McCOY

IBP FOR INVENTORY

A Business Case

WHY IS IBP FOR INVENTORY THE BEST SOLUTION FOR YOUR INVENTORY PLANNING?

Having the correct inventory at the correct time at the correct location is crucial for every company. If this process is not correctly tackled, it leads to lower than expected customer service levels, too much working capital tied up to your inventory, obsolete stocks and inability to respond to changes in demand or supply. In order to solve these issues, SAP has developed 'IBP for Inventory'. But how does IBP help to accomplish your inventory goals?

First of all, it uses robust statistical models which allow you to create an inventory plan with single- and multi-echelon optimization. You can also visualize your supply chain network and quickly gain insights into inventory drivers with the embedded analytics. On the other hand, uncertainty can be tackled with real-time what-if scenarios and planners can focus on identifying problems or complications by executing alerts or exceptions. Finally, it provides visibility to check master data and to determine root causes for inventory.

As a consequence, the direct benefits you will face are:

- Improvement of customer service levels
- Minimization of stock-outs
- Maximization of the efficiency of inventory and working capital
- Automatization and standardization of the inventory target-setting process at each tier within the supply chain to feed operational plans
- Improvement of the planner productivity by standardizing the planning processes
- More efficient deployment and replenishment of inventory across the entire supply chain
- Reduction of product and distribution costs

WHAT IS THE IBP FOR INVENTORY SOLUTION OF MCCOY & PARTNERS?

The IBP for inventory solution of McCoy & Partners is based on the inventory algorithms of the standard IBP solution. On top of it, we have built an interface to transfer the required master data and historic transactional data from SAP ECC or S/4 Hana to IBP. As topping of the cake, we included dashboards that not only give immediate insight in your future inventory positions, but also on the load for the various production resources and suppliers.

A high-level overview of the solution is shown on the figure below. We start with maintaining the master data (target service levels, BOM's, quota's, lot-sizes, lead times and inventory policies) and, if possible, we interface it from ECC or S/4. If that is not the case, we either maintain the data directly in IBP or we upload it from CSV-files.

Afterwards we load the historical data. The first steps consist of incorporating the forecast that steered the production plan and loading the past sales orders with the requested quantity. We also integrate historical production orders, stock transport orders and purchase orders to have a view on the actual lead times. Based on the standard IBP algorithms, we calculate the forecast error and the production, transport and purchasing lead times variance.

Once the data preparation is finished and the demand and supply uncertainties have been calculated and reviewed, we launch the multilevel inventory optimization to calculate the recommended safety stocks for each product-location combination in our network. Besides that, we also estimate the lost sales and the required resource and supplier capabilities.

Thanks to this approach we can optimize the different factors and elements involved in inventory planning. Planners will be able to analyze data more accurately, have a good view of their business and take the most profitable decisions accordingly.

The following use-case is an example of how this solution can assist and give a quick answer to inventory planning when we have an unexpected situation that impacts our supply chain. Due to the eruption of COVID-19, the McCoy brewery had to adapt their plans and strategies to the new circumstances. They produce three different products (kegs, bottles and cans) and deliver to two customer groups (pubs and supermarkets). Bars and restaurants will remain closed until further notice, so the sales to this customer group will be highly affected. Therefore, forecasts, supply plans and stocks will have to be changed.


Master Data
Target Service Level
BOM
Quotas
Lot size
Lead Time and Inventory Policies
Transactional Data
Forecast
Past Sales Orders
Historical Production Orders
Stock Transport Orders
Purchase Orders
Calculated Values
Forecast Error
Production Lead Time
Transport Lead Time
Purchasing Lead Time
SAP IBP Optimization Algorithm
Output Data
Safety Stock
Required Source/Suppplier Capabilities
Lost Sales
Dashboard
Safety Stock Value in EUR - base
Safety Stock Origin in % - base
Average lost sales in liter - base version
Average Canning Resource Demand (PAL) - base

HOW WAS IBP FOR INVENTORY USED AT THE MCCOY BREWERY DURING COVID-19?

March 2020:A Corona virus forces restaurants and bars to close their doors.

