TREK

LOKAD

OPTIMIZING TREK'S INVENTORY FOR CONFIGURABLE, HIGH-END BIKES

TREK

a global leader in bicycle manufacturing, partnered with Lokad to tackle the extreme complexity of its Project One line of highly configurable bikes (often valued at $10,000 US or more). Through Lokad's probabilistic forecasting and advanced decision optimization, Trek has streamlined its inventory management and reduced costly stockouts while maintaining its customer-promise of delivering bespoke bikes in under 30 days.

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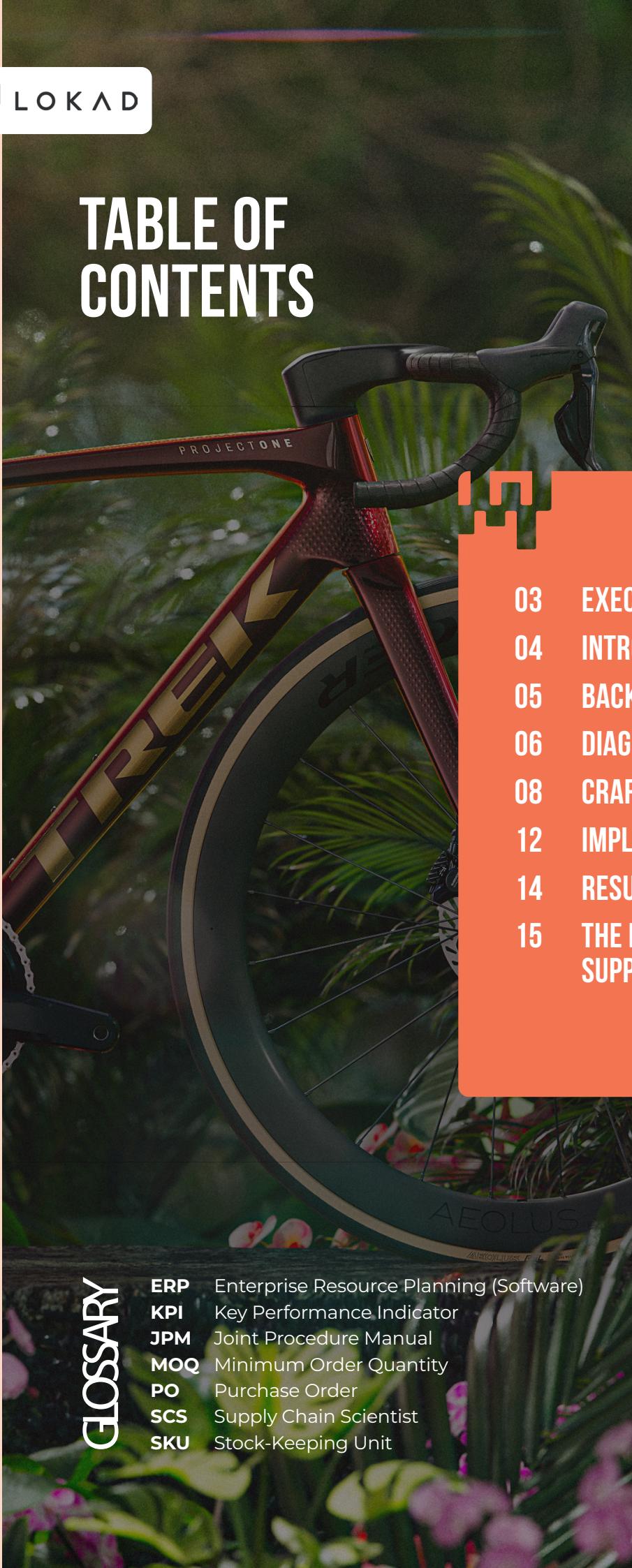
GLOSSARY

ERP	Enterprise Resource Planning (Software)
KPI	Key Performance Indicator
JPM	Joint Procedure Manual
MOQ	Minimum Order Quantity
PO	Purchase Order
SCS	Supply Chain Scientist
SKU	Stock-Keeping Unit

EXECUTIVE SUMMARY

Trek, a world-famous bicycle manufacturer recognized globally for its premium offerings, identified a critical need to modernize the supply chain behind its **Project One** custom-bike line. Traditional forecasting and inventory management methods proved insufficient for handling the tremendous variety of parts and paint options, each of which is subject to sudden changes in consumer demand.

