ANALYZE - SIMULATE - AUTOMATE

Abels & Kemmner

WHITE PAPER

Dr. Götz-Andreas Kemmner

What is possible at the technological forefront of supply chain optimisation today, what the efficient optimisation of logistics and supply chain management has to do with the crash test of car bodies and why a digital twin helps to optimise your logistics business model.

Supply Chain Optimization through Empirical Simulation

Inhalt

ANALYZE - SIMULATE - AUTOMATE A QUANTUM LEAP AHEAD	**Abels & Kemmner** brings the optimisation potential of supply chains to light and replaces gut feeling with facts.
Thanks to our **unique consulting approach,** we help companies to achieve sustainable concepts, which we validate and optimise and implement in a secure and agile manner.	**As a pioneer in** logistics simulation and automation in supply chain management, we combine strategic and operational consulting with powerful digital methods.

© Abels & Kemmner
Gesellschaft für
Unternehmensberatung GmbH
Kaiserstr. 100
52134 Aachen / Herzogenrath

AACHEN - EINDHOVEN - LONDON

www.ak-online.com

ak@ak-online.com
+49 (0) 2407 9565-0

Supply Chain Optimization through Empirical Simulation

Dr Götz-Andreas Kemmner
LinkedIn

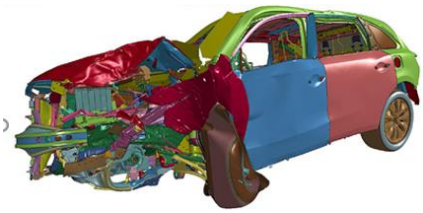
What is possible at the technological forefront of supply chain optimisation today, what the efficient optimisation of logistics and supply chain management has to do with the crash test of car bodies and why a digital twin helps to optimise your logistics business model.

We all know the drastic images of crash tests from pictures and videos, where the sheet metal of the car bodies bends frighteningly around an obstacle.

In the past, countless crash tests were necessary in car body development to achieve the right torsional rigidity of a car body on the one hand and plasticity on the other. This took a long time, was very expensive and still meant a residual risk for the later operation of the car, because it was not possible to optimise down to the last detail. For some time now, the optimisation of car bodies has been taking place in the computer. Using simulation software, the body parts are assembled and subjected to countless crash tests. Test cycles can be carried out much faster, optimisation can be more precise and the residual risk can be eliminated more reliably.

Today, the economic optimisation of many products and processes can only be achieved by means of simulation: whereas vehicles used to be improved in expensive and laborious tests, in modern car body development they are crashed by means of computer simulation and optimised quickly and cost-effectively.

Simulation



Source: © by Honda R&D Americas Inc.

fast
reliable
risk-free

Test result

Source: © by Honda R&D Americas Inc.

slow
expensive
risky

Gesellschaft für
Unternehmensberatung GmbH
Kaiserstr. 100
52134 Aachen / Herzogenrath

www.ak-online.com

ak@ak-online.com
+49 (0) 2407 9565-0

Simulation creates attractive prospects in SCM

What is standard in car body development represents the technological cutting edge in optimising processes in supply chain management and logistics. Only by means of empirical simulation can improvements be brought out of the fog of gut feeling into the sunshine of objective facts. The interplay of value flows, requirements, forecasts and scheduling decisions in a company and throughout the entire supply chain is so complex that it can no longer be penetrated with common sense and years of experience alone.

Many practitioners know from daily experience how volatile the entire logistics business model with its value streams, decoupling points, warehouse levels and planning and control processes works:

- There is not enough supply despite high stocks;
- MRP results are person-dependent and change with every staff turnover, holiday or sickness replacement;
- Improvement processes are slow, laborious and yet unsustainable;
- Priorities change regularly because no one has an overview of the interaction of the processes.

An empirical simulation of the dynamic behaviour of the entire supply chain in the computer makes it possible to check the effects of different solutions in advance and without risk and to arrive at objective numerical values. Discussions are thus objectified, a consensus is reached more quickly and decisions are made more quickly and easily. While in the classic optimisation of logistical processes one ventures forward slowly, carefully and laboriously in pilot phases and tests with a few articles, logistical business models simulated in advance can be realised quickly.

