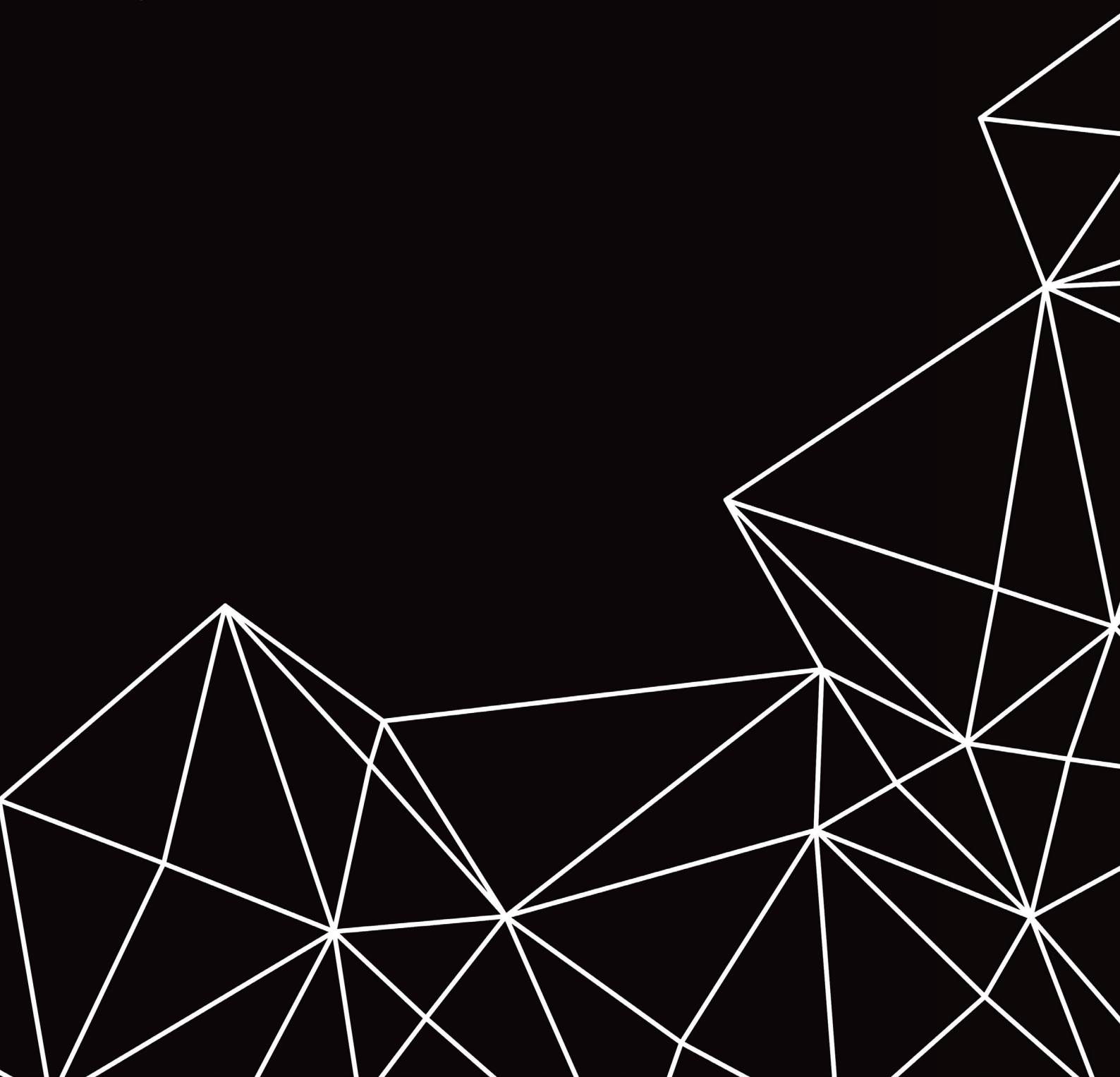
QuantSpark

Optimising for uncertainty

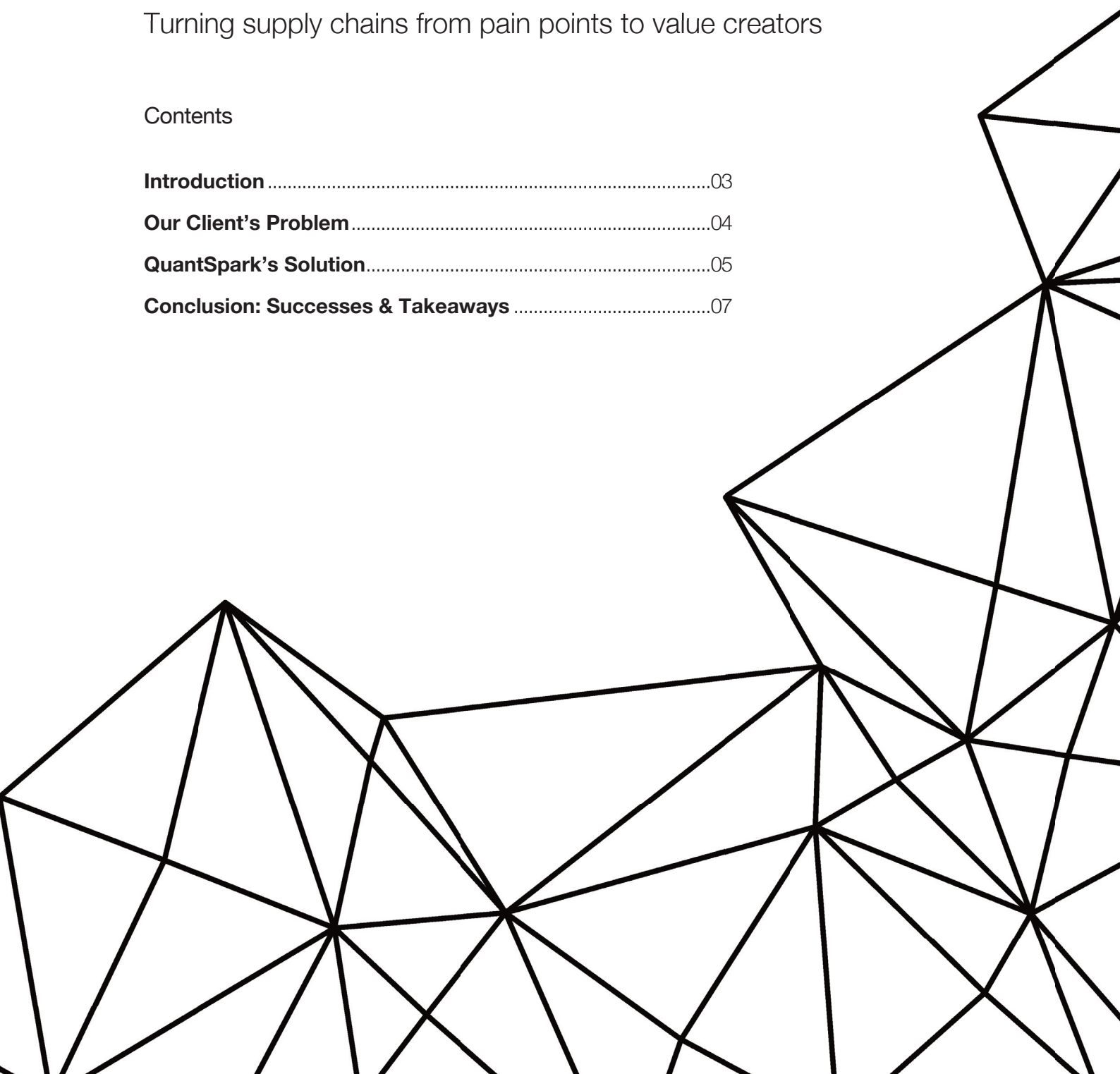
Turning supply chains from pain points to value creators



Optimising for uncertainty:

