

# APO: Characteristics Based Forecasting



## Applies to:

SCM 5.0 APO Demand Planning. For more information, visit the [Supply Chain Management homepage](#).

## Summary

Characteristics-Based Forecasting (CBF) is a powerful tool that enables you to forecast demand on both the product and the characteristics level. In the Automobile and high-tech industries, different combinations are possible. Obviously, it is not practicable to forecast and track all of these combinations. Although there may be many possible combinations, not all of these combinations are possible or you do not want to produce several combinations. In characteristics-based forecasting, you can produce demand plans for combinations of characteristic values or for individual values. You generally restrict the characteristics used in CBF to those that are important for planning purposes. CBF is integrated with the SAP APO Production Planning/Detailed Scheduling component, and can be procured or produced individual components based on the characteristics-based forecast. This article explains the process of characteristic based forecasting and its purpose and configuration.

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## Author Bio

Srinivas Matta has over 15 years of experience in Supply Chain Management. He is a Principal Consultant with 10+ years of experience in SAP PP/PP-PI/MM/APO-DP Implementations / Upgrades and technical Support. He has delivered on many complex projects in Manufacturing, Pharmaceuticals, Chemical, Retail, Hi-tech and Media industries.

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## Business Scenario:

In this Business Scenario Car is taken as configurable product. It has characteristics Color, Transmission and Trim with different values. The scenario is to forecast the demand for the product (Car), but also for the characteristic combinations or individual characteristic values for example particular colors (White, Black etc.) or particular Trims (4 Cylinder, 6 Cylinder etc.). You need to know how many engines of a particular size or doors in a particular color are required in future. In an ERP system or in SAP APO, these features (color, engine, and trim in the above example) are referred to as characteristics. The characteristic values are for instance the colors red, green, and blue or the individual engine sizes. Some of the combinations (6 Cylinder Engine and Manual Transmission) are excluded from the forecasting.

## Master Data in APO:

Main master data for Characteristics based forecasting is Product, Class and characteristics.

### a) Create a Product:

The product must have requirements strategy *30 Planning Without Final Assembly* (Demand tab page for the location product). This prevents production orders for the final product from being created, but generates dependent requirements for the components.

Transaction: /SAPAPO/MAT1 – Product

**Display Product 1596 for Location 3200**

Product:	1596	Base Unit	EA
Prod. Descript.	Toyota Camry - CBF testing- SMATTA		
Location	3200	Atlanta	

Administr. Properties Properties 2 Units of Meas. Classification Pkg Data

Created By	SCMGEN	01/25/2009 14:12:28	Changed By	SCMGEN	02/01/2009 16:24:42
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Planner

Production Planner	<input type="checkbox"/>
SNP Planner	<input type="checkbox"/>
Demand Planner	<input type="checkbox"/>
Transportatn Planner	<input type="checkbox"/>
ICH Planner	<input type="checkbox"/>
Product Manager	<input type="checkbox"/>

### Display Product 1596 for Location 3200

Product: 1596 Base Unit: EA  
 Prod. Descript: Toyota Camry - CBF testing- SMATTA  
 Location: 3200 Atlanta

Pkg Data  
  Storage  
  ATP  
  SNP 1  
  SNP 2  
  Demand  
  Lot Size

**Demand Profile**

Demand Profile:

Requirement Strategy  
  Pegging  
  Available Stocks

Proposed Strategy: 30      PLANNING WITHOUT FINAL ASSEMBLY

**Dependent Requirements**

Always coll. requirement  
 Period Profile:    
 Possible indiv. cust. req.

**Consumption**

Consumption Mode:   
 Bwd Consumption Per.:  0  
 Fwd Consumption Per.:  0

Assembly Planning

Consumption Group:

**Alert Filter**

Product Alerts: Determine Direct Alerts, Relevant to Network Alerts

**b) Create Characteristics and Class**

Master Data → Classification System → CT04 – Characteristics

CAR\_COLOR

Characteristic: CAR\_COLOR     

Change Number:

Valid From: 02/28/2009     

Additional Values     

**Allowed Values**

Char. Value	Description	D	O	S
WHITE	WHITE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BLACK	BLACK	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CAR\_TRANSMISSION

Characteristic: CAR\_TRANSMISSION

Change Number:

