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Procurement Competition and Cordination in Perishable Supply Chains: A Game-Theoretic Literature Review

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Abstract

Procurement in perishable supply chains involves securing access to products while preserving their usefulness before deterioration limits utilization. This article examines how competition and coordination influence procurement decisions from a game-theoretic perspective. It adopts a narrative literature review with thematic analysis of selected research identified through Google Scholar and examined using accessible source materials. The synthesis distinguishes buyer-side procurement competition from supplier rivalry, downstream sales competition, and vertical coordination. Five themes organize the analysis: forms and drivers of procurement competition; perishability and information; sourcing and contractual responses; outcomes and distributional trade-offs; and boundary conditions and strength of evidence. The synthesis suggests that scarcity alone does not explain strategic procurement responses. Allocation rules, information ownership, sourcing alternatives, and commitment timing shape incentives, while deterioration, delivery conditions, and preservation costs influence the value retained from acquired quantities. The distinction between nominal and usable supply connects acquisition with product utilization. Contractual coordination can address particular incentive problems without necessarily resolving competition among buyers, and improvements in individual profit do not automatically increase total supply chain surplus or reduce waste. The review contributes a conceptual framework linking procurement conditions, strategic mechanisms, and outcomes. Its implications support evaluating purchasing arrangements through expected usable output, delivery reliability, and risk allocation. Conclusions remain conditional on selective coverage, uneven source access, and heterogeneous research settings. Future research should connect allocation decisions, ordering behavior, delivered freshness, and contractual risk sharing within observed procurement relationships.

Keywords: *procurement competition; perishable supply chains; game theory; supply chain coordination; narrative literature review.*

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INTRODUCTION

Procurement in perishable supply chains is a race to secure value before that value deteriorates. A favorable purchase price offers little advantage if products arrive with insufficient remaining shelf life or cannot be sold before their quality declines. Buyers must therefore balance acquisition costs against delivery timing, preservation requirements, and expected sales opportunities. Lin & Januardi (2023) examine pricing alongside quality-keeping and waste reduction efforts, while Dey et al. (2026) incorporate deterioration and digital technology into a three-tier pricing framework. These studies connect product condition with economic performance, providing a foundation for examining how competitive acquisition and coordination arrangements influence the value retained across the chain.

For this review, procurement competition refers to strategic interdependence among buyers whose sourcing, ordering, bidding, or contracting decisions influence one another's access to supply or purchasing terms. It differs from competition among suppliers for a purchasing account and from retail rivalry for consumer demand. Procurement coordination, meanwhile, concerns arrangements that align decisions through contracts, information sharing, allocation rules, or shared incentives. Competition and coordination can coexist buyers may compete for supply while coordinating preservation or delivery with their suppliers. Understanding this relationship requires identifying the participants, the contested resource, and the decisions through which their interests become connected.

Game theory is well suited to these questions because the attractiveness of a procurement decision depends on other participants' responses. Nevertheless, a model's strategic structure determines which conclusions can be transferred across settings. Dasci & Guler (2019) examine a single buyer procuring from two competing capacitated suppliers. Calvo & Martínez-de-Albéniz (2016) show that the benefits of dual sourcing for short-life-cycle goods depend on suppliers' price-commitment timing. These studies illuminate capacity, flexibility, and endogenous pricing, but supplier rivalry does not itself establish competition among buyers. Likewise, a short commercial life does not necessarily involve physical deterioration. Their relevance lies in mechanisms whose applicability requires explicit examination.

Buyer-side interactions become particularly visible when procurement depends on allocation rules and information advantages. Huang et al. (2023) show that competing retailers facing uncertain supplier capacity may inflate orders to protect themselves against shortages, while contractual coordination can moderate this distortion. In an agricultural setting, Zhao et al. (2027) examine information sharing and procurement involving a farmer cooperative and two competing retailers. Their results connect sourcing costs and information precision with ordering and profit allocation. These contributions establish relevant procurement mechanisms, although uncertain yield and agricultural production do not independently establish physical perishability. Their implications must retain the distinction between upstream allocation and competition transmitted through downstream demand.

Perishability adds a further consideration: securing greater quantities does not necessarily secure greater economic value. Here, physical perishability means deterioration, freshness loss, spoilage, or expiration, rather than technological obsolescence. Chintapalli & Hazra (2016) examine competitive stocking and quality decisions for deteriorating products, while Januardi et al. (2024) investigate contracting under asymmetric freshness information. Together, they motivate distinguishing nominal supply, meaning quantities acquired, from usable supply, meaning products available in a condition and time window suitable for utilization. This distinction serves as an analytical lens for the review, directing attention to whether procurement arrangements preserve value as well as secure access.

Existing reviews provide foundations for positioning this discussion. Ziari et al. (2022) review competitive pricing models across supply chain management, while Wu et al. (2025) examine game-theoretic sustainable supply chains under asymmetric information. The latter identify simplified model structures and limited empirical validation within their selected literature. These observations encourage attention to assumptions and evidence, but do not establish identical limitations throughout perishable procurement research. The present review takes a narrower explanatory perspective, connecting competition and coordination with the acquisition and preservation of usable value. Its purpose is to interpret relationships across selected contributions, without claiming exhaustive coverage or an unexamined absence of earlier synthesis.

