Use Advanced Analytics to Make Better Procurement Decisions

Advanced analytics can help CPOs and their organizations to identify new cost-saving and risk mitigation opportunities and enable better decision making. This research helps sourcing and procurement leaders understand this competency, where it is used and how to deploy advanced analytics.

Overview

Key Challenges

- With so much hype and expectation around digitalization, there is a lack of clarity about what advanced analytics means in a procurement context.
- Use cases for deploying advanced analytics in procurement are often unclear, making it difficult to identify and prioritize where procurement leaders should focus.
- Deploying advanced analytics in procurement can seem a daunting prospect, often raising concerns about data quality, tool selection and change management, among others.

Recommendations

Chief procurement officers looking to leverage advanced analytics in direct material sourcing should:

- Distinguish between basic and advanced analytics by understanding the type of outcomes each capability can help to deliver in a procurement context.
- Identify how advanced analytics can help the company achieve its business goals by reviewing the use cases currently in place in leading procurement organizations.
- Create a strategy for implementing advanced analytics by following key principles for use-case prioritization, data quality, tool selection, team composition and change management.

Introduction

As a supply chain function that manages thousands of parts, components, suppliers, purchase orders and spend categories, sourcing and procurement functions are an obvious candidate for
data analytics support. Leading chief procurement officers (CPOs) have been steadily improving their organizations’ visibility of external spend data and capabilities in analysis and reporting for the better part of two decades now. And they have deployed a variety of tools and applications to equip their buyers and category managers with insights that enable them to procure direct materials more cost-effectively.

However, despite some progress, many sourcing and procurement functions have only scratched the surface of analytics’ potential. A Gartner study of procurement executives in 2019 found that spend and cost analytics is the No. 1 area in which they are deploying technology, with 51% actively doing so.¹ Such a focus is underpinned by their belief in the power of big data and analytics to help buyers make better sourcing decisions. This is particularly true for the most mature procurement organizations, where 55% listed data-driven decisions as a top-three factor when prioritizing digital investments and one-fifth ranked it in first place (see Note 1).

Like their colleagues in other functions, CPOs’ enthusiasm for analytics has been partly fueled in recent years by the vast excitement around the potential of big data, machine learning and artificial intelligence (AI) to transform business operations. Data from our 2019 study shows that, aside from enterprise resource planning and mobile apps, “advanced analytics” is the digital technology most highly invested in among leading procurement organizations. The majority are also experimenting with AI — whether in the guise of analytics, automation of sourcing activities, or both — more frequently than with other newish technologies, such as smart contracts, blockchain or robotic process automation (see Figure 1).

Figure 1: New Technologies Procurement Is Currently Investing in
Despite this seemingly positive picture, a note of caution is required. Interviews with procurement leaders at a dozen major companies — more than half of them in the Gartner Supply Chain Top 25 for 2020 — indicate that most are still at a relatively early stage in their analytics journeys. Their capabilities today can more accurately be described as foundational rather than advanced. Nevertheless, a few are genuinely pushing into higher levels of maturity to take advantage of the cost-saving, risk-mitigating and value-creating opportunities offered by advanced analytics.

They are also actively tackling the key challenges associated with what amounts to a transformation of ways of working, as opposed to just another wave of technology implementation. These challenges include data quality and accessibility, finding compelling and scalable use cases, overcoming skills shortages, integrating analytics into the broader sourcing application portfolio, and instilling a data-driven mindset and culture into the activities performed by procurement staff.

Analysis
What Advanced Analytics Means in a Procurement Context

Analytical capabilities, like those involving other types of digital technology, range from foundational to advanced. At the foundational end of the spectrum, “descriptive analytics” uses business intelligence tools, data visualization and dashboards to answer the question “What happened?” or “What is happening?” Examples in the procurement domain include “What did we spend on commodity X in the last quarter?” “Who are our biggest suppliers for commodity Y?” and “How close are we to hitting our cost-saving target for this financial year?” Moving along in the spectrum, “diagnostic analytics” uses techniques such as drill-down and data mining to answer the question “Why did it happen?” Examples might include “Why has supplier A’s performance rating dropped in the past six months?” and “Why are we running behind on our e-sourcing events objective for this year?”

At a more advanced level, “predictive analytics” seeks to answer the question “What will happen?” by interrogating historical and market data and using this to project future potential outcomes. Procurement-specific examples include “What will the future price of commodity B be in the next quarter?” or “Which supplier location is most likely to give us on-time delivery issues in the next few weeks.” Lastly, “prescriptive analytics” goes further still by recommending actions that should be taken in specific circumstances. Examples might be “Purchase X thousand tonnes (kilograms) of commodity Y on the spot market next month” or “Seek to negotiate an X% unit price reduction on commodity Z to reflect new supply capacity opening up this year.” Figure 2 summarizes these different levels of analytical capability.

