Forecast Accuracy v3

Supply Chain Excellence

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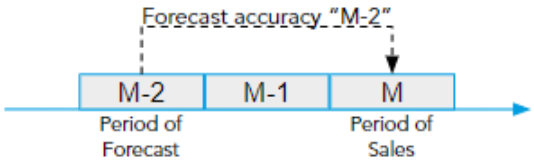
General Description

The KPI **Forecast Accuracy (FA)** evaluates the ability to get a visibility on customers' demand in terms of quantity.

As an input of S&OP process, reliable forecasts constitute the major way to improve the customer satisfaction via an optimized planning of operations. The Forecast Accuracy in this dashboard is calculated based on the **Final Forecast and the Gross History.** *Check definitions by GBU here*

For a particular month, the Forecast Accuracy is calculated for the last **5 months forecast (M-1 ... M-5);** allowing the possibility to evaluate the accuracy of the forecast with reference to several different forecast periods.

Forecast Accuracy M onth-2 is the time between produced forecast and the Gross History (FA June M-2: means forecasts done in April, as shown in the illustration below)



The refresh of the KPI is made every month on the 7th, including the full history.

It is available for all GBUs currently using Dynasys or APO as Demand Planning systems: Aroma Performance, Composite Materials, Novecare, Peroxides, Silica, Soda Ash&Derivatives, Special Chem and Technology Solutions.

Glossary

Source Data in the GSCD

GBU	Source	Gross History	Final Forecast
Aroma	Dynasys	Demand History ETA	Last validated Forecast ETA
Silica	Dynasys	Demand History ETA	Last validated Forecast ETA

TS	Dynasys	Demand History ETA (Sales Orders volumes in ETA)	Sales Team Forecast ETA
Novecare	Dynasys	Demand History ETA (Last Requested Delivery Date)	Last validated Forecast ETA
SA&D	Dynasys	Actual Shipped Qty in ETD	Last Validated Forecast ETD (Unconstrained Demand validated after demand review meeting)
Peroxides	Dynasys	NA: Shipped History ETD Others: Demand History ETA	NA: Last validated Forecast ETD Others: Last validated Forecast ETA
Spec Chem	Dynasys	Demand History ETA	Last validated Forecast ETA

Please note that O&G data can be found in GSCD but is not capturing all regions and markets; Data taken into account in the calculation is ETD.

FA of Spp is available on E2E value chain dashboard, calculated ETD, but not weighted as per the group definition.

Aggregation levels: what is the purpose of each level?

Figures

Final Forecast = Total on quantity forecast to be shipped. Final Forecast is the forecast validated after the Demand Review (=Unconstrained Forecast)

Gross History = Customer Demand = Last Customer Request

Check the above definitions by GBU here

Dimensions

Distribution Channel = Sales Distribution Channel

GBU Prod. Family = by default the Product Family, but also the Product Hierarchy, the GBU Material Group, or the Forecasts Family

GBU Zone = Mini-Zone = Group of Countries, Specific by GBU

Packaging Type = used on a material

Product Group (PGMI) = Group of products from Dynasys

Product Line 00 = Attribute of a material. There are 6 differents product line levels, corresponding to differents aggregations of products

Sales Rep = Sales Representative from Dynasys Sales Group = DFU owner

Ship-to KA = Ship-to Key Account, final account

Tactical Material = Concatenation of Product Hierarchy and Packaging

Full Dimensions Glossary here

Training

Link to the training material (G Slides)

Purpose: what can we really measure with each dimension/aggregation level in order to understand who is the Key Responsible to track this KPIs.

Roles & Responsibilities: Responsible is considered the person who will look after this KPI in a monthly basis and Accountable is the person whose decisions can leverage a better insight and/or opportunities to improve the KPI

Timeframes (Lag): they depend on how the business is structured and their standard leadtimes, eg. if we talk about a business mostly MTO driven with total replenishment lead times that last around 3 months then the operational purpose is at M+4, if instead it is a business mostly MTS driven M+2 will give an insight on operational purposes. Overall we can say that: M-n: Operational purpose, M-n+2: Procurement purpose and M-n+5: Workload/Contract purpose