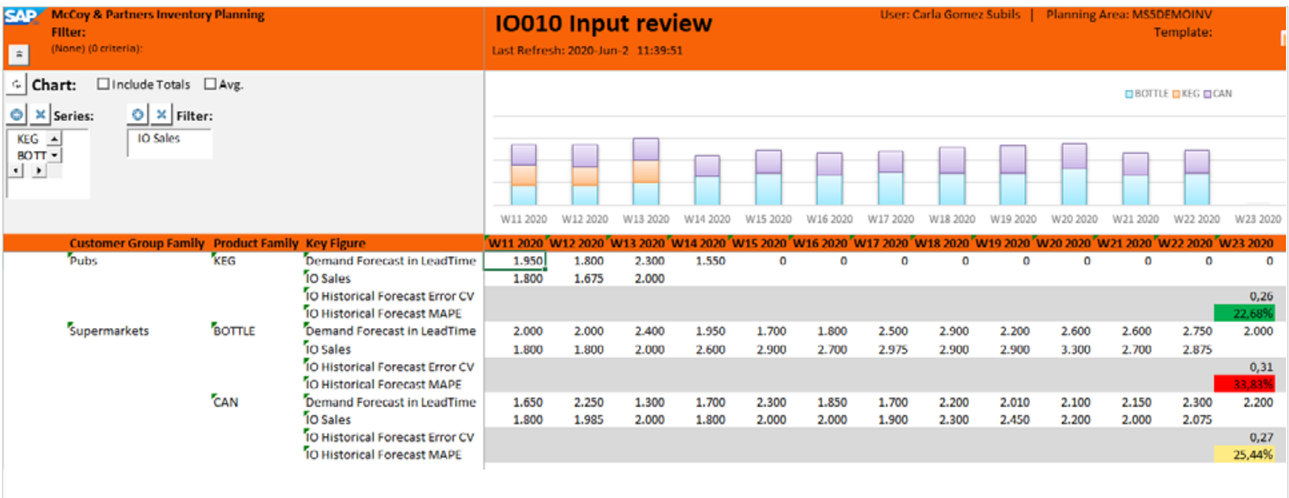
David, the VP for sales and marketing at McCoy's Brewery expects that, because of the lockdown, end customers will purchase more beer at supermarkets. He orders his demand planners to immediately cancel the forecast for the pubs and move 50 percent of the volume to supermarkets. Supply plans are modified to produce bottles and cans instead of kegs. Meanwhile, the brewery is finalizing the implementation of the IBP for inventory solution of McCoy & Partners to optimize the inventory levels towards the new situation.

May 2020: go-live of the inventory optimization solution.

Anna is responsible for calculating the optimal inventory levels at the McCoy brewery. The past two months have been difficult for her. Instead of producing mainly beer in kegs, the production of McCoy shifted to bottled and canned beer. The government just announced that pubs may be reopened in July, August or September. David's team already updated the sales forecast for these 3 scenario's and Anna needs to estimate the impact on the inventory targets.

Input data review

Anna starts her inventory optimization process by looking at what has happened in the past weeks. First, she looks at the historical sales and compares them with the forecast that was used to steer production. Anna is happy that the prediction of Dave's team was quite good. Indeed, since week 14, keg sales disappeared and the sales of bottles and cans to supermarkets increased. The forecast error is still around 30% which is the same as in the pre-Covid 19 days.