Predictive and prescriptive advanced analytics go beyond foundational descriptive and diagnostic analytics in terms of both the insights generated and the degree of decision-making support.
provided. The addition of machine learning algorithms and AI can enhance such analysis in two ways: first, by processing unstructured data and natural-language-based information; and second, by self-learning over time as ever-larger datasets are consumed. Taken together, these capabilities comprise “advanced analytics.”

Gartner defines advanced analytics as follows:

“Analysis of all kinds of data using sophisticated quantitative methods to produce insights that traditional approaches to business intelligence (BI) — such as query and reporting — are unlikely to discover. Advanced analytics span predictive, prescriptive and artificial intelligence techniques.”

Conversations with sourcing and procurement executives responsible for driving digital transformation in their organizations highlight the fact that today most are operating at the level of foundational descriptive and diagnostic analytics rather than advanced analytics. So far, their capability-building efforts have been focused in two main areas. First, structuring, cleansing and enriching spend data in a central data warehouse or data lake to make it reliable and accessible (see “Data Hubs, Data Lakes and Data Warehouses: How They Differ and Are Used in Supply Chain”). Second, adding cloud-based visualization tools, such as Tableau and Power BI, to existing spend analysis or other sourcing applications to enable staff to create custom dashboards and query the data more easily.

At one large mobile network operator, for example, buyers working in different countries now have quick access to the latest supplier and contract information. Procurement also provides “narrative analytics” for C-level executives — a one-to-two page view of key data on supplier spend, savings, commercial disputes and so on. The leader of its analytics initiative describes its efforts to date as “making sense of what’s happening in the organization” and “showing what’s going on in a nice way.” In parallel, though, the leader’s team has been busy developing its “data layer” and new category-based datasets that will enable more sophisticated analytical techniques to be used going forward.

Five Compelling Use Cases for Advanced Procurement Analytics

One of the key challenges with advanced analytics, as with digital procurement more broadly, is identifying compelling use cases. In our 2019 survey, more than one-third of participants ranked “unclear use case and return on investment” among their top-three implementation challenges. (A fragmented vendor market, cultural resistance and IT infrastructure constraints were the other
most commonly identified barriers.) Procurement organizations that are most actively pursuing advanced analytics are typically targeting their efforts in five broad areas, as shown in Figure 3.

**Figure 3: Top Uses of Advanced Analytics in Procurement**

**Top Uses of Advanced Analytics in Procurement**

- **Cost and Price Visibility**
  Getting better visibility of pricing and cost drivers, and then using this information in sourcing events and supplier negotiations, is the highest-rated use case for advanced analytics. Gartner's 2018 Future of Supply Chain Study found that 57% of procurement professionals expect greater transparency to deliver "significant impact" for their companies by 2025 (see Figure 4). As an example, IBM's procurement function uses its Watson-based Pricing IQ tool to analyze internal pricing trends, external intelligence and market sentiment to guide its buyers on the correct prices for specific items at any given time. Using this tool reduces the time spent analyzing price rates by 80% and generates significant incremental cost savings, according to its CPO, Bob Murphy.

- **Plenty of procurement teams, notably in the automotive sector, use should-cost models for direct materials already. But advanced analytics can be used to accelerate the process and deepen the insights obtained. A major global food company is using advanced analytics tools to compare the cost elements of supplier bids in minute detail. In 2019, this delivered additional cost savings of 2% to 3% on key ingredients, raw materials, and packaging and logistics, according to the leader of its digital procurement transformation initiative. The leader's counterpart at a U.S. high-tech manufacturer says the insights gleaned from detailed cost analysis can also be used to inform value engineering discussions during the new product introduction process. If engineers...**
understand cost drivers better, the leader explains, it will help them to make better-informed decisions about design features and component usage that eliminate unnecessary expense.