Turning supply chains from pain points to value creators

Contents

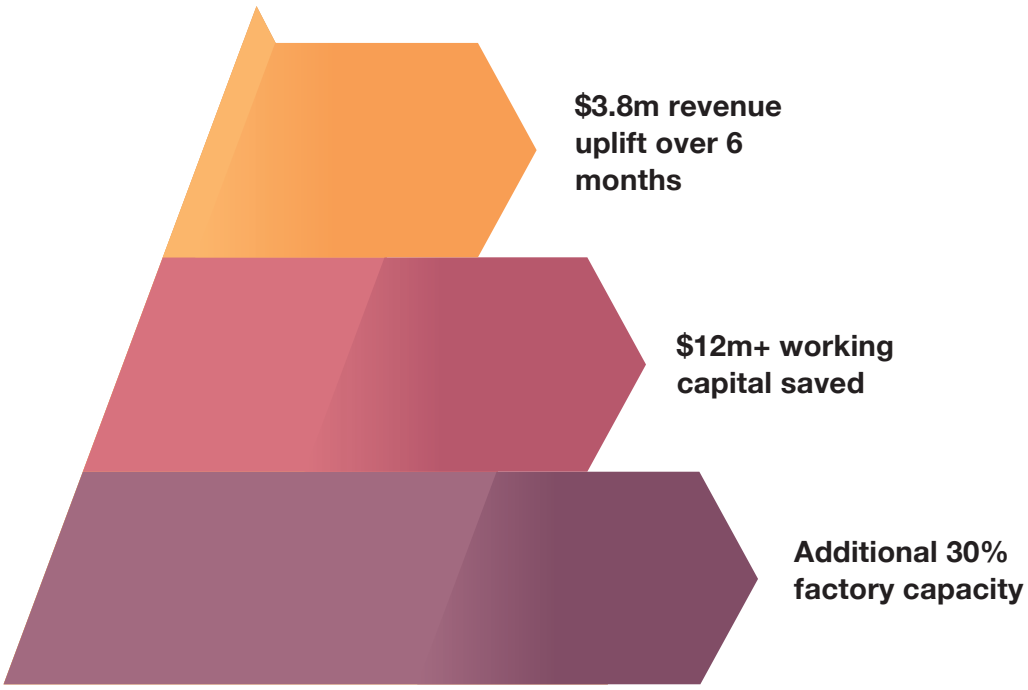


Introduction

Predicting and managing supply during unpredictable global conditions can be challenging at best or damaging at worst. Consumer retail, FMCG, and manufacturing industries, among others, depend on a visible, reliable flow of products and parts to maintain healthy stock levels. During these times of worldwide supply chain turbulence, traditional stock planning and forecasting systems are unable to adapt to logistical limitations, the knock-on effects of which drive margin erosion and ultimately revenue loss.

However, as this case study sets out, QuantSpark's recent work with a premium retail brand shows that having dynamic, data-driven planning systems and models in place can not only avoid losses, but actually create significant real-terms value.

Impact of QuantSpark's predictive modelling on the client's supply chain:



Our Client's Problem

The business case: global supply chain disruption has exposed the limitations of traditional system in dealing with dynamic constraints

Across the globe, supply chains and logistics operations are facing contortions and contractions at unprecedented levels. At home and abroad, our client, a private equity-backed British fashion icon with annual revenues of over £100m, faced shortages thanks to a wide array of external factors. This ranged from heavy delays in manufacturing alongside hard limits on Chinese industrial capacity; sea freight delays and price hikes; UK and European customs delays (to say nothing of Brexit compromises); and transportation staff shortages. As a premium retail brand, delays to stock arrival had the potential to push deliveries out of season, and rapidly decrease both the likelihood of purchase and retail value.

The client faced three key stock arrival issues:

1. Increased demand

Having outsold projections for several years, the required unit volume was uncharacteristically high

2. Decreased factory capacity

Chinese manufacturers had been hit by government mandated power cuts, which had reduced capacity on most of their factory production lines by close to 50%.

3. Global shortage of ocean freight

Thanks to the effects of the Covid-19 pandemic, both costs and lead-times had increased dramatically by an average of 4 weeks.

The client's current MRP system was unable to dynamically adjust to these constraints or prioritise seasonal key products for delivery. Therefore, we needed to provide a solution that used purchase order data from the current MRP (material requirements planning) system, but enriched it with data from across the business, considered the constraints and priorities, and produced an optimised purchase order solution to maximise availability, while minimising cost.

The analytics case: data rich, insight poor.