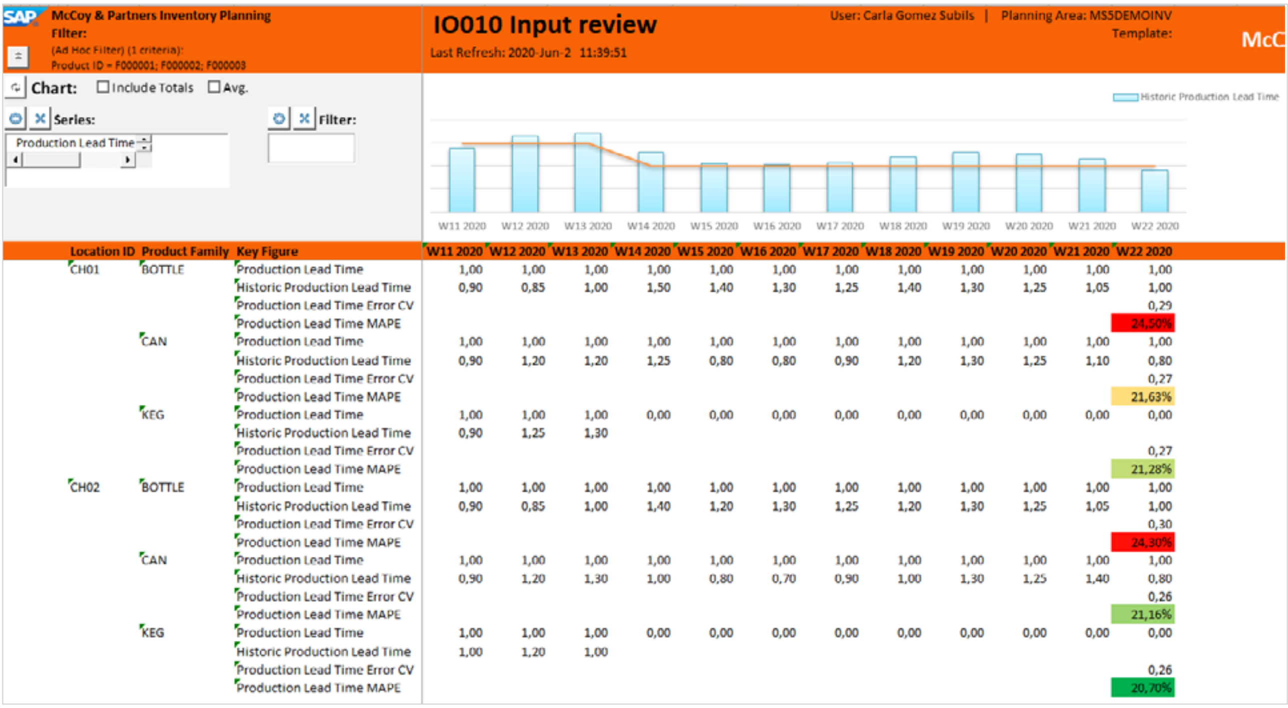


Customer Group Family	Product Family	Key Figure	W11 2020	W12 2020	W13 2020	W14 2020	W15 2020	W16 2020	W17 2020	W18 2020	W19 2020	W20 2020	W21 2020	W22 2020	W23 2020
Pubs	KEG	Demand Forecast in LeadTime	1.950	1.800	2.300	1.550	0	0	0	0	0	0	0	0	0
		IO Sales	1.800	1.675	2.000										
		IO Historical Forecast Error CV													0,26
		IO Historical Forecast MAPE													22,68%
Supermarkets	BOTTLE	Demand Forecast in LeadTime	2.000	2.000	2.400	1.950	1.700	1.800	2.500	2.900	2.200	2.600	2.600	2.750	2.000
		IO Sales	1.800	1.800	2.000	2.600	2.900	2.700	2.975	2.900	2.900	3.300	2.700	2.875	
		IO Historical Forecast Error CV													0,31
		IO Historical Forecast MAPE													33,83%
	CAN	Demand Forecast in LeadTime	1.650	2.250	1.300	1.700	2.300	1.850	1.700	2.200	2.010	2.100	2.150	2.300	2.200
		IO Sales	1.800	1.985	2.000	1.800	2.000	2.000	1.900	2.300	2.450	2.200	2.000	2.075	
		IO Historical Forecast Error CV													0,27
		IO Historical Forecast MAPE													25,44%

Due to lack of sales in week 14 to week 19, the forecast error for beer kegs has improved to 22%. Since this percentage is not realistic for the future, Anna makes history corrections and copies the forecast and sales from the corresponding weeks of 2019. Afterwards, she reruns the forecast error calculation algorithm.

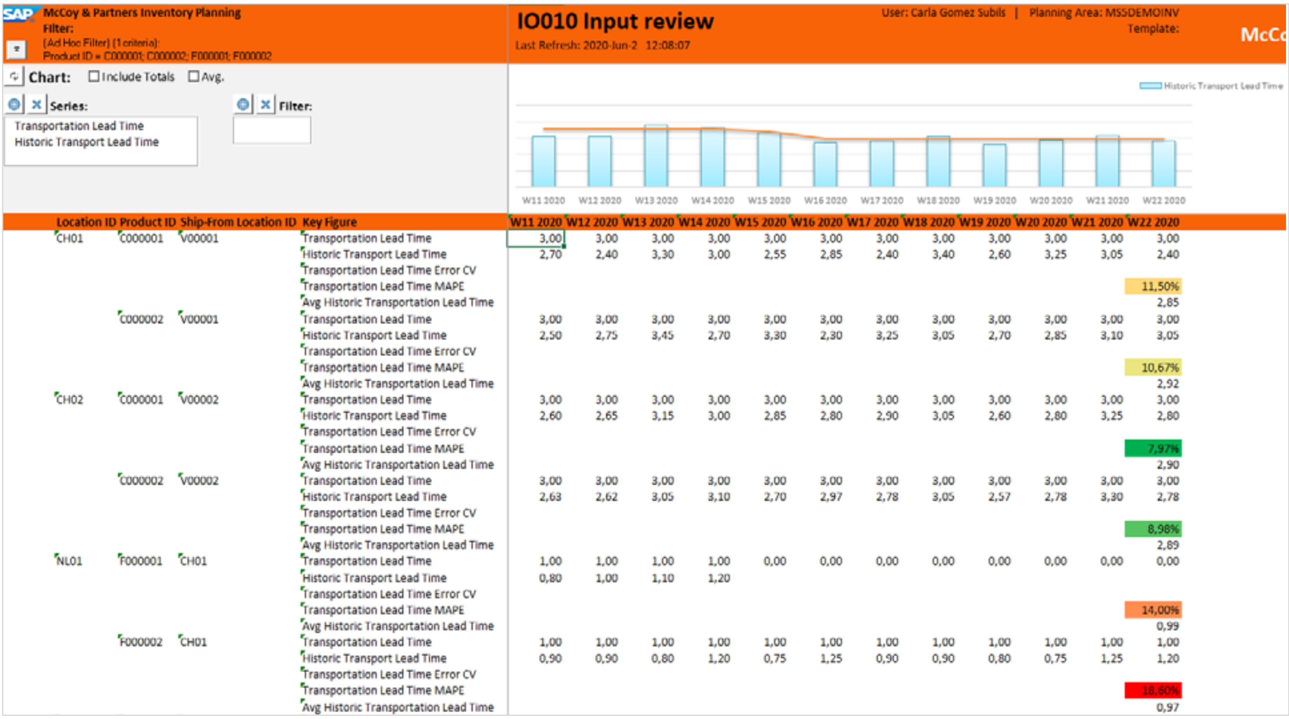
Secondly, Anna looks at the historic production lead times. She recognizes the higher production lead times for the bottle packaging resource in the past weeks. Workers from the kegging department were suddenly moved to the bottling line and had to be trained on the job. Moreover, the packaging line had to be stopped several times because suppliers could not deliver enough bottle caps.