Figure 4: Expected Impact of Analytics and AI on Procurement

Expected Impact of Analytics and AI on Procurement

<table>
<thead>
<tr>
<th>Area</th>
<th>Significant Impact</th>
<th>Moderate Impact</th>
<th>No Impact</th>
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<tbody>
<tr>
<td>Make Cost Drivers and Pricing Much More Transparent</td>
<td>26%</td>
<td>53%</td>
<td>21%</td>
</tr>
<tr>
<td>Identify Cost Savings and Other Value Opportunities</td>
<td>47%</td>
<td>42%</td>
<td>11%</td>
</tr>
<tr>
<td>Accurately Predict Future Cost of Raw Materials, Components, etc.</td>
<td>42%</td>
<td>45%</td>
<td>13%</td>
</tr>
<tr>
<td>Monitor Contract Terms (e.g., Volume Discounts, Index Pricing, Efficiency Incentives, SLAs)</td>
<td>49%</td>
<td>37%</td>
<td>6%</td>
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n = 117
Base: Procurement respondents
Q: What will be the impact of technology and automation on sourcing and procurement in your company by 2025?
Source: 2018 Gartner Future of Supply Chain Survey

Purchase Volumes and Timing

Using analytics to optimize purchase volumes and the timing of sourcing events opens up further opportunities for cost savings. Another large food company reckons that around 40% of the ingredients and raw materials it buys annually are unplanned. It is currently developing predictive capabilities to anticipate volumes more accurately and reduce higher-priced spot buys by as much as half, saving tens of millions of euros a year. Its analytics group is also using data to assess bundling opportunities and the best windows to renegotiate existing contracts or sign new deals. The U.S.-based, high-tech manufacturer has run a series of benchmarking exercises to determine the best time to update to the latest technologies based on component life cycle and market dynamics. Its digital procurement leader describes this as “changing the way we play chess with suppliers.”
Contract Terms and Compliance

IBM’s procurement organization uses Watson’s natural language processing capabilities to cut the time it takes to analyze legal documents by as much as 90%. Identifying terms such as foreign exchange clauses across thousands of contracts and then monitoring invoice compliance against these when currencies move by certain percentages is another source of savings, explains Murphy. A telecom equipment maker has piloted analytics of quality and delivery key performance indicator (KPI) failure rates above set thresholds that trigger penalty payments or rebates. It is also tracking payment terms deviations to ensure that it doesn't pay suppliers earlier than it needs to — and if it does, to request credit notes.

Future Commodity Pricing

Figure 4 shows that 40% of our survey sample anticipates significant benefits from using advanced analytics to predict the future cost of raw materials and components. One PC maker has been using sophisticated algorithms to predict prices for key commodities, such as gold, copper and DRAM, up to 12 months ahead for more than a decade now. But advanced analytics tools open up the possibility to automate the data crunching, do it much faster and scale the analysis to a bigger basket of materials — resins and plastics, for instance. It also makes the results accessible in real time rather than on the weekly or monthly cadence provided through today's manual process. Similarly, the CPO of one U.S. food producer sees an opportunity to make its existing analysis of index-traded commodities "more digitally robust." And the head of procurement excellence for a rival firm says that the use of machine learning tools has increased the accuracy of its predictions for commodities such as corn — an average deviation of around 2.5% against actual market pricing, compared with 4.5% for human experts. This enables recommendations to be made to help guide forward sourcing decisions — in other words, prescriptive analytics.

Supplier Risk Management

Only 5% of organizations use predictive and prescriptive analytics to help them identify potential supply disruptions before they happen, our 2018 research found. But by 2025, three-quarters of supply chain professionals expect to have this capability. Aside from the cost and pricing opportunities already highlighted, supplier risk management was the most frequently mentioned use case for advanced analytics among the executives we interviewed. Tier 1 automotive supplier BorgWarner was an early pioneer in this area. Its internally developed Supplier Performance Monitor tool used the Hidden Markov Model to crunch historical data on supplier deliveries, quality and financial health to predict which firms and plants had the highest risk of subpar performance in the future. Other companies, including industrial products maker Schneider Electric, have experimented with similar models in the past couple of years. The head of procurement transformation at a global beverage firm sees “vast” potential in this type of risk analysis. This executive said that the ability to make rapid predictions about supplier capacity and lead times during the early phases of the COVID-19 pandemic, for example, would have been invaluable.

Getting Started on the Journey to Advanced Analytics

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As with any digital transformation initiative, the use of advanced analytics to make better decisions and increase the value generated by the direct material sourcing team is a journey involving several stages. The evolution companies follow is based on two factors: the type of analytics used and how they are delivered to end users (see Figure 5).

**Evolution Stages of Procurement Analytics**

At early stages, procurement organizations focus on developing foundational analytics to gain insights in the form of ad hoc, static reports. From here, companies then focus on enabling end users to access these insights using on-demand, dynamic reporting dashboards. Dynamic dashboards like these have enabled a U.S.-based consumer packaged goods (CPG) company to increase user adoption, as now users are able to create tailored reports that help them uncover deeper insights specific to their spend categories. The next stage is where companies begin scoping advanced analytics use cases, which are generated in the form of static reports to be used for specific activities. For example, the analytics team in a U.S.-based, high-tech manufacturer generates a quarterly report with anticipated cost driver changes to be used by its procurement leaders during its quarterly price negotiations with suppliers. The final stage, where procurement leaders get access to predictive or prescriptive insights on-demand is perhaps one of the biggest challenges even the most sophisticated companies we interviewed are faced with.