Three connected analytical needs guide this inquiry. The first concerns conceptual clarity. Grouping procurement-related studies without distinguishing buyer rivalry, supplier competition, and vertical coordination can obscure the mechanism behind a reported outcome. The second concerns integration: perishability, scarcity, information, and commitment need to be considered together when interpreting sourcing and contractual decisions. An arrangement that improves access may impose preservation costs, while better information may improve matching yet redistribute bargaining advantages. The review therefore compares how these conditions interact within the selected literature, distinguishing findings established by individual studies from conceptual extensions proposed through the synthesis.

The third need concerns boundary conditions and evidential support. A sourcing arrangement that improves performance under one allocation rule may operate differently when capacity, information ownership, or decision timing changes. Similarly, an equilibrium derived for a single transaction may provide limited guidance for repeated trading relationships. Analytical derivations, numerical illustrations, experiments, and field observations support different inferences and should be interpreted accordingly. Outcome measures also require separation: lower purchasing costs, higher buyer profit, greater total surplus, and reduced waste are not interchangeable. Retaining these distinctions helps explain apparent disagreements without if every difference between studies constitutes a substantive contradiction.

The synthesis draws on studies that address different components of the procurement problem. Buyer-interaction studies inform allocation and sourcing incentives, while research on physically deteriorating products informs freshness, preservation, and utilization. Supplier competition and channel coordination provide further comparisons concerning commitment and governance. These contributions are connected at the level of mechanisms, without if every study jointly models buyer procurement rivalry and physical deterioration.

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The review develops a conceptual synthesis linking procurement conditions, strategic mechanisms, and outcomes. Its contribution lies in clarifying competitive structures, using nominal and usable supply to connect acquisition with value preservation, and explaining why sourcing and coordination outcomes depend on specific conditions. Rather than presenting a new equilibrium or an empirically tested causal framework, it organizes existing explanations into a basis for comparison and further investigation. For managers, this perspective supports evaluating purchasing terms alongside delivery reliability, product condition, and risk allocation. For researchers, it identifies propositions requiring direct examination and clarifies the limits of transferring findings between procurement settings.

METHODOLOGY

Review Design and Analytical Scope

This article uses a narrative literature review with thematic analysis to examine procurement competition and coordination in perishable supply chains. The approach supports comparison across research settings and the development of conceptual explanations, rather than exhaustive publication mapping or statistical effect estimation. Its methodological orientation draws on guidance concerning the alignment of review purposes, source selection, and interpretation (Snyder, 2019; Sukhera, 2022) .

The analysis addresses how competition and coordination are conceptualized; how scarcity, perishability, information, and sourcing influence strategic incentives; when contracts generate benefits or distributional trade-offs; and which assumptions and evidence qualify these explanations. Procurement competition means interdependence among buyers whose acquisition decisions affect one another's supply access or purchasing terms. Supplier competition, downstream rivalry, and vertical coordination remain distinct analytical settings. Physical perishability concerns deterioration, freshness loss, spoilage, or expiration, rather than commercial obsolescence. The resulting framework is a conceptual synthesis, not an empirically tested model.

Literature Sources and Identification

Google Scholar was used to locate literature connecting game theory, perishable products, procurement, and supply chains. Documented query examples include "game theory" "perishable" "supply chain", "game theory" "perishable" "procurement", "game theoretic" "perishable" "sourcing", and "competing buyers" "perishable". These examples describe searches supported by the available records, rather than a complete, reproducible search strategy. Google Scholar served as a discovery platform; its results were not treated as Scopus search results or searches restricted to titles, abstracts, and keywords.

Publisher websites and institutional repositories were consulted to verify bibliographic information and seek accessible article versions. Google Scholar's estimated result totals were not used as counts of collected or assessed publications. The available documentation does not establish a complete search chronology or a consistently applied publication-year window, so neither is reconstructed retrospectively. These limits qualify coverage and reproducibility, consistent with the search-system concerns examined by Gusenbauer & Haddaway (2020) .

Relevance Assessment and Use of Sources

Sources are considered according to their contribution to the review questions. Relevant connections include strategic procurement decisions, sourcing alternatives, allocation mechanisms, contractual incentives, information asymmetry, and the preservation of product value. Game-theoretic relevance concerns identifiable players, interdependent choices, and associated outcomes. These considerations explain the use of sources within the narrative discussion; they do not constitute a retrospectively imposed formal eligibility protocol.

The author initially used Q1 and Q2 labels displayed through Rapid Journal Quality Check to assist source selection. This influenced the literature considered, but the displayed labels were not independently verified across all sources and are not treated as guarantees of article quality. Within the manuscript, research directly addressing buyer procurement interactions is distinguished from related sourcing and coordination studies, theoretical and methodological references, and previous reviews.

Access varied across publications. Interpretation therefore depends on the material available for examination. Abstract-based information supports only claims explicitly reported there, while detailed statements about assumptions or mechanisms require accessible supporting text. Bibliography totals and articles appearing in comparison tables are not presented as verified selection counts.

Comparative Reading and Thematic Synthesis

The thematic comparison focuses on players and competitive structures, procurement and coordination decisions, information ownership, decision timing, perishability representations, reported outcomes, and explanatory limits. The comparison tables organize selected studies by their aims, approaches, and findings. They support interpretation without implying that every source addresses an identical procurement problem or received an equivalent full-text assessment.

