Historical Trends in Demand and Future Projection

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Introduction

The Axon case concerns the purchasing of finished plastic products from five suppliers—Trocha, Integrity, Rapid Cut, Yuyao, and the newer supplier Airspeed—and asks how historical spending should inform future demand. The original analysis correctly identifies quality, volume, and service as drivers of supplier use and notes that Trocha received the greatest spend while Airspeed received the least. However, supplier expenditure is not the same as customer demand. Spend can rise because unit prices increased, the product mix changed, emergency orders were placed, or responsibility shifted among suppliers even when physical demand remained stable. The graph embedded in the original post does not preserve readable supplier values, so a responsible forecast cannot manufacture exact amounts. This revised case analysis explains how Axon should reconstruct its data, separate demand from price, evaluate supplier performance, create forecasts with uncertainty, and translate those forecasts into a sourcing strategy.

Clarifying the Category and the Decision

Forecasting should begin with the decision the forecast must support. Axon appears to buy finished plastic components that directly affect the quality and availability of goods delivered to customers. The relevant decisions may include annual budget allocation, order quantities, supplier capacity reservations, safety stock, and the introduction or exit of suppliers. Each decision requires a different level of detail and horizon. An annual finance forecast may tolerate monthly aggregation, while production scheduling may require product-level weekly data. The category should therefore be defined by product families, specifications, sites, and intended use. Treating all plastic products as one category can conceal a shortage in a critical component behind excess inventory in another.

Why Spend Is an Incomplete Demand Measure

Total spend equals quantity multiplied by price, with possible additions for freight, tooling, duties, expedite fees, and other charges. A rise in spend between 2015 and 2017 could indicate greater customer demand, but it could also reflect inflation, exchange-rate movements, quality upgrades, smaller lot sizes, or supplier disruption. Axon should reconstruct at least four separate series: units ordered, units received, unit price, and total landed cost. It should also record rejected units, late deliveries, emergency purchases, and stockouts. This decomposition prevents management from

describing a price increase as volume growth. Where historical records are incomplete, the company should document which figures are observed, estimated, or unavailable. Forecast accuracy cannot exceed the quality of the underlying definitions.

Reconstructing the Historical Baseline

The first analytical phase is a clean baseline. Axon should collect transaction-level purchase orders and receiving records for at least the available 2015–2017 period, then reconcile them with inventory movements and customer shipments. Duplicates, cancellations, returns, and open orders must be identified. Product codes that changed over time should be mapped to consistent families. The team should examine whether a supplier served the same specifications throughout the period; otherwise, comparing spend shares may be misleading. A timeline of events—new customers, product launches, quality incidents, contract changes, supplier onboarding, and capacity constraints—should accompany the numerical series. Historical data are not self-explanatory. The baseline becomes useful when changes can be connected with documented operational causes.

Interpreting the Supplier-Spend Pattern

The original graph indicates that Trocha received the largest share of 2017 expenditure and Airspeed the smallest. Trocha’s position may reflect reliable quality and service, but spend concentration should not be treated automatically as proof of superior performance. A supplier can receive more business because it provides the largest product family, holds approved tooling, or is the only qualified source. Airspeed’s low spend is consistent with a new supplier being tested, although it could also reflect limited capacity or a narrow specification. Axon should compare spend share with share of units, number of active items, quality acceptance, on-time delivery, lead time, responsiveness, and total cost. The purpose is to distinguish earned allocation from historical dependency.

Demand Drivers to Include

End-customer orders are the most direct demand driver, but several additional variables can improve interpretation. Forecasts should consider active customer contracts, order backlog, sales pipeline adjusted for probability, seasonality, product life cycles, planned promotions, customer concentration, and changes in the company’s own finished-goods inventory. Macroeconomic indicators may matter if Axon serves cyclical industries. Engineering changes can abruptly end demand for one component and create demand for another. Service targets also affect procurement: a policy promising immediate availability requires more inventory or more responsive capacity than a make-to-order policy. Qualitative information from sales and operations should be recorded as assumptions, not silently inserted into the forecast.

Choosing a Forecasting Hierarchy

Axon should forecast first at the level where demand is generated—normally product or product family—and then aggregate to the category and supplier levels. Forecasting directly by supplier would embed current sourcing decisions into the demand estimate. If Axon later reallocates an item from Trocha to Airspeed, supplier-level history would falsely suggest that demand moved for market reasons. A hierarchical structure allows product forecasts to reconcile with category totals and financial budgets. Hyndman and Athanasopoulos (2021) recommend matching methods to data characteristics and evaluating forecasts against withheld observations rather than assuming that a sophisticated model is automatically better. For intermittent items, methods designed for many zero-demand periods may be more appropriate than ordinary trend extrapolation.

A Practical Model-Building Sequence

The forecasting team should begin with simple benchmarks: last-period demand, seasonal naive forecasts where seasonality exists, and moving averages. More advanced exponential-smoothing or regression models can then be tested against those benchmarks. A trend should not be projected indefinitely simply because purchases rose for three years. Structural breaks, one-time contracts, and supplier constraints must be examined. Model selection should use rolling-origin evaluation, in which forecasts are generated from several historical cutoffs and compared with what actually occurred. Error measures such as mean absolute error or scaled error should be interpreted alongside service consequences. Underforecasting a low-cost critical part may be more damaging than overforecasting an expensive but substitutable item.