Logistical optimisation through simulation is not witchcraft. It all starts with a so-called digital twin of the value flows and planning and control processes. This digital twin can be generated from the deep data ocean of an ERP or merchandise management system by transferring article master data, historical time series of customer orders, purchase orders and stock issues, bills of materials, work plans and other data as required. While it can take weeks in classic value stream design to map a value stream for selected representative articles, a complex logistical value stream model covering all material numbers is available within a few days.

High expressiveness and dynamics

And while classic value stream design only works with static average values, the digital model takes into account the dynamic behaviour of the materials in the value stream. The results are not only more detailed and differentiated, but in many cases only realistic and reliable. Static average considerations, on the other hand, all too often fail in the dynamics of practice.

In order to simulate logistic effects with a digital twin, the changes to be examined are made to the model and simulated over a defined period of time in the past - typically 12 months. The simulation results can then be compared with the practical results known for the past and thus evaluated.

The simulation approach is very broadly applicable. It can answer strategic questions such as the optimisation of the logistics business model or the restructuring of value streams. It can take care of

improving sales forecasting or scheduling, balancing inventories and service levels or answering detailed questions.

From a professional perspective	From a financial perspective
Improve forecasts	Release liquidity
Reduce inventories in the short term and sustainably	Increase turnover through high service level
Improve service level	Reduce personnel costs in the supply chain
Increase data quality in the ERP system	Avoid special trips and penalties
Automate data quality in the ERP system	Avoid warehouse expansion
Improve MRP results	Reduce ordering costs
MRP results good regardless of the person	Increase yield: • Each million of stock costs between €190,000 and €300,000 a year in revenue.
Optimise logistics business model	
Automate planning/control processes	

Typical simulations for strategic business objectives

The questions can relate to individual, selected or all articles and thereby concern the entire value chain, also across several company levels. They can relate to selected segments of the value chain or only to a single warehouse level.

A few concrete examples from different sectors may clarify the situation:

At the lingerie manufacturer Anita Dr. Helbig, A&K was able to demonstrate years ago with the simulation approach that the inventories in the entire global supply chain will hardly be influenced by the envisaged shortening of lead times. An improvement in sales forecasting was identified as the decisive lever. This measure then enabled the inventory to be reduced quickly.

Trost, today a brand of WM SE, one of the leading automotive parts wholesalers in the independent aftermarket in Germany and Europe, pursued the goal of a largely fully automated replenishment of the approx. 150 branches. By means of simulation, A&K simulated the replenishment strategies of the branch down to every single relevant planning and MRP parameter of each article and developed a set of rules for setting the MRP parameters. This has now been in operation for several years and has sustainably reduced stocks by a high double-digit million amount.

Fritz Driescher KG, a medium-sized manufacturer of medium-voltage switchgear, pursued the goal of significantly reducing its circulating stocks and establishing a more efficient value chain. By means of a dynamic empirical simulation of the entire value chain, A&K developed a new logistical business model in which the logistical decoupling points were shifted, an 80/20 levelling combined with a Kanban system was set up, a personnel capacity management was introduced and an MRP control system for tuning the ERP system was implemented. As a result, working capital stocks were drastically reduced and the efficiency of the entire value chain was significantly increased. Without

the simulation of the solution concept in advance, the development of the new logistics business model and its implementation would have required significantly more time and effort.

As one of Germany's leading DIY market suppliers, GAH Alberts requires maximum service levels. By simulating the planning processes, A&K developed a combination of short-term and sustainable measures and implemented them as a MRP control system that reduced inventories by 53% within nine months.

In cooperation with the Swiss Sihl Group, the decisive starting points for improving the continuity of the international planning chain were identified and jointly implemented by means of logistical simulation of the value chain

A&K is currently working together with a large international manufacturer of technical components on a new concept for the logistics business model with the aim of reducing inventories in the high double-digit million range.

Iterative optimisation with intelligence

By and large, logistical optimisation is carried out through empirical simulation in several iteration loops. Solution approaches are defined by the project team, mapped in the system and simulated. The results are analysed and the solution approach is optimised iteratively. A part of the optimisation tasks can be carried out automatically by a powerful simulation system, partly using mechanisms from artificial intelligence, by independently determining from a given spectrum of solution variants the one that best achieves a given optimisation goal.