CPOs looking to move beyond routine spend analysis and add predictive and prescriptive capabilities over the next few years should consider the following advice to get started, or accelerate their progress, on this journey.

**Focus on Insights the Business Needs**

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Obvious as it may seem, ensuring that the insights derived from advanced analytics actively support business goals and financial objectives is paramount. The technical orientation of data science means it’s all too easy to end up in analytical rabbit holes if you don’t start out with the focus and act to maintain it. The digital procurement team at one telecom equipment maker ran brainstorming sessions with stakeholders — both inside and outside the function — to understand their needs, prioritize use cases and decide which data models to build and test. Speed can be an important factor here. Models that take months to develop without delivering any tangible benefits are likely to be harder to justify than those that can be pulled together and piloted in specific spend categories just a few weeks.

Create an Analytics Strategy and Roadmap

Use-case prioritization should form part of an analytics strategy and roadmap, whether stand-alone or as part of a wider digital procurement transformation program. This should set out what you want to achieve and the time frame and the investment required for priority projects. One global CPG company started its journey by running a series of Google Design Sprint workshops with 20 buyers and business users to define the key opportunities where analytics could drive value. These were mapped to 18 “competitive buying modules” and a two- to three-year timeline consisting of three distinct phases. Each has a series of projects covering data quality, data modeling and visualization, analytics and intelligence, and orchestration and integration activities. These are supported by a set of technical workstreams designed to provide the data and tools required.

Build a Quality Data Foundation

Advanced analytics feeds on a plentiful supply of well-structured and accessible data contained in a lake, a warehouse or some other centralized entity. But creating a robust data foundation of this kind is far from easy. In our 2019 survey, almost one-third (32%) of procurement leaders ranked “poor data availability and/or quality” as a top-three challenge in implementing a digital strategy. A majority of executives interviewed also cited trust in the data as a prerequisite for progress. At the same time, noted one, you have to accept that the data will never be 100% right, so it’s important to define acceptable thresholds and tolerances. These may vary depending on the use case and time period involved, but in general, 85% to 95% data quality is good enough, he suggests. Another leader adds that since quality data is so fundamental to analytics success, it can’t be left to a small team of technical specialists. “Data is everybody’s problem and everyone has to be part of the solution,” the leader says. For more on this topic, see Supply Chain Executive Report: Build a Data Foundation for Future Success.

Choose Your Tools Wisely

If waiting around for perfect data is a barrier to progress, then the same is true of analytics tools and technologies. The fragmented and incomplete nature of solutions currently available in the market were identified as key challenges in our 2019 survey. Nevertheless, advises one CPG digital transformation leader, this is no reason not to push forward with analytics initiatives. “It’s better to be fast and half done than slow and perfect,” the leader says. Choosing your tools wisely is also
important, adds a counterpart at a big food company, since some are very expensive and can quickly “blow up your ROI and your journey.” But you can’t do advanced analytics at scale using Excel, either, so you need to work with IT colleagues to select suitable alternatives and to create easy-to-use, self-service dashboards for buyers and other users (see Market Guide for Supply Chain Analytics Technology). One high-tech firm set up an analytics council made up of procurement, IT and data engineering staff to kick-start the discussion and agree on the right tools and data sources to power its advanced analytics initiative.

Get the Right Talent in Place

The effective application of advanced analytics in direct material sourcing requires a mix of data science skills and procurement know-how. Some CPOs have opted to build a small team of data scientists within their organizations by hiring from the external market. But attracting such talent into procurement is neither easy nor inexpensive, so others have chosen to use data scientists based on shared services centers or business analytics teams, retrain digitally savvy sourcing staff or partner with universities and student interns. Whichever route you go down, ensuring that data models and algorithms are informed by procurement and category expertise is essential. Starting last year, one CPG firm created a cadre of over 100 “citizen data scientists” drawn from its procurement and supply chain groups. These individuals help to define use cases and experiment with data that may be useful for generating insights. Defining the digital and technology skills required across the procurement team more broadly is also important. One mobile network operator assessed the digital competencies of all its sourcing staff and asked them to take ownership of an individual development plan that sets out the training steps relevant to their current roles and future career goals.

