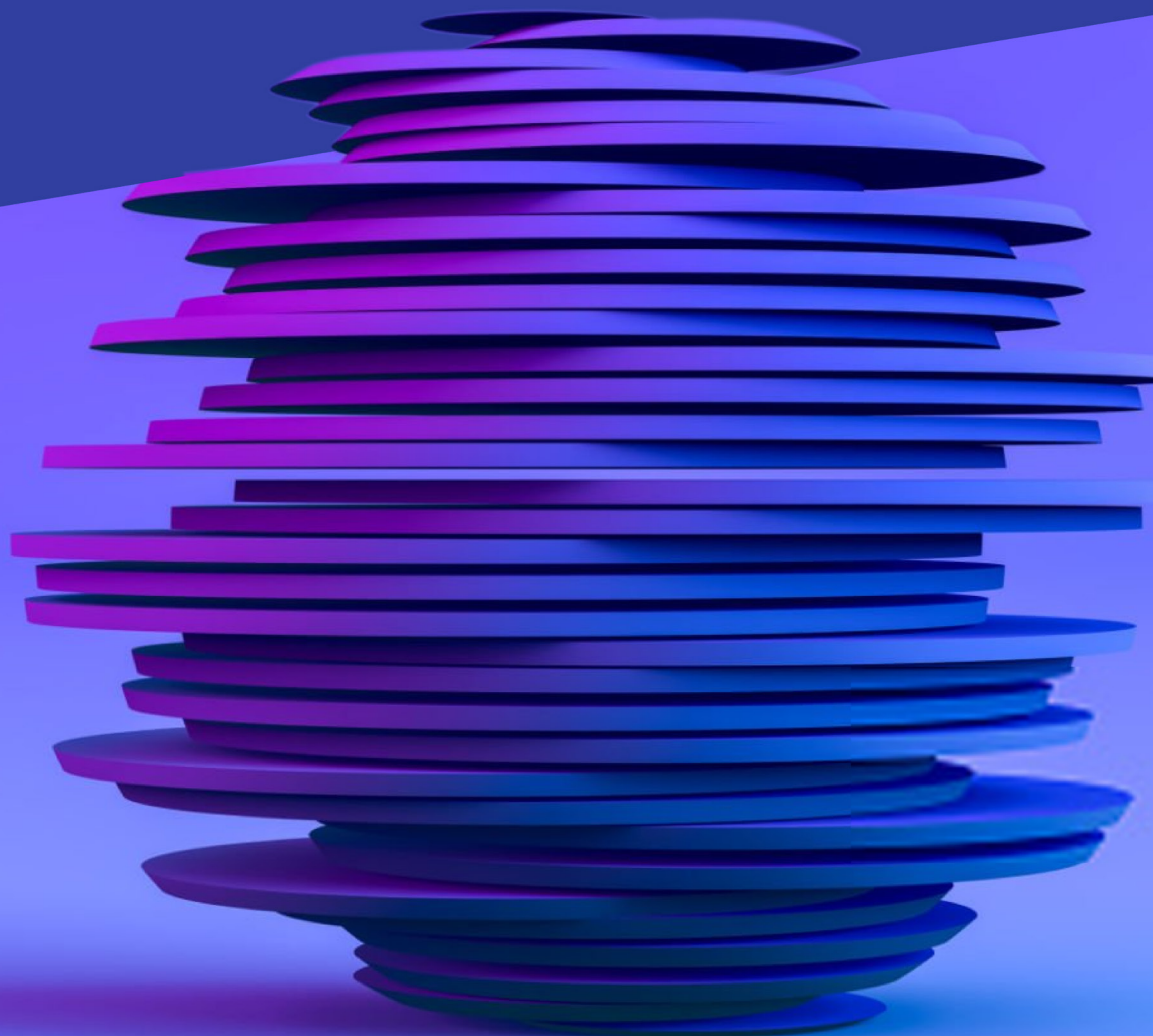


pactera **EDGE**

# The Future of Forecasting

Leveraging machine learning and real-time  
data for future-ready forecasting



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# The Covid-19 pandemic has proven that history no longer repeats itself when it comes to understanding consumer behavior.