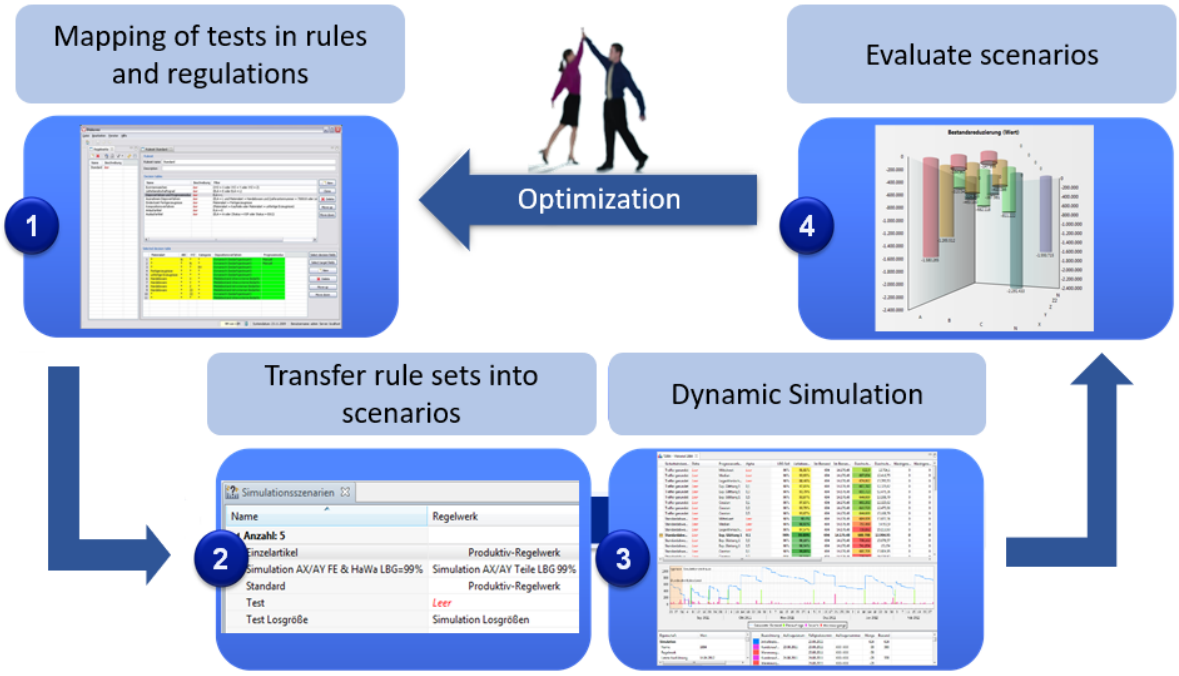
The preceding explanations sound a lot like theoretical work on the computer. However, such a digital twin does not spare its users the understanding of the logistical conditions and restrictions in the company. While some of the potential for improvement can already be identified through various tests and simulations on the digital twin, much of the potential only arises from knowledge of the company situation and the current handling of processes in the company; logistical simulation thus also still requires experienced specialists.

A simulation project therefore begins down-to-earth with a process analysis and consists of regular workshops in which optimisation approaches are jointly identified and reviewed with the employees in the company. It leads to an action plan with fields of action and sub-projects.

Gesellschaft für
Unternehmensberatung GmbH
Kaiserstr. 100
52134 Aachen / Herzogenrath

www.ak-online.com

ak@ak-online.com
+49 (0) 2407 9565-0



Control loop for optimising the achievement of objectives

Fast results and payback

It is therefore worthwhile to look at digital, rather than conventional, optimisation methods. The advantages are obvious. Practical application shows that the simulation approach is usually more cost-effective and more profitable than conventional optimisation methods. The cost advantage becomes all the greater the larger the article portfolio under consideration, because the number of material numbers to be considered has practically no effect on the project effort. In addition, the simulation approach enables shorter payback times than classic optimisation projects thanks to the faster implementability of the solutions developed. From this alone, a typical logistics simulation project practically finances itself.