Develop an Analytics Culture

Actively involving team members in analytics experiments and asking them to take responsibility for data quality and personal skills development are ways of building a digital mindset and culture. Despite the potential benefits on offer, resistance to data-driven methods can be strong among some procurement professionals, especially those that rely on many years of experience and instinct. So a mixture of sticks and carrots is required to change behaviors and instil analytics in day-to-day work. CPOs should set an example for their teams by demonstrating their personal use of data and analytical insights. They also need to challenge staff who discourage or block adoption, whether they are senior direct reports, middle managers or junior research analysts. One CPO has added KPIs to assess how often individuals are using its data analytics tools each month. If they are not using them regularly, the question to them is simple: “Why not?” Another recommends reducing the time allocated for certain sourcing activities, to force people to change how they operate. On the incentives front, a big CPG firm encourages healthy competition between its sourcing teams on their use of data and tools, such as Power BI. It has created a “data garage” where they can publish their best dashboards and invite colleagues to help improve them.

Acronym Key and Glossary Terms
<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tr>
<td>Advanced analytics</td>
<td>Analysis of all kinds of data using sophisticated quantitative methods to produce insights that traditional approaches to business intelligence (BI) — such as query and reporting — are unlikely to discover. Advanced analytics span predictive, prescriptive and artificial intelligence techniques.</td>
</tr>
<tr>
<td>Artificial intelligence (AI)</td>
<td>A set of technologies that seeks to mimic human ability to understand data, find patterns, make predictions and find recommended actions without explicit human instructions. What distinguishes AI technology from traditional predictive and prescriptive analytics is its ability to self-learn and/or process natural language.</td>
</tr>
<tr>
<td>Citizen data scientists</td>
<td>Individuals with professional experience or educational background in the analytics field who are responsible for executing a variety of “more simple” data science tasks, utilizing embedded analytics and more intuitive data discovery and modeling platforms.</td>
</tr>
<tr>
<td>Data scientists</td>
<td>Individuals with advanced degrees in quantitative disciplines, such as mathematics, computer science or operations research, who are responsible for performing complex data discovery and exploration, and building complex advanced analytics and machine learning models.</td>
</tr>
<tr>
<td>Descriptive analytics</td>
<td>The examination of data or content to answer the question “What happened?” or “What is happening?” using business intelligence (BI) and data visualizations, and dashboards.</td>
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<tr>
<td>Diagnostic analytics</td>
<td>A form of analytics which examines data or content to answer the question “Why did it happen?” using techniques such as drill-down, data discovery, data mining and correlations.</td>
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<tr>
<td>Predictive analytics</td>
<td>Set of technologies that predict future scenarios. Examples: raw material costs, supplier delivery performance.</td>
</tr>
<tr>
<td>Prescriptive analytics</td>
<td>Set of technologies that recommend an action. Examples: use of spot market purchases, supplier negotiation tactics.</td>
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**Evidence**

1 2019 Gartner Procurement’s Contribution to Value in Supply Chain Survey (n = 264). This primary research study was designed to understand the business outcomes procurement. It is most focused on supporting the primary levers it is using to achieve these business outcomes and the technology enablers required to operate these levers effectively. It was conducted online during July and August 2019 among 264 respondents in North America, Latin America, Western Europe and Asia/Pacific regions. Respondents at manager level with primary involvement and
responsibility for the sourcing and procurement function were surveyed in companies from the retail, manufacturing, healthcare and natural resources sectors with annual revenue of at least $1 billion. The study was developed collaboratively by Gartner analysts and the primary research team supporting supply operations.

2 2018 Gartner Future of Supply Chain Survey (n = 1,526).

3 Presentation by Bob Murphy, CPO of IBM, at the Digital Procurement World conference in Amsterdam, 18 September 2019.

4 Video: Creating a Supplier Performance Monitor to Quickly Identify and Mitigate Risk.

**Note 1: 2019 Gartner Procurement’s Contribution to Value in Supply Chain Survey**

The study asked respondents to self-assess their effectiveness across six capabilities — business alignment, stakeholder engagement, category strategy, supplier partnerships, supplier risk management and talent development — on a 1 to 7 scale, with 1 being “not at all effective” and 7 “highly effective.” Mature sourcing and procurement organizations were defined as those that scored a 6 or 7 on all six capabilities. A total of 65 of the 264 participating organizations fulfilled this criterion.

**Recommended by the Authors**

Map Your Journey to Supply Chain Analytics Excellence With Gartner’s Five-Stage Maturity Model

Transforming Procurement Through Digitalization

Supply Chain Executive Report: Build a Data Foundation for Future Success

When and How to Combine Predictive and Prescriptive Techniques to Solve Business Problems

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