Trek, through its partnership with Lokad, has migrated away from insufficient time-series forecasting and embraced a probabilistic forecasting model—one that is designed to accommodate their high level of complexity. This model evaluates **millions of possible demand scenarios,** helping Trek make more **reliable purchasing decisions** and **optimize ordering schedules**—particularly critical given Project One's 30-day worldwide delivery promise.

KEY PERFORMANCE INDICATORS (KPIS) SHOW:

- **40% reduction in average stock value** (2023 to 2024) while **sales increased 19%** (2023 to 2024).

- **Greater lead time management** through dashboards that prioritize open POs and identify necessary actions.

- **Reduced stockouts** for high-end components, notably for items with extended supplier lead times.

- **Improved purchasing decisions** and **fewer manual interventions**, freeing planners to focus on strategic tasks rather than purely operational ones.

- **Better alignment** between procurement, production scheduling, and final assembly.

Future plans include further embedding Lokad's decision-optimization engine into Trek's supply chain workflow, exploring deeper system integrations, and potentially extending the approach to other Trek product lines.

INTRODUCTION

Trek stands as one of the world's **premier bicycle manufacturers**, offering a comprehensive range of bikes to suit casual riders and elite professionals alike. Headquartered in Waterloo (Wisconsin), Trek maintains a substantial global presence. Within this portfolio, the Project One custom-bike program is a flagship initiative that empowers cyclists to create their "dream bike," tailoring everything from color schemes to handlebar sizes.

While this high level of configurability sets Trek apart in the premium market, it also produces enormous (and increasing) levels of complexity in its supply chain (e.g., the possible combinations of parts and colors quickly becomes unimaginable).

For this reason, standard demand-planning software cannot easily and reliably handle the "combinatorial explosion" inherent in custom orders.

To address this complexity and maintain its brand promise—a worldwide delivery of custom bikes in 30 days or less—Trek partnered with Lokad to employ advanced probabilistic forecasting and supply chain optimization.

BACKGROUND

Historically, Trek's supply chain depended on a single, enormous Enterprise Resource Planning (ERP) system, supplemented by a separate forecasting tool (designed primarily for off-the-shelf models). Given the enormous degree of configurability involved in Project One, this software setup was not fit-for-purpose.

In Trek's unique situation, **Project One** involves completely customized bikes, each of which features a very rare frame-colour-part configuration. Each one of these resources features dozens, if not hundreds, of possible choices. This means that a traditional forecasting approach to demand is completely inadequate for the high mix of parts and paint permutations in the **Project One** line.

According to **Dan Scharneck,** Trek's Director of Supply Chain, balancing inventory levels for **dozens of frames, hundreds of color/ paint options,** and approximately **200 individual components per bike** became an uphill battle. Missing even a single critical component could delay the entire build. Over-investing in slow-moving parts, however, created financial risk and the potential for obsolescence as newer models and technologies superseded older ones.

Recognizing that conventional methods could not fully address these challenges, Trek began seeking a solution that could accommodate complexity while providing actionable, day-to-day decisions. After a review of potential vendors and technologies, the Trek team selected Lokad.

We were using an ERP system that runs the whole business and then we had a forecasting software for finished goods planning. Neither of those things are really created for the complexities inherent with a custom business.

DAN SCHARNECK,
DIRECTOR OF SUPPLY CHAIN
TREK

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DIAGNOSING THE SITUATION

The Project One program offers unparalleled customization. A single high-end Trek bike may have:

→ **PAINT CONFIGURATIONS:**
Multiple color palettes, designer patterns, and user-customizable paint zones.