Demand forecasting systems have been ill-equipped to address disruptions to our daily lives globally. Consumer packaged goods (CPG) companies and retailers were caught flat-footed as unforeseen panic buying took hold throughout 2020, resulting in product shortages. And as it turned out, the onset of the Covid-19 pandemic in 2020 was just a warm-up for what was to follow. A global supply chain disruption, inflation, and the emergence of coronavirus variants have continued to wreak havoc with demand forecasting.



How can CPGs and retailers adapt? This is an important question. The businesses that figure out the answer stand to gain a huge competitive advantage. That's because demand forecasting, when done well, helps CPGs and retailers avoid frustrating inefficiencies such as stockouts caused by the misalignment of supply and demand across the business operations. Accurate demand forecasting, which relies on predictive analytics, means making better decisions that affect all aspects of CPG and retailing operations – including budgeting, pricing, capacity planning, workforce planning, etc.

# Rethinking Demand Forecasting

The journey starts by rethinking the demand-forecasting process. Traditional approaches employ consensus forecasting. Each function involved in demand forecasting – operations, finance, sales, and marketing (which is responsible for promotions, discounts, and so on) – uses standard statistical techniques, historical sales data, and some external data to generate its forecast.

This approach has several flaws. First, fine-tuning the models and arriving at a consensus that satisfies all business requirements takes five to six weeks. More often than not, resolving conflicts in forecasting involves gut feelings about what drives sales, revenues, and margins. This time frame is much too slow.

**These inefficiencies were amplified as the pandemic took hold. Forecasting performance dropped to an all-time low.**

During the onset of the pandemic and after new normal periods, planning errors were 20-percent-to-30-percent higher than the pre-pandemic baseline.

## AI is Part of the Solution

So, what is the answer? Artificial intelligence is part of it. Models based on artificial intelligence are superior to traditional approaches.

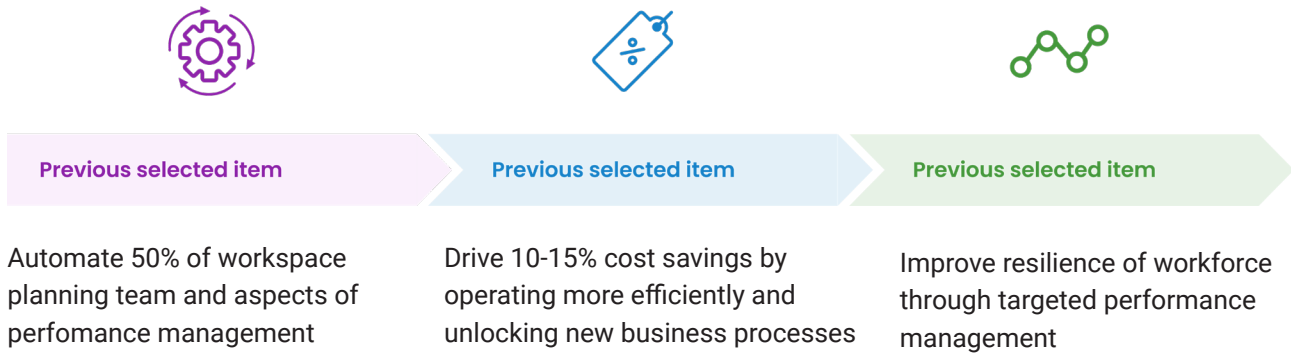
**Businesses can reduce errors by between 20 percent and 50 percent by applying AI-driven forecasting to their supply chains.**

According to McKinsey, this can reduce lost sales and product unavailability by up to 65 percent, among other benefits.



