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Moderating Role of Uncertainty and Asset Specificity in the Structure-Conduct-Performance Paradigm: Evidence from Rice Millers in Sri Lanka

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Abstract

Most small and medium-sized enterprise (SME) rice millers have experienced performance issues related to their conduct, threatening the sustainability of the industry. These issues appear to stem from uncertainty, even though their investments are asset specific. This study, therefore, assessed the moderating effects of asset specificity and uncertainty on the relationships among Structure, Conduct, and Performance (SCP) in SME rice mills. A questionnaire survey was conducted among 125 SME rice mills in the main paddy-producing districts of Sri Lanka. The analysis was carried out using SmartPLS 4 software. The results confirmed a significant negative moderating effect of uncertainty on the relationship between conduct and performance ($\beta = -0.387$, $t = 3.010$, $p < 0.003$). This indicates that the presence of uncertainty significantly weakens the impact of conduct on performance. In contrast, the results did not show such an effect on the relationship between structure and conduct. Furthermore, asset specificity did not moderate the relationships between either structure and conduct or conduct and performance. In addition, the study found that conduct did not mediate the relationship between structure and performance. The findings suggest policies and strategies to minimise the impact of uncertainty in achieving sustainable positive performance outcomes. Future research is recommended to explore strategies to mitigate these moderating factors and enhance performance. The incorporation of asset specificity and uncertainty into the SCP framework represents the novelty of this study.

Keywords: Asset Specificity; Small and Medium Enterprise Rice Millers; Structure Conduct and Performance Framework; Uncertainty.

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Introduction

The process of paddy and rice to feed half of the world's population is done by rice millers (Food and Agriculture Organisation, 2024). In Sri Lanka, 2.1 million farmer families grow paddy as their main livelihood to feed the nation (Department of Agriculture, 2026). The volatility of prices and the supply of this crop in the market significantly affect transaction costs and, consequently, the conduct and performance of rice milling enterprises. Price and supply fluctuations increased information and bargaining costs, which pressurise millers to alter their inputs, processing, and marketing rice. Similarly, the seasonality and adverse climatic circumstances created uncertainty in input supply, increasing coordination costs to maintain a stable supply (Fafchamps, 2004).

To address the increased transaction costs, rice millers are more likely to change their conduct by forming long-term supplier relationships, upstream integration, using intermediaries, or timing purchases and storage to reduce risk. Such adaptive behaviours are consistent with the institutional theory that economic players realign the governance institutions (North, 1990). These alterations in the organisational strategies, competitive behaviours, and market interactions are impacting their conduct and performance.

Bourai et al. (2024) and Wijesooriya et al. (2021) examined the relationship among Structure, Conduct, and Performance (SCP) in analyzing the market dynamics. Transaction cost economics (TCE) is another tool that can be used to analyse the issues associated with conduct and performance (Lipski, 2024). Williamson (1979, 1985) highlighted the role of transaction costs in organisational decision-making (Peng, 2021). Mainly emphasised the appropriate governance mechanism for the asset-specific investment and functioning with uncertainty. Even though the transaction cost caused server impact on conduct and their performance, the availability of literature is limited on the effect, particularly on the rice milling industry in Sri Lanka

Continuous performance issues in the Sri Lankan rice milling industry, due to price fluctuations, unpredictability in market supply, and uneven allocation of revenues to different parties in the value chain, have been observed (Bandara et al., 2024a; Thibbatuwawa, 2021). As investments in the industry are highly asset-specific, the outcomes of the market and governance frameworks are poorly established (Bandara et al., 2024a). Even having a higher market supply, the drastic reduction in market participation during the off-season by SME millers created an opportunity for Large Scale Millers to influence the market, such as creating artificial scarcity, earning excessive profits, which harms industry players (Bandara et al., 2024a).