Luckily, the situation stabilized in the last two weeks. Anna decides to make a small correction on the production lead times of bottles from week 14 until week 19 because she knows these were only caused due to the crisis that suddenly emerged. Moreover, the company purchased enough bottle caps to cover the next 3 months. She reruns the algorithm to update the production lead time error.



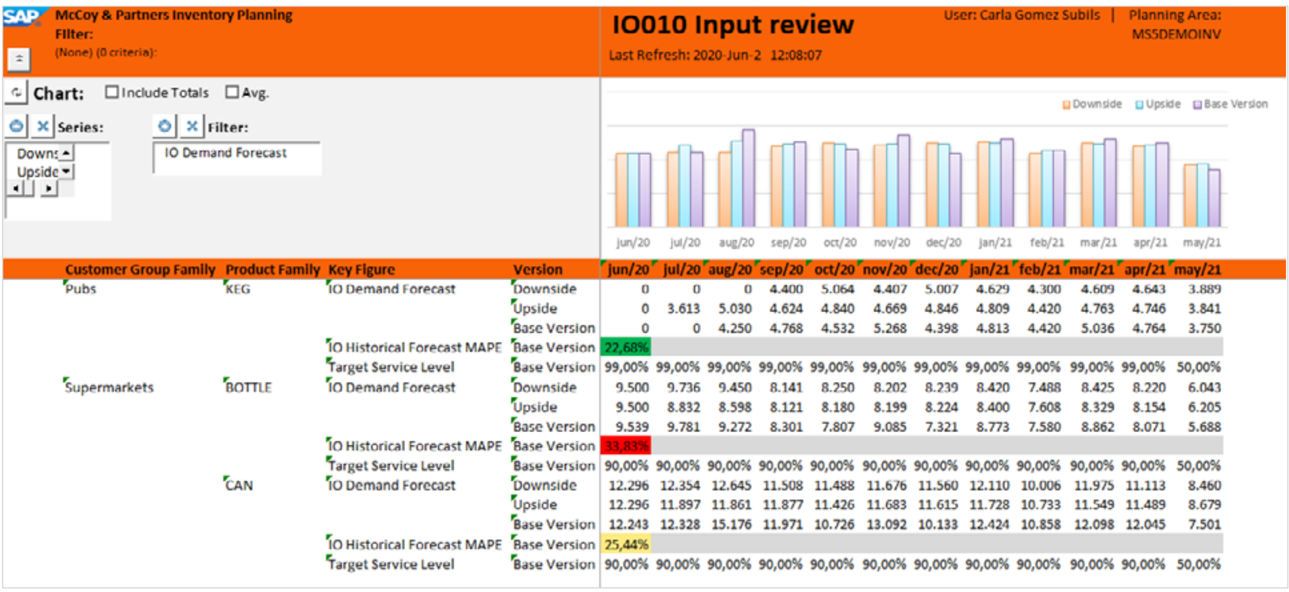
Location ID	Product Family	Key Figure	W11 2020	W12 2020	W13 2020	W14 2020	W15 2020	W16 2020	W17 2020	W18 2020	W19 2020	W20 2020	W21 2020	W22 2020
CH01	BOTTLE	Production Lead Time	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
		Historic Production Lead Time	0,90	0,85	1,00	1,50	1,40	1,30	1,25	1,40	1,30	1,25	1,05	1,00
		Production Lead Time Error CV												0,29
		Production Lead Time MAPE												24,50%
	CAN	Production Lead Time	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
		Historic Production Lead Time	0,90	1,20	1,20	1,25	0,80	0,80	0,90	1,20	1,30	1,25	1,10	0,80
		Production Lead Time Error CV												0,27
		Production Lead Time MAPE												21,63%
	KEG	Production Lead Time	1,00	1,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
		Historic Production Lead Time	0,90	1,25	1,30									
		Production Lead Time Error CV												0,27
		Production Lead Time MAPE												21,28%
CH02	BOTTLE	Production Lead Time	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
		Historic Production Lead Time	0,90	0,85	1,00	1,40	1,20	1,30	1,25	1,20	1,30	1,25	1,05	1,00
		Production Lead Time Error CV												0,30
		Production Lead Time MAPE												24,30%
	CAN	Production Lead Time	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
		Historic Production Lead Time	0,90	1,20	1,30	1,00	0,80	0,70	0,90	1,00	1,30	1,25	1,40	0,80
		Production Lead Time Error CV												0,26
		Production Lead Time MAPE												21,16%
	KEG	Production Lead Time	1,00	1,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
		Historic Production Lead Time	1,00	1,20	1,00									
		Production Lead Time Error CV												0,26
		Production Lead Time MAPE												20,70%

