotal values for the one-tailed test stand at 1.28 ($p < 0.10$), 1.65 ($p < 0.05$), and 2.33 ($p < 0.01$), in agreement with suggestions by Jr. et al. (2017).

Table 6. Hypothesis relationship among constructs

Hypothesis	Relationships	Path coefficients	Std. DEV	t-value	p-value	LL	UL	Sig.
H1	LS -> OP	0.325	0.061	5.348	0.000	0.223	0.423	Yes
H2	LS -> QC	0.461	0.053	8.714	0.000	0.379	0.551	Yes
H3	LS -> SC	0.459	0.056	8.250	0.000	0.370	0.553	Yes
H4	QC -> OP	0.186	0.063	2.969	0.001	0.086	0.293	Yes
H5	SC -> OP	0.346	0.057	6.050	0.000	0.251	0.438	Yes
H6	QC x LS -> OP	0.121	0.049	2.453	0.007	0.041	0.203	Yes
H7	SC x LS -> OP	-0.137	0.041	3.325	0.000	-0.203	-0.067	Yes
H8	LS -> QC -> OP	0.158	0.032	4.887	0.000	0.109	0.215	Yes
H9	LS -> SC -> OP	0.086	0.031	2.731	0.003	0.039	0.140	Yes

The data in Table 6 showed a significant relationship between LS and OP, marked by the figures ($p<0.01$, t=5.348, LL: 0.223, UL: 0.423). The relationship is upheld because the t-value surpasses 1.65, and the p-value remains under 0.05, coupled with a 95% confidence interval that does not span zero within the lower and upper boundaries. Similarly, the connection between LS and QC & SC was significant, evidenced by QC ($p<0.01$, t=8.714, LL: 0.379, UL: 0.551), SC ($p<0.01$, t=8.250, LL: 0.370, UL: 0.553). The same as the relationship between QC and OP ($p<0.01$, t=2.969, LL: 0.086, UL: 0.293), SC and OP ($p<0.01$, t=6.050, LL: 0.251, UL: 0.438). Given that these metrics exceed or fall within the required thresholds, hypotheses H1 to H5 are validated.

The moderation of QC and SC on the relationship between LS and OP underwent examination using the bootstrapping procedure with 5000 resamples at a 5% confidence interval. Results from Table 6 show that both QC ($\beta=0.121$, t=2.453) and SC ($\beta=-0.137$, t=3.325) moderate the relationship between LS and OP. Given t-values exceeding 1.65, p-values below 0.05, and Confidence Interval bounds not including zero, the interaction path was deemed significant, leading to the acceptance of H6 and H7.

To test the mediation of QC and SC in the relationship between LS and OP, indirect effects for mediation were tested by performing bootstrapping as above. Results found QC is statistically significant in the relationship between LS and OP ($\beta=0.158$, t=4.887, $p<0.01$), and the same mediation effect of SC between LS and OP ($\beta=0.086$, t=2.731, p=0.003). So, H8 and H9 were both supported.

2) Coefficient of Determination (R square)

Chin (1998) suggested that an R^2 value surpassing 0.67 is deemed substantial, a value around 0.33 is considered moderate, and anything close to 0.19 is considered weak. The specific R^2 values are shown in Table 7 below.

Table 7. Results of model explanatory power (R^2)

Endogenous Constructs	R^2	Decision
OP	0.486	moderate
QC	0.212	weak
SC	0.210	weak

Table 7 reveals that LS accounts for 48.6% of the overall variation in operational performance while contributing to 21.2% of the variance in quality culture and 21.0% in safety culture. Considering the benchmarks Cohen, (1988) provided, these R^2 values suggest a moderate and weak level of predictive accuracy for OP, QC and SC. Therefore, the model possesses a commendable level of predictive capability.

3) Effect Size (f square)

Cohen (1988) guidelines suggest that an f^2 value of 0.02 indicates a small effect, 0.15 represents a medium effect, and anything above 0.35 indicates a significant effect. The computed f^2 values for this research are documented in

Table 8.