An initial blocker for our client, which contributed to the MRP limitations, was a lack of data visibility. Mirroring a very common trend for modern businesses, the client had an extensive data collection of both historic sales and purchase orders alongside usage prediction, but there was room for improvement to build SKU (stock-keeping unit)-level granularity that would be required for navigating data and producing daily actionable insights.

QuantSpark's Solution

The approach

Our client had a particular set of factory conditions and freight logistics which necessitated the construction of a custom model:

We constructed a sawtooth graph using purchase and sales information to understand stock positions with absolute clarity.
The client had currently been able to view stock information at a monthly level and aggregated a rough level, with limited visibility of stock for individual colours, sizes, styles etc. By developing a custom sawtooth function, we enhanced this view to the desired daily SKU granularity.

This insight allowed us to develop a strategy for stock shortfall minimisation.
Although many SKUs ended in shortfall, conversely the business had an overall positive stock position thanks to its holding an excess amount of stock in other lines. Although much of this excess was unfortunately already warehoused, a proportion was set to arrive in future purchase orders.

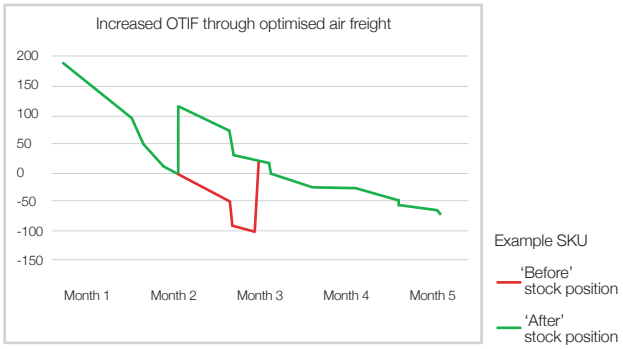
Reducing future orders of SKUs in excess meant factory capacity could be transferred to key seasonal products and products in shortfall.
By taking a common-sense approach of cutting down excess orders without compromising overall stock availability and combining it with price-constrained optimisation of air freight volumes, the model could generate drastic stock position improvements while minimising freight costs.

The model: prioritise SKUs to maximise KPI uplift and increase working capital.

Our bespoke model used existing purchase order data, supplemented it with additional sources to increase resolution, and implemented four custom modules to uplift stock shortfalls. The solution was straightforward in concept but complex to implement: the model ran several thousand times to factor in the various situational constraints. This could only have been achieved with computational methods driving those four modules, the success of which was measured by a proprietary KPI to assess unacceptably late fulfilments.

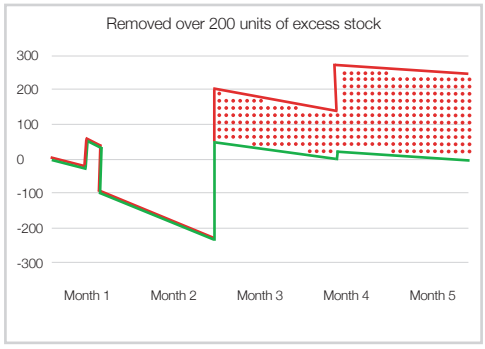
1. Increase On-Time, In-Full Orders

Our model found SKUs which spend time in shortfall and reassigned them from sea freight to air freight, allowing them to arrive in time to increase on-time, in-full (OTIF) orders. Limits on the amount of SKUs moved by air could be set, and SKUs were prioritised by lowest cost to air, or highest remaining margin after additional air costs.



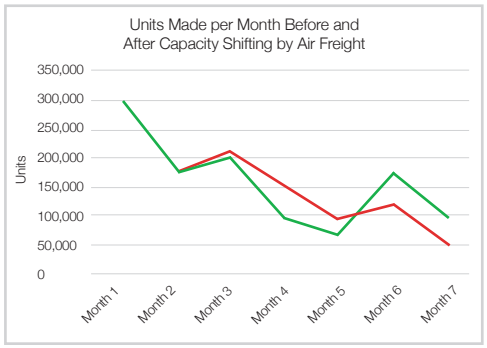
2. Remove excess stock

The model determined which SKUs ended the period in excess and reduced prior purchase orders to remove this excess, being careful not to drop the product into shortfall. A 'safety net' of stock could be specified to prevent stockouts. This trimming of the fat was pivotal to the model's success, as it increased capacity on both factory lines and freight.



