Abels & Kemmner
SUPPLY CHAIN EXPERTS

WHITE PAPER

Best practice rules for effective sales forecasting

The market is picking up and delivery capacity is declining! Is there a clear sign that sales forecasting is not working properly in many companies?

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Best Practice Rules for an Effective Sales Forecast

The market is picking up and delivery capacity is sagging! Is there a clear sign that sales forecasting is not working properly in many companies? Companies with a functioning sales forecast - we know a whole range of them and have helped many of them to create a reliable sales forecast ourselves - have reacted more quickly both to the onset of a recession and to the market picking up again.

Despite everything, the importance of sales forecasts for company success is underestimated by many: On the one hand, we come across companies that, in good faith in their own know-how and existing ERP system, do not even notice how bad they currently are compared to their existing potential. On the other hand, some companies are of the opinion that in the age of market-synchronized production, sales forecasts are no longer necessary and that poor delivery readiness or high inventories are due to the inadequate performance of their planning. But how do you know how to set the sails (= plan) if you do not know which way the wind (= future requirements) is blowing?!

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>
> if you don't know which way the wind is blowing?!

With the following 13 basic principles and best practice building blocks for an efficient and effective sales forecast, we would like to clear up some misconceptions and point out essential success factors for a good sales forecast.

You will hardly be able to implement all of the best practice building blocks. Either because you lack the tools to do so or because the structure of your company or product portfolio does not allow it. However, the more of these best practice building blocks you consider and implement, the more powerful your sales forecast will be.

Basic Principle 1: Market demand does not conform to company plans

Those responsible for the supply chain, its inventories and delivery readiness often understand sales planning or sales forecasting differently than sales or Category Management.

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Imagine you are responsible for sales and are preparing for the planning meeting for the next fiscal year. The markets are uncertain, the global economy is faltering and you assume that you might just manage to maintain the previous year's sales.

The meeting is a classic exchange of opinions. You go into the meeting with your opinion and leave with the management's opinion that 10% more should be possible. Then the head of scheduling crosses your path and asks you about your expectations for the next few months. Do you tell her to plan more cautiously or do you get her in the mood for the great 10% increase?

Those responsible for the profitability and inventory of a supply chain understand sales planning differently than sales-oriented areas in a company.

Sales are – out of necessity – guided by the sales plan. In some companies, the interests of other business areas are also taken into account. Controlling may ensure that deviations in dates, quantities and prices are as small as possible, and production ensures that capacity utilization corresponds to the planned values.

However, the planning and the entire supply chain require the expected future reality of demand.

Anyone who specifies sales volumes that do not materialize later and are not reflected in any statistics is driving up the costs of the supply chain. On the other hand, anyone who shifts sales plan figures between product groups contrary to realistic expectations just to keep the deviation between dream and reality as small as possible is depriving the company of market opportunities and revenues and often also increasing costs.

On the other hand, it is not unusual for a sales plan to fall short of the forecast market needs. As part of a sales and Operations Planning Sales figures often become a “Constraint Demand Plan” or leveled out over time because seasonal or general capacity, procurement or liquidity bottlenecks must be taken into account.

Best Practice Module 1 therefore results in: A responsible sales forecast ensures that reality, and not hope, is the starting point for supply chain planning. It is organized in such a way that the actual expected demand quantities are identified, incorporated into the further planning process and implemented, provided that liquidity, production and supplier capacity are sufficient.