The main reasons for such a situation are the inability to cope with the issues, and the challenges faced by SME millers due to high transaction costs when adopting appropriate governance mechanisms for asset-specific investment and uncertainty (Bandara et al., 2024a). At the same time, paddy farmers continue to report complaints about low farm-gate prices, questioning the

sustainability of paddy growing as their main income source, which is triggering farmer unrest. The lack of sustainability in farming affects the conduct of millers (Bandara, et al., 2025). Alam et al., (2022) stated that policy interventions are required to reduce transaction costs for players in the rice markets. The procurement of paddy at the guaranteed price scheme, buffer stock maintenance, releasing such stock during scarcity, and the imposition of maximum retail prices are effective policy tools in reducing transaction costs (Bandara et al., 2024b). However, governmental interventions were not adequately effective (Prasanna, 2018; Wickramasinghe et al., 2016). The reduced capacity and performance issues experienced by SME millers seem to be due to their unawareness of the effect of transaction costs in the rice market (Alam et al., 2022). To fulfil the requirements in the industry, this study was conducted for SME millers operating under reduced capacity. Since the uncertainty and asset specificity are major attributes of TCE (Williamson, 1985), this study examined the moderating effect of uncertainty and asset specificity on the relationship among SCP of Sri Lankan SME rice millers. In addition, this study assessed the mediating effect of conduct on the structure-to-performance relationship.

Literature Review

Structure, Conduct, and Performance Framework

Bourai et al., (2024); Wijesooriya et al., (2021) used the SCP framework to analyse market dynamics by examining the industry relationship among SCP in the rice milling industry. The SCP model assumes a cause-and-effect pattern from market structure to conduct of the firm and then to performance (Porter, 1981). In the agricultural field, there are empirical experiences with mixed evidence on this, whereby conduct is frequently limited by institutional and external shock rigidity. Bain (1951) suggested that the structure of an industry influences conduct and, in turn, its effects on performance. The market structure reflects the characteristics of the industry, such as the number of firms operating in the industry, product differentiations, and entry barriers (Bain, 1951). The conduct of a firm is the behaviour in response to the structure of the market. The conduct includes pricing strategies, decisions on production status, effort on marketing, product innovation, technology improvements, and collaboration (Bain, 1951; Donloa, 2023). The performance refers to the measurements of outcomes such as profitability, innovation, efficiency, financial performance, and consumer welfare (Donloa, 2023; Baker & Sinkula, 2005). In other terms, the performance of a firm is how well an organisation achieves its market-oriented goals and its financial goals (Yamin & Harmelink, 2001; Mavondo, 1998). Accordingly, as the market structure determines conduct and the firm's status of conduct directly affects performance, the following hypotheses were proposed.

H_1: There is a positive effect of market structure on the conduct of SME rice millers
H_2: There is a positive effect of the conduct of SME rice millers on their performance

Effect of Asset Specificity and Uncertainty in Structure, Conduct, and Performance Relationship

SCP popularised from around 1950 to 1970, during which attributes such as uncertainty and asset specificity were not recognised. However, with the popularization of TCE by Williamson

(1985), the effect of the status of asset specificity and the degree of uncertainty in transactions was recognised.

Effect of Asset Specificity in SCP Relationship

The extent of assets dedicated to a transaction has been identified as asset specificity and recognised as a main factor in choosing governance choices (Williamson, 1979, 1985). Firms with high asset specificity face higher transaction costs and tend to adopt respective governance forms (vertical integration, long-term contracts) while moving to appropriate conduct, which affects performance (Geyskens et al., 2006). Thus, asset specificity can moderate the relationship between industry structure and conduct. A higher level of asset specificity is associated with improved integration in the supply chain, which leads to better performance outcomes (Farida et al., 2024). Further, Lanka Jayathilake & Priyanath (2021) stated that a higher level of asset specificity has a positive and direct effect on a firm's performance in relational contracts. Therefore, firms engage in a long-term contract with defined tasks and responsibilities of transaction partners and exclusive agreements to ensure continuous transaction (Joskow, 1985). Conversely, improper management of asset-specific investments caused poor performance because of an increase in transaction costs (Williamson, 1985). Most of the SME millers in Sri Lanka did not adopt an appropriate level of vertical integration in comparison to the large-scale millers, which caused the performance issues (Bandara et al., 2024a). Hence, the following hypotheses are proposed for the rice milling industry in Sri Lanka,

H_3: State of asset specificity moderates the relationship between market structure and the conduct of SME mills.