Valid From: 02/28/2009 Validity

Basic data | Descriptions | **Values** | Addnl data | Restrictions

Additional Values Other Value Check

Allowed Values

Char. Value	Description	D	O	S
MANUAL	MANUAL TRANSMISSION	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AUTO	AUTO TRANSMISSION	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

CAR\_TRIM

Characteristic: CAR\_TRIM

Change Number:

Valid From: 02/28/2009 Validity

Basic data | Descriptions | **Values** | Addnl data | Restrictions

Additional Values Other Value Check

Allowed Values

Char. Value	Description	D	O	S
4CYL	SEDAN 4CYL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6CYL	SEDAN 6CYL	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Master Data → Classification System → CL02 – Classes

Assign existing characteristics to the class

Class: CAR\_CLASS\_CBF

Class type: 012 Characteristics Class

Change Number:

Valid from: 02/28/2009 Validity

Basic data | Keywords | **Char.** | Texts

Char.	Description	Data	N	D	Unit	R	Org. Areas	Std	O	I	Origin	P	S
CAR_TRIM	Toyota Car Trim	CHAR	10	0		<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
CAR_TRANSMISSION	Toyota Car Transmission	CHAR	10	0		<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>
CAR_COLOR	Toyota Car Color	CHAR	10	0		<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>

## Planning object structure and planning area

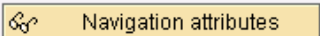
### a) Planning object structure:

Transaction: /SAPAPO/MSDP\_ADMIN - Administration of Demand Planning and Supply Network Planning

In Demand Planning, master planning object structure contains planning characteristics for one or more planning areas.

Master planning object structure is prerequisites for creating planning areas in Supply and Demand Planning.

Planning object structure: **ZDP\_CBF**

Master Png Object Struct.	ZDP_CBF
Status	<input checked="" type="checkbox"/>
Text	DP_V2R_CBF Planning Obj Str- SMATTA
<input type="checkbox"/> SNP Possible	
<input type="checkbox"/> SNP: Scheduling Agreeemt	
<input checked="" type="checkbox"/> Charstc-Based Forecasting	
<input type="checkbox"/> Relevant for DP BOM	

Planning Obj. Struct.		
Char.	Short Description	
9ALOCNO	APO Location	1
9AMATNR	APO Product	1
9AMV_PROF	CBF Profile	1
9AMV_ROW	Char.-Based FcstR	1
9AMV_TAB	CBF Table	1

Copy Fr		
Char.	Short Description	
0ABCINDIC	ABC Indicator	
0ABCPRC_TYP	Process type	
0ABCPROCESS	Business Process	
0ABC_CLASS	ABC class	
0ACCNT_GRP	Account group	
0ACCNT_GRPV	Vendor Account Group	

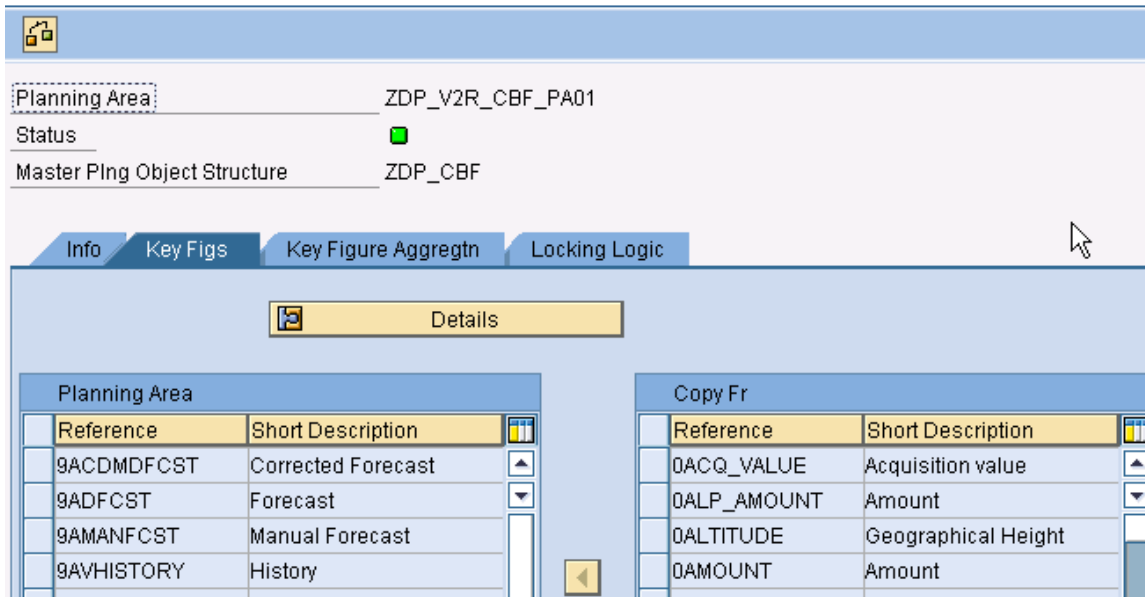
Select the indicator Characteristic based forecasting, it will copy the characteristics: 9AMV\_PROF, 9AMV\_ROW and 9AMV\_TAB

