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Strategic sourcing and total cost of ownership in industrial procurement: integration between cost, risk, and supplier performance.

Strategic sourcing and total cost of ownership in industrial procurement: integrating cost, risk and supplier performance

Strategic procurement and total cost of property in industrial acquisition: integrating cost, risk and provider performance

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SUMMARY

This article analyzes the integration between strategic sourcing, Total Cost of Ownership (TCO), risk management, and supplier performance in industrial procurement. The research adopts a qualitative, exploratory, and bibliographic-documentary approach, combining classic procurement and supply management literature with studies on multi-criteria supplier selection and recent institutional documents on supply chain resilience. It argues that comparisons based solely on unit price can obscure costs related to quality, logistics, transactions, inventory, unavailability, and supply failures. A five-dimensional decision framework is proposed: item criticality, total cost, operational performance, supply risk, and relationship governance. The analysis shows that TCO and supplier scorecards fulfill complementary functions: the former expands economic measurement, and the latter organizes quantitative and qualitative variables. It concludes that industrial sourcing is more robust when price, total cost, risk, and performance are evaluated in an integrated manner, with explicit assumptions and periodic review.

Keywords: strategic sourcing; procurement; total cost of ownership; suppliers; supply chain; risk management.

ABSTRACT

This article examines the integration of strategic sourcing, Total Cost of Ownership (TCO), risk management and supplier performance in industrial procurement. The study adopts a qualitative, exploratory and bibliographic-documentary approach, combining established purchasing and supply management literature with research on multi-criteria supplier selection and recent institutional evidence on supply-chain resilience. It argues that decisions based exclusively on unit price may conceal quality, logistics, transaction, inventory, downtime and supply-failure costs. A five-dimension decision framework is proposed: item criticality, total cost, operational performance, supply risk and relationship governance. TCO and supplier scorecards are treated as complementary tools. The article concludes that industrial sourcing becomes more robust when price, total cost, risk and performance are assessed jointly through explicit assumptions and periodic review.
Keywords: strategic sourcing; procurement; total cost of ownership; suppliers; supply chain; risk management.

INTRODUCTION

The purchasing function is no longer treated solely as a transactional activity in organizations whose

Operational continuity depends on materials, services, and equipment provided by third parties.

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Kraljic (1983) formulated one of the bases for this change by arguing that purchasing should evolve into Supply management, relating supply strategy to the economic importance of items and to complexity of the supplier market.

In industrial settings, purchasing decisions often involve consequences that become apparent. After the order is issued: Freight, inspection, rejection, rework, inventory, maintenance, delays. Supplier qualification and unavailability can significantly alter the real economics of a hiring. Ellram (1995) describes TCO as an approach that looks beyond the price of Acquisition and incorporates costs associated with the purchase and use of the good or service.

The problem becomes more relevant when global supply chains are subject to disruptions. Concentration of supply and logistical bottlenecks. The OECD (2025) notes that resilience does not mean Isolation, but the ability to navigate risks through agile, adaptable, and aligned chains. For procurement, this shifts the question from "which supplier has the lowest price?" to "which supply configuration delivers economic value and continuity under plausible conditions of risk?".

The objective of this article is to analyze how strategic sourcing, TCO, multi-criteria evaluation, and management of Risks can be combined into a coherent framework for industrial procurement. It is not proposed that... universal scoring model, as weights and variables depend on the category, the market, and the criticality and operational context.

Beyond the economic dimension, industrial procurement involves technical dependencies that may Limit supplier substitution. Approvals, dedicated tooling, requirements of Engineering, certifications, and accumulated knowledge create switching costs that are not always apparent. in the quotation. Strategic analysis needs to recognize these constraints before trading, because the The apparent existence of multiple sources does not necessarily mean that they are all the same. interchangeable within the timeframe required by the operation.

The supply management perspective also requires integration between purchasing, operations, quality, Engineering, finance, and logistics. The value of a hire is generated across these interfaces: An overly restrictive specification can reduce competition; an unstable forecast can Increasing inventory or addressing urgent needs; poorly defined quality criteria can lead to higher rejection rates. Therefore, Procurement performance depends as much on the ability to negotiate as on the quality of the... Information that structures the decision.