The thematic synthesis is organized around five themes: forms and drivers of procurement competition; perishability and information in strategic procurement; sourcing and contractual responses to procurement competition; procurement outcomes and distributional trade-offs; and boundary conditions and strength of evidence. These themes provide a structure for comparing the selected literature rather than categories established through formal inductive coding. The analysis distinguishes source-reported findings, comparisons between studies, and propositions developed through the review.

Nominal supply and usable supply provide a connecting analytical lens. Nominal supply concerns quantities acquired, whereas usable supply concerns products whose condition and remaining life permit their intended utilization. This distinction is not a validated measurement instrument or a uniformly reported variable. Comparisons retain the relevant actor, performance measure, benchmark, and model conditions. Profit, margin, fairness utility, total supply chain surplus, and waste reduction remain separate outcomes. Differences between studies are interpreted through their strategic assumptions before being described as contradictions.

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Interpretive Limitations

The review reflects a selected literature base shaped by Google Scholar discovery, initial journal-label preferences, and uneven access to full texts. Relevant research may consequently be absent, and unavailable details restrict some interpretations. Narrative synthesis also involves interpretive judgment, making the clarity of scope and source use important (Sukhera, 2022) .

Differences in game structures, information assumptions, timing, and outcome measures limit direct comparability. Related studies illuminate components of procurement problems without independently demonstrating competition among buyers of physically perishable goods. Accordingly, the synthesis supports conceptual understanding and conditional propositions. It does not establish causal effects, empirical generalizability, or the prevalence of particular characteristics across the entire research field.

RESULTS AND DISCUSSION

The following synthesis compares how selected studies explain procurement decisions, coordination arrangements, and the preservation of value in perishable supply chains. The discussion distinguishes findings established within individual studies from interpretations developed through comparison. Research on buyer-side procurement interactions is considered alongside related work on supplier competition, channel rivalry, and vertical coordination, with these differences retained when assessing transferability. Across the five themes, the central analytical connection concerns how procurement conditions shape strategic incentives and how those incentives affect access, usable supply, and the distribution of returns.

Forms and Drivers of Procurement Competition

Procurement competition concerns the strategic consequences of acquisition decisions, rather than simply the presence of several firms purchasing products. An acquisition decision becomes competitively significant when it affects another participant's access, purchasing terms, or sourcing incentives. Table 1 compares explanations involving allocation, information, disruption timing, supplier responses, and channel structure. These mechanisms help distinguish procurement rivalry from operational purchasing requirements.

Table 1. Selected studies informing the forms and drivers of procurement competition.

Authors	Title	Aim	Methodology	Findings
Zhao et al. (2027)	*Information sharing and procurement strategies in agricultural supply chains under retailer competition*	Examine how sourcing choices and demand-information sharing interact under retailer competition	Game-theoretic model of a cooperative and two heterogeneous retailers.	Sourcing costs and signal precision condition procurement and disclosure decisions.
Huang et al. (2023)	*Capacity coordination under uncertain yield for supply chains with a single supplier and two competing retailers*	Examine allocation under uncertain capacity.	Game-theoretic allocation model involving a supplier, a long-term retailer, and a newly cooperating retailer	Shortage concerns encourage inflated orders; coordination moderates distortion.
Gupta et al. (2015)	*Contingent sourcing under supply disruption and competition*	Compare contingent and single sourcing under disruption.	Analytical model and numerical computations involving competing manufacturers.	Disruption timing and procurement timing jointly influence purchasing decisions.
Yang et al. (2018)	*Multichannel distribution strategy: Selling to a competing buyer with limited supplier capacity*	Examine capacity-constrained distribution and strategic purchasing.	Analytical comparison of supplier-only, direct-selling, and dual-channel structures.	A buyer may purchase all available capacity and strategically withhold supply.
Dasci & Guler (2019)	*Dynamic strategic procurement from capacitated suppliers*	Compare procurement process designs.	Noncooperative games involving one buyer and two suppliers.	Procurement design and supplier capacities affect costs and profits.
Chintapalli & Hazra (2016)	*Stocking and quality decisions for deteriorating perishable products under competition*	Examine competitive stocking and quality maintenance.	Two-period Cournot duopoly model.	Quality-maintenance costs influence inventory and quality decisions.

Huang et al. (2023) identify an allocation mechanism involving a supplier, a long-term cooperating retailer, and a newly cooperating retailer. Uncertain capacity and retailer competition create incentives to order beyond actual requirements as protection against shortages. Their contractual allocation approach addresses this distortion, with the reported coordination results including more truthful ordering by the long-term retailer. The comparison shows why procurement quantities should be interpreted alongside allocation rules and relationship structure. It does not establish that larger orders necessarily represent greater operational demand or that the same response occurs under physical deterioration.

Information and sourcing alternatives connect procurement decisions through different strategic channels. Zhao et al. (2027) examine sourcing and demand-information sharing among competing retailers, whereas Gupta et al. (2015) compare contingent and single sourcing for manufacturers exposed to supply disruption. The former links procurement choices with information and downstream competition; the latter shows how

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disruption and purchasing timing affect sourcing decisions. These studies inform the strategic value of acquisition alternatives, but their procurement links do not by themselves establish rationing competition for physically deteriorating supply.

