Photo by Kevin Peschke
Kearney, Chicago

Signals amid the noise

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aws

New demand-sensing technology and solutions are capturing the full range of internal supply chain and external market data, for more precise forecasting, despite ongoing market volatility. With enough of the right data at the right time with the right quality, all of the chaos begins to make sense.

With the pandemic finally in the rearview mirror for most developed economies, companies have built enough resilience into their supply chains that they can adapt quickly to, and manage, sudden supply–demand disruptions. So now what? Organizations also need forward-looking strategic planning, and in the current market environment that's no simple matter.

The chaos seen in the past three years predated COVID-19, with the rise in omnichannel, direct-to-consumer (D2C) fulfillment and the added cost and complexity of last-mile delivery. Years of relatively predictable seasonal demand and inventory "pushed" out to distribution centers and retail outlets in large orders have given way to a more decentralized "pull" model. Industrial buyers with lean production models, minimal safety stocks, and time-definite requirements on one hand, and trend-sensitive consumers making highly discretionary D2C purchases across the Internet on the other, are demanding unprecedented speed, schedule reliability, and flexible shipment options.

Omnichannel brought delivery efficiencies that added multiple time-definite and drop-ship location delivery options, often for free. The pandemic added a new wrinkle: where demand had been the largely unknown forecast variable, COVID closures upended supply and demand, creating a "bullwhip effect" as demand surges create supply scarcity and disruption, constraining orders when inventory finally arrives.

Supply–demand dislocation has evolved beyond COVID and extreme events, as evidenced by sudden materials shortages from the war in Ukraine, or the abrupt retail inventory overhang created in mid-2022 as the US Federal Reserve began hiking interest rates to fight inflation.

How is a business supposed to forecast against all of that and adapt in the short term, let alone make informed decisions about capital investments in technology or product development, facilities, staffing, or equipment? Even the highest-quality internal data is, by itself, no longer sufficient for extrapolating the future. Capturing and interpreting the external data needed from suppliers, vendors, and other sources has until recently proven elusive.

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Forecasting time horizons and user archetypes

Forecasting typically deploys mathematical models, aided by human insight and decision-making, to predict future events by extrapolating from patterns in current and historic data—in the case of supply chains, internal operations data, supplier and vendor reporting, customer sales results, and external third-party market and other contextual data.

Forecasts predict and plan for future demand, identify potential business opportunities, and suggest operational and process improvements. Demand forecasting varies based on factors such as seasonality, competition, geography, and product lead time that are tracked or controlled internally, whereas supply forecasting is largely dependent on reporting from supply chain partners and external data providers.

Supply chain planning time horizons include short-term (0 to 2 months), medium-term (2 months to 2 years), and long-term (3+ years). Short-term forecasting typically has an execution focus, aligning purchasing, workforce, inventory, and product levels with demand. It tends to use broader and less quantitative methods, yet is typically more accurate due to the shorter time horizon. Medium- and long-term forecasts deal with more comprehensive issues and support management decisions regarding planning and products, plants, and processes.

How companies use demand and market sensing will vary by each organization's product portfolio or operating characteristics, which in turn help to drive its forecasting time horizon.

Businesses largely dependent on long-term forecasting tend to operate in more predictable markets that are less prone to change. They typically perform specialized manufacturing of high-value products with specialized uses. Capacity is tied to limited, specific demand that is not discretionary, with long manufacturing lead times or, in a case such as agriculture, seasonality. Modifying the product or service, because of its specialization and value, would require heavy capital investment.

Forecasting tends to focus on mid-term to long-term macroeconomic, weather, or input price and availability trends. Sectors include aerospace, defense, shipbuilding, automotive, agriculture, metals, and mining.

Businesses with shorter-term forecasting needs, by contrast, tend toward commoditized products that are widely available to the public in different forms from many competitors. Purchases are discretionary and highly trend-sensitive, driven by mass advertising in entertainment and social media.

Here the forecasting focus is immediate and near-term, prioritizing industry-specific retail and consumer trends influencing consumer preferences and purchasing trends. Industry examples include food and beverage, health and personal care, consumer electronics, and consumer packaged goods.

Product life cycle and its four stages—introduction, growth, maturity, and decline—also play a role. Sales rates of products and services tend to fluctuate over a life cycle; forecasts help predict staffing, inventory levels, and factory capacity at each stage. Products or services in the introduction and growth stages usually need longer forecasts than those in later stages.