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2 METHODOLOGY

The research is qualitative, exploratory, and bibliographic-documentary. Works were selected from Reference on supply management, TCO, and supplier selection, supplemented by literature. Recent and institutional documents published up to January 31, 2026. Kraljic (1983) is used. for strategic segmentation; Ellram (1995) and Wouters, Anderson and Wynstra (2005) support the discussion of TCO; Ho, Xu and Dey (2010) provide the basis for multicriteria evaluation; and the OECD (2025) Provides contemporary context on resilience and supply chain concentration.

The concepts are organized into five analytical dimensions: criticality, total cost, performance, Risk and governance. The proposed framework is conceptual and does not replace financial or legal models. or specific technicians from each organization.

The bibliographic selection was guided by conceptual adherence to the research problem, prioritizing Recognized work on purchase segmentation, total cost of ownership, valuation of Suppliers and resilience. Institutional sources were used to contextualize risks. contemporary supply chain management, without replacing the scientific literature employed in construction of the central concepts.

As an analytical procedure, the findings were compared by thematic convergence. Concepts Segmentation studies were related to criticality and market power; TCO studies were related to economic measurement; the multicriteria literature has been associated with non- Monetary data and resilience documents were used to examine dependence and concentration. and recovery capacity.

No confidential company data, interviews, or proprietary case studies were used. Consequently, the matrices presented are conceptual and illustrative in nature. They serve to To demonstrate how different dimensions can be integrated, but they do not constitute a sectoral benchmark. Nor is there a recommendation for universal weights.

The validity of the analysis depends on the traceability between claims and sources. For this reason, the The normative arguments of the article are presented as propositions derived from the literature. While numbers, specific concepts, and classifications are associated with their respective references. The The document collection period ended on January 31, 2026.

3. From Transactional Purchasing to Strategic Sourcing

Strategic sourcing assumes that purchasing categories are not treated identically. Low-value item with abundant supply demands governance different from a critical component.

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produced by a few suppliers. Kraljic's (1983) logic combines impact on the business and
Supply risk is used to differentiate strategies, avoiding applying the same analytical effort to all.
the acquisitions.

Segmentation also influences the depth of the RFX process. In routine categories,
Standardization and transactional efficiency may prevail. In critical categories, the decision may require...
Due diligence, capacity assessment, financial analysis, testing, site visits, plans
continuity and negotiation of contractual performance mechanisms.

Strategic sourcing does not eliminate price negotiation. It repositions the price within a...
broader decision. This distinction is central because nominal reductions obtained in negotiations can
to be offset by subsequent costs or by greater operational exposure.

Dimension	Decision question	Examples of evidence
Criticality	What is the impact of failure or delay?	stop, safety, revenue, deadline
Market	How replaceable is the source?	number of suppliers, lead time, concentration
Economy	What is the total cost?	price, shipping, quality, stock, transaction
Performance	The supplier delivers in a way consistent?	OTD, quality, responsiveness
Risk	What events alter the decision?	financial, logistical, geographic, cyber

Figure 1. Conceptual framework for segmenting the sourcing decision. Source: developed by
The author based her work on Kraljic (1983) and OECD (2025).

The transition to strategic sourcing begins with understanding demand. Before addressing the...
In the market, the organization needs to identify historical consumption, specifications, variability,
Criticality, demanding units, and switching costs. Without this step, volume consolidation...
It can bring together technically distinct needs or, at the opposite extreme, fragmentation can prevent
Economies of scale and reduced bargaining power.

Mapping the supplier market expands this internal understanding. Number of suppliers
qualified personnel, barriers to entry, available capacity, location, dependence on raw materials.
The timing and time required to approve alternatives affect the strategy. In the Kraljic matrix

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(1983), supply risk is not an abstract attribute: it stems from concrete conditions that alter
The buyer's freedom of choice.
The category strategy should then transform diagnosis into action. Depending on the quadrant and
Depending on the context, priority can be given to competition, standardization, and supplier development.
Long-term contracts, dual sourcing, or technical collaboration. The choice is not permanent;
Changes in demand, technology, or market conditions can displace a category and require reassessment.