Structural differences also explain why similar purchasing actions can serve different purposes. Yang et al. (2018) examine withholding in supplier–buyer channel competition, whereas Dasci & Guler (2019) examine suppliers competing for one buyer. The former concerns control over downstream availability; the latter concerns procurement process design. Neither establishes repeated purchase-price escalation among independent buyers. Chintapalli & Hazra (2016) , meanwhile, connect competitive stocking with product quality, bringing physical condition into an acquisition-related decision without independently establishing upstream bidding rivalry.

The thematic insight is that scarcity, allocation protection, sourcing adaptation, and strategic control are distinct drivers. Their interpretation requires identifying the contested resource and the response available to other participants. For perishable procurement, an additional question follows whether the action secures quantities that remain usable. This connection introduces the role of product condition and information examined next.

Perishability and Information in Strategic Procurement

Perishability and information influence procurement through related but different pathways. Deterioration changes the condition and usefulness of products, while information affects how participants assess quality, anticipate demand, and respond strategically. Table 2 distinguishes freshness disclosure, demand forecasting, preservation, pricing, and digital adoption. Their comparison shows why better information and better product condition cannot be treated as interchangeable improvements.

Table 2. Selected studies on perishability and information relevant to procurement.

Authors	Title	Aim	Methodology	Findings
Januardi et al. (2024)	*Perishable food supply chain contract with asymmetric freshness information*	Examine contracting when suppliers hold private freshness information.	Principal–agent optimization incorporating quality deterioration.	Contract design influences disclosure incentives and supplier returns.
Lin & Januardi (2023)	*Two-stage pricing of perishable food supply chain with quality-keeping and waste reduction efforts*	Compare pricing arrangements incorporating quality maintenance and waste.	Vertical Nash and Stackelberg games with alternative pricing stages.	Two-stage pricing improves both players' payoffs and lowers waste relative to single-stage pricing.
Zhao et al. (2027)	*Information sharing and procurement strategies in agricultural supply chains under retailer competition*	Examine demand information and procurement choices.	Cooperative–retailer game with asymmetric information access.	Disclosure and purchasing decisions depend on cost and information conditions.
Huo et al. (2026)	*Channel encroachment and information sharing strategy: A game-theoretic equilibrium analysis of fresh agricultural product supply chain*	Examine channel choice, forecast disclosure, and preservation.	Two-echelon game solved by backward induction, with alternative timing and competition structures.	Information-sharing incentives vary with channel arrangements and competition form.
Dey et al. (2026)	*Digital technology based game-theoretic pricing strategies in a three-tier perishable food supply chain*	Examine digital adoption and perishable-food pricing.	Centralized, decentralized, and contractual models, including Stackelberg leadership.	Deterioration and technology costs affect modeled profitability.

Januardi et al. (2024) address uncertainty about product condition, whereas Zhao et al. (2027) address the precision and sharing of demand signals. The distinction matters because a reliable forecast does not reveal the freshness of delivered products, and truthful freshness reporting does not resolve uncertain demand. Information interventions must therefore be interpreted through their object, holder, recipient, and associated decisions.

The comparison also separates information availability from disclosure incentives. A participant may benefit from accurate information while remaining unwilling to share its own knowledge. Huo et al. (2026) illustrate this dependence on the strategic relationship, showing that information sharing changes with channel configuration and competition form. The implication for this review is interpretive: technical visibility does not itself establish that information will be disclosed or used in ways that benefit every participant.

Preservation and pricing concern a different route to value retention. Lin & Januardi (2023) connect pricing stages with quality-keeping and waste outcomes. Dey et al. (2026) incorporate digital investment into a pricing framework where freshness and adoption costs matter. These studies support examining decisions beyond initial acquisition, but their results do not establish that digital technologies eliminate information asymmetry, or that rival buyers would choose the same arrangements.

Nominal supply and usable supply connect these findings. Nominal supply records acquisition quantity; usable supply concerns the condition and remaining utilization opportunity of that quantity. This lens distinguishes obtaining products from maintaining their

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commercial usefulness. It does not imply that every source measure usable supply or demonstrates a change in competitive equilibrium.

The thematic insight is that physical condition, knowledge, and disclosure incentives require separate treatment. Their interaction helps explain why information or preservation arrangements can improve one dimension of performance without resolving others. This distinction leads to the next question: which sourcing and contractual responses address access, incentives, and utilization?

Sourcing and Contractual Responses to Procurement Competition

Sourcing determines which acquisition alternatives are available, whereas contracts shape the obligations and incentives governing their use. Their effects depend on availability, commitment, information, and the allocation of costs and returns. Table 3 compares these responses without if additional suppliers or stronger bilateral coordination necessarily resolve competition across buyers.

Table 3. Selected studies on sourcing and contractual mechanisms relevant to procurement competition.