### b) Planning Area:

Planning area is the central data structures for Demand Planning and Supply Network Planning. The live Cache objects in which data is saved are based on the planning area. You assign the key figures with which you want to work directly to the planning area.

Planning Area: **ZDP\_V2R\_CBF\_PA01**

## Change Planning Area



Planning Area: ZDP\_V2R\_CBF\_PA01  
 Status: ■  
 Master PIng Object Structure: ZDP\_CBF

Info | Key Figs | Key Figure Aggregatn | Locking Logic

Details

Planning Area	
Reference	Short Description
9ACDMDFCST	Corrected Forecast
9ADFCST	Forecast
9AMANFCST	Manual Forecast
9AVHISTORY	History

Copy Fr	
Reference	Short Description
0ACQ_VALUE	Acquisition value
0ALP_AMOUNT	Amount
0ALTITUDE	Geographical Height
0AMOUNT	Amount

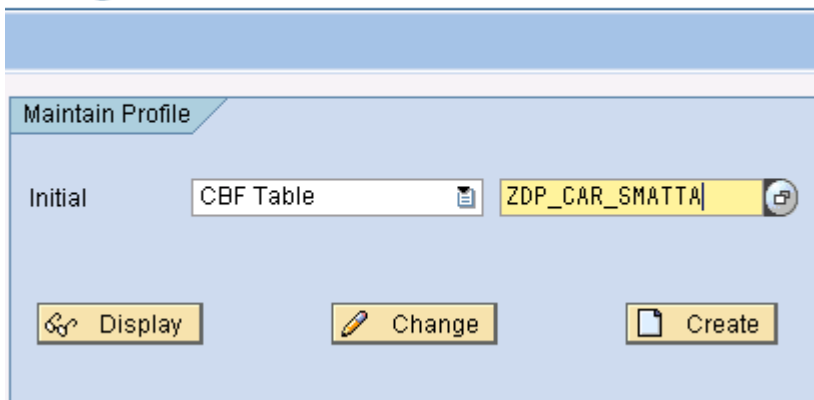
## Settings for CBF in APO

### a) Create CBF Table

To be able to carry out Characteristics-Based Forecasting, you must define a CBF table and assign it to the product. CBF tables contain details of the characteristics to be used and the permissible values and combinations.

Master Data → Application-Specific Master Data → Demand Planning → Configured Products → /SAPAPO/IPM01 - Maintain Master Data for CBF

## Integrated CBF Profile Maintenance



Maintain Profile

Initial: CBF Table | ZDP\_CAR\_SMATTA

Display | Change | Create

## Integrated CBF Profile Maintenance

The screenshot displays the 'Integrated CBF Profile Maintenance' interface. It is divided into two main sections: 'Tables' and 'Table Data'.

**Tables Section:** A table lists CBF tables. The first entry is highlighted:

Table	Description
ZDP_CAR_SMATTA	DP V2R CBF CAR- SMATTA

**Table Data Section:** Shows details for the selected table:

Product:	
CBF Table	ZDP_CAR_SMATTA
Description	DP V2R CBF CAR- SMATTA

**CBF Characteristics Section:** A table lists characteristics for the selected table:

Char. Name	Description
CAR_COLOR	Toyota Car Color
CAR_TRANSMISSION	Toyota Car Transmission
CAR_TRIM	Toyota Car Trim

The screenshot displays the 'Characteristic Values of Table' section of the SAP interface. It shows a table with columns for characteristic names and their values:

	CAR_COLOR	CAR_TRANSMISSION	CAR_TRIM
	BLACK	AUTO	4CYL
	BLACK	AUTO	6CYL
	BLACK	MANUAL	4CYL
	BLACK	MANUAL	6CYL
	WHITE	AUTO	4CYL
	WHITE	AUTO	6CYL
	WHITE	MANUAL	4CYL
	WHITE	MANUAL	6CYL
	CBF_DELTA	CBF_DELTA	CBF_DELTA

### b) Maintain the CBF profile and table to Product

Assign CBF tables to CBF profiles in integrated profile management.