→ **PARTS SELECTIONS:**
Over 200 individual components, including drivetrain, cockpit, suspension (where applicable), and even region-specific specs. For example, some road-bike models offer customers 36 handlebar options to help them craft their dream bike.

→ **FRAME SIZES:**
Multiple variations per model, each with unique geometry.

→ **GLOBAL DELIVERY IN 30 DAYS:**
Customers expect fast turnarounds, even in peak riding seasons.
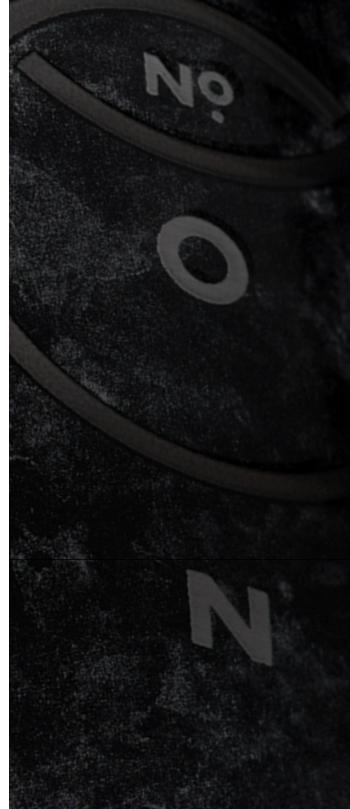
From an inventory perspective, the wide range of options Trek offers produces an enormous volume of possible combinations (each with different probabilities of being selected). For this reason, it is not surprising that conventional planning tools struggled with Trek's specific level of "combinatorial complexity."

For example, if you multiply color options, size requirements, and part choices, you get an astronomical number of potential frame-colour-part configurations (measured in the millions)—most of which will appear in small or unpredictable volumes.