Scenario Forecasting When History Is Short

Only a few annual observations cannot support a reliable statistical trend. Axon should therefore combine whatever monthly or transaction-level history exists with scenarios. A base scenario can reflect confirmed customers and normal growth; an upside scenario can reflect conversion of credible pipeline opportunities; and a downside scenario can reflect customer loss or economic weakening. Each scenario should state the assumptions that would make it occur. Management can then identify decisions that remain sensible across scenarios, such as qualifying a second source for a critical item, and decisions that should wait for better evidence. Scenarios are not three arbitrary percentages. They are coherent operational narratives linked to measurable triggers.

Forecasting Price Separately from Quantity

The budget needs both quantity and price forecasts. Unit-price projections should consider contracts, resin or other input indexes, labor, energy, exchange rates, freight, tariffs, minimum-order quantities,

and expected productivity. Negotiated reductions should not be assumed until agreed and contractually documented. If Yuyao or another international supplier invoices in a foreign currency, Axon should distinguish the supplier's local price from the exchange-rate effect. Landed cost should include quality failures and lead-time consequences rather than invoice price alone. Separating quantity from price also improves accountability: sales and operations can explain volume assumptions while procurement explains commercial assumptions.

Supplier Performance as a Sourcing Constraint

A demand forecast says what Axon may need; it does not say which supplier should receive the order. Allocation should use a scorecard that combines conformance quality, on-time-in-full delivery, lead-time stability, capacity, technical support, corrective-action performance, financial resilience, and total cost. Criteria should be weighted according to the category's risk. Quality is especially important because the products arrive in finished form and defects may pass directly into Axon's production or customer experience. Service should be measured through defined indicators rather than impressions. A high-performing incumbent can receive a substantial share while Axon still develops an alternative to reduce concentration risk. The new supplier Airspeed should be evaluated through controlled orders and capability evidence before rapid expansion.

Capacity, Lead Time, and Inventory Policy

Forecasted annual volume can still create failure if demand peaks and suppliers lack short-term capacity. Axon should compare the forecast by period with demonstrated supplier capacity, minimum runs, shutdown calendars, and transportation lead times. Longer and more variable lead times require earlier commitments or inventory buffers. Safety stock should reflect demand and supply uncertainty, service targets, and replenishment time rather than a fixed percentage of annual spend. Criticality segmentation can prevent excessive stock across the entire category. A component with no substitute and long qualification time deserves a different policy from a standard item available from several sources. Inventory is a risk-control choice, not merely evidence of poor forecasting.

Collaborative Planning and Governance

Forecasting improves when sales, operations, finance, procurement, and suppliers review one set of assumptions. A monthly sales and operations planning process can compare the statistical baseline with customer intelligence, inventory, capacity, and financial targets. Overrides should be recorded with an owner and reason so that the organization can learn whether human adjustments improved the forecast. Suppliers should receive an appropriate forecast horizon and a clear distinction between nonbinding visibility and firm orders. Governance also requires version control: managers need to know which forecast supported a contract or budget decision. Without that discipline, different

departments can use convenient numbers and later claim that another forecast was responsible.

Risk Analysis for the Five-Supplier Portfolio

Trocha's high spend indicates potential concentration. Axon should map which components and customer commitments depend on Trocha and estimate the time required to move them. Integrity, Rapid Cut, and Yuyao should be assessed for overlapping capability rather than treated as interchangeable based only on category membership. International sourcing may add currency, customs, transit, and geopolitical exposure, while local sourcing may have capacity or price disadvantages. Airspeed can improve resilience if its quality system and capacity are verified. Risk management should include contingency specifications, approved alternate materials, emergency logistics, tooling ownership, financial monitoring, and escalation procedures. The objective is not equal spend among five suppliers; it is a portfolio whose concentration is consciously justified.

Forecast Accuracy and Business Outcomes

Axon should measure forecast performance at the level and horizon at which decisions are made. Accuracy metrics need to be accompanied by bias, because a model can have an acceptable average error while consistently underforecasting. Operational outcomes include fill rate, customer stockouts, obsolete inventory, expedite cost, and supplier schedule changes. Commercial outcomes include purchase-price variance and total landed cost. Quality outcomes include defect rates and customer complaints. A forecast is useful when it improves these decisions, not merely when a statistical error number decreases. Performance should be reviewed by product segment because fast-moving and intermittent items behave differently.

Recommended Projection Approach

Given the information preserved in the original case, Axon should not publish an exact future dollar figure. It should first recover monthly unit, price, and service data and build product-family forecasts using simple benchmarks and rolling validation. Management should then create documented base, upside, and downside scenarios and translate quantities into landed cost with separate price assumptions. Supplier allocation should be constrained by capability, quality, capacity, risk, and contractual commitments. Trocha's high historical share warrants both performance recognition and concentration review; Airspeed's low share warrants staged qualification rather than either immediate rejection or rapid expansion. This approach converts an unsupported upward-line projection into a repeatable planning system.

Conclusion

Historical spending is a starting clue, not a demand forecast. In the Axon case, quality, customer volume, and service plausibly explain purchasing decisions, but the unreadable graph and absence of quantity data make exact projection impossible. Axon should separate units from price, forecast products before suppliers, test models against simple benchmarks, use scenarios where history is limited, and integrate the result with capacity, inventory, and supplier-risk decisions. A disciplined process will reveal whether rising spend reflects genuine market growth, higher input costs, product mix, or sourcing changes. The strongest future projection is therefore not one number. It is a transparent range supported by data, assumptions, performance evidence, and governance.

References

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