Authors	Title	Aim	Methodology	Findings
Gupta et al. (2015)	*Contingent sourcing under supply disruption and competition*	Examine alternative sourcing under disruption.	Analytical and numerical comparison of competing firms' sourcing arrangements.	Purchasing outcomes depend on the timing of disruption and procurement.
Calvo & Martínez-de-Albéniz (2016)	*Sourcing strategies and supplier incentives for short-life-cycle goods*	Examine flexibility with strategic supplier pricing.	Equilibrium comparison of sourcing and price-commitment arrangements.	Up-front supplier pricing can offset dual-sourcing benefits.
Shi et al. (2023)	*Blockchain adoption or contingent sourcing? Advancing food supply chain resilience in the post-pandemic era*	Compare food-safety-related sourcing and technology responses.	Game-theoretic analysis of sourcing and blockchain alternatives.	Strategy attractiveness depends on risk and cost conditions.
Li et al. (2023) .	*Profit-sharing contract of the fresh agricultural products supply chain under community group purchase mode considering freshness preservation efforts*	Examine preservation incentives and profit allocation.	Pricing and profit-sharing models with fairness preferences and Nash bargaining.	Profit-sharing and bargaining conditions influence preservation incentives and returns.
Huang et al. (2023)	*Capacity coordination under uncertain yield for supply chains with a single supplier and two competing retailers*	Address distorted orders under uncertain capacity.	Allocation game with contractual coordination.	Revenue-sharing coordination mitigates order distortion; reported results include truthful ordering by the long-term retailer.
Zhao et al. (2027)	*Information sharing and procurement strategies in agricultural supply chains under retailer competition*	Examine information-dependent sourcing.	Game-theoretic cooperative–retailer model.	Procurement and disclosure interact under different sourcing conditions.

Gupta et al. (2015) and Calvo & Martínez-de-Albéniz (2016) qualify the assumption that sourcing flexibility necessarily improves performance. The first emphasizes when supply alternatives can be used; the second shows why suppliers' pricing responses matter. An additional source is therefore a conditional opportunity rather than an automatic advantage. For perishable procurement, this comparison raises a further requirement: the alternative must provide products within a useful delivery window. That requirement is an extension developed here, not a result established by the general sourcing models.

Risk types also need separation. Shi et al. (2023) compare food-safety-related responses involving technology and contingent sourcing. Their contribution concerns the relationship between risk management and sourcing choice. Reducing infection exposure is not equivalent to slowing quality deterioration, just as improving traceability does not create additional capacity. The procurement problem addressed by an intervention must remain explicit.

Contracts operate by changing behavior within specified relationships. Huang et al. (2023) concern order reporting and allocation, while Li et al. (2023) connect profit-sharing arrangements with preservation incentives. These mechanisms address different problems: more accurate claims on capacity and stronger incentives to retain product value. Neither improvement establishes how other buyers respond outside the coordinated relationship.

Three analytical questions organize the comparison. The access question concerns whether an arrangement changes acquisition opportunities. The incentive question concerns which actions, costs, and benefits it changes. The utilization question concerns whether acquired products remain useful through delivery, preservation, and sale. These questions form an interpretive structure, not a validated assessment instrument.

The thematic insight is that sourcing and contracting can complement one another while remaining functionally distinct. An

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arrangement may secure access without preserving value or align bilateral incentives without moderating horizontal rivalry. Assessing these differences requires examining the resulting outcomes and their distribution rather than labelling a sourcing or coordination strategy successful in general.

Procurement Outcomes and Distributional Trade-offs

Procurement performance has several dimensions. A decision can change acquisition expenditure, actor-specific profit, total chain returns, preference-adjusted utility, and physical utilization. Table 4 retains these distinctions and the benchmarks against which outcomes are reported. Its comparison avoids treating an improvement in one measure as evidence that every participant or performance dimension benefits.

Table 4. Selected studies on procurement-related outcomes and distributional trade-offs

Authors	Title	Aim	Methodology	Findings
Lin & Januardi (2023)	*Two-stage pricing of perishable food supply chain with quality-keeping and waste reduction efforts*	Compare pricing, profit, and waste outcomes.	Vertical games with single-stage and two-stage pricing.	Two-stage pricing improves payoffs and lowers waste within the analyzed comparison.
Li et al. (2023)	*Profit-sharing contract of the fresh agricultural products supply chain under community group purchase mode considering freshness preservation efforts*	Examine preservation and distributional outcomes.	Profit-sharing and Nash bargaining with fairness preferences.	Greater supplier bargaining ability raises supplier fairness utility while reducing agency fairness utility.
Zhao et al. (2027)	*Information sharing and procurement strategies in agricultural supply chains under retailer competition*	Examine procurement and profit allocation.	Game-theoretic comparison of information structures.	Information and sourcing conditions influence orders, prices, and profit allocation.
Huang et al. (2023)	*Capacity coordination under uncertain yield for supply chains with a single supplier and two competing retailers*	Assess allocation coordination.	Capacity allocation and revenue-sharing analysis.	Coordination can reduce order distortion and improve chain profit.
Calvo & Martínez-de-Albéniz (2016)	*Sourcing strategies and supplier incentives for short-life-cycle goods*	Compare single and dual sourcing.	Equilibrium analysis with endogenous supplier prices.	Dual sourcing does not always improve buyer profit or chain efficiency.
Yang et al. (2018)	*Multichannel distribution strategy: Selling to a competing buyer with limited supplier capacity*	Examine withholding and stakeholder outcomes.	Analytical model of constrained supplier–buyer channel competition.	Buyers withhold benefits the supplier but can reduce buyer profit under some conditions, despite first-best total chain profit in the analyzed setting.