After looking at the historical production data, Anna reviews the transportation and purchasing lead times. She notices nothing out of the ordinary. The lead time errors are still around 10 percent like they have always been for the last few years. No action is required here.



Location ID	Product ID	Ship-From Location ID	Key Figure	W11 2020	W12 2020	W13 2020	W14 2020	W15 2020	W16 2020	W17 2020	W18 2020	W19 2020	W20 2020	W21 2020	W22 2020
CH01	C000001	V00001	Transportation Lead Time	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
			Historic Transport Lead Time	2,70	2,40	3,30	3,00	2,55	2,85	2,40	3,40	2,60	3,25	3,05	2,40
			Transportation Lead Time Error CV												
			Transportation Lead Time MAPE												11,50%
			Avg Historic Transportation Lead Time												2,85
	C000002	V00001	Transportation Lead Time	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
			Historic Transport Lead Time	2,50	2,75	3,45	2,70	3,30	2,30	3,25	3,05	2,70	2,85	3,10	3,05
			Transportation Lead Time Error CV												
			Transportation Lead Time MAPE												10,67%
			Avg Historic Transportation Lead Time												2,92
CH02	C000001	V00002	Transportation Lead Time	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
			Historic Transport Lead Time	2,60	2,65	3,15	3,00	2,85	2,80	2,90	3,05	2,60	2,80	3,25	2,80
			Transportation Lead Time Error CV												
			Transportation Lead Time MAPE												7,97%
			Avg Historic Transportation Lead Time												2,90
	C000002	V00002	Transportation Lead Time	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00	3,00
			Historic Transport Lead Time	2,63	2,62	3,05	3,10	2,70	2,97	2,78	3,05	2,57	2,78	3,30	2,78
			Transportation Lead Time Error CV												
			Transportation Lead Time MAPE												8,98%
			Avg Historic Transportation Lead Time												2,89
NL01	F000001	CH01	Transportation Lead Time	1,00	1,00	1,00	1,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
			Historic Transport Lead Time	0,80	1,00	1,10	1,20								
			Transportation Lead Time Error CV												
			Transportation Lead Time MAPE												14,00%
			Avg Historic Transportation Lead Time												0,99
	F000002	CH01	Transportation Lead Time	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00	1,00
			Historic Transport Lead Time	0,90	0,90	0,80	1,20	0,75	1,25	0,90	0,90	0,80	0,75	1,25	1,20
			Transportation Lead Time Error CV												
			Transportation Lead Time MAPE												18,60%
			Avg Historic Transportation Lead Time												0,97

As a last step of the input review phase, Anna checks whether the forecast and the target service levels are correctly maintained by the demand team. She looks at the 3 versions of the forecast: an upside version where pubs open in July, a base version for August and a downside version for September. The forecast for supermarkets drops correspondingly because the end customers will prefer to go back to the pub instead of drinking at home. The target service level for pubs has been maintained at 99% (a pub without beer may never happen) and for supermarkets the service level agreements contain a target service level of 90%.