Material/ Ship-to / Distribution Channel	**Product / ShipDestination zone/ Group of activity**	**Product / Plant or** **Product Hierarchy / Sold-To**	**Sales Rep / Product / Ship-to KA** **or Product / Sales rep**
Timeframe: operational purpose **Purpose**: • Measurement to review schedule/forecast accuracy correlation in relation to the schedule adherence at plant level • Detailed reviews and Deep dive to understand the gaps	*Timeframe: all purposes* **Purpose:** • Measurement to review Forecast Accuracy at the Global S&OP meetings (Quarterly) • Understanding the needs of a product in a given region • Used in the E2E VC dashboard and at the GBU level	*Timeframe: all purposes* **Purpose:** • Measurement to review planning accuracy in Supply Reviews (actual correlation forecast /planning) • Proper procurement of forecasts. Impact on raw material planning • Review performance of work centers Note: Product Hierarchy/Sold-to is used for SpP and Peroxides also for their SIP reviews	*Timeframe: operational purpose* **Purpose:** Measurement for SIP targets: sales representative performance reviews
Roles & responsibilities: • Responsible: none, is a KPI used for the details • Accountable: Demand Planner /S&OP Mgr	**Roles & responsibilities:** • Responsible: Demand Planner /S&OP Mgr • Accountable: Sales Mgr	**Roles & responsibilities:** • Responsible: Supply Planners/SC Site Mgr • Accountable: Demand Planner/S&OP Mgr	**Roles & responsibilities:** • Responsible: GBU SCE /Demand Planner • Accountable: Sales Mgr
Main aggregation level for reporting in performance reviews (formerly known as level1)	(formerly known as level3)	(formerly known as level5)	(formerly known as level8)

WMAPE: Improvement of Forecast Accuracy Weighted formula

The Forecast Accuracy (MAPE) measures the accuracy of the forecasting figures. In Solvay the figures are based on the Final Forecast validated in the Demand monthly Reviews vs. the Gross History. Forecast accuracy at the SKU level is critical for proper allocation of resources.

Weighted Forecast Accuracy (wMAPE) is a variant of MAPE in which errors are weighted. In the past we used to weight the values of actuals, which did not penalize the over forecasting cases. To overcome this situation, now we **weight using the Total of Actuals and Forecasted volumes** by the Aggregation Level (Material, SREP or product).

NEW Weighted Forecast Accuracy Formula

WMAPE = MAPE x Weight

Forecast accuracy (MAPE) = (1- Abs((Final Forecast - Gross History)/Gross History))) for each line by aggregation level

Weight = (Final Forecast + Gross History)/(Sum(Final Forecast + Gross History)) for each SREP, material or product

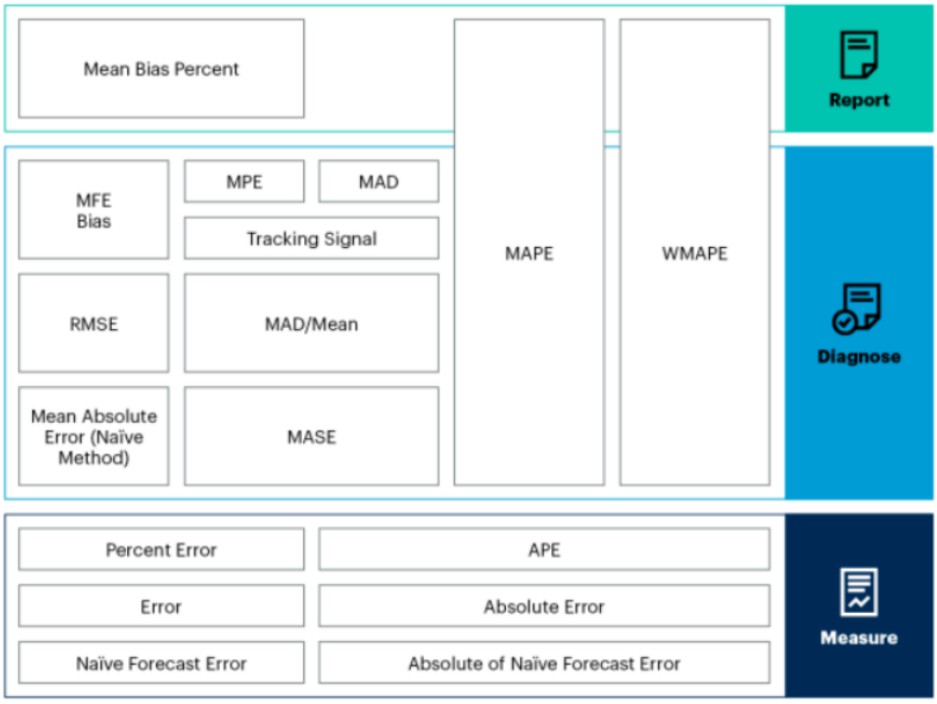
						New Formula	Old Formula	New Formula	Old Formula
Sales Rep	Product	Ship-to KA	Gross History (kT)	Final Forecast M-2 (kT)	MAPE	Weight	Weight	WPAME	WPAME
	Total		**3 150,00**	**37 870,00**				**3,75%**	**21,27%**
De / De Andrea	Cyanox® 1790 Antioxidant	Decision: Various	0,00	5 400,00	0,00%	13,16%	0,00%	0,00%	0,00%
De / De Andrea	Cyanox® 1790 Antioxidant	Total	0,00	1 000,00	0,00%	2,44%	0,00%	0,00%	0,00%
De / De Andrea	Cyasorb Cynergy Solutions® B877 Stabiliz	Decision: Various	800,00	1 200,00	50,00%	4,88%	25,40%	2,44%	12,70%
De / De Andrea	Cyasorb Cynergy Solutions® B878t Stabili	Asahi Kasei	80,00	0,00	0,00%	0,20%	2,54%	0,00%	0,00%
De / De Andrea	Cyasorb® Uv-3529 Light Stabilizer	Argus	0,00	1 000,00	0,00%	2,44%	0,00%	0,00%	0,00%
De / De Andrea	Cyasorb® Uv-3529 Light Stabilizer	Decision: Various	0,00	21 600,00	0,00%	52,66%	0,00%	0,00%	0,00%
De / De Andrea	Cyasorb® Uv-3638f Light Absorber	Clariant	270,00	270,00	100,00%	1,32%	8,57%	1,32%	8,57%
De / De Andrea	Cyasorb® Uv-3808pp5 Light Stabilizer	Borealis	800,00	5 000,00	0,00%	14,14%	25,40%	0,00%	0,00%
De / De Andrea	Cyasorb® Uv-3853pp5 Light Stabilizer	Ineos	1 200,00	2 400,00	0,00%	8,78%	38,10%	0,00%	0,00%