H_4: State of asset specificity moderates the relationship between the conduct of SME and their performance

Effect of Uncertainty In SCP Relationship

Uncertainty is one of the main attributes in TCE that has significantly created implications for the conduct and performance of firms (Williamson, 1985). Different types of uncertainty are considered in literature, such as environmental uncertainty (Williamson, 1985) and behavioural uncertainty (Anderson & Weitz,1989). Further, Zhang et al. (2023) explained the negative impacts of economic policy uncertainty on firm performance, which proposed stable policies for a sustainable business environment. Bing-Feg et al., (2023) highlighted the requirement of a strategic response mechanism, such as insurance, to respond to unpredictable uncertainties. Sharfaei et al. (2023) showed the adverse impact of market uncertainty and demand uncertainty, which caused a reduction in performance. These uncertainties in the Sri Lankan rice market show structural changes in the milling sector with respect to the unstable policy and market environments, causing opportunities for leading millers to regulate the market (Wijesooriya et al., 2021). Uma et al., (2023) stated that when input costs of paddy are unpredictable, millers change their conduct. In addition, the seasonal and climatic variation caused supply uncertainty in the Sri Lankan rice industry (Bandara et al., 2024a). Further, improper intervention of government, such as ad-hoc guaranteed prices, unplanned import alters the competitive conduct that reduces transparency, fairness, and demand uncertainty (Bandara et al., 2024a). Accordingly, in particular, to the rice milling industry, the following hypotheses are proposed.

H_5: Uncertainty moderates the relationship between market structure and the conduct of SME mills.

H_6: Uncertainty moderates the relationship between the conduct of mills and their performance

Mediation Effect of Conduct on the Structure-Performance Relationship

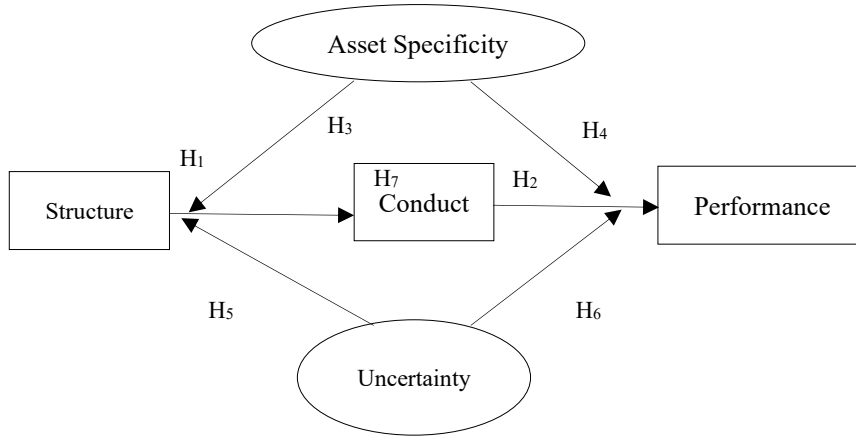
Bain (1951) suggested a linear relationship between market structure and firm conduct, which in turn determines performance. However, Teeratansirikool et al. (2013) and Han et al. (2024) suggested that this relationship is not linear. They stated that conduct acts as a mediating variable and transforms the impact of market structure on performance. In competitive markets, firms may follow different conducts that could succeed in diverse performance (Han et al., 2024). Further, differentiation strategies have significantly mediated the impact on firm performance (Teeratansirikool et al., 2013). Accordingly, the following hypothesis is proposed.

H_7: Firm conduct has a mediation effect between the market structure and performance relationship.

Conceptual Framework

Based on literature, a conceptual framework was developed (Figure 01). Accordingly, market structure influences the conduct of the mill, and then the conduct influences performance.

Figure 01: Conceptual Framework



Similarly, this study assessed the moderating effects of main attributes of TCE (asset specificity and uncertainty) on the relationships between the structure of the market and the conduct of SME mills, and then the conduct of mills to the performance. The independent variable is structure, and performance is the dependent variable, while asset specificity and uncertainty are moderating variables.