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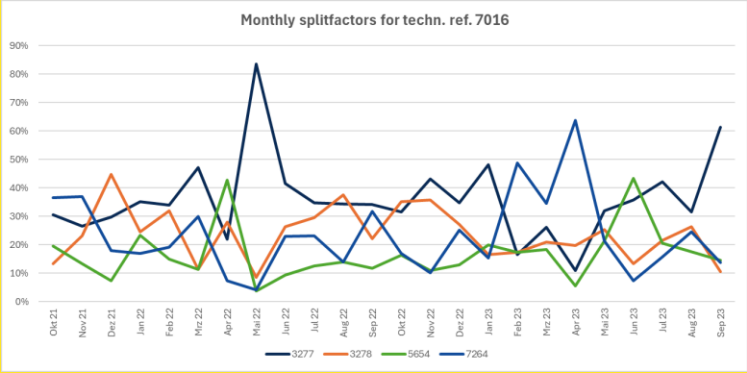
Basic principle 2: Forecasts at the product group level are convenient for sales and useless for production and purchasing

When sales forecasts are created by the sales department, this is usually done at the product group level, i.e. for a condensed group of similar but not identical items, and sales figures are often taken into account. However, purchasing must order specific individual parts and production orders for specific parts must also be created in production control.

In order to get from the general sales statement of the sales department to the required quantities of the individual material numbers, split factors. The forecast demand of a product group, e.g. the product group televisions, is broken down into the demand of the individual devices: On average, 22% of the demand is for the HD-TS 15 device, 8% for the HD-TS 16 device, etc. If you have split factors work, the monthly fluctuation of the split factors calculated? Probably not, otherwise you would no longer be split factors work...

split factors almost always fluctuate so much that they are completely useless for drawing conclusions about the demand for a single material number from a product group forecast. In technical jargon, this is called the “split factor-Problem".



If you need information about the future requirements of specific items, material numbers, SKUs (Stock Keeping Units), warehouse positions, etc., you cannot avoid an item-specific forecast.

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Your best practice module 2 is therefore: Forecast at item level / SKU level and avoid split factors. You can then provide these forecasts to the sales department for verification if necessary.

Basic principle 3: Sales is completely overwhelmed with a forecast at article or material number level

This sounds banal at first and is one reason why sales usually provide their sales forecasts at a condensed level, e.g. a product group level.

However, sales is not only overwhelmed in terms of quantity when it has to deal with potentially thousands of material numbers, but also in terms of quality. Anyone who has never worked in sales can hardly imagine how difficult it is to develop an accurate feeling for how demand for a single item will change in the future. You may have a certain feeling about whether demand will increase, stay the same or decrease for a group of similar items, but not for a single item.

In addition, sales staff usually have to think on two levels: on the one hand, they have a certain demand expectation and, on the other hand, a sales target that often has little to do with their own demand expectation. Which future sales volumes for the next few months should a sales staff member use in their forecast: those that they expect based on their experience or those that are expected "from above"?

Ultimately, we all – including sales – tend to let our expectations about the future be influenced by recent experiences. In technical jargon, this is called the “Recent Pastbias".

We have no choice but to reduce the influence of the human factor somewhat when it comes to an objective forecast of the future sales volumes of articles.

This brings us to your best practice module 3: For most industries and in most markets, sales forecasts must be prepared in the form of technical (=statistical or AI-based) forecasts. Sales should only be requested for information where technical forecasts are inadequate.

Sales can only create forecasts for sales items, be they standard products or possibly spare parts. They cannot make any meaningful statements about individual assemblies or individual parts that they never sell in isolation. There is another reason why it is not always possible, or at least difficult, to use sales forecasts.

Basic principle 4: The finished goods level is not always the right forecast level

We often hear from companies that it is not possible to make a correct sales forecast because the variety of their end products is too large or because practically every end product is customer-specific. It is typical for such companies that they build their end products from standardized or partially standardized assemblies and components and only some of the components are truly customer-specific.

The customer-specific solution is therefore the result of the variable arrangement of the "Lego bricks" and not of individual building blocks. In most cases, the delivery times that the market accepts are sufficient to build a customer-specific solution largely from standard components. The "logistical decoupling point", i.e. the point in the value stream from which production can be carried out according to customer orders, is usually before final assembly; sometimes even further up the value stream.

Up to the logistical decoupling point, production must be carried out anonymously by the customer and thus stockpiled based on suspicion (forecast). The logistical decoupling point is exactly the point in the value stream where a sales forecast must begin.