4. TOTAL COST OF OWNERSHIP: PRICE IS ONLY ONE INSTALLMENT

Ellram (1995) characterizes TCO as a methodology and philosophy that seeks to capture costs beyond the purchase price. Wouters, Anderson, and Wynstra (2005) reinforce this logic by treating TCO as
Applying costing concepts to sourcing decisions, including order costs, freight, and control.
quality, rejection, rework and warranty.
In an industrial purchase, a TCO model can be conceptually expressed as the sum of
Net price, acquisition and transaction costs, logistics, inventory, quality, deployment or use,
Maintenance and expected failure or downtime costs, less any residual values.
or measurable benefits. The composition needs to be tailored to the purchased item.
The risk of false precision must be controlled. Not every variable can be estimated with the same accuracy.
Degree of confidence. Therefore, assumptions, time horizon, volumes, rates, currencies, and scenarios.
They need to be recorded. When data is uncertain, sensitivity analysis is more informative than
that a single value be presented as definitive.
TCO should also not automatically convert every qualitative attribute into monetary value.
Security, compliance, technical capacity, and continuity can all serve as criteria.
Eliminatory factors or as separate decision-making dimensions.
A consistent application of TCO begins with defining the object and horizon of analysis.
Comparing suppliers of durable equipment, for example, may require installation costs.
operation, maintenance and disposal; while a recurring consumption category can concentrate costs in
Logistics, inventory, quality, and order processing. Ellram (1995) emphasizes that the usefulness of
TCO depends on identifying the costs relevant to the specific decision.
Wouters, Anderson, and Wynstra (2005) show that the adoption of TCO requires information and capacity.
organizational. This helps explain why overly sophisticated models can fail:
If the data on failures, rework, freight, or administrative hours is unreliable, the accuracy...
Mathematics does not eliminate the fragility of the assumptions. A smaller, auditable model may be superior.
to an extensive spreadsheet based on undocumented estimates.

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5. Multicriteria Selection and Supplier Performance

The literature on supplier selection shows that contemporary decisions utilize multiple criteria.
Ho, Xu and Dey (2010), in a review of multicriteria methods, highlight that suppliers are evaluated
based on quantitative and qualitative factors, and not just cost. This approach is especially
Relevant when differences in quality, delivery, and capacity affect the operational outcome.
A scorecard can combine indicators such as on-time delivery, defect rate, lead time,
Capacity, responsiveness, financial stability, compliance, and performance improvement. A
The usefulness of a scorecard depends on the quality of the data and the consistent definition of the metrics. Weights
Arbitrary choices can only formalize preferences without improving the decision.
TCO and multicriteria evaluation are not substitutes. TCO primarily addresses the dimension
expanded economic analysis; multi-criteria evaluation allows for the incorporation of factors that should or should not be included.
They can be reliably monetized.
The criteria must be defined before the final comparison of the proposals. When weights are
Changes after prices or preferred suppliers are already known increase the risk of
Confirmation bias. More robust governance records criteria, scales, and those responsible.
previously and maintains evidence to justify exceptions.
Ho, Xu, and Dey (2010) identify widespread use of multi-criteria methods in the selection of
suppliers, reflecting the simultaneously economic and operational nature of the decision. For use
In management, however, the choice of method should be proportional to the complexity. Not every category
It requires advanced modeling; the central requirement is that the criteria be relevant and measurable.
and applied consistently.
Historical performance should inform future decisions. Quality and delivery indicators, records.
Non-compliance, responsiveness, and adherence to action plans help to differentiate
Commercial promise of observed performance. This feedback transforms supplier performance.
Management plays a part in sourcing, closing the loop between selection, contract, execution, and new developments.
competition.

6. RISK, RESILIENCE AND SUPPLY CONCENTRATION

The OECD Supply Chain Resilience Review (2025) shows that most trade remains
diversified, but registering an increase in import concentration compared to decades ago.