Table 8. Results for effect size (f^2)

Relationship	f^2	Effect Size
LS → OP	0.137	Medium
LS → QC	0.269	Medium
LS →SC	0.266	Medium
QC→ OP	0.049	Small
SC→ OP	0.177	Medium

The results in Table 8 show that LS has a medium effect on the OP, QC, and SC. QC has a negligible effect on the OP, and SC has a medium effect on it.

4) Construct Cross-validated Redundancy(Q^2)

Another aspect of assessing the structural model is its predictive capability. The primary measure of predictive relevance is Stone-Geisser's Q^2, which requires the model to predict each endogenous latent construct's indicators adequately. The Q^2 value is obtained through a blindfolding procedure and comes in cross-validated redundancy and commonality. The use of cross-validated redundancy is recommended. The benchmarks for evaluating Q^2 are 0.02 for small, 0.15 for medium and 0.35 for sizeable predictive relevance. A model is deemed to have good predictive relevance if Q^2 is above 0. If Q^2 falls below 0, the model's predictive relevance is lacking (Hair et al., 2014). The outcomes regarding the model's predictive relevance are outlined in Table 9.

Table 9. Predictive relevance Q^2

	Q^2	Predictive Relevance
OP	0.327	Medium
QC	0.136	Small
SC	0.125	Small

Table 9 displays a Q^2 value of 0.327 for OP, signifying a medium predictive relevance for each construct. Conversely, Q^2 values of 0.136 for QC and 0.125 for SC show limited predictive relevance for these constructs.

5) Fit of the Model

In evaluating a model's fit to data, the Goodness of Fit (GoF) is a crucial statistical test that measures the model's alignment with the data and quantifies the robustness of the study's model adoption (D'Agostino, 2017).To determine a model's GoF, researchers have used various techniques in the past. Wetzels et al. (2009), for example, classified GoF values into three categories: large (0.36), medium (0.25), and tiny (small) using the formula shown in equation (1). An alternative method would be to assess the Standardized Root Mean Square Residual (SRMR). A model is deemed an excellent fit if the SRMR values are below 0.08 (Hu & Bentler, 1998) and the NFI (Normed Fit Index) is nearly 1. As delineated in Table 10, the model's GoF stands at 0.387, surpassing the threshold of 0.36 for a large model fit, indicating that the model under investigation exhibits a commendable fit.

Table 10. Summary of Model Fit

Construct	AVE	R^2
LS	0.599	
OP	0.685	0.399
QC	0.641	0.237
SC	0.666	0.056

$$GoF = \sqrt{AVE \times R^2} \quad (1)$$

Equation (1) is a formula to calculate the standardised root mean square residual (SRMR) as an Average Score of (AVE =0.648 and R^2 = 0.231) and

$$GoF = \sqrt{0.648 \times 0.231} = 0.387 \text{ > Cut-off values 0.36.}$$

In this model's context, the SRMR values stood at 0.049, less than 0.08, showing a good fit for the model. Bentler and Bonett (1980) introduced the NFI as an early fit measure in SEM. An NFI value closer to 1 and above 0.50 is typically deemed to indicate a good model fit (Lohmöller, 2013). With a value of 0.876, which exceeds the 0.5 threshold, the model demonstrates an acceptable fit, as presented in Table 11.

Table 11. Model Fit Value

Criterion	Value
SRMR	0.049
NFI	0.876

4. Discussion

This study examined the complex relationships between operational performance, quality and safety cultures, and leadership in China's small and medium-sized food processing enterprises. The study aimed to experimentally verify these factors' direct and indirect impacts using a quantitative technique and PLS-SEM analysis. The study's findings support many significant relationships. It has been shown that leadership significantly improves organisational cultures related to quality and safety, improving operational performance. This suggests that those in charge of food processing SMEs have a critical role in creating an atmosphere prioritising quality and safety, greatly improving overall performance. These results support the theory Arghode et al. (2022) put forward that organisational leadership is critical in influencing worker performance. They said that increased organisational performance may result from leaders cultivating an environment that fosters development, guarantees smooth operation, and makes it easier for staff members to work together.