And so the best practice module 4 is: The storage level at which forecasting should be carried out is at the logistical decoupling point, i.e. at the last customer-anonymous production stage.

The four basic principles above should have made it clear that technical forecasting is of considerable importance in the sales forecasting process. In practice, however, technical sales forecasts are handled so naively and sometimes ignorantly that it is not surprising that many companies do not trust statistical forecasts. Statistical forecasts are sometimes wrong, but on average they are usually better than human forecasters, especially since they can usually only deal with a few selected items and have to deal with the rest of the items in a rather general way due to their sheer number.

Statistical forecasts are sometimes wrong, but on average they are usually better than human forecasters, provided the statistical forecasts are correctly developed.

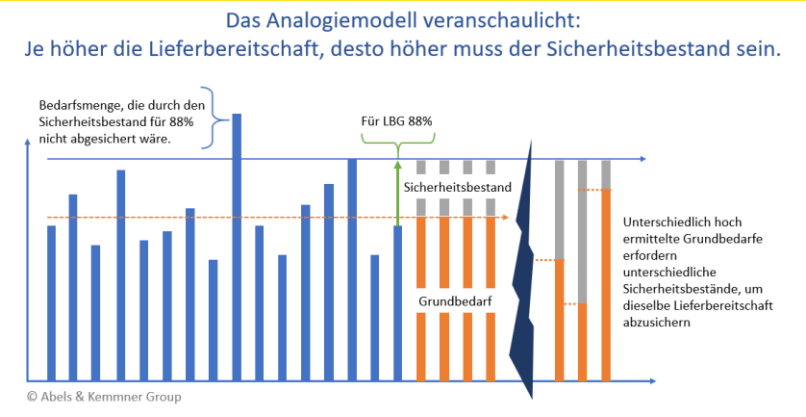
However, this requires that you set up your statistical forecasts correctly. Therefore, we will now look at important basic principles and best practice rules for effective technical forecasts. Some of these best practice rules represent organizational requirements for your forecasting process and some of them have to be implemented on the software side.

Basic principle 5: Every sales forecast consists of three pieces of information and not just one forecast value

We know the situation from the weather forecast: Saturday was supposed to be mostly pleasant with temperatures around 21°C. On Saturday evening at 8pm we found ourselves standing with freezing guests in drizzle at 18°C and battling with the damp charcoal. The obvious accusation is probably that the weather forecast was wrong.

If we hadn't gotten the weather forecast from the weather forecaster on TV, but had instead looked at the weather service on the Internet, we might have found out that there was a 45% chance of rain on Saturday evening and that the temperature would be 22°C, with a 25% chance that the temperature would fluctuate within +/-1° and a 67% chance that the temperature would fluctuate within +/-3.75°. Drizzle and 18°C were therefore well within the fluctuation range of the forecast.

With forecasts, whether they concern the weather or the future demand for items, we have two main problems: Firstly, we have no sense ofProbabilities and secondly we like to pick out what we want to hear from the information provided. The TV weather report therefore immediately capitulated and dropped the probability of rain and the range of temperature fluctuations.



It is important to understand that a forecast does not only consist of forecast values, for example the expected monthly consumption in the next few months, but must also contain a statement about the uncertainty of this forecast. Instead of forecast values, it is therefore correct to speak of basic requirements. The uncertainties of the forecast must then be secured by safety stocks. How high the safety stock must be depends on the statistical certainty with which you want to be able to deliver. The higher the required delivery readiness, the higher the required safety stock.

Best practice module 5 is therefore: A sales forecast is only complete if it contains information on basic requirements, safety stock and required delivery readiness.

Basic Principle 6: The demand for items is almost never “normally distributed”

You may remember the normal distribution or Gaussian bell curve that you heard about at school. First of all, the normal distribution states that measured values fluctuate symmetrically around a mean value towards smaller and larger values. The range of fluctuation is subject to certain laws; for example, 68.27% of all values lie within a range of one standard deviation around the mean value.