The first distinction concerns value creation and value distribution. If purchasing payments change while quantities, quality, and operating costs remain constant, the immediate effect is a transfer between participants. Changes in aggregate economic performance require attention to associated real decisions. A lower purchase price therefore cannot, by itself, demonstrate a more efficient chain.

The selected preservation studies illustrate why financial and physical outcomes also require separation. Lin & Januardi (2023) explicitly connect a pricing comparison with waste and payoff outcomes. Li et al. (2023) examine bargaining-related changes in fairness utility. The latter measure incorporates preferences and should not be reported as monetary profit or social welfare. Read together, these studies support distinguishing whether an arrangement improves joint performance from how participants evaluate their shares.

Yang et al. (2018) illustrate why chain performance and participant outcomes require separate assessment. In their capacity-constrained channel setting, buyer withholding benefits the supplier but can reduce the buyer's profit under some conditions, even when total supply chain profit reaches the model's first-best benchmark. Calvo & Martínez-de-Albéniz (2016) identify a different source of divergence: ordering flexibility can lose its advantage when suppliers adjust prices strategically. These findings concern distinct mechanisms and benchmarks. They support examining who captures the benefits of an arrangement rather than treating higher aggregate returns or greater sourcing flexibility as sufficient evidence of improvement for every participant.

For synthesis, the relevant comparison therefore retains the actor, metric, and benchmark. Lower margin does not necessarily mean lower total profit; improved allocation reporting does not demonstrate reduced spoilage; and a chain-profit optimum does not establish a social optimum. Participation creates a further distinction: an increase in joint returns does not guarantee that every affected participant prefers the arrangement to its alternatives.

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The thematic insight is that procurement outcomes can be favourable on one dimension and unfavourable or untested on another. Usable supply adds attention to physical utilization without replacing economic measures. This multidimensional interpretation provides the basis for examining which model assumptions and evidence support each conclusion.

Boundary Conditions and Strength of Evidence

Game-theoretic findings explain strategic outcomes within specified structures and assumptions. Their relevance depends on whether those conditions correspond to the procurement setting being considered. Table 5 compares decision timing, information, perishability, and evidence designs. It identifies explanatory boundaries rather than assigning a single quality ranking to different research approaches.

Table 5. Selected studies informing boundary conditions and evidential assessment.

Authors	Title	Aim	Methodology	Findings
Calvo & Martínez-de-Albéniz (2016)	*Sourcing strategies and supplier incentives for short-life-cycle goods*	Assess commitment timing.	Analytical equilibrium comparisons.	Sourcing benefits depend on when suppliers commit to prices.
Huo et al. (2026)	*Channel encroachment and information sharing strategy: A game-theoretic equilibrium analysis of fresh agricultural product supply chain*	Compare sequencing and competition structures.	Backward induction with price- and quantity-competition scenarios.	Disclosure outcomes change with timing and competition form.
Dey et al. (2026)	*Digital technology based game-theoretic pricing strategies in a three-tier perishable food supply chain*	Examine technology-related pricing conditions.	Analytical centralized, decentralized, and contractual scenarios.	Profitability depends on deterioration and technology-cost parameters.
Januardi et al. (2024)	*Perishable food supply chain contract with asymmetric freshness information*	Examine private freshness information.	Principal–agent optimization.	Disclosure incentives depend on contract design.
Zhao et al. (2027)	*Information sharing and procurement strategies in agricultural supply chains under retailer competition*	Examine information-dependent procurement.	Game-theoretic comparison of sourcing and disclosure arrangements.	Information precision and sourcing conditions qualify strategic outcomes.
Walker & Hyndman (2025)	*Late payments, higher prices? An experimental investigation of competitive procurement*	Examine payment uncertainty and procurement incentives.	Regulatory-report analysis, analytical modeling, and laboratory experiments.	Late-payment penalties can strengthen commitment credibility and alter supplier competition; outcomes depend on incentive conditions.

Competitive structure is the first boundary. Suppliers bidding for one buyer, a supplier entering retail markets, and several buyers competing for allocation involve different interdependencies. Similar solution techniques do not make their findings interchangeable. Information ownership and decision sequence create additional boundaries because participants respond to what they know and what others have already committed to do.

The representation of perishability also matters. Huo et al. (2026) adopt a single-period, make-to-order arrangement without within-period stockouts or leftover inventory. Consequently, their channel and preservation findings do not independently establish reductions in disposal or repeated shortage competition. More generally, freshness-sensitive demand, quantity deterioration, and fixed expiration impose different constraints. Results cannot be transferred between these representations solely because each concerns fresh products.

Evidence design further qualifies interpretation. Analytical derivations establish consequences within a formal specification, while numerical illustrations explore selected parameter configurations. Experiments examine behaviour under controlled incentives and rules. Walker & Hyndman (2025) combine modelling and experiments to investigate payment-related supplier competition, providing behavioral evidence for their mechanism. This does not constitute a field test of perishable-product buyer rivalry.

These distinctions do not imply that theoretical work is automatically weaker than empirical work. Credibility is relative to the claim. A supported equilibrium explains a formal mechanism but does not establish its prevalence in practice. An observed association may characterize a setting without identifying the strategic process that produced it. Wu et al. (2025) report simplified structures and limited empirical validation in their review of sustainable supply chain games; that finding provides context rather than a measured characteristic of the literature considered here.