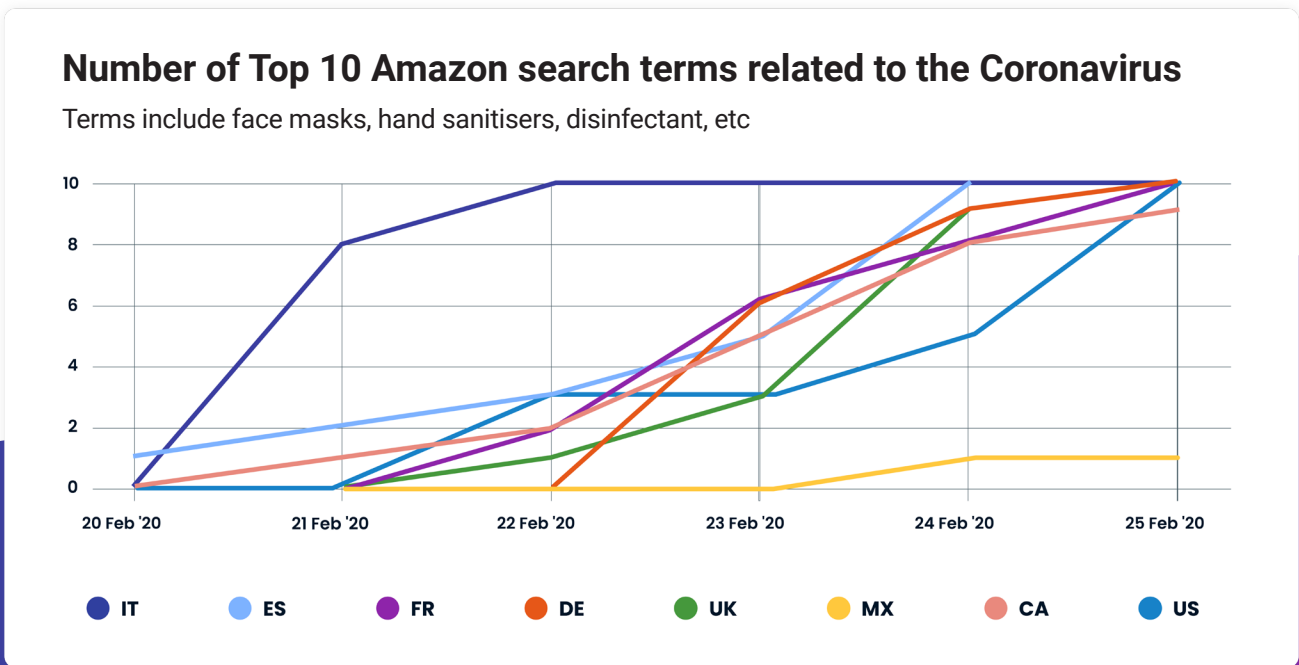
# Enabling AI-driven forecast models in operations unlocks multiple sources of value.

Levels of results of AI forecasting engines



Source: McKinsey & Company

But the pandemic has exposed some weaknesses in AI, particularly models trained on human behavior. Consumers quickly resorted to panic buying face masks, toilet paper, cleaning solutions, hand sanitizers, and other health and safety products. As noted in MIT Technology Review, the typical products that compose Amazon’s top ten, such as phone cases and phone chargers, were knocked off the charts in just a few days as people searched for coronavirus-related products:



Source: Nozzle

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As lockdowns took effect, retailers then experienced a spike in demand for products most suitable for use in the home, such as cookbooks, puzzles, and home crafts. The problem is that demand forecasting models that rely on machine learning did not account for those sudden shifts in demand, and many businesses were unable to keep up.

## AI + Real-Time, Third-Party Data

AI is not the problem. When trained with proper data, AI unearths patterns of behavior more effectively than any human being can. But learning is based on historical data. These models need to be complemented by real-time data from third-party sources as more businesses discover.

Per McKinsey,

“Externally sourced data can cover a variety of sources and content, including social-media activity, web-scraping content, financial transactions, weather forecasts, mobile-device location data, and satellite images. Incorporating these data sets can significantly improve forecast accuracy, especially in data-light environments. These sources provide an excellent option for the inputs required for AI-driven models and create reasonable outputs. The market for external data is expected to have a CAGR of 58 percent, reflecting the increasing popularity of these data sources and the significant expansion in the types of external data available.”