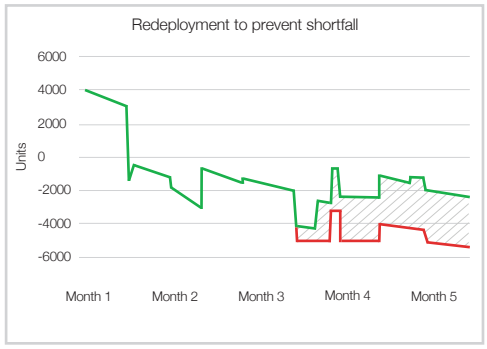
3. Optimise factory capacity around shipping dates

The third module of the model frees up factory capacity early in the season, enabled by switching low priority SKUs that are cost-effective to air freight from sea to air freight. Reducing delivery lead-times allows the factory to manufacture later in the period. This allowed higher priority SKUs to be produced.



4. Redeploy manufacturing capacity to SKUs in danger of shortfall

Finally, the model considered all the newly created capacity available on factory lines and freight trips and allocated it to the highest priority SKUs with the greatest shortfalls.

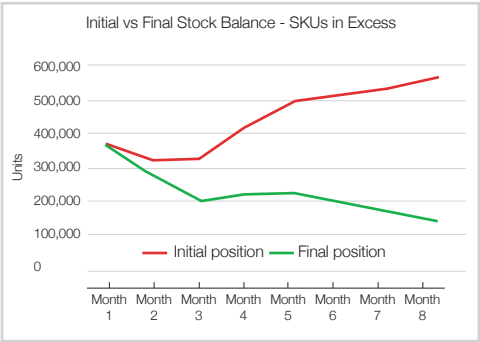


Conclusion

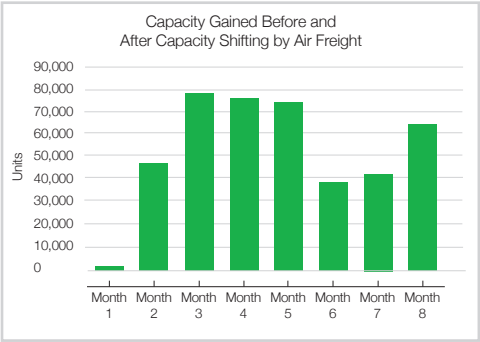
Key successes
The model's effectiveness at optimising factory and freight capacity generated a clear return on investment for the client:

1. By capturing additional demand that would have been missed had SKUs gone into shortfall, the model contributed to a **$6m gross revenue uplift over 6 months**. Taking into account the tactical use of air freight to maximise OTIF deliveries, **the client's net gain was still in excess of $3.8m.**

2. The removal of over 420k units of excess stock and all the associated manufacture, transport, and warehousing costs that accompany unsold goods saved over $12m in working capital that could be reinvested in the business.



3. Finally, the model's dynamic dynamic redeployment of manufacturing baked-in resilience against future shocks by **increasing factory capacity by 30%**. This extra capacity could be used to make next season's products ahead of time, which in turn meant products could be shipped by cheaper ocean freight, **saving money and returning value to the client once again.**



Key takeaway: using your company's data to optimise your stock management and planning

Supply chain disruptions and stock management disruptions are not one-off events. Disturbances are global and every FMCG, retail and manufacturing business is at risk.

Holistic data models with future-proof design are vital to enabling the greatest range of insights and reporting, with the minimal amount of maintenance and rework. They are the enabler of liquidity in the intangible asset that is your data

Many off-the-shelf MRP solutions lack the functionality to respond to unforeseen limitations in supply chain links, and almost all lack the ability to prioritise certain products during such events. None provide bespoke, adjustable parameterization to your specific scenario. With QuantSpark's supply chain knowledge and analytical expertise, you can increase your business's robustness in the face of disruption, safeguarding your investment and ultimately improving your revenues.

QuantSpark

Contact

contact@quantspark.com
+44 (0)20 8075 7677
230 Blackfriars Rd
London
SE1 8NW