Maintain tables and profiles for individual products



## Integrated CBF Profile Maintenance

**Maintain Profile**

Initial    Product

## Integrated CBF Profile Maintenance

**Maintain Profile**

Product

Profile Text

Valid from

Profile Text	Act
APO DP-CBF SMATTA	<input checked="" type="checkbox"/>

**Profile**    **Log**

Profile/CFB Tables	Charact. values combinatn/key	Relevant
<ul style="list-style-type: none"> <li>APO DP-CBF SMATTA                             <ul style="list-style-type: none"> <li>ZDP_CAR_SMATTA                                     <ul style="list-style-type: none"> <li>Combination1    CAR_COLOR/BLACK CAR_TRANSMISSIO...    <input checked="" type="checkbox"/></li> <li>Combination2    CAR_COLOR/BLACK CAR_TRANSMISSIO...    <input checked="" type="checkbox"/></li> <li>Combination3    CAR_COLOR/BLACK CAR_TRANSMISSIO...    <input checked="" type="checkbox"/></li> <li>Combination4    CAR_COLOR/BLACK CAR_TRANSMISSIO...    <input type="checkbox"/></li> <li>Combination5    CAR_COLOR/WHITE CAR_TRANSMISSIO...    <input checked="" type="checkbox"/></li> <li>Combination6    CAR_COLOR/WHITE CAR_TRANSMISSIO...    <input checked="" type="checkbox"/></li> <li>Combination7    CAR_COLOR/WHITE CAR_TRANSMISSIO...    <input checked="" type="checkbox"/></li> <li>Combination8    CAR_COLOR/WHITE CAR_TRANSMISSIO...    <input type="checkbox"/></li> <li>Combination9    CAR_COLOR/CFB_DELTA CAR_TRANSMI...    <input checked="" type="checkbox"/></li> </ul> </li> </ul> </li> </ul>		

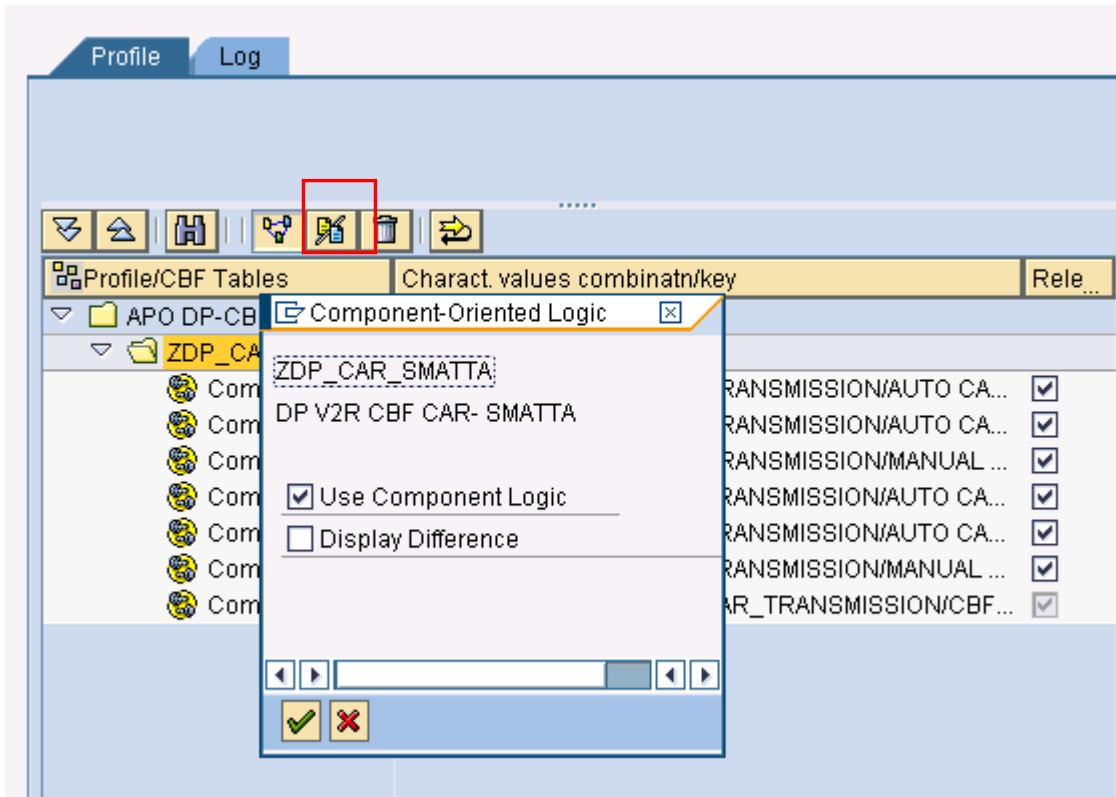
You can select Forecast planning indicator for the relevant characteristic value combinations