## What kind of real-time data? Here are some examples:



**SEARCH TRENDS**, especially those unearthed from the most popular sources of product-related searches, namely Google and Amazon. According to Google, as people went into lockdown mode during the pandemic, Google noticed an uptick in searches for “candle-making kits” (a 300-percent increase). Searches for “patio heaters” increased by 600 percent as people moved to eating outdoors. Indeed, people search with the intent to purchase on Amazon and Google – say, “steaks on sale near me.” But people also do searches for topics that are not necessarily purchase-related but offer some insight into a possible surge in product demand – say, “tips for planning a cookout.” This is known as a nonlinear connection, meaning the data offers a clue about what a consumer might be seeking to purchase – but the cause and effect are not as clear. By contrast, an overt search to buy something (“steaks on sale near me”) is a linear connection because the intent to purchase is overt.

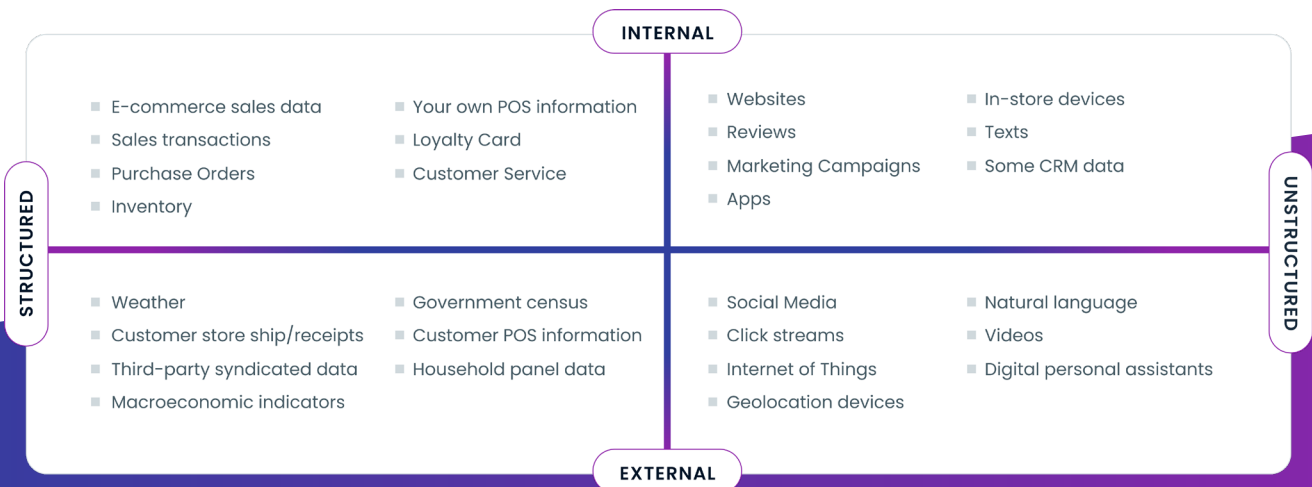


**SOCIAL MEDIA.** People are not necessarily searching with the intent on social media sites, but they do discuss trends that offer some insight into probable buying behavior. In fact, retailers have been learning how to study TikTok to understand purchasing trends. ‘TikTokers’ often use the hashtag #TikTokMadeMeBuyIt to post content about products they discover on the platform. Of course, the challenge is to anticipate trends before they happen. Social listening tools make it possible for businesses to monitor these sites and do that.



**WEATHER DATA.** For instance, access to real-time weather data can help CPG companies and retailers coordinate the planning of trade promotions that target seasonal products. Instead of planning months ahead, CPGs and retailers can plan in a far more agile fashion as changes in weather patterns happen. They can also respond to unseasonal changes in weather, such as unexpected cold fronts in warm-weather areas.