Customer Group Family	Product Family	Key Figure	Version	jun/20	jul/20	aug/20	sep/20	oct/20	nov/20	dec/20	jan/21	feb/21	mar/21	apr/21	may/21
Pubs	KEG	IO Demand Forecast	Downside	0	0	0	4.400	5.064	4.407	5.007	4.629	4.300	4.609	4.643	3.889
			Upside	0	3.613	5.030	4.624	4.840	4.669	4.846	4.809	4.420	4.763	4.746	3.841
			Base Version	0	0	4.250	4.768	4.532	5.268	4.398	4.813	4.420	5.036	4.764	3.750
		IO Historical Forecast MAPE	Base Version	22,68%											
		Target Service Level	Base Version	99,00%	99,00%	99,00%	99,00%	99,00%	99,00%	99,00%	99,00%	99,00%	99,00%	99,00%	50,00%
Supermarkets	BOTTLE	IO Demand Forecast	Downside	9.500	9.736	9.450	8.141	8.250	8.202	8.239	8.420	7.488	8.425	8.220	6.043
			Upside	9.500	8.832	8.598	8.121	8.180	8.199	8.224	8.400	7.608	8.329	8.154	6.205
			Base Version	9.539	9.781	9.272	8.301	7.807	9.085	7.321	8.773	7.580	8.862	8.071	5.688
		IO Historical Forecast MAPE	Base Version	33,83%											
		Target Service Level	Base Version	90,00%	90,00%	90,00%	90,00%	90,00%	90,00%	90,00%	90,00%	90,00%	90,00%	90,00%	50,00%
	CAN	IO Demand Forecast	Downside	12.296	12.354	12.645	11.508	11.488	11.676	11.560	12.110	10.006	11.975	11.113	8.460
			Upside	12.296	11.897	11.861	11.877	11.426	11.683	11.615	11.728	10.733	11.549	11.489	8.679
			Base Version	12.243	12.328	15.176	11.971	10.726	13.092	10.133	12.424	10.858	12.098	12.045	7.501
		IO Historical Forecast MAPE	Base Version	25,44%											
		Target Service Level	Base Version	90,00%	90,00%	90,00%	90,00%	90,00%	90,00%	90,00%	90,00%	90,00%	90,00%	90,00%	50,00%

Anna decides to run the multi-stage inventory optimizer and prepare a nice cup of coffee. While walking to her kitchen she says to herself: "At least there is one positive aspect about this whole crisis. I don't have to drink that awful coffee at the office anymore".

Output data review

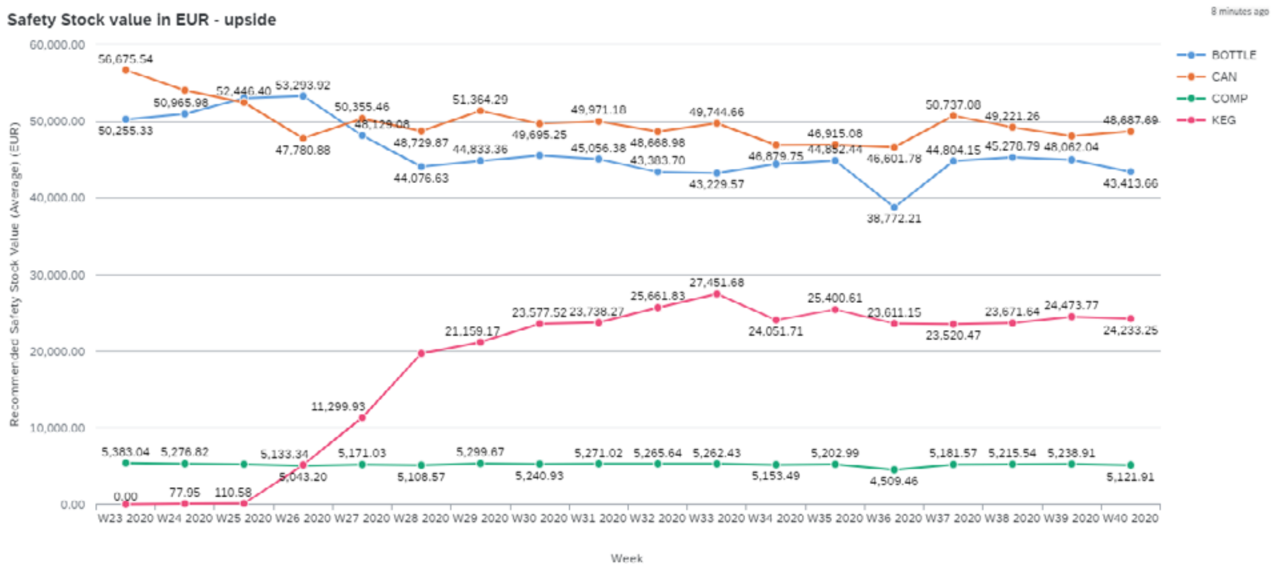
When Anna returns to her desk, the multi-stage inventory optimization job has finished. She opens the Master Data Check dashboard and checks if every product has been planned. She does this by validating that all the products have received a correct inventory network ID and network echelon level (= low-level code calculated by the inventory optimizer). She is happy that everything looks fine: it proves that the master data process that was put in place is working and all the necessary bill of materials and transportation lanes are available in IBP.