In the above scenario Car with 6 cylinder engine and Manual Transmission will not have planning indicator. So there will not be any forecasting for the above combinations.

### c) Maintain Component oriented logic indicator

This function is intended for use in over-planning or under-planning scenarios.

After an initial disaggregation to CBF characteristics it is possible to make changes at detail level without these changes being added to the total on the aggregate level. However to ensure consistency this difference can be displayed in the planning table in a separate row.



## Demand Forecasting:

### a) Characteristic Value Combinations:

A characteristic value combination is the combination of characteristic values with which you want to plan. It is only possible to plan data if you have defined such combinations.

Characteristic value combinations are defined for master planning object structure and these combinations are valid for all planning areas based on this planning object structure.

*Master Data → Demand Planning Master Data → Maintain Characteristic Values.*

Display Existing Characteristic Combinations

7 Data records selected for Planning Obj. Struct.: ZDP\_CBF

9ALOCNO	9AMATNR	9AMV_PROF	9AMV_ROW	9AMV_TAB
3200	1596	32	1	3308
3200	1596	32	2	3308
3200	1596	32	3	3308
3200	1596	32	5	3308
3200	1596	32	6	3308
3200	1596	32	7	3308
3200	1596	32	9	3308

**b) Maintain Forecast Profile**

Define univariate forecasting profile for the planning area to forecast for the next 12 months based on the last 24 month history.

Transaction: /SAPAPO/MC96B - Maintain Forecast Profiles

### Maintain Forecast Profile

Master Prfl.
 Univariate Profile
 MLR Profile
 Composite Forecast

**Basic Settings**

➤ **Planning Area** ZDP\_V2R\_CBF\_PA01

➤ **Master Prfl.** ZDP\_CBF\_AUTOFACT\_MS01 ▼ 01d Saved

**Description** DP-CBF-V2R-FORECAST AUTO MODEL-SMATT

**Forecast Key Figure** 9ADFCST Forecast

**Additional Settings**

**Period Indicator** M      **Fiscal Year Variant**  

Lifecycle Planning Active

**Forecast Horizon**

**From**   **To**        **Periods** 12      **Offset**

**History Horizon**

**From**   **To**        **Periods** 24      **Offset**

**Model Selection**

Univariate Forecast ZDP\_CBF\_AUTOFACT-SMAT ▼

Multiple Linear Regression   ▼

Composite Forecast   ▼

Master Prfl.		Univariate Profile		MLR Profile		Composite Forecast	
<b>Basic Settings</b>							
Profile	ZDP_CBF_AUTOFACT-SMAT	Text	DP-CBF-SMATTER-AUTOMODEL				
<b>Read Historical Data</b>							
Key Figure	9AVHISTORY	Version	000				
<b>Model Parameters</b>							
Forecast Strategy	53	Forecast with Automatic Model Selec					
Alpha	0.30	Beta	0.30	Gamma	0.30	Sigma	1.25
Periods	12	Variation					
Alpha 2							
Weighting Profile							
Trend Dampng Prfl.							
Hist. Val. Markngs							
Diagnosis Group							
<b>Control Parameters</b>							
Outlier Correction	Ex-Post Method			<input checked="" type="checkbox"/> Without Leading Zeros			
<input type="checkbox"/> Add Up Decimal Places	Days in Period						
<b>Forecast Errors</b>							
<input checked="" type="checkbox"/> MAD	<input type="