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previous ones. The report argues that resilience should be built through risk management, not by indiscriminate relocation.

For industrial procurement, diversification needs to be analyzed economically. Dual sourcing It can reduce dependence, but it can also reduce scale, increase quality complexity, and demand... Duplication of approvals. Single sourcing can generate efficiency and integration, but it increases... Exposure when there are no qualified alternatives. The choice should consider probability and impact. and recovery time.

Supplier due diligence complements the analysis. The NIST (2024), although focused on risks Regarding the technology and cybersecurity supply chain, it explicitly states a transferable principle: decisions Acquisition decisions must be preceded by a proportionate assessment of the supplier's risks. In purchasing In industrial settings, the same logic can guide financial, operational, and compliance audits. continuity, while respecting the context of the category.

Supply risk should be analyzed by considering a combination of probability, impact, and speed. of materialization. A low-probability rupture may justify priority treatment when halts production or requires months to approve an alternative. In contrast, frequent events but Low-impact costs can be managed through inventory, logistics parameters, or agreements. operational.

The concentration needs to be observed on more than one level. Two contracted suppliers may depending on the same raw material, region, port, sub-supplier or technology, creating a correlation of risk. Therefore, counting suppliers is not the same as measuring diversification. The OECD (2025) highlights the The importance of understanding dependencies and navigating risks without assuming self-sufficiency or comprehensive relocation are universal solutions.

Resilience also comes at an opportunity cost. Reserved capacity, additional inventories, and Alternative sources increase protection, but consume capital and may reduce efficiency. The goal In procurement, the goal is not to eliminate all risk, but rather to choose a level of exposure compatible with the... The criticality of the item and the financial and operational capacity of the organization.

7 Integrated Decision Structure

Based on the literature, a seven-step workflow is proposed: (1) define need and criticality; (2) (1) map the market and alternatives; (2) establish elimination requirements; (3) build TCO with explicit premises; (5) evaluate non-monetary criteria; (6) test risk scenarios; and (7) define Contractual governance and post-award indicators. The sourcing decision thus becomes a cycle and not an isolated event.

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Block	Examples	Treatment
TCO	price, shipping, stock, quality, monetary	value/scenarios
Performance	OTD, quality, capacity	indicators
Risk	continuity, concentration, financial	probability vs. impact
Compliance	legal and internal requirements	gate/criteria
Governance	SLA, review, improvement	contract + scorecard

Figure 2. Example of an integrated decision matrix. The weights are illustrative and should be calibrated. By category. Source: author's own work.

In the first stage, criticality and necessity must be defined using language common to all areas. This includes consequences of unavailability, minimum technical requirements, expected demand and necessary timeframe. Initial clarity prevents essential criteria from being discovered only later. commercial equalization.

In the second and third stages, the market is mapped and elimination requirements are separated from Gradual criteria. Safety, legal compliance, or minimum technical capacity may apply. such as gates; price, lead time and performance can be compared between suppliers that They exceeded these requirements. This separation reduces the risk of compensating for a critical inadequacy. with an economic advantage.

In the fourth and fifth stages, TCO and non-monetary criteria are evaluated in a complementary manner. The decision should record assumptions, data sources, and any uncertainties. When the difference between If alternatives are few, sensitivity analyses can show whether the ranking depends on one. Weak premise.

In the sixth stage, risk scenarios test the robustness of the solution. Logistical delays, loss of capacity, Exchange rate fluctuations or quality failures can be simulated qualitatively or quantitatively. The goal is not to predict the future exactly, but to identify which hypotheses would cause the decision to be reversed. to be economically or operationally acceptable.

Finally, post-award governance translates the decision into follow-up. Indicators, meetings, Escalation mechanisms, risk review, and improvement plans preserve the logic used in selection. Without this continuity, sourcing ends with the signing of the contract and the opportunity is lost. to validate whether the expected benefits were actually achieved.

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8 DISCUSSION

The proposed integration reduces two common oversimplifications: confusing lower price with lower cost.
and confusing a larger number of suppliers with greater resilience. The first mistake ignores costs.
later; the second ignores actual capacity, qualification, interdependencies and costs of
coordination.