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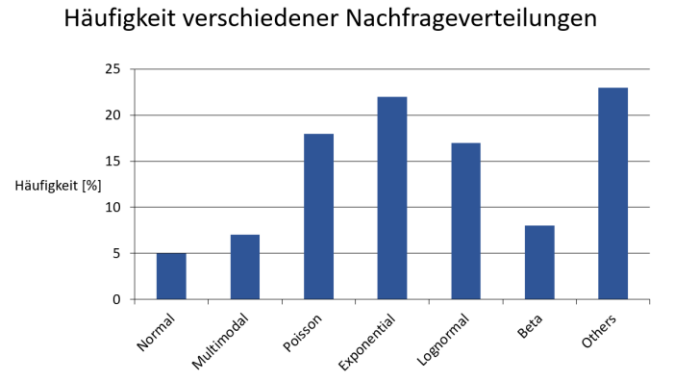
You don't need to understand the normal distribution statistically, but you do need to know that all classic forecasting methods, such as the moving average or first or second order exponential smoothing for items, only determine statistically correct basic requirements if the demand for these items is normally distributed, which in practice only applies to about every 20th item. This means that about 95% of your demand forecasts are systematically and systematically wrong.



Of course, there are also forecast formulas and safety stock procedures for other forms of demand distribution. In practice, however, this is not very useful: the demand distribution, i.e. the pattern according to which demand for an item fluctuates, can change from month to month and for a good fifth of all items, no demand distribution can be identified at all.

There are three approaches to dealing with this problem: The most common approach is to ignore this problem. This is the typical approach used by most ERP systems.

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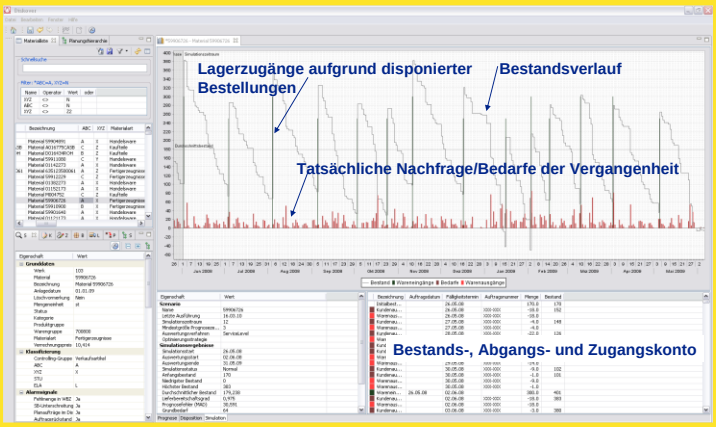
Reliable forecasts can only be made if, during each forecast run, you check for each article which of the various basic requirement and safety stock calculation methods would have produced the best results in the past for a specific article, in order to then use this combination of basic requirement and safety stock calculation methods to forecast future sales volumes. This approach requires simulating the basic requirement and safety stock determination and the resulting disposition depending on the actual demand over a certain period of time - ideally one year - in the past. Although this approach does not avoid the problem that the forecast methods are incorrect from a statistical point of view, you at least select the basic requirement and safety stock method that has produced the best results in the past from the group of "incorrect" methods for each article.

This approach is complex, as a large number of simulations with different basic requirement and safety stock calculation methods must be carried out for each forecast. An ERP system would be overwhelmed by this. Such calculations must therefore be carried out outside the host system in special sub-systems and run there automatically without users having to intervene or understand what exactly is happening.

A third solution approach is to use so-called "distribution-free" methods. These are basic requirement and safety stock calculation methods that work without knowledge of the actual demand distribution, so they work mathematically and statistically correctly and thus lead to the desired delivery readiness. These distribution-free methods can only be found in very few sales forecasting systems.



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This brings us to Best Practice Module 6: In order to calculate reliable sales forecasts, you have to simulate the most suitable basic requirement and safety stock calculation methods for each item every month in order to calculate the forecast for the next requirements. Use a large number of different basic requirement and safety stock calculation methods. Also use distribution-free methods and integrate the distribution-free methods into the simulation runs. This sounds daunting, but don't worry. Good forecasting systems do this automatically, without users having to understand what is happening.