Figure 2: Example of data types, structures and sources



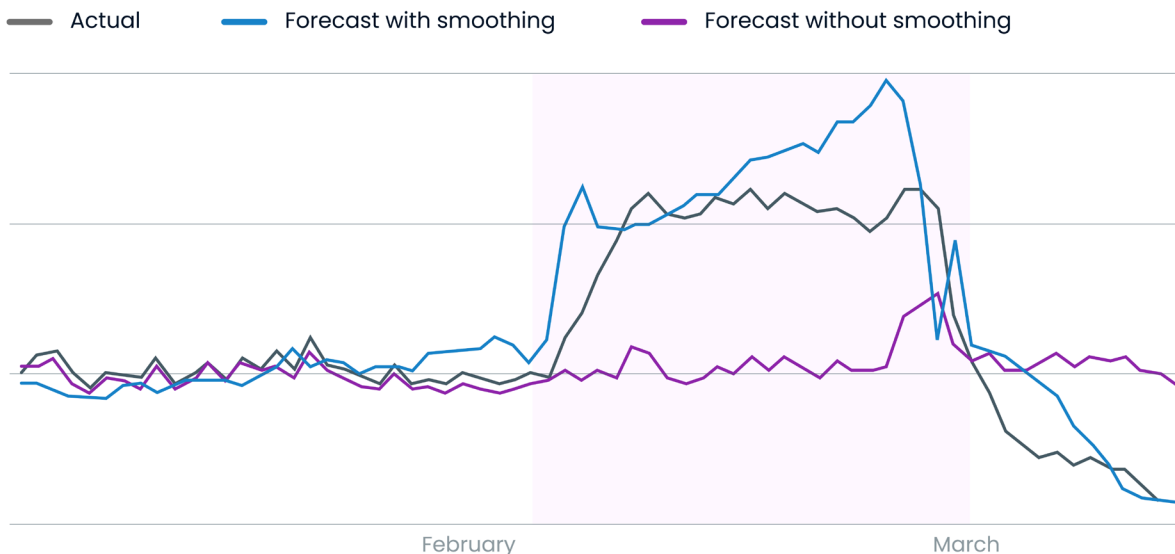
Source: (Alexsoft, 2019)

The following image, courtesy of McKinsey, illustrates the forecast outputs for maintenance work in a single region, with and without weather data. The image shows that the number of maintenance work tickets increased in February. But this data was not reflected in the original forecast (which lacked the weather data). That’s because the same period last year did not experience a similar exception that an AI model could learn from. Providing the AI model with weather information allows it to learn how temperatures and humidity levels influence higher levels of maintenance work. The model successfully applies this insight to predict a higher level of maintenance work for February. This kind of insight would apply to CPG and retailing, for instance, to understand how weather variances might affect the availability of factory workers, warehouse employees, and store associates needed to manage peak volumes:

### Incorporating weather data helps predict maintenance demand.

Illustrative chart on maintenance demand

This period coincides with a storm. Inclement weather leads to about a 50% - increase in maintenance demand. When the model factors in weather data, these demands can be anticipated.



Source: McKinsey & Company



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But there's a catch: this real-time data is unstructured, meaning it's not the result of a formal survey mechanism or other tool managed by a company. A business needs to go out and find it. Google processes 8.5 billion searches a day. No human being can keep track of all that search activity, much less look for trends they reveal. But with machine learning, CPGs and retailers can shift through it and find patterns and associations that would go undetected by manual means.

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## The Value of AI

*AI models are especially adept at finding nonlinear connections that are crucial for demand forecasting – such as less obvious search behavior cited above, where intent to purchase is not overt. Even an automated platform would have difficulty uncovering those nonlinear associations without advanced AI Models. AI Models and real-time data together are a powerful one-two punch. With the ability to understand nonlinear patterns across unstructured data, CPGs and retailers can:*