The quality of the decision depends on the quality of the data. Sophisticated TCO built on assumptions.
Fragile scorecards can create a false sense of rigor. Similarly, lengthy scorecards can...
Dilute critical criteria. Governance should prioritize metrics that have a plausible causal relationship.
with cost, continuity, quality or value.

The model also reinforces the cross-functional nature of procurement. Engineering, operations, finance,
Quality, legal, logistics, and information security factors may possess indispensable data.
Strategic sourcing is therefore as much a problem of decision-making as it is of organizational coordination.

One practical consequence is that savings needs to be interpreted with caution. Reduction versus a
The initial quote does not necessarily represent net savings if there is a change in scope.
Deterioration in quality, increased inventory, or transfer of costs to another area. TCO
It offers a discipline for discussing these effects, although it does not eliminate the need for criteria.
Financial terms defined by the organization.

The integrated approach also modifies the relationship with suppliers. Strategic categories can
to demand greater transparency regarding capacity, risks, and cost drivers, while categories
Routine tasks can prioritize automation and efficiency. This avoids applying intensive collaboration where it is needed.
It does not create value or, conversely, treats a critical dependency as a simple price transaction.

Another point is the quality of the data. Scorecards and TCO models can convey false information.
Objectivity when fed by inconsistent data. Data governance, definition of
Indicators and traceability of assumptions are, therefore, conditions for the quality of the decision, and not
peripheral administrative activities.

CONCLUSION

Industrial purchasing requires a broader economic and operational understanding than simple comparison.
of prices. The literature reviewed supports the view that TCO, multi-criteria selection, and risk management offer
Complementary perspectives. TCO expands cost measurement; multi-criteria methods organize
heterogeneous attributes; and risk management tests the robustness of the decision in the face of interruptions and
uncertainty. The main managerial implication is that sourcing should be proportional to the criticality of the

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This category is supported by verifiable data, transparent assumptions, and subsequent monitoring.
There is no universal combination of weights or suppliers: there is a disciplined process for...
to make explicit trade-offs that would otherwise remain hidden.
The study demonstrated that strategic sourcing, TCO, multi-criteria evaluation, and risk management...
They respond to different dimensions of the same decision. Segmentation helps define where
Focus efforts; TCO broadens the economic perspective; multi-criteria evaluation incorporates attributes.
non-monetary; and risk analysis examines the robustness of the alternative in the face of disruptions and
dependencies.
The first conclusion is that unit price, in isolation, has a limited capacity to represent
Value in industrial purchases. Logistics costs, quality, inventory, maintenance, transaction and failures.
These factors can alter the economic outcome. The contribution of TCO lies in making these components explicit.
and comparable within documented premises.
The second conclusion is that suppliers should not be evaluated solely on the basis of commercial promises.
Delivery history, quality, capacity, responsiveness, and stability need to fuel the...
A decision can be made when reliable data is available. The multicriteria literature offers...
instruments to organize this comparison without forcing the artificial monetization of all of them.
attributes.
The third conclusion concerns resilience. Diversification doesn't simply mean increasing the...
The number of suppliers varies, as different sources may share dependencies. Dual strategies
Sourcing, inventory, contracts, supplier development, and contingency planning must be calibrated.
depending on criticality, impact, and recovery time.
The proposed integrated structure seeks to preserve traceability. Elimination criteria, premises.
Total Cost of Ownership (TCO), weights, scenarios, and award justifications must be recorded so that the decision can be...
revisited. This documentation strengthens governance and reduces reliance on constructed justifications.
only after the choice.
As a limitation, this article is bibliographic-documentary and does not empirically test the structure in a...
specific company or category. The weights and examples presented are illustrative. Future studies
They can apply the model to different sectors and compare the sensitivity of the results to data from
performance, risk and cost.
Another limitation stems from the availability and quality of data. Organizations with low
Supplier performance or cost accounting maturity may require implementing the model.
progressively. In these cases, transparency about uncertainty is preferable to producing numbers.
seemingly accurate, but difficult to audit.

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