Basic principle 7: The quality of the sales forecast depends on the quality of the demand time series from the past

When you create a statistical sales forecast, you are trying to make statements about future requirements from a past demand time series. It is obvious that the quality of the forecast is better the more accurately the past time series reflects the actual market requirements of the past. If you only use the past time series to calculate stock outflows or invoice data, it can happen that there are gaps in the time series in which you were unable to deliver and during which, logically, no stock removal and no invoicing could take place. If you use this time series unchanged as the basis for your forecast, then you are assuming that the lack of stock removal was due to a lack of market demand. In doing so, you have already distorted the truth. By using a "outlier removal“, which powerful forecasting systems can carry out automatically, such demand valleys in past time series can be filled or, conversely, demand peaks can be capped. This can significantly improve the quality of the past figures.

You can improve your forecast even further if you use the time series of agreed delivery dates and delivery quantities, but these can also still contain delivery gaps that have nothing to do with demand gaps.

Best Practice Module 7 is: At the finished goods level, use customer requested dates and quantities as a history of market demand wherever possible and record zero sales due to poor delivery situations. If you are forecasting at the component or individual part level, derive "corrected" requirements from the past time series of the finished goods or from inventory outflow values whose outliers have been adjusted.

Even if you base your forecast on a better quality demand history, your work is not yet finished. Are you dealing with promotions or project business? Then you need to follow basic principle 7.

Basic principle 8: In addition to general demand, past time series usually also contain promotions and project business, which are difficult to forecast together

In general, three forms of demand can be distinguished. Firstly, in many industries there are "promotions" that are carried out by the sales department or that have to be carried out due to customer demands. In such promotions, either a certain product is only offered for a short time or a product that is sold regularly is temporarily offered at a cheaper price. This type of promotion is typically found in retail. In the first case, a distinction can be made between goods that are only offered once and those that are offered repeatedly. In the first case, there is no historical time series specific to the promotion, in the second, there is a promotion-specific historical time series from the last promotion(s).

If a product that is sold on an ongoing basis is used in promotions, the demand history inevitably contains requirements from promotion phases and requirements from non-promotion phases. In general, a company, or rather the sales department, should be able to plan promotions in good time so that promotion requirements can be arranged in good time; although admittedly, the problem of determining the correct promotional quantities still remains. Looking at promotions that have taken place in the past may help here.

Projects are separate from campaigns. Projects exist where large quantities of one or more items are sold to individual customers and these quantities are explicitly negotiated with the customer. Typically, with projects you are in competition with other "competitors".

Projects are often decided on at short notice after a long lead time and the products often have to be delivered at short notice. Projects also need to be automatically filtered out of the item's demand history using suitable filter mechanisms if they significantly exceed the background noise. If this is the case, then sales is required to provide estimates when forecasting projects, despite all the imponderables.

If there is not enough data to calculate actions and projects from the historical data, you can try to do this using outlier removal, in this case rather roughly. The challenge is firstly to find good procedures and secondly to set the filter correctly. This can only be achieved reliably by simulating forecasting and scheduling behavior, in which different article-specific selectivity levels are regularly checked using historical demand time series accurate to the day and the most suitable one is determined.

Best Practice Module 8 is: Project business and actions that significantly exceed the background noise must be separated from it and forecast separately. The correct selectivity for automatically filtering out projects and actions from the background noise must be determined regularly on an article-specific basis through simulations.

Basic Principle 9: Different sales channels / sales regions

The demand for the same item develops differently in different sales channels / sales regions.