Methods

The present study employed a descriptive research method, and the SME millers in the 04 major surplus paddy-producing districts participated. A questionnaire was developed based on the accepted measurement scale and based on the focus group discussion held with the 20 members of the SME Miller Association. As Kerlinger (1986) stated, this study was organized to achieve empirical evidence to investigate the research problem. First, this study examined the effect of market structure on firms' conduct and, in turn, on performance. Secondly, examined the moderation effect of attributes of TCE (asset specificity and uncertainty) among the relationships. Thirdly, the study examined the mediation effect of firm conduct on the relationship between market structure and a firm's performance. Single cross-sectional designs during a single period were used in the data collection of the study. Further, this research adopted a conclusive design of descriptive research based on the present arguments of the focus group discussion held with SME millers. The present study concentrates on the SME rice millers in Sri Lanka, as their market contribution is 57 per cent, as Wijesooriya et al. (2021) stated. The study was designed through a sampling frame based on the commercially operated millers registered in the Paddy Marketing Board (PMB). Forty SME millers from each of the main four paddy-producing districts of Anuradhapura, Ampara, Polonnaruwa, and Kurunegala were randomly selected for this survey. This study was conducted at a 95 per cent confidence level, from 1st July 2024 to 30th September 2024, as the owner of the mill was used as the decision maker. Only 133 SME millers responded out of the 160, and 08 were unusable, with an overall response rate of 82.5 per cent. In multivariate analysis, the PLS-SEM technique was used in social science research to assess the relationships amongst latent variables (constructs) and individual indicators as the most appropriate method (Hair et al., 2013). In regression analysis, PLS-SEM permits the analysis of latent factors (Segars & Grover, 1993). Further, assessing and modifying the theoretical model can also be assessed (Karahanna & Straub, 1999). Hence, the PLS-SEM technique was employed in this study to assess the moderating effect of asset specificity and uncertainty on the relationships between the structure of the market and the conduct of the firm, and then from the conduct of the firm to its performance. Further, the mediation effect of the firm's conduct on the relationship between market structure and performance was assessed. The demographic data analysis was conducted through SPSS. Among the usable respondent mill owners, 124 were males, and one was female. Among them, 82 (66.1%) respondents completed education up to an advanced level, and 2 (1.6%) were graduates. Thirty-six (29%) had achieved up to ordinary level, and four (3.2%) were diplomats. Mainly two sections comprised in the questionnaire. First part on the key variables such as the market structure, Mills conduct, performance, asset specificity, and uncertainty. The second part was on demographic data. Three constructs were used to represent the market structure, five constructs to conduct the behaviour of firms, and four constructs on performance based on the literature on Bain (1951); Donloa (2023). As the first moderating variable, five factors for asset specificity were used. As a second moderating variable, five factors of uncertainty were used. The questions in the questionnaire were developed to be answered on a five-point Likert scale that ranges from "1= strongly disagree" to "5= strongly agree".

Table 01: Operationalization

Variable	Conceptual Definition	Dimensions	Indicators (Operational Measures)	References
Structure	Market characteristics that shape competition, including concentration, entry barriers, and differentiation.	Market concentration; Entry barriers; Product differentiation	CR4/HHI; Number of competitors; Entry/exit costs; Degree of differentiation	Bain (1956); Church & Ware (2000)
Conduct	Firm behavior and strategic actions in response to market structure.	Pricing strategy; Competitive behavior; Innovation; Cooperation	Pricing methods; Advertising intensity; R&D investment; Strategic alliances	Church & Ware (2000)
Performance	Outcomes of firm conduct in terms of profitability and efficiency.	Profitability; Efficiency; Market share; Customer satisfaction	Cost efficiency; Market share; Satisfaction index	De Figueirêdo Junior et al. (2014)
Asset Specificity	Degree to which assets are specialized and not easily redeployed.	Physical; Human; Site specificity	Specialized equipment; Training intensity; Custom processes; Switching cost	Williamson (1985); Anderson & Coughlan (1987)
Uncertainty	Level of unpredictability in the business environment affecting decisions.	Environmental; Behavioral uncertainty	Demand volatility; Supplier reliability; Technological change; Information asymmetry	Williamson (1985)

Results

Smart PLS 4.0 software was used to analyse the data. First, the measurement model was tested for convergent validity to ensure that the indicators on a construct converge to find a meeting point. Thereafter, the discriminant validity ensures that the constructs differ. Finally, the model testing was conducted, followed by bootstrapping to assess the moderating effect and the mediation effect.

Reliability and Validity of Construct

The above 0.7 Cronbach's alpha and 0.5 average variance extracted (AVE) ensured the convergent validity based on the criteria introduced by Hair et al., (2017) (Table 2). In this study mainly assumed that in the measurement model, the observed variables were generated with the residual and as a linear function of the latent variable.