Sensing, not just forecasting

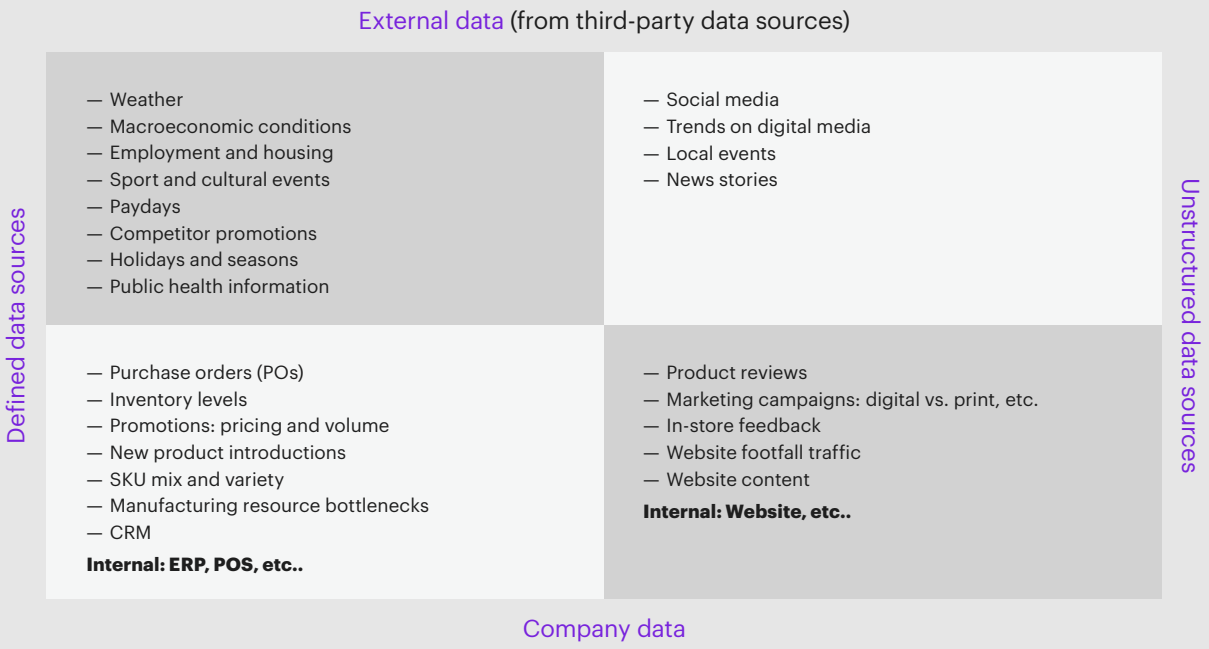
Demand sensing is distinct from conventional forecasting in several key ways (see figure). First, it recognizes the need for a richer set of sourcing, production operations, shipment, order, inventory, and sales data encompassing the complexities of today's supply chains and the range of variables that can drive potential disruption. This data is captured, structured, integrated, and shared in near-real time, providing for the first time a current, transparent, dynamic view of the supply chain.

External data is increasingly crucial, and not only because 80 percent or more of today's supply chain data is now generated externally, by suppliers, vendors, end users, and third parties. It is also important for validation, since recent historical internal data is often corrupted for forecasting purposes by the impacts of COVID; history is no longer a useful indicator of the future.

Sensing uses artificial intelligence (AI) and machine learning (ML), guided by human intervention, to fill in remaining visibility gaps, with real-world context and modeling to pinpoint customer behavior and test probability of multiple outcomes and solutions in near-real time. In this way sensing can build precise, short-term forecasts of customer demand on a daily or even hourly basis.

Finally, the true value of demand sensing is derived from real-time, dynamic information sharing and collaboration across the end-to-end supply chain, versus a top-down model with upstream and downstream partners reporting to, and taking instructions from, a central supply chain client. A more collaborative approach unlocks traditionally siloed cross-functional data within organizations and among supply chain partners, and inevitably transforms historically adversarial relationships as parties pursue and achieve shared, mutually beneficial goals.

Figure
A number of data sets can impact demand sensing



Source: Kearney analysis

Enter Kearney/AWS demand and market sensing

Demand sensing is still in early stages but is seeing considerable interest from major data center and software providers with enterprise software and cloud-based solutions such as SAP and Google—and their customers.

Kearney has teamed with Amazon Web Services (AWS) to roll out their supply chain demand and market sensing platform to address the end-to-end data, forecasting, and collaboration challenges organizations now face.