The thematic insight is that a useful synthesis connects each claim to its conditions and evidential basis. Apparent disagreement may reflect different benchmarks or assumptions rather than incompatible findings. Where full texts are unavailable, conclusions remain limited to accessible information, and an

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unreported detail is not treated as an established omission. Taken together, the five themes support conditional explanations connecting procurement conditions, strategic mechanisms, and outcomes, while identifying where behavioral or field examination is still needed.

Discussion

Procurement in perishable supply chains involves securing access to supply while preserving the usefulness of products whose condition deteriorates over time. The distinction between nominal and usable supply connects competitive acquisition with preservation and coordination. Purchasing additional units does not necessarily improve performance if those units arrive too late, require excessive preservation expenditure, or cannot be utilized before deterioration. Competition and coordination can therefore coexist: buyers may compete for upstream resources while coordinating delivery, freshness disclosure, or preservation with suppliers. This interpretation requires retaining the differences between buyer procurement competition, supplier rivalry, downstream sales competition, and vertical coordination, since each connects participants through different decisions and incentives.

Game theory explains why scarcity alone cannot predict procurement responses. Huang et al. (2023) show how competing retailers facing uncertain supplier yield can inflate orders to protect their allocation positions, while contractual arrangements can moderate this distortion. Their analysis concerns uncertain availability rather than physical deterioration. Nevertheless, it identifies an allocation mechanism relevant to interpreting procurement competition: submitted orders can reflect strategic claims on supply as well as operational requirements. For physically perishable products, this comparison raises a conditional proposition. The attractiveness of additional ordering depends on allocation benefits alongside preservation, disposal, and resale consequences. Whether deterioration restrains or intensifies strategic ordering requires examination within the relevant allocation and cost structure.

Resource dependence provides a complementary perspective on constrained sourcing alternatives. Jiang et al. (2023) examine how organizations manage dependencies across interorganizational and international settings. Fang et al. (2024) provide related manufacturing evidence linking supply chain relationship dependencies with circular economy performance and the moderating role of digitalization. Neither study directly establishes how competing buyers acquire perishable supply. Their relevance lies in directing attention to feasible alternatives. In the setting considered here, an additional supplier provides limited immediate protection if delivery, certification, or acceptance requirements exceed the product's usable window. The synthesis consequently interprets sourcing flexibility through alternatives capable of delivering acceptable products in time, rather than supplier numbers alone.

Information introduces a different constraint. Matinheikki et al. (2022) distinguish information asymmetry and goal incongruence when examining governance mechanisms in supply chain relationships. This distinction helps explain why obtaining information and encouraging truthful disclosure require different interventions. Januardi et al. (2024) address asymmetric freshness information through contracting, focusing attention on the condition of the acquired product. Freshness information differs from demand forecasts or information about supplier yield because each concerns a different uncertainty and decision. Verification can improve product assessment, whereas disclosure incentives influence whether informed participants benefit from reporting accurately. Neither mechanism independently establishes how rival buyers respond when competing for the same supply.

Channel research further qualifies the benefits attributed to information sharing. Huo et al. (2026) examine disclosure incentives within a fresh agricultural product supply chain, illustrating the importance of channel arrangements and strategic interaction. Their setting does not directly represent independent buyers competing for a common source. Keller et al. (2024) , reviewing digital supply network governance, likewise explain that digital technologies can strengthen, simplify, or undermine governance arrangements. Read together, these contributions support evaluating visibility alongside access rights, disclosure incentives, and participants' opportunities to act on information. Applied to procurement, improved visibility may enhance assessment while redistributing strategic advantage. Its contribution therefore depends on how information changes decisions and relationships, rather than its availability alone.

Transaction-cost reasoning adds attention to the scope of governance responsibilities. Chae et al. (2024) distinguish direct and indirect transactions in multi-tier supply chains, explaining why outsourcing production does not automatically transfer every sourcing responsibility. Yin et al. (2023) provide complementary manufacturing evidence concerning configurations of governance mechanisms associated with reduced perceived opportunism. These contributions support matching safeguards to the transactions and hazards they address. For perishable procurement, the synthesis introduces an additional timing consideration: verification may protect buyers while procedural delays reduce remaining usable life. This is an interpretation developed by the review, rather than an effect directly tested by these studies. Governance arrangements therefore require consideration of both protection and operational urgency.

Sourcing, information, and contracts consequently address connected but distinct procurement problems. Alternative suppliers can change outside options, information can change assessments and responses, and contracts can redistribute risks and returns. A reservation arrangement may support access without guaranteeing freshness, while freshness-contingent payments may encourage disclosure without preventing strategic ordering by other buyers. Preservation incentives can improve product condition without resolving allocation conflicts. Comparing contractual arrangements therefore requires identifying the behavior each arrangement influences, the risk it reallocates, and the decisions left outside its scope. A bilateral coordination result cannot establish that the same arrangement resolves horizontal procurement competition when rival buyers' responses are absent from the analysis.

Procurement outcomes also require separating value creation from value distribution. Lin & Januardi (2023) report improvements in participants' profits and reduced food waste under two-stage pricing relative to single-stage pricing within their model. Li et al. (2023) connect profit sharing with preservation effort, bargaining, and fairness concerns in community group purchasing. These vertical settings illuminate different performance questions without directly demonstrating a solution to buyer rivalry. Higher buyer profit may reflect a transfer from suppliers rather than greater total surplus. Similarly, increased chain surplus does not guarantee

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voluntary participation if one actor receives an unfavourable share. Monetary profit, fairness utility, usable supply, waste reduction, and social welfare therefore remain distinct outcomes.