Master Data Check

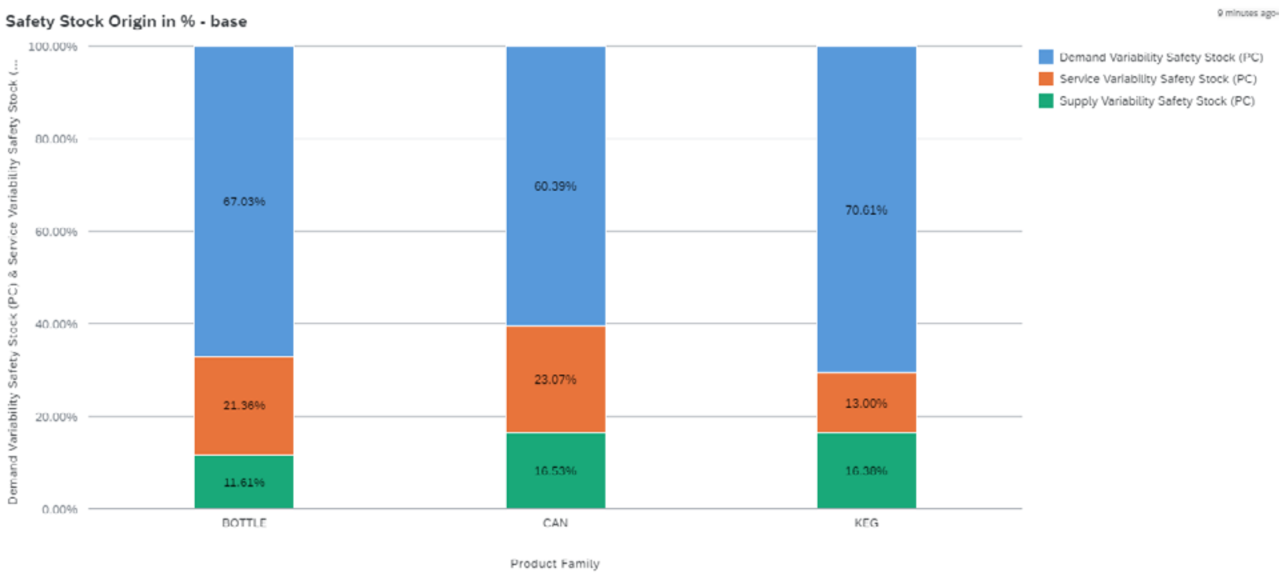
IO Network ID	Product ID	Location ID	Network Echelon Level
EUC_0	C000001	CH01	3
EUC_0	C000001	V00001	4
EUC_0	C000002	CH01	3
EUC_0	C000002	V00001	4
EUC_0	C000003	CH01	3
EUC_0	C000003	V00001	4
EUC_0	F000001	CH01	2
EUC_0	F000001	NL01	1
EUC_0	F000002	CH01	2
EUC_0	F000002	NL01	1
EUC_0	F000003	CH01	2

Afterwards, Anna opens her inventory dashboard in the IBP web browser to check the high-level results of the optimizer. The dashboards show real-time data which can be compared and visualized according to her necessities. There are several options to create the most suitable charts and to select or filter how the data will be displayed (different units of measure, percentages, monetary impact, etc.).

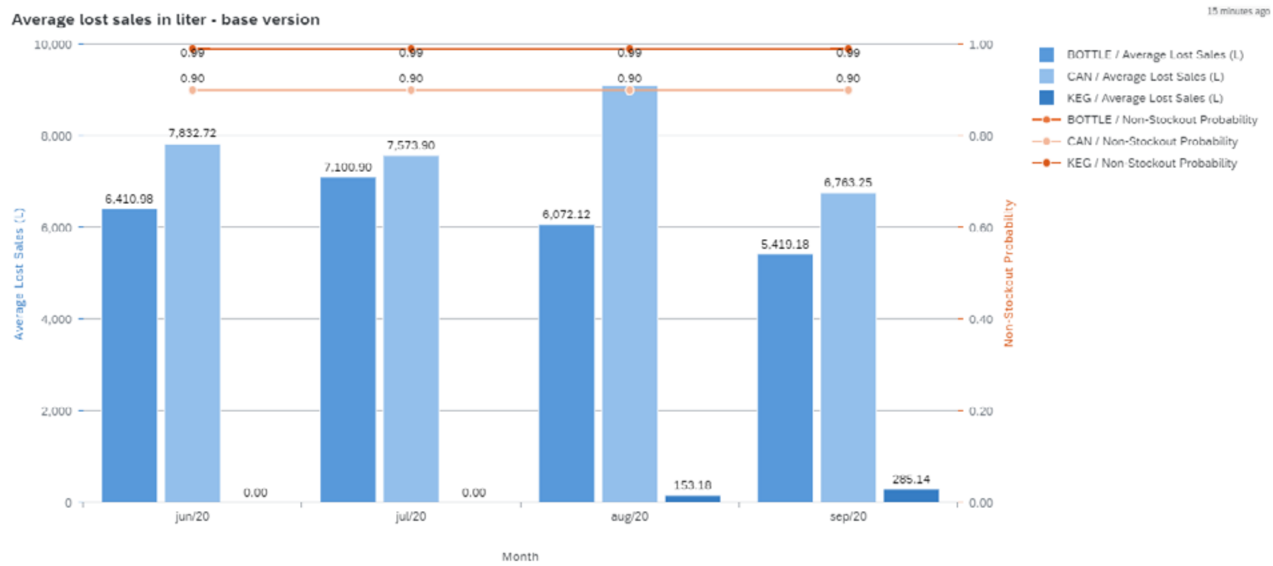
In the example below, Anna sees the fluctuation of the safety stock value in euro in the upside scenario. She can conclude that the value increases for kegs while it decreases for bottles and cans.