The demand and market sensing initiative, with support from major US firms in manufacturing and services, with distinct long-term and short-term forecasting profiles, brings to bear Kearney's supply chain, procurement, and corporate governance expertise with AWS's robust technology and retail capabilities, including (see sidebar: Kearney/AWS case studies on page 5):

— Security and data architecture (IAM, Cognito, Secrets Manager), built on AWS data models (Sagemaker) and AWS data lake

— A network of 200+ external demand and contextual third-party data providers

— AI/ML-enabled analytics for real-time capture and interpretation of demand signals

— Short-term (operational), mid-term (tactical), and long-term (strategic) forecasting focus

— Dynamic dashboard, graphing, and other visualization tools that provide an enhanced user experience for planning and decisioning

The pursuit of certainty

Demand forecasting has never been a precise science. Companies have traditionally applied standard forecasting or category trend analysis, or attempted to use shipments as a proxy for consumption. Linking consumption forecast results to the planning process is problematic; the analysis is often a one-off effort, with a lag time of weeks or months between events in the market and completion of the forecast.

The rolling series of "black swan" supply chain events seen in the past three years has rattled global economies and businesses. As firms shift their planning focus from long-term strategy to resilience, they still need a degree of business certainty to make long-term decisions and plan investments. They sense real potential for better data, visibility into sales and operations, and collaboration to provide that certainty.

Perhaps things are about to change—for the better.

Case study #1

Challenge: A $100 billion US telco with retail and online presence needed better demand forecasting accuracy across regions as it purchases and allocates devices and accessories for stores and distribution centers.

Brief: Build a targeted demand-sensing tool focused on OEM 2 smartphone demand across three largest channels: company-owned stores, authorized retailers, e-commerce.

Approach: Consolidate internal and external data from multiple sources on historical sales, promotions, demographics, economic indicators, web data; test efficacy of 1,500+ indicators to predict demand; develop and back-test machine learning models for demand forecasting unit at channel-product level to produce four weeks of demand forecasts.

Results: Baselined seven key metrics, including forecast accuracy, non-deployment rate, and out-of-stock rate; created usable structured client data to identify key sales drivers from 1,500+ variables; developed and operationalized demand-sensing tool with custom user interface to forecast demand for OEM 2 smartphones at all US locations, plus a road map to scale six sensing use cases across the supply chain.

Estimated financial benefits: Twenty-three percent gain in forecast accuracy; 5 percent reduction in inventory on hand; 30 percent annual reduction in fulfillment redirect costs.

Case study #2

Challenge: A $15 billion global tool and hardware manufacturer needed better vendor collaboration and data collection/cleansing to add visibility into market and supplier dynamics and to improve forecast accuracy.

Brief: Develop a market-sensing product to forecast demand for power tools in the US market, and an operating model that can own, drive, integrate, and govern ongoing use.

Approach: For the market-sensing product, identify/prioritize 30+ internal and external data sources to extrapolate a market demand baseline; test correlations and causality of historic data against priority metrics; develop predictive econometric models for target markets and a methodology for forecast accuracy validation.

For the operating model, workshops with key leaders to align vision, scope, and priorities; a future-state model detailing organizational design, roles, and responsibilities; and a road map for change management—essential steps for ensuring effective governance and ongoing use of the tool to drive long-term change and adoption.

Results: A strategic insights data marketplace serving as a single trusted source for external data across six business lines; an enterprise products pipeline with dashboards and tools to manage product data; an SI insights consulting group to build internal forecasting capabilities; and a 90 percent market-sensing forecast accuracy rate over one- to four-month intervals, scaled across product categories and geographies.

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About Kearney

Kearney is a leading global management consulting firm. For nearly 100 years, we have been a trusted advisor to C-suites, government bodies, and nonprofit organizations. Our people make us who we are. Driven to be the difference between a big idea and making it happen, we help our clients break through.

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About the Kearney Supply Chain Institute

The Kearney Supply Chain Institute (KSCI) generates strategic insights to help global business leaders integrate fragmented operational efforts and transform their supply chains. As the authority on supply chain foresights and leading operational practices, we regularly conduct well-regarded studies and competitions on issues critical to the operations world. Whether the topic is the need for growth, cost improvement, sustainability, or resilience, we unravel global value chain trends and inspire action from business leaders as they examine how best to undertake their supply chain transformation.

kearney.com/supply-chain-institute

About Amazon Web Services

For over 15 years, Amazon Web Services has been the world's most comprehensive and broadly adopted cloud offering. AWS has been continually expanding its services to support virtually any cloud workload, and it now has more than 200 fully featured services for compute, storage, databases, networking, analytics, machine learning and artificial intelligence (AI), Internet of Things (IoT), mobile, security, hybrid, virtual and augmented reality (VR and AR), media, and application development, deployment, and management from 81 Availability Zones within 25 geographic regions, with announced plans for 27 more Availability Zones and nine more AWS Regions in Australia, Canada, India, Indonesia, Israel, New Zealand, Spain, Switzerland, and the United Arab Emirates. Millions of customers—including the fastest-growing startups, largest enterprises, and leading government agencies—trust AWS to power their infrastructure, become more agile, and lower costs.

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