For managers, the resulting implication is to evaluate purchasing arrangements through expected usable output and the conditions supporting it. Purchase prices should be considered alongside remaining shelf life at receipt, lead-time variability, rejection rates, preservation expenditure, and expected disposal. These indicators are proposed evaluation criteria rather than measures validated by this review. Their relevance depends on the procurement problem: freshness uncertainty directs attention to verification and acceptance arrangements, allocation constraints to reservation and quantity commitments, and preservation effort to cost sharing and benefit distribution. Supplier diversification likewise requires assessing whether alternatives remain operationally viable within the available delivery window.

Payment reliability adds a further dimension to commitment credibility. Walker & Hyndman (2025) combine analytical and experimental approaches to examine competitive procurement and delayed payment expectations. Their supplier-competition setting does not directly test buyers' access to scarce perishable products. It nevertheless provides a comparison for understanding how credible purchasing commitments influence counterparties' responses. Extending this insight suggests evaluating payment performance alongside delivery and freshness performance. Whether reliable payment strengthens a buyer's access to constrained fresh-product supply remains a question requiring direct investigation.

The review clarifies three functions that procurement arrangements can perform: securing access, moderating strategic distortions, and preserving acquired value. These functions can interact without being achieved by the same intervention. Allocation coordination addresses claims on supply, freshness-related contracting addresses information and preservation incentives, and sourcing alternatives change outside options subject to timing constraints. Connecting these functions with the distribution of returns provides a more specific basis for comparison than treating a sourcing or contractual arrangement as effective in general. Game theory explains the interdependent responses, while the supporting perspectives clarify dependence, disclosure, and governance responsibilities. The resulting framework remains interpretative, with transferability determined by the actors, assumptions, and outcomes examined.

Wu et al. (2025) provide a relevant comparison concerning assumptions and evidence in sustainable supply chain games, although their conclusions cannot be generalized to every perishable procurement study. These interpretations remain bounded by selective literature coverage, uneven full-text access, and the use of related research settings. Analytical derivations support consequences within specified assumptions, numerical exploration examines parameter-dependent behavior, experiments investigate controlled responses, and field observations address institutional settings. Each supports different claims. Future research can connect these approaches by observing competing buyers, shared suppliers, allocation decisions, and delivered freshness within the same transactions. Particularly useful comparisons would examine ordering responses to freshness disclosure, supplier alternatives under narrowing delivery windows, and contracts that alter usable supply and risk distribution. Repeated transactions would also permit examination of learning, payment reputation, and the credibility of commitments over time.

CONCLUSION

This narrative literature review examines how competition and coordination shape procurement in perishable supply chains from a game-theoretic perspective. The synthesis suggests that procurement involves interdependent decisions about access to supply whose usefulness changes through physical deterioration. Larger purchases and lower acquisition prices do not necessarily improve performance when delivery timing, product condition, and preservation costs are considered. Competition and coordination can coexist, as buyers compete for resources while coordinating freshness, delivery, or preservation with suppliers. Interpreting these relationships requires distinguishing buyer procurement rivalry from supplier competition, downstream sales competition, and vertical coordination, rather than treating their findings as interchangeable.

The review connects procurement conditions, strategic mechanisms, and outcomes within an interpretative framework. Allocation rules influence claims on scarce supply, information ownership shapes assessment and disclosure, and sourcing alternatives and commitment timing affect feasible responses. Contracts can modify these incentives and redistribute risks, but improvements in bilateral coordination do not independently establish a resolution to horizontal buyer competition. The distinction between nominal and usable supply provides an analytical lens for connecting acquisition with value preservation. It also clarifies why buyer profit, total supply chain surplus, distributional benefits, and waste reduction require separate assessment. Reported outcomes remain conditional on the relevant actors, benchmarks, decision sequences, and representations of perishability.

For managers, the principal implication is to evaluate purchasing arrangements through expected usable output alongside acquisition expenditure. Remaining shelf life at receipt, delivery reliability, preservation expenditure, and risk allocation help identify whether an attractive purchasing offer retains its value through utilization. The appropriate response depends on the procurement problem: freshness uncertainty directs attention to verification and disclosure incentives, constrained access to allocation and reservation arrangements, and preservation requirements to the sharing of costs and benefits. These considerations constitute implications of the synthesis rather than a validated assessment instrument. Additional suppliers, greater visibility, or stronger contractual safeguards require evaluation against their operational feasibility and strategic consequences.

The conclusions are bounded by selective literature coverage, uneven full-text access, and comparisons with studies addressing related strategic structures. Differences in assumptions and evidence designs further limit transferability, supporting conditional explanations rather than empirical generalizations. Future research can observe allocation decisions, order behaviour, and delivered freshness within the same transactions to examine how strategic claims translate into usable supply. Comparisons of sourcing arrangements under narrowing delivery windows can assess whether alternatives remain feasible, while longitudinal research can investigate how contracts and repeated commitments redistribute deterioration risks and returns. Procurement competition is therefore best evaluated through the relationship

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between strategic access, preservation of acquired value, and its benefits.

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