Table 02: Convergent Validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Asset specificity	0.71	0.746	0.791	0.564
Conduct	0.780	0.792	0.871	0.694
Performance	0.7	0.700	0.833	0.625
Structure	0.7	0.807	0.859	0.754
Uncertainty	0.892	0.915	0.920	0.698

The results of the HTMT (Heterotrait–Monotrait Ratio) (Table 3) ensured discriminant validity, as all values are below the recommended threshold of 0.85.

Table 03: Heterotrait–Monotrait Ratio

	Asset specificity	Conduct	Performance	Structure	Uncertainty	Uncertainty x Structure	Uncertainty x Conduct	Asset specificity x Structure	Asset specificity x Conduct
Asset specificity									
Conduct	0.726								
Performance	0.764	0.592							
Structure	0.566	0.849	0.435						
Uncertainty	0.689	0.613	0.553	0.710					
Uncertainty x Structure	0.462	0.338	0.244	0.652	0.530				
Uncertainty x Conduct	0.533	0.523	0.598	0.369	0.481	0.605			
Asset specificity x Structure	0.695	0.385	0.350	0.494	0.463	0.713	0.595		
Asset specificity x Conduct	0.642	0.455	0.402	0.317	0.483	0.432	0.728	0.679	

The Forenell & Larcker (1981) criterion values (Table 4) were within the acceptable limits that ensured the discriminant validity further, which means the constructs in the study were distinct from each other.

Table 04: Fornell-Larcker Criterion

	Asset specificity	Conduct	Performance	Structure	Uncertainty
Asset specificity	0.681				
Conduct	0.555	0.833			
Performance	0.562	0.440	0.790		
Structure	0.471	0.678	0.322	0.869	
Uncertainty	0.609	0.537	0.461	0.598	0.835

In case of ensuring the reliability, the standardise factor loading, t-value, composite reliability, and AVE (Table 5), provide evidence of robustness of measures. The above 0.7 factor loading of latent variables ensured the statistical significance and acceptability of the indicator variables of a respective construct.

Table 05: Confirmatory Factor Analysis

Construct of Indicators	Standardize Factor Loading/ (t- Value)	Composite reliability / (AVE)
Market structure		0.807 / (0.754)
I experienced high competition from Rival Agencies	0.801 / (14.278)	
I feel large-scale millers exploit the market based on their higher market share	0.931 / (103.565)	
Conduct of millers		0.792 / (0.694)
I supply rice continuously to the market	0.871 / (30.842)	
I frequently introduce a new product	0.784 / (187.434)	
I set the price based on the competitor's price	0.842 / (25.948)	
Performance		0.700 / (0.625)
My rice processing business is profitable	0.796 / (13.685)	
I utilise resources efficiently	0.772 / (10.154)	
I earn a profit in comparison to the working capital	0.802 / (14.169)	
Asset Specificity		0.746 / (0.564)
It would be costly to switch to a new business partner due to our current investments	0.841 / (23.142)	
Our machinery and equipment are tailored for specific processing tasks that cannot be easily used for other purposes	0.779 / (12.298)	

The skills and knowledge developed by our staff are specific to our operations and hard to transfer	0.881 / (12.582)	
Uncertainty		0.915 / (0.698)
Changes in customer preferences are unpredictable	0.851 / (18.276)	
Competitor actions in this market are difficult to forecast	0.857 / (29.409)	
It is difficult to measure performance outcomes	0.925/ (51.275)	
Technology in our industry changes rapidly	0.794 / (23.209)	
We frequently need to adapt to new technical standards	0.737 / (11.757)	

Moderation Effect

The results of the model test indicated that without including the moderator variable, the R-squared value for the performance was 0.230, which explained that the conduct of mills accounts for a 23.0 percent variance in the dependent variable (performance). With the inclusion of the moderation variables (Asset Specificity and Uncertainty), the R-squared value of performance increased up to 0.42, demonstrating an increase of 19 per cent in the variance explained in the dependent variable due to the moderating variables. Table 6 provides the model goodness-of-fit statistics.