It is a commonplace that an article sold to several key accounts or in different regions is not in demand to the same extent in all distribution channels. In France, for example, demand is very even but at a low level, while in Poland, where larger quantities are sometimes purchased and smaller quantities are sometimes purchased very irregularly. If both countries are supplied from one production facility, one might think that it is enough to forecast the total demand for this article in order to keep stocks in the central warehouse sufficiently high. This would possibly mean that the French and Polish sales departments would be required to make a forecast for this article. By separating the distribution channels into two, it is no longer necessary for the French sales department to make forecasts for this article, as a technical forecast can provide sufficiently accurate and objective figures.

If the national sales departments have their own regional warehouses, separating the forecasts into the various sales channels offers the advantage for logistics that it becomes clear which replenishment quantities must be delivered to the local warehouses of the individual national sales departments and which safety stocks must be kept there.

Best Practice Module 9 therefore requires: Forecasts should be broken down by sales channels/regions.

Do you supply your customers via several distribution levels, for example from a central warehouse to various regional warehouses or national distribution warehouses? Then another basic principle 10 must be observed.

Basic Principle 10: The End Consumer

The real market demand in a supply chain is the needs of the end consumer

Whenever you deliver your finished goods to end users via several intermediate storage levels, the question arises as to who your customer is. Is it the national company or the end user in a specific country? A national or regional warehouse can turn a steady demand from end users into irregular or intermittent demand at the central warehouse, as the national or regional warehouse collects requirements and then passes them on in intermittent quantities. From a transport cost perspective, this may be cheaper, but it does not have to be. For sales forecasting, it definitely means that higher safety stocks have to be kept and the actual market demand is distorted. If you consider the national company to be your customer, you must forecast the national company's demand based on its possibly stochastic demand in the past, so that you can ensure that you have sufficient delivery capacity.

However, by considering the national company and not the end consumer as your customer, you are already deviating from the overall optimization of your supply chain and are implementing segment optimization, which results in a poorer forecast and higher inventories in the supply chain. If your customer is an external third party, for example a hardware store or a general agent in a country in which you do not have your own sales company, you will probably have no choice but to consider them as your customer, even though they are actually just an intermediary; it is still segment optimization nonetheless.

However, if the “intermediary”, for example in the form of a national sales company, belongs to your own company, you should consider, in the interests of overall optimization of your supply chain, whether it would be better to base your forecasts on the end consumer needs (point-of-sale requirements). The historical demand time series of the point-of-sale requirements from different regional or national warehouses can be consolidated at different distribution levels. You can use this data not only to create forecasts at regional or national warehouse level. You can also consolidate the requirements at central warehouse level and forecast basic requirements and safety stocks there - upstream in the value stream. This will relieve the "middleman" of some of his planning sovereignty.

Best Practice Module 10: To optimize the entire supply chain, you must create the necessary forecasts for different distribution levels based on the end consumer's needs and not on the needs (calls) of intermediaries. This is even more true if the intermediaries belong to your own group.

Basic Principle 11: Previous Articles and Similar Articles

Many new articles have predecessor articles and similar articles.

It is part of the routine of practically every company to regularly introduce new products to the market. Each time you are faced with the problem of forecasting the likely demand for this item.

If a successor article merely represents a technical update of the predecessor article, it is usually sufficient to transfer the demand history of the predecessor article to the successor article using a predecessor-successor relationship.

When a successor item has technical compromises or design changes compared to the predecessor item, it becomes more complicated to quantify the future demand for the new item. Nevertheless, even in such cases, transferring the demand trend of a suitable predecessor or representative item remains a useful approach.

A successor article does not always simply replace a predecessor article. Often a predecessor article expires while the successor article is already being phased out.

In such cases, a pure predecessor-successor relationship is not sufficient to create a sales forecast for the two items. In addition to the predecessor-successor relationship, an overlap period must be defined and consideration must be given to how the "substitution curve" runs over this overlap period.

If a new article expands the existing product range, it can be expected that the new article will attract part of the market demand for the articles already offered. This is then referred to as cannibalization of the demand for existing articles. This must also be taken into account in an effective sales forecast. And in this case too, you may need to consider that the cannibalization effect builds up over a certain period of time.