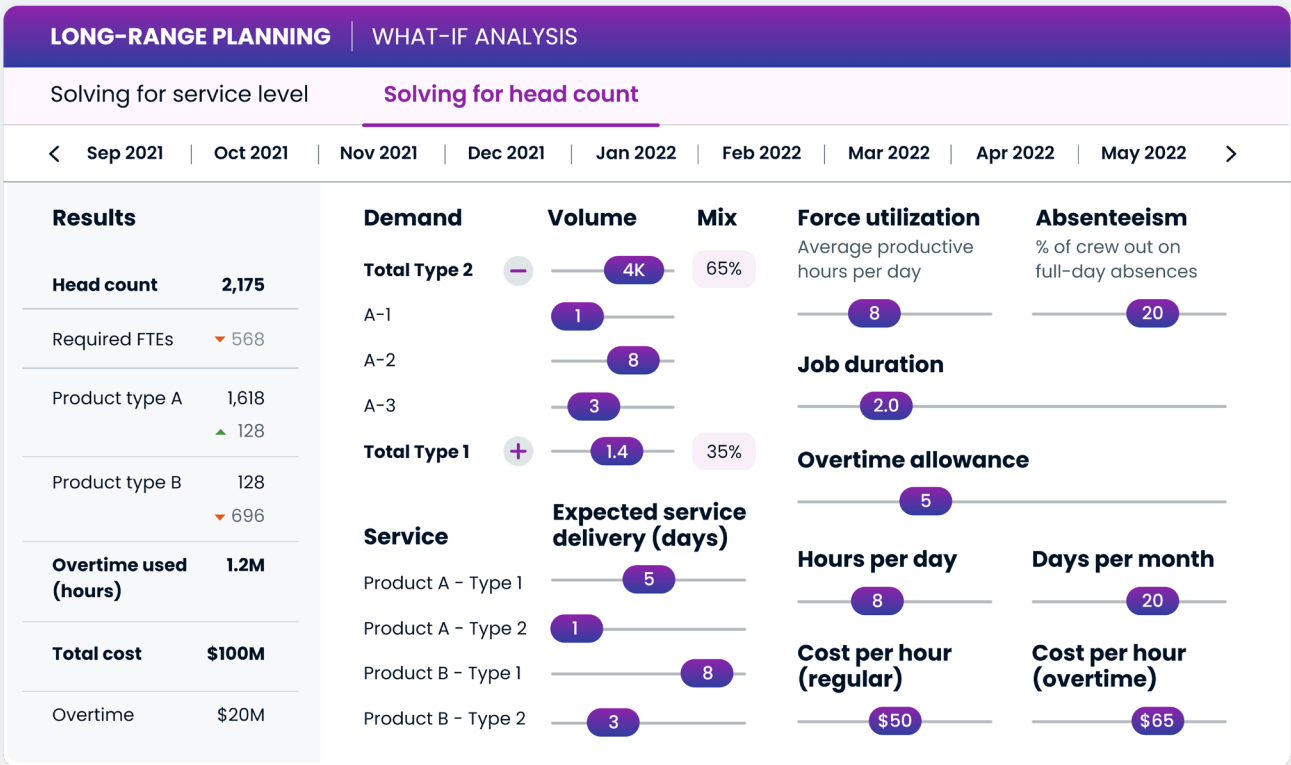
**More effectively uncover emerging consumer behaviors** such as panic buying brought about by external forces such as a weather event or the emergence of a coronavirus variant.

**Do scenario planning.** CPGs and retailers can do “what-if” analysis with computer simulations. For instance, they can analyze the likely impact of running a promotion at a specific date based on the anticipated actions of a competitor. The potential scenarios are endless. For instance, how might the rising cost of gasoline in one city affect a planned promotion for a nonessential CPG product versus a staple good in rural areas versus cities? This kind of planning can be done with little investment.



Research has shown that by using machine learning and third-party data such as search trends and real-time data to sense demand, CPG firms have cut forecast errors by more than one-third across all pandemic stages. They've also reduced the volume exposed to an extreme error by half. They have driven a six-fold increase in realized value from investments in people, processes, and technology related to planning. One such example is the integration of binary variables for the lockdown of the locality based on the number of cases and intensity of search trends.

**A what-if tool lets users test a wide range of parameters in designing scenarios.**  
 Illustrative user interface for creating forecasts



Source: McKinsey & Company

L’Oréal, a French multinational and one of the world’s largest beauty products manufacturers, has used information from various sources to anticipate trends, optimize sales and predict customer demand. L’Oréal uses sources such as social media, weather, and financial market indicators – along with data gathered at point-of-sales, such as collection, reception, and inventory – as a starting point. From there, L’Oréal can target customers more effectively and respond to the challenge of demand volatility.