Table 06: Results of the Model fit

	Saturated model	Estimated model
SRMR	0.123	0.122
d_ULS	2.575	2.562
d_G	2.325	2.325
Chi-square	1142.457	1139.378
NFI	0.458	0.459

The estimation of the relationships between variables was employed using bootstrapping methods. The results (Figure 2) revealed a significant positive effect of market structure on the conduct of mills ($\beta = 0.594$, $t=6.907$, $p < 0.000$), supporting hypothesis H_1, which demonstrated that the market structure had a significant effect on the conduct of firms. Further, study results revealed a positive relationship between the conduct of mills and the performance ($\beta = 0.201$, $t=2.13$, $p < 0.034$), supporting hypothesis H_2, which demonstrated that the conduct had a statistically significant effect on the performance of SME rice mills.

The study result suggested an insignificant moderating effect of asset specificity in the relationship from market structure to the conduct of mills ($\beta = 0.073$, $t=0.608$, $p < 0.543$), rejecting hypothesis H_3. Similarly, the results confirmed an insignificant moderating effect of asset specificity in the relationship between the conduct of mills and the performance ($\beta = 0.208$,

t=1.461, p < 0.144), rejecting the hypothesis H_4. In case of the moderating effect of uncertainty, the results of the study (Figure 02) confirmed an insignificant moderating effect of uncertainty in the relationship between the market structure and the conduct (β = 0.138, t=1.130, p < 0.259), rejecting hypothesis H_5. However, the results confirmed a significant negative moderating effect of uncertainty in the relationship between the mills' conduct ánd their performance (β = -0.387, t=3.010, p < 0.003), accepting the hypothesis H_6.

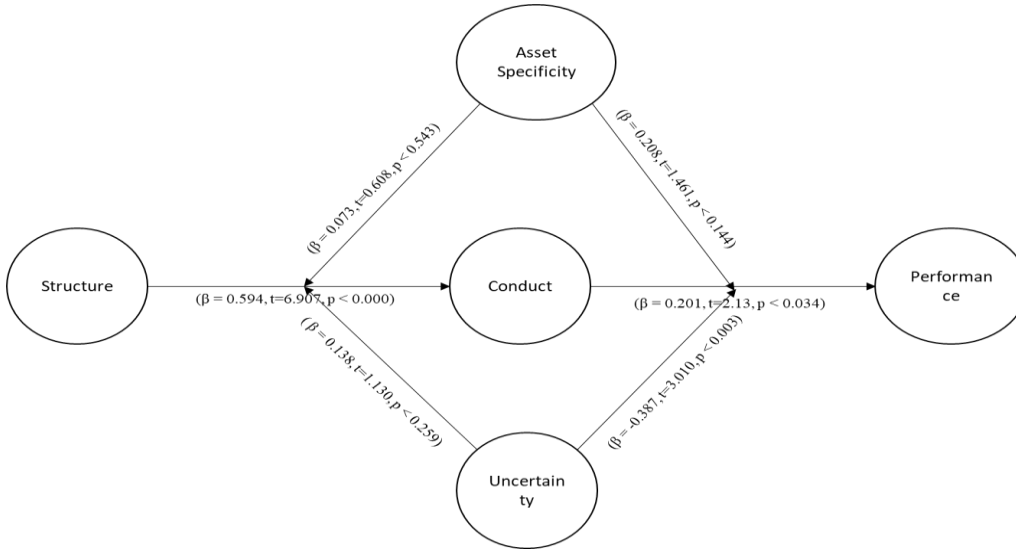


Figure 02: Results (bootstrapping) of the Model Testing

The slope analysis (Figure 3) also presented the moderating effect of uncertainty in the relationship between conduct and performance. In an environment with a lower level of uncertainty (-1SD of uncertainty / red line), the impact of conduct on performance was positive, which means the improved conduct resulted in improved performance, fostering effective outcomes. However, when the uncertainty becomes high (+1 SD of uncertainty / green line), the impact was negative, which demonstrated that the improvement of conduct leads to negative performance. Hence, the study suggested that a higher level of uncertainty weakened the impact of conduct on the performance of SME rice millers in Sri Lanka. In the case of average uncertainty (blue line), the study results suggested a small positive relationship between conduct and performance. At the mean level of conduct, a crossing-over interaction effect was observed, which indicated an unstable relationship between conduct and performance that depends heavily on the level of uncertainty.