Predecessor-successor relationships, such as substitution relationships, “grow out” because after some time a sufficiently long demand history for the “new” article has been built up.

Best Practice Module 11: Document predecessor-successor and substitution relationships to track demand for new items anddemand cannibalizationto predict ongoing similar articles.

Basic Principle 12: Forecast situations versus classical approaches

Some forecasting situations elude classical approaches.

We all know those exotic items where we come across sporadic market needs by chance. A typical example of this group of items is spare parts. It seems to be a basic characteristic of spare parts that customers always ask for a part that has not been needed for months or years, just after it has been scrapped.

Almost even more exotic are end-of-Life forecasts, such as those you have to create in the electronics industry, for example, when important components that are either expensive or cannot be replaced by other parts are discontinued by the supplier, while your items still need to be manufactured or at least maintained for some time.

Consider also the fashion industry, which is regularly required to determine the required quantities for new collection items.

In some cases it helps to develop a specific forecasting method, as we have done for the end-of-Life forecast of components for Medion.

With the help of a special forecast exchange, hsx.com, a company in Los Angeles, supposedly produces quite good forecasts for the box office results of new feature films.

If the forecast cannot be managed, either sales are lost due to a lack of delivery readiness or high costs are incurred due to excess inventory and scrapping. The only way to reduce these costs is to intelligently align the company's business model with the limits of the logistics business model.

The supposed operational problem of a poor sales forecast can become a strategic challenge for the company.

Best Practice Module 12: Special situations may require special forecasting methods. If this is not successful or the consequences are too expensive, the only option is to intelligently align the company's business model with the limits of the logistics business model.

Basic Principle 13: Even an artificial intelligence gains its experience from the past and does not tame the chaos of the market

The naive opinion of many managers and clerks is that artificial intelligence (AI) can finally make accurate forecasts. Instead of looking at past data, it is better to rely on AI. But the reality is very different.

In reality, an AI system also learns from the past. The AI may be able to recognize regularities beyond trends and seasonalities in the existing historical time series that classic statistical forecasting methods do not recognize. However, the ARIMA method is already very good here. In order to improve the quality of the forecasts, it is particularly advisable for AI forecasts to take external factors into account that (can) influence the demand for your products. However, you need to know which factors these could be and find data material in sufficient quantities and at reasonable procurement costs.

And this effort is still not enough. The influencing factors or the data describing them must also be meaningful for the future. This is the case if there are future numerical values for the influencing factors under consideration, from which your AI system can conclude the resulting future demand for your product.

Even if there are no statements about the future development of the influencing factors under consideration, your AI system may be able to make statements about the future. This is possible if the system can detect a time lag between the development of one or more influencing factors and the development of demand. A statement about future market demand can then be made from the current value(s) of the influencing factor(s).

However, you will never be able to identify all the factors that directly or indirectly affect the demand for your products, as many events occur stochastically. Even a neural network or other artificial intelligence cannot reliably quantify causal relationships for the future that could not be identified from past values. Future market behavior is chaotic to a certain extent and even the smallest, barely measurable changes can have immense effects.

This leads to the last best practice building block: First, start with a statistical forecast. If you want to further improve the quality of the forecast and think you can identify external factors that significantly affect the demand for your products, try training a neural network. Before doing so, however, make sure that you can obtain sufficient data on the suspected factors at a reasonable cost.

The deeper you go into the details of sales forecasting, the more best practice rules you can establish. Not every best practice rule can be followed in every case, especially if you are trying to make progress using the resources you have at your disposal.

Don't be put off by the apparent complexity of these rules. Many of the best practice building blocks listed are practically fulfilled automatically if you create your forecasts using a powerful sales forecasting system and configure it correctly. In this way, you will not only take a big step towards a best practice solution, but you will also achieve less complex sales forecasting processes.

However, the following remains to be said in conclusion:

If you shoot with a homemade rifle with a bent barrel, you shouldn't be surprised if the rifle doesn't hit the target. You should only be surprised if the hobbyists conclude that professionally made rifles don't hit the target either.