



How Audi forecast their supply chain with KNIME

Problem

Audi wanted a more accurate and automated way to do supply chain forecasting, so they could make more timely decisions and monitor warehouse capacity.

Solution

Audi used KNIME to develop accurate, real-time forecasts using machine learning that enabled effective warehouse and supply chain management.

Result

Automating just one workflow eliminated manual errors and saved €30,000 annually. Enhanced forecasting accuracy helped prevent warehouse overcapacity and production delays.

Getting supply chain management right is the top priority for any business working in manufacturing. If there are too many raw goods coming in, you risk damaged assets through lack of warehouse space to house them. If there aren't enough raw goods coming in, production gets delayed.

Leading automotive company Audi knows better than most that fine-tuning supply chain management forecasts to within an acceptable risk tolerance is a balancing act. But an all important one that keeps the business running like a well-oiled machine.

In this article we'll talk about how Audi used KNIME to create supply chain forecasts that keep production running like clockwork.

Simulating the Supply Chain

In the real world, we don't always have all the data we need on hand to make decisions. That's when we need to look to machine learning and modeling to create forecasts.

Audi Data Analyst Simon Herzog framed the key problem faced by Audi by saying that:

“One problem we often face is the question of how will our stock levels in the warehouses develop over the coming weeks and this is a very important question, because based on this question many decisions in supply chain management and in the steering of our supply chain are made.”

€30k saved
automating a
single process

80% reduction
in debugging
expenses

Manufacturing

Supply chain

Supply Chain Analytics

Supply chain management decisions are high stakes because they need to be made quickly and one error can cause a huge knock-on impact that can have both balance sheet and P&L impact. For example, if goods are shipped to warehouses without the space to hold them, they could end up being damaged by the elements when stored outside. Or if goods arrive too late, the assembly line may end up lacking necessary parts to complete orders, causing delays.

Audi decided to use KNIME to improve the speed and accuracy of their supply chain management forecasting, so they could solve the following problems:

- Problem 1: How can we better predict the incoming goods from suppliers despite incomplete data, so we can make sure warehouses have capacity to house them?
- Problem 2: How can we simulate what materials are leaving the warehouse and when, so we know the warehouses have capacity?

Audi has complete data on what supplies they've ordered, what parts are needed for production, and what's currently in production. But two key pieces of information are incomplete:

1. How many purchased parts will arrive at the Audi warehouses due to rapid cancellations, order changes that may or may not have been fulfilled before the order was sent, or problems during shipping.
2. How much demand there will be for finished goods in the coming weeks and months, which affects how many parts are needed and should leave the warehouse to the production line.

AUDI

Audi AG is a German automotive manufacturer of luxury vehicles. It is headquartered in Ingolstadt, Germany and is a subsidiary of the Volkswagen Group. As well as covering the Audi brand, it also manages the Lamborghini, Ducati, and Bentley brands.

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Simon Herzog
Data Analyst at Audi

Speed, agility, and shareability with KNIME

The supply chain forecast Audi built in KNIME uses machine learning to present the most likely scenario for warehouse stock levels within a confidence range. When stock looks like it may approach the warehouse limit, the team now has enough time to call off orders of goods until there are more sales orders where those goods will be used.

With KNIME Audi were able to connect to multiple data sources using KNIME's suite of connector nodes, instead of manually pulling data from multiple sources into one place to begin cleaning it, or having to unite multiple structured data downloads in one place.

What's more, KNIME allowed Audi to build a supply chain forecasting workflow once, and execute on it forever. This "build once, execute forever" model eliminated countless hours of manual and error-prone data wrangling in spreadsheets that speeds up the process by a matter of hours.

Audi now uses KNIME server to automate pulling data, cleaning data, running statistical and machine learning analyses, and reporting. Automating these workflows means the data is ready to use by the time the team reaches the office every morning. The speed of access to this completed forecast gives Audi a strategic advantage. Now they are able to react much more quickly than previously and make faster decisions about whether to call off an order of supplies if they can see likely warehouse over-capacity.

KNIME's no code interface has also made it easier for Audi to debug issues and document their work for other departments. And being able to show the outcome of the workflow in an interactive data app makes it easy for anyone to consume the information at a glance.

"The KNIME server helped us deploy our workflows and automate our use cases and was a good way to make these things more shareable" said Simon Herzog.

Cost and time savings with KNIME

Audi now saves €30,000 per year from automating this single supply chain management workflow, eliminating manual work in Excel and Python, and allowing them to access forecasts immediately at the start of the work day. Now consider the cost savings across the whole of Audi, with 500+ users and a footprint across all business divisions.

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KNIME makes it easier to debug workflows because you can clearly see which node has not triggered. The visual workflow builder helps easily see what went wrong and make the change, which is easier than looking back through a Python script.

Why Audi chose KNIME

KNIME allowed Audi to automate one of its most complex and important processes – supply chain management. But it's not only cost and time savings that they achieved with KNIME. They also experienced:

- Better ability to predict over-capacity risks earlier
- Higher quality forecasts
- Better ability to prevent delays in production
- Less manual labor and human error risk due to automated workflows
- Reduced time to create forecasts
- Greater transparency of workflows and data
- Optimized deliveries based on predicted KPIs
- Reliability of the KNIME servers for dependable execution of workflows
- Cost savings through automation
- Reduced time and effort on debugging

You can learn more about how Audi uses KNIME by taking a look at their talk at the [Munich DataHop Event](#).

Want to experiment with KNIME for your own supply chain management process? [Take a look at how KNIME supports companies in their supply chain analysis](#).