Click on the image for detailed information

Forecast Error: Bias & Tracking Signal (NFM)

Forecast error measurement should serve a purpose. From a demand forecasting perspective, the purpose is to understand the planning process capab systematically the biggest error contributors and set actions to offset the effects of them.

The objective is to introduce a framework for using Solvay's forecast error metrics according to a structured process:



1. **Measure forecast deviation** (PE(Bias))

2. **Diagnose the forecast error root causes** (WMAPE, MAPE and Tracking Signal (NFM))

3. **Report the results** (WMAPE, MAPE, Mean Bias)	
Measure Forecast Deviation **Forecast Bias % (PE)** = (sum (Final Forecast)- sum (Gross History))/Sum (Gross History) x 100	**Diagnose the forecast error and root causes:** **Normalized Forecast Metric** = (Final Forecast - Gross History)/ (Gross History + Final Forecast)) When to use: as a diagnostic measure for finding forecast line items with the most significant forecast bias in a diverse group of products. It car of volume or units of measure.

When to use: The conversion of forecast error into percentages, allows for comparison across products with different magnitudes of demand volumes. It is also used to indicate underforecast or overforecast. When the computed error is greater than 100% in either direction, the measurement result should be shown as it appears.

Sales Rep	Product	Ship-to KA	Gross History (kT)	Final Forecast M-2 (kT)	Bias	NFM
	Total		**3 150,00**	**37 870,00**	122,47%	84,64%
De / De Andrea	Cyanox® 1790 Antioxidant	Decision: Various	0,00	5 400,00	0,00%	100,00%
De / De Andrea	Cyanox® 1790 Antioxidant	Total	0,00	1 000,00	0,00%	100,00%
De / De Andrea	Cyasorb Cynergy Solutions® B877 Stabiliz	Decision: Various	800,00	1 200,00	50,00%	20,00%
De / De Andrea	Cyasorb Cynergy Solutions® B878t Stabili	Asahi Kasei	80,00	0,00	-100,00%	-100,00%
De / De Andrea	Cyasorb® Uv-3529 Light Stabilizer	Argus	0,00	1 000,00	0,00%	100,00%
De / De Andrea	Cyasorb® Uv-3529 Light Stabilizer	Decision: Various	0,00	21 600,00	0,00%	100,00%
De / De Andrea	Cyasorb® Uv-3638f Light Absorber	Clariant	270,00	270,00	0,00%	0,00%
De / De Andrea	Cyasorb® Uv-3808pp5 Light Stabilizer	Borealis	800,00	5 000,00	525,00%	72,41%
De / De Andrea	Cyasorb® Uv-3853pp5 Light Stabilizer	Ineos	1 200,00	2 400,00	100,00%	33,33%

How does it work?