Furthermore, fulfilling the 30-day promise requires extreme reliability. Having 98% availability on each part might sound high, but in a bike requiring ~200 components, the cumulative probability of **all** necessary parts being in stock drops considerably. Such stockouts disrupt production, frustrating a customer base already paying a premium for bespoke, high-end service.
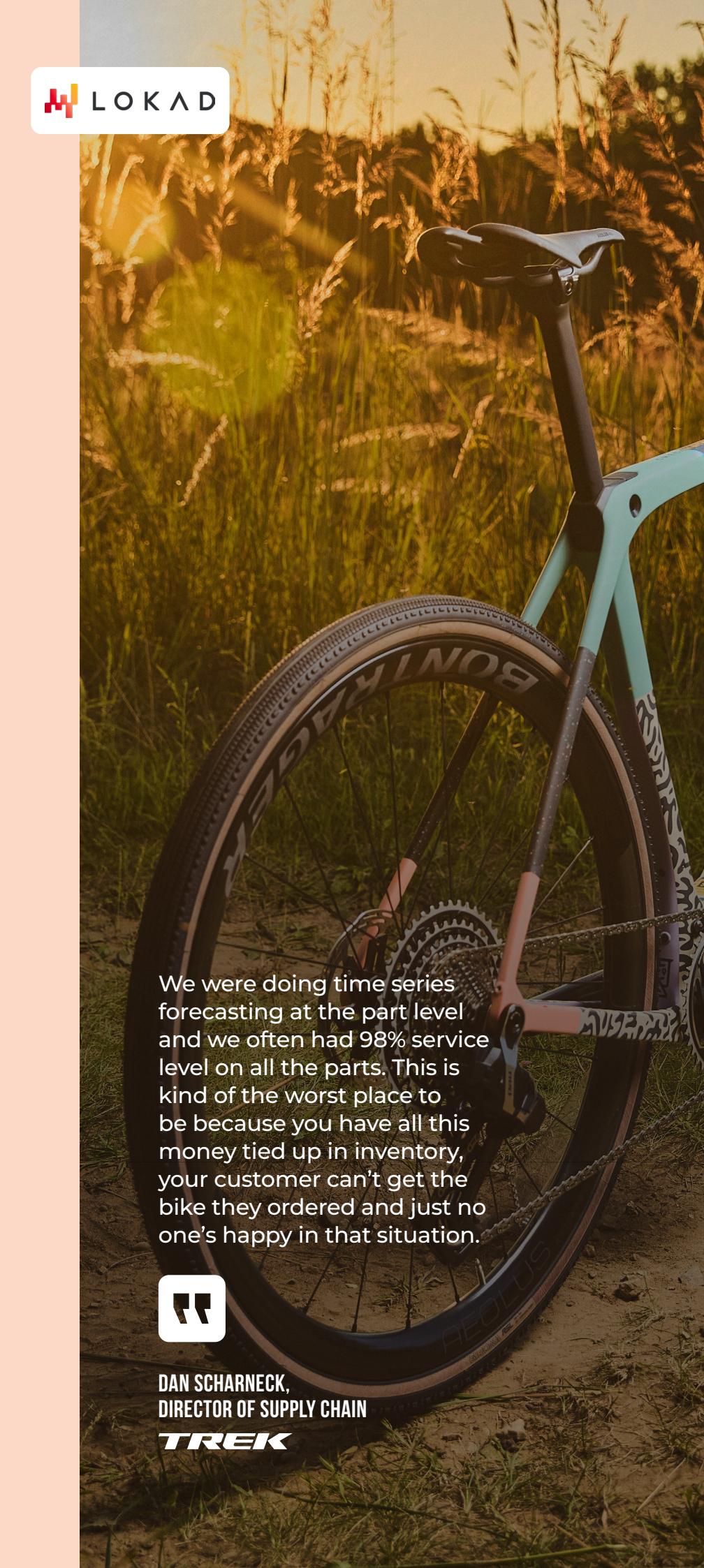
> We were doing time series forecasting at the part level and we often had 98% service level on all the parts. This is kind of the worst place to be because you have all this money tied up in inventory, your customer can't get the bike they ordered and just no one's happy in that situation.

**DAN SCHARNECK,
DIRECTOR OF SUPPLY CHAIN**

TREK

KEY PAIN POINTS

→ **EXCESSIVE INVENTORY:**
Over-ordering rarely used parts to avoid stockouts leads to waste and obsolescence, especially as new product lines come to market.

→ **CHRONIC STOCKOUTS ON CRITICAL PARTS:**
Shortages of even a single crucial part can stop an entire build (and cause the loss of high-paying customers).

→ **LONG AND VARIED LEAD TIMES:**
Some suppliers are flexible; others require months of lead time, compounding the planning difficulty.

→ **MANUAL WORKAROUNDS:**
Planners spent enormous amounts of time in spreadsheets attempting to forecast or expedite specific items.

CRAFTING THE SOLUTION

Trek partnered with Lokad to replace their limited time-series forecasting with probabilistic forecasting—an approach that directly addresses the uncertainties inherent in supply and demand.

TIME-SERIES FORECASTING

Trek previously used time-series ("point") forecast models. These are "deterministic", which means they predict a single future value (e.g., the number of units customers will buy next week).

This deterministic approach is flawed as it ignores the full range of possible future values (e.g., customers could buy 1 unit, 2 units, 3 units, or even 0). It also means that a company cannot estimate and compare the financial rewards of different scenarios, such as the economic return of selling 7 units versus 10 units versus only 1. For this reason, Lokad uses probabilistic forecasting.

PROBABILISTIC FORECASTING

Rather than relying on a single "best guess" for future demand of each part, Lokad's technology produces a **range of possible** demands and assigns probabilities to each outcome. This approach:

→ **CAPTURES DEMAND VARIABILITY:**
Factors in sporadic usage (e.g., rare handlebar widths) and seasonal surges.