The findings indicate that while leadership directly impacts operational performance, this link is significantly strengthened when the firm has a strong quality and safety culture. This research supports the notion that organisational solid cultures that place a high priority on quality and safety are necessary for successful leadership to reach its full potential. This is supported by the observation made by Coves-Martínez et al. (2023) that a favourable safety culture may mitigate the impacts of work schedules on performance, underscoring the complex relationship between organisational culture and performance. Eniola et al. (2019) and Hilman et al. (2019) provided additional support for this idea by pointing out that organisational culture plays a major mediating role between the performance of SMEs and Total Quality Management (TQM) practices. This suggests that understanding the subtleties of organisational culture is essential to maximising the benefits of TQM. Similarly, Kraśnicka et al. (2018) found that an innovative organisational culture (OC) links management innovation and enhanced firm performance in their study of 301 Polish companies. This suggests that promoting an innovative culture benefits organisational growth and adaptability. S. J. Wu (2015) further outlined a chain effect in which core practices are strengthened to improve overall quality performance, and effective infrastructure is built upon a strong quality culture. When taken as a whole, these studies highlight the significance of an integrated approach to organisational culture and leadership, stressing that obtaining better operational performance depends on the interaction between these components.

Regarding the study's practical ramifications, it is suggested that SMEs in the food processing industry might achieve improved operational results by deliberately fostering a culture of quality and safety and investing in leadership development. The results support programs that develop leadership abilities and corporate cultures that prioritise these factors for legislators and business executives.

Despite its insightful findings, the research has limitations. Its dependence on self-reported data may impact the results' generalizability and concentration on SMEs in a particular area. Future studies might overcome these constraints by using a larger sample size and considering more contextual elements.

In general, this research adds to the expanding corpus of information on how organisational culture and leadership affect operational performance, especially in the context of China's small and medium-sized food processing enterprises. It provides insight into the intricate interactions between these elements and lays the groundwork for further research and comprehension.

5. Conclusions

This research has methodically investigated the intricate interactions between operational performance, quality and safety cultures, and leadership in China's SMEs that process food. The results highlight leadership's critical role in forming organisational culture and, in turn, in affecting these businesses' operational success. Effective leadership involves more than simply making decisions and developing strategies; at its core, it involves fostering an atmosphere in which quality and safety are not just top objectives but also deeply ingrained in the company's culture. The study found that strong quality and safety cultures greatly increase the beneficial effects of good leadership on operational performance, indicating that these cultural components are essential to achieving an organisation's leadership potential rather than just complementary.

The research also emphasised how organisational culture mediates the connection between operational success and leadership. Studies by Coves-Martínez et al. (2023b) and others show that while good safety and quality cultures improve performance, the degree to which they have an effect depends on the particular environment and management style of the business. This emphasises the need to develop an organisational culture in a customised manner that fits the requirements and conditions of every business.

Conclusively, this research adds to the current corpus of knowledge by furnishing empirical data regarding the noteworthy function of leadership and organisational culture in augmenting the operational efficacy of small and medium-sized enterprises (SMEs), specifically within China's food processing sector. It requires leaders to actively foster a culture of quality and safety that supports and strengthens their strategic goals and concentrate on their leadership philosophies. To further evaluate and build upon these results, it is advised that these dynamics be investigated in other settings and with bigger sample sizes in future studies.

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Conceptualisation, Bingqing Zhu and Hayati Habibah Abdul Talib; methodology, Bingqing Zhu and Hayati Habibah Abdul Talib.; software, Bingqing Zhu.; validation, Hayati Habibah Abdul Talib; formal analysis, Bingqing Zhu.; investigation, Bingqing Zhu; resources, Bingqing Zhu; data curation, Bingqing Zhu; writing—original draft preparation, Bingqing Zhu; writing—review and editing, Bingqing Zhu and Hayati Habibah Abdul Talib; visualisation, Bingqing Zhu and Hayati Habibah Abdul Talib; supervision, Hayati Habibah Abdul Talib; project administration, Bingqing Zhu; funding acquisition, Bingqing Zhu. All authors have read and agreed to the published version of the manuscript.

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No additional data are available.

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