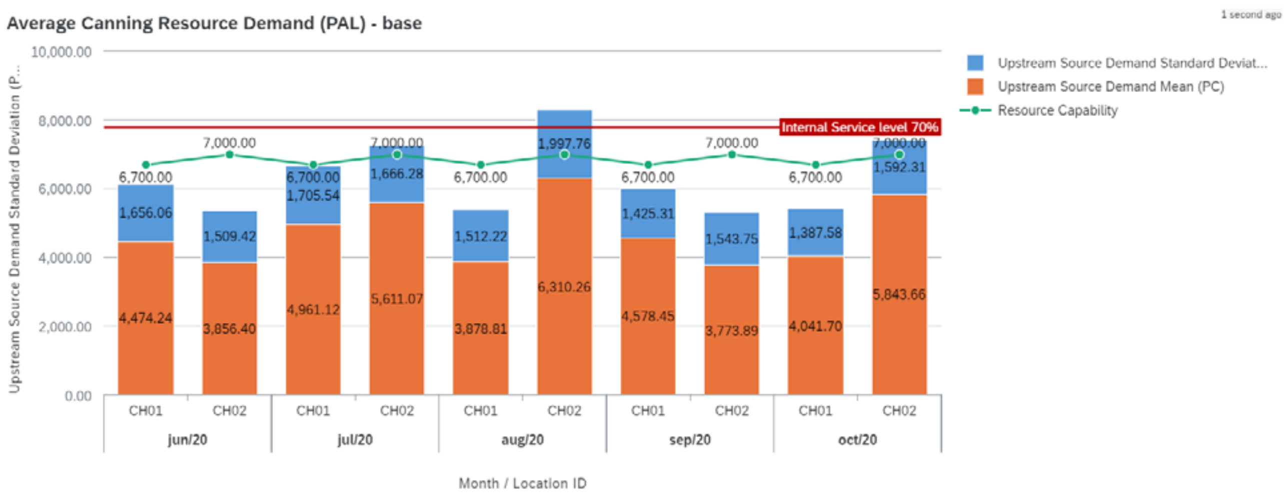
The following chart explains how the safety stock is build up for each product taking into account different variabilities. Most of the safety stock comes from the demand variability, which is higher for kegs due to higher service level of 99% versus 90% for bottles and cans. The service variability is generated by the way the algorithm works: in most cases, it tends to put a higher buffer in the distribution centers and a lower safety stock in the plants because this will result in a lower total safety stock. Finally, the supply variability occurs due to production lead time and supplier lead time uncertainty.



The chart below shows the average loss of sales in liters. We can see that it is higher for bottles and cans because we only want to reach a 90% service level versus 99% for the kegs.



Since the optimizer aims for an internal service level of 70%, the capability of a resource should be a little bit higher than the average demand plus the standard deviation (average + deviation in a normal Gauss curve cover 68,2%). In the example below, where we are checking the average canning resource demand, we see that in plant CH02 this requirement is not always met. Therefore, the planner will have to move some production to CH01 in the supply review phase of his S&OP process.



We also need to make sure that our dependent demand is not higher than the supplier capability. In the following chart we also see that in June and July Vendor 2 cannot deliver enough bottles. However, we can cover this by buying more at Vendor 1.

As you can see, the IBP for inventory solution of McCoy & Partners is a very powerful answer to the challenges that planners face in their daily work. It does not only provide them a tool to visualize and analyze in real-time all the factors involved, but also the capacity to quickly react to unexpected situations. The algorithm we developed calculates the most optimal safety stocks, resource and supplier capabilities and lost sales at any level of detail. In combination with the dashboard and the possibility to plan for different business scenario's, it gives perfect input to take the best financial decisions and achieve the business goals.

About McCoy & Partners

McCoy & Partners believes in the strengths and possibilities of SAP IBP. Together we believe in a 'Simply Proof' approach. McCoy's IBP for inventory is the tool to improve your customer service levels and optimize your inventory. The Excel user interface makes it easy to use and the different dashboards provide a detailed insight in how stock levels are calculated and which opportunities you have to even further improve them. The scenario capabilities make it easy to analyze the impact of specific events on your supply chain and allow you to make the best decision. Together we will prove the value of IBP inventory optimization. For more information, please

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