→ **ACCOUNTS FOR SUPPLIER LEAD-TIME RISKS:**
Recognizes the diverse lead times for different suppliers.

→ **PINPOINTS BOTTLENECKS:**
Quantifies the risk of **one** part delaying an entire order cycle.

Once Trek has a probability distribution for each part, Lokad's algorithms determine coverage ratios to ensure that needed parts are available in time for each bike configuration.

Specifically, the solution:

→ **SETS PURCHASE COVERAGE RATIOS FOR ALL PARTS:**
Allows Trek to be more or less aggressive in stocking, ensuring critical items are on hand without inflating overall inventory.

→ **ADAPTS TO REAL-TIME DATA:**
Updates recommendations as new orders come in daily from around the world.

→ **PUSHES PRIORITY-BASED WORKFLOWS:**
Lokad automatically pushes critical items to the top of daily, weekly, and/ or monthly purchasing tasks.

These features allow Trek to know what to prioritize and reduces the risk of planners missing key components.

MANAGING LEAD TIMES

🔒 Actionable Purchase Orders

PO Id	PartNumber	Supplier	Open Qty	Supplier LeadTime	Original PTA	Action	Actionable Qty	Recommended Shipping Date	Recommended Delivery Date
1827113	160234560249	CrestShift Compo...	5	136	Oct 17, 2025	Defer	5 / 5	Oct 1, 2025	Feb 14, 2026
1827113	160234560250	CrestShift Compo...	2	136	Oct 17, 2025	Cancel	2 / 2	Jul 24, 2025	Dec 7, 2025
1827113	160234560251	CrestShift Compo...	110	136	Oct 17, 2025	Defer	110 / 110	Aug 31, 2025	Jan 14, 2026
1827113	160234560246	CrestShift Compo...	5	120	Oct 17, 2025	Expedite	3 / 5	Jul 30, 2025	Nov 27, 2025
1827113	160234560246	CrestShift Compo...	5	120	Oct 17, 2025	Defer	2 / 5	Aug 4, 2025	Dec 2, 2025
1827113	160234560246	CrestShift Compo...	5	120	Oct 17, 2025	No Action required	0 / 5	Jul 24, 2025	Nov 21, 2025
1827113	160234560255	CrestShift Compo...	8	136	Oct 17, 2025	Defer	8 / 8	Sep 13, 2025	Jan 27, 2026
1827989	160234560256	EmberWheel Co.	80	60	Oct 17, 2025	Expedite	3 / 80	Sep 2, 2025	Nov 1, 2025
1827989	160234560256	EmberWheel Co.	80	60	Oct 17, 2025	Defer	52 / 80	Sep 7, 2025	Nov 6, 2025
1827989	160234560256	EmberWheel Co.	80	60	Oct 17, 2025	Defer	52 / 80	Sep 7, 2025	Nov 6, 2025
1827989	160234560256	EmberWheel Co.	80	60	Oct 17, 2025	Partially cancel	25 / 80	Nov 26, 2025	Jan 25, 2026

5646 lines omitted, click to enlarge.

383 PO(s) need action this week
Click to view

423 PO(s) need action this month
Click to view

312 Action-Free PO(s)
Click to view

Actionable POs breakdown

- Defer 37.02% · 415
- Cancel 21.77% · 244
- Expedite 18.47% · 207
- Partially cancel 18.02% · 202
- No Action required 4.73% · 53
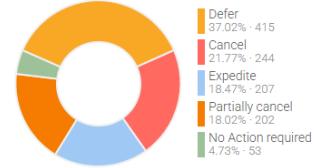
One of the biggest pains for Trek was managing lead times. They wanted to increase operational visibility, responsiveness, and control over the full order lifecycle, while also maintaining accountability.