Mediating Effect

The results revealed that the total effect of market structure on performance was statistically significant (β=0.558, t=7.832, p=0.000), indicating that structure had a strong influence on performance. The direct effect was statistically significant (β=0.457, t=3.318, p=0.001), suggesting that structure affects performance even with the presence of a mediating variable

(conduct). However, the results confirmed an insignificant indirect effect (β=0.101, t=0.983, p=0.326), suggesting that conduct did not significantly mediate the relationship between market structure and their performance. The 18 percent VAF also supported that there was no mediation. It means that most of the effect of structure on performance was direct and not mediated by conduct. According to Hair et al. (2021), VAF values can be interpreted as: < 20% = No mediation, 20%–80% = Partial mediator, 80% = Full mediation.

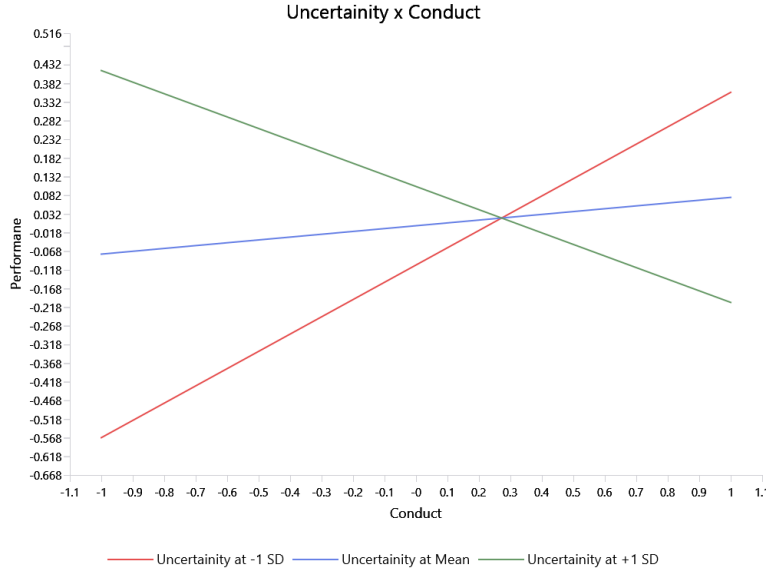


Figure 03: The Moderation Effect of Uncertainty in the relationship between the conduct of mills and performance

Accordingly, the results suggested that structure had a significant and direct impact on performance, and while there was a minor indirect effect through conduct, that was not statistically significant. Therefore, the hypothesis H_7 was not supported, which means the conduct of SME millers did not act as a significant mediator in the relationship between market structure and their performance.

Discussion

The results of this study confirmed the validity and reliability of the construct, suggesting that the selected latent variables explained the variance of the indicators. The Fornell-Larcker criterion and the HTMT value within the acceptable range confirmed discriminant validity that ensured constructs were distinct and the suitability of the measurement model. Further, the standardized factor loading, AVE, t-value, and composite reliability provide evidence of the robustness of the measures studied and ensured that indicator variables of a respective construct were statistically significant.

The results revealed a significant relationship between the structure of the market and the mills' conduct, supporting hypothesis H1, which means the existing market structure had a strong effect on the conduct of SME rice mills. Further, results revealed a significant and positive relationship between conduct and their performance, supporting the hypothesis H2. Hence, the study complied with the SCP framework as suggested by Bain (1951).

The results of the study suggested an insignificant moderating effect of asset specificity on the relationship between the market structure and the conduct of SME rice mills, rejecting hypothesis H3. Similarly, the study results suggested an insignificant moderating effect of the relationship between conduct and their performance, rejecting the hypothesis H4. The advances in modular design, standardization process, and coordination through digital platforms in the existing rice milling industry might be the reasons for this insignificant moderating effect of asset specificity on the relationship between structure, conduct, and performance, as Joshi & Stump (1999) also stated. Further, as Valentinov & Roth (2024) said, with strong relational norms or contractual safeguards, the asset specificity might not change the SCP links.