You can use the GSCD on Tableau to extract forecast accuracy. For this, click on the tile "forecast accuracy" tile as shown in the screen below. More information on how to use the dashboard for forecast accuracy is available at 26'20'' of this video:

Technical Documentation

Source: DYNASYS / APO (WP1) / APO (PF1) - QV_BW_QRY_MVDYN11_0005

Update: Monthly full reload (history included) on the night of the 6th and the 7th (minor corrections in Gross History may still occur from one month to another)

Technical BW Documentation: BW - DP - Forecast Accuracy (Core Query)

Naming convention by Source System (Dynasys vs APO)

Global SC Dashboard	Dynasys	APO (WP1)	APO (PF1)
Gross History	GH / Gross History	Demand History	History
Final Forecast	FF / Final Forecast	PreSOIP Plan	Consensus Forecast

Dimensions: Global Overview of Dimensions

			Forecast Accuracy
Global Filters	**Period**	**Month Year**	Calendar Year/Month [0CALMONTH]
	Organization	**GBU**	BFC GBU [CPFCTR1_2]
		Group of Activity	PF1: Group of activity = [C_DYN_010] BU\Attributs\[CPFCTR2_2] BFC Group of activities WP1: Manual Mapping based on [G_CWWE1] IECRA to get Group of Activity (MAPPING DYNASIS.xls)
		Sub-Activity	PF1: Activity = [0G_CWWE01__C_MAGNITU] BFC Activity 1 WP1: Manual Mapping based on [G_CWWE1] IECRA to get the Sub-activity (MAPPING DYNASIS.xls)
		Company	[C_DYN_018__C_COMPCDE] Company code
	Plant	**Zone**	Main Shipping Plant Geo Zone [C_DYN_018__C_MPPLANT__C_GEOZONE]
		Country	Main Shipping Plant Country [C_DYN_018__C_MPPLANT__C_0COUNTRY]
		Plant	Main Shipping Plant [C_DYN_018__C_MPPLANT]
	Ship Destination	**Zone**	Ship-to BFC Geo Zone [C_SHIPTID__C_ZONE]
		Country	Ship-to Country [C_SHIPTID__C_0COUNTRY]
		Corporate Group	Ship-to Corporate group [C_SHIPTID__C_CORPGR]
		Ship Destination	Ship-to [C_SHIPTID]
	Product	**Product Hierarchy**	Prod.hierarchy [C_MATNR2__0PROD_HIER]
		Product	Com Prod / Mat Grp [C_MATNR2__C_PROD]
		Bulk/Packed	N/A
		Transport Mode	N/A
Specific Filters		**Distribution Channel**	Distribution Channel [0DISTR_CHAN]

GBU Product Family	Default: Product Family Code [C_MATNR2] Material\Attributes\[C_FMPRD] **Exceptions**: Soda Ash, Fibras: WP1: C_MATNR2_C_LIP03 PF1: [C_MATNR2__0PROD_HIER] Prod. Hierarchy Aroma, Silica = GBU Material Group Special Chem = GBU Material Group (both WP1 & PF1) Peroxides: WP1:LIP2 PF1: Product_Hierarchy_ Cheops PIF (Missing- not possible) Novecare, Technology Solutions: WP1: Default PF1: [C_MATNR2__0PROD_HIER] Prod. Hierarchy Polytechnyl, Performance Polyamides, Alsachimie: [C_MATNR2] Material\Attributes\[C_ACRI015] Forecasts Family
GBU Zone	[CGBUZONE__C_ZONEH2] Ship-to GBU zone 2 Exception for TS: [CGBUZONE__C_ZONEH1] GBU zone (hier .1) for TS Mining No hierarchy used for Phosphorus Specialities
Material	Material [C_MATNR2]
Material Group	Material Group [C_MATNR2__C_MAT_GRP]
Packaging Type	Packaging Type [C_MATNR2__C_MAT_GRP]
Product Group (PGMI)	Product Group (PGMI) [C_DYN_005__C_GRPPGMI]
Product Line 00	Product line 00 [C_MATNR2] Material\Attributes\[C_LPROD]
Sales Rep	Sales Employee [C_DYN_021__C_DYN_065]
Ship-to KA	Ship-to Key Account [C_GBR15_C_SHIPKA]
Tactical Material	Tactical Material [C DYN_005_C_TACTIC2]
Corporate Sold-To	[C_CORPGR] CRM Customer Corp. Group (PRS)