The dashboard above (with anonymized data) illustrates the kind of information Trek receives each day in their account. Its purpose is to clearly **identify** and **prioritize** open purchase orders and the action(s) Trek staff should take: cancel, partially cancel, defer, or expedite.

This information allows Trek to continuously study the health of their POs and to take action when necessary. In turn, this helps them to reduce unnecessary replenishment and to avoid accumulating excess inventory.

> What really helped us to manage lead times was the ability to see which parts were causing (longer) lead times and prioritize which POs and quantities needed to be expedited.
>
> **TIM SCHARRER,**
> **DATA ANALYST**
> **TREK**

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STOCK EFFICIENCY LEVELS
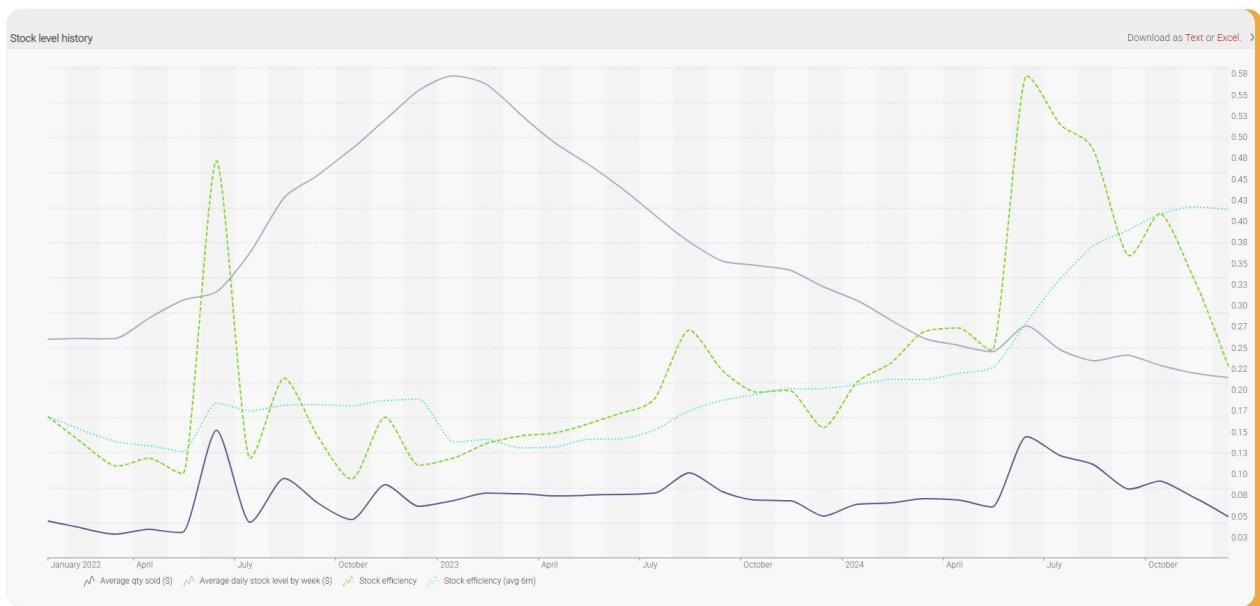
The above graph (reproduced with permission from Trek's account) demonstrates the positive trends in Trek's overall Project One stock efficiency.

In simple terms, the dashed blue line represents the 6-month stock efficiency moving average. Increasing stock efficiency essentially means more money was generated (through sales) with less money tied up in inventory.

Trek's stock efficiency has increased significantly: **sales have increased ~19%** while **total value of inventory has reduced by ~40%** (comparing calendar years 2023 and 2024).

> Deterministic approaches ignore the thousands of 'what if' scenarios and cannot model the full range of possible futures. By contrast, the probabilistic approach merges advanced analytics with actual constraints (like 30-day delivery, seasonal spikes, supplier reliability) and yields actionable purchase priorities every day.

JOANNES VERMOREL, FOUNDER

LOKAD

IMPLEMENTING THE SOLUTION

Rolling out the new system at Trek required a blend of technological, organizational, and process adaptation.