These results confirmed an insignificant moderating effect of uncertainty on the relationship between the market structure and the conduct of mills, rejecting hypothesis H5. However, the results confirmed a significant negative moderating effect of uncertainty on the relationship between the conduct of mills and performance ($\beta = -0.387$, $t=3.010$, $p < 0.003$), supporting H6. The results of the slope analysis explained that, when uncertainty (-1 SD) was at low levels, conduct has a strong positive impact on performance, indicating enhanced outcomes in relatively stable environments. The effect of conduct on performance remains slightly positive at the mean level of uncertainty, which suggests moderate uncertainty does not entirely interrupt the benefits of effective conduct. However, the relationship reversed at high levels of uncertainty (+1 SD), which negatively affected performance. These findings were aligned with statements of Li et al. (2023) Zhang et al., (2023), who stated that uncertainty changes the effectiveness of firm conduct. Additionally, when uncertainty was high, excessive formalization or rigid structures could reduce the responsiveness of the conduct that harms performance (Mao, Liu, & Zhang, 2021). Thus, in uncertain environments, the managers of the rice milling industry should adopt flexible conduct strategies to sustain their performance.

The findings of the mediation analysis indicated that the relationship between structure and performance had no mediating effect of conduct. This means that there was no major change or the displacement of the impact of strategic and behavioral involvements (conduct) of SME millers on the performance under an existing structural market environment. As the Variance Accounted For (VAF) was equal to 18%, this also proved that most explanatory variables could be attributed to the direct structure-performance relationships (Hair et al., 2021). Zakova & Trankova (2025) stated that in food processing industries, the profitability (Performance) was explained by technical efficiency and the costs, but not by the strategic conduct. Bandara et al., (2024a); Guenette, J.D. (2020) explained that Sri Lankan rice markets have been shaped due to direct procurement of paddy by the Paddy Marketing Board (PMB) in minimum support prices as well as by maintaining buffer stock. Under these circumstances, the conduct of particular firms' pricing strategies had limited room to transmit market structure into the performance of the firm, which weakened the SCP pathway.

The conventional assumptions of Transaction Cost Economics (TCE) might not be applicable altogether, such as in the increasingly modular industry, digital coordination, and standardization processes in the rice milling industry, as the minor moderating effect of asset specificity is observed. This indicates recent studies, such as relational governance, contractual protections, or technology, weaken the effect of asset specificity on firm conduct (Valentinov & Roth, 2024; Joshi & Stump, 1999). Therefore, the findings enhanced the SCP model by demonstrating that asset specificity did not always serve as a boundary condition. Second, the uncertainty moderated a significant and negative relationship between conduct and performance.

Although SCP presumed that conduct tends to improve performance, this research study confirmed that a high level of uncertainty had a negative effect in line with the contingency theory and recent research that had shown that uncertainty contradicts the capacity of firms to translate strategic conduct into high performance (Li et al., 2023; Zhang et al., 2023). This observation highlighted why environmental uncertainty was an important moderating factor to be incorporated into SCP-based models.

The findings indicated that asset-specific investment will not always make them competitive or alter the impact of market forces. Hence, managers should work towards developing adaptive strategies to face uncertainty, such as flexible pricing, product diversification, and joint supply chain arrangements. They must also be aware that structural interventions such as maintaining buffer stocks, ceiling prices, and direct procurement by the Paddy Marketing Board are direct determinants of firm performance. The promotion of adaptive and technology-based approaches in SMEs in these settings can assist in maintaining competitiveness and survival.

Conclusion

This paper has tested the SCP framework using moderating variables that are based on TCE to explain SME rice millers' performance in Sri Lanka. The findings justified the direct influence of structure on conduct and, in turn, on performance in confirmation of the fundamental assumptions of the SCP paradigm. The moderating effect of asset specificity, however, was not present. In its turn, uncertainty proved to be a major negative moderator of the conduct-to-performance relationship. It demonstrated that the positive influence of firm conduct can be undermined by uncertainty. Further, study results revealed that conduct did not have any intervening effect on the structure-performance association. This implies that the structure of the rice milling industry in Sri Lanka has a greater direct impact on the performance of firms than strategic conduct.

This research made contributions to theory in terms of narrowing down the boundary conditions of the SCP and TCE link and practice by focusing on adaptive conduct strategies in the face of uncertainty. The results demonstrated the role of structural regulation in balancing the outcomes of the industry that should be considered in future policy measures. And also, the findings emphasised the flexibility and resilience of conduct strategies as opposed to asset specificity investment, where managers must consider.

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