# The Explainability Factor

AI-based demand forecasting begins with explaining why people act. Everything after that, including predicting tomorrow’s behavior, begins with understanding why they behave today. Explanation is key to making that decision more effectively. This is another example of how third-party data and machine learning can help right now –going beyond optimizing your inventory today and answering where a purchase pattern (such as panic buying for hand sanitizers and toilet paper) is likely to happen again and when.

Any variation in sales forecast should be explained either by competitor behavior, cannibalization, promotions, or discounts or merely by special holidays or influenced by current economic conditions, a pandemic, or lockdowns. For example, according to IRI, Covid-19 triggered panic buying in categories such as sports drinks. The power of machine learning and real-time data is that together they can assess how likely these surges will return.

## Some Categories (e.g., Frozen, Sports Drinks) Maintain Elevated Consumption Levels, Some Begin to Improve (e.g., Bakery) While Others Revert

Latest 4 Weeks Category Volume Elevation vs. 2020 Volume Elevation, MULO

Category type: Perimeter Edible Nonedible

HIGH CONSUMPTION HOLDING			REVERTING CONSUMPTION			MINIMAL IMPACT			IMPROVING CONSUMPTION		
Category	2020	L4	Category	2020	L4	Category	2020	L4	Category	2020	L4
Drinkware	22	18	Frozen Vegetables	15	-1	Pain Relief	0	0	Perimeter Bakery	-21	3
Fresh Seafood	28	16	Flour	31	0	Pet Food	-1	0	Eye Cosmetics	-14	3
Frozen Seafood	35	13	Paper Towels	20	1	Laundry Detergent	0	-3	Chocolate Candy	0	3
Frozen Fruits	29	12	Pasta	20	1	Water	2	0	Snacks Bars	-6	0
Sports Drinks	12	9	HH Cleaner	27	3	Skin Lotion	2	2	Prepared Dell	-20	-4
Sleeping Remedies	13	7	Vitamins	17	3	Skin Care	-2	-3	Deodorant	-11	-4
RTD Tea/Coffee	13	6	Soap	32	4				Facial Cosmetics	-25	-7
Frozen Dinners	11	6	Baking Mixes	23	4				Gum	-27	-12
Baby Formula/ Electrolytes	4	9	Baking Needs	25	6				Prepared Salads	-21	-14
			Fresh Vegetables	14	6						

2020 Volume Elevation: ppt difference 52 WE 2/21/21 Growth Rate - 3 Year CAGR; L4 Volume Elevation: ppt difference L4W vs 2019 - 3 Year CAGR.

# Introducing, Meerkat

## See things others don't, in ways others can't

To overcome forecasting and investing challenges, you need ground level perspective. You can't keep pace with a shifting world without operational agility, vision for what's coming, and attention to disruptions below the surface. That's why we created **Meerkat**.



**Meerkat** is an all-in-one demand, pricing, and promotions planning platform from Pactera EDGE that gives users the ability to deliver the right product, at the right moment, at the right price while simultaneously delivering financial value for your stakeholders.



**Meerkat** leverages state-of-the-art, pre-trained AI models that are fueled by your own company data, alongside a broad range from our extensive data partner ecosystem, to solve questions that are top-of-mind for today's CPG and Retail brands.

### ✓ **Right Product**

Sense threats and activate with precision.

### ✓ **Right Moment**

Set the standard in executional excellence.

### ✓ **Right Price**

Maximize market share rapidly and at scale.

**To speak with one of our experts, [contact us](#).**

Authored by Vasudevan Sundarababu, SVP and Head of Digital Engineering.

# It's time you were able to focus on what matters most - delivering exceptional customer experiences...

## The Pactera EDGE White Glove Service Different by design.

From start to finish, The Pactera EDGE White Glove Service enables you to act with agility and accuracy as you enhance your overall business and brand experience. When you're ready, we're ready (because we're always ready).

Unlike the competition, we'll work shoulder-to-shoulder with you to enable rapid and sustained value growth for your stakeholders.