DATA INTEGRATION

Trek's ERP system remained a primary data source, but daily transaction data, bills of material (BOMs), and supplier lead times had to be extracted for Lokad's modeling.

Using **secure data pipelines,** Trek set up nightly refreshes to ensure each morning's recommended actions reflected up-to-date orders and inventory positions.

PHASED APPROACH

→ **PILOT:**
Trek progressively integrated Lokad's recommendations over time, refining implementation based on **real-world results.** Trek started with Lokad's purchase order (PO) management tools, and then included Lokad's Purchase Suggestions on a progressively increasing scope of parts.

→ **EXPANSION:**
Over time, the solution scaled to cover a broader range of **Project One** components, including frames, custom paint materials, and specialized components.

CHANGE MANAGEMENT

Effective change management can be the difference between a successful digital transformation and a failure. As such, careful efforts were made to make the transition as smooth as possible.

→ Trek and Lokad organized workshops and internal tutorials for procurement and planning teams to understand probabilistic forecasts—an approach very different from traditional time-series forecasting. Lokad also created and provided supporting materials, such as unique presentations, to facilitate adoption.

→ Lokad's Supply Chain Scientists (SCS) worked directly with Trek staff to formalize supply chain information and documentation related to the solution and its workflows.

→ Weekly calls with Lokad's Supply Chain Scientists (SCS) enabled quick iteration on any data or configuration challenges.

ONGOING COLLABORATION

Through recurring check-ins, Trek receives updated **ranking dashboards** for rebalancing, purchase order (PO) modifications, and at-risk components.

Lokad's "white-box" approach also actively encourages Trek to see **why** certain parts are prioritized, boosting end-user trust and adoption.
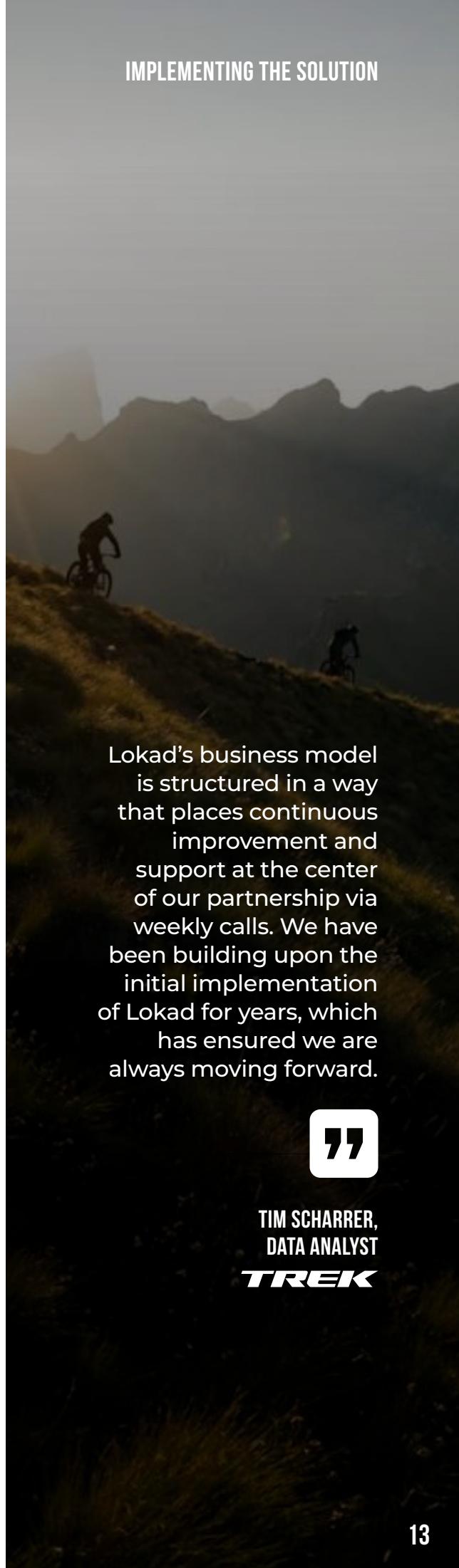
Lokad's business model is structured in a way that places continuous improvement and support at the center of our partnership via weekly calls. We have been building upon the initial implementation of Lokad for years, which has ensured we are always moving forward.

**TIM SCHARRER,
DATA ANALYST
TREK**

RESULTS

> The buyers all agreed Lokad has saved them time in several areas—sending forecasts to suppliers, setting up inventory transfers, putting together expedite lists, and especially by flagging only the 'suspicious' forecast lines. Not having to build phantom-part forecasts from scratch has been a huge time-saver.

**TIM SCHARRER,
DATA ANALYST**
TREK

EARLY PROJECT RESULTS INDICATE:

→ **REDUCED AVERAGE STOCK VALUE**
40% reduction in average stock value (2023 to 2024) while **sales increased 19%** (2023 to 2024).

→ **MANAGING LEAD TIMES**
Dashboards prioritize open POs and identify necessary actions (defer, cancel, expedite, partially cancel).

→ **STOCKOUT REDUCTION**
Trek has seen fewer last-minute scrambling events for critical parts. This is especially notable for internationally sourced components with lead times in excess of 3 months.

→ **PRESERVED 30-DAY PROMISE**
The most important KPI, global delivery in 30 days or less, remains achievable, with over 60% of orders shipped on time in all markets, and up to 75% in the US.

→ **TIME SAVINGS**
Planners report a reduction in weekly hours spent manually adjusting orders, now that priority lists and recommended orders are automatically generated.

→ **STRONGER SUPPLIER RELATIONSHIPS**
Lokad's daily reprioritization has enabled Trek to communicate more proactively with key suppliers, smoothing out spikes in demand.

THE FUTURE OF TREK'S SUPPLY CHAIN REVOLUTION

Trek intends to deepen its integration with Lokad across multiple domains:

➔ REAL-TIME PO REVISIONS.
Enhanced collaboration with key suppliers to enable last-minute order adjustments, further minimizing stock imbalances.

➔ EXPANDED PRODUCT LINES.
While currently focused on Project One, future expansions may incorporate other custom or semi-custom lines, extending Lokad's capabilities to different business units within Trek.

➔ CAPACITY MODELING.
Building on the success of part-level forecasting, Trek plans to incorporate production constraints—like paint booth capacity and specialized assembly lines—directly into Lokad's optimization logic.

➔ FINANCIAL INSIGHTS FOR COVERAGE OPTIMIZATION.
Trek and Lokad are also exploring ways to incorporate deeper financial insights, helping Trek fine-tune coverage ratios in step with its evolving product roadmap.

➔ SHARING FORECASTS WITH SUPPLIERS.
The Collaborative Supply Chain feature of Lokad's platform could enable the secure and effortless sharing of Trek's forecasts with its suppliers. Currently Trek employees do this manually, but in the future those suppliers could get access to the relevant forecasts through Lokad's platform for free.

> From the outset of our collaboration, I've always appreciated the high quality of our exchanges and the genuine desire to go beyond the status quo.

BENOÎT BAILLY, LEAD SUPPLY CHAIN SCIENTIST
LOKAD

> We used to spend the majority of our time just trying to come up with a decision... Now, it's generated in Lokad and we're able to evaluate it, review it, work with suppliers and spend a lot more time on value-added activities.

DAN SCHARNECK, DIRECTOR OF SUPPLY CHAIN
TREK

> Working with Trek has been a great collaboration. As partners, they have fully embraced the notion that complexity can be a competitive advantage if managed well. Project One's configurability is a great demonstration of how smart people can rethink both the supply chain problem and solution together.

JOANNES VERMOREL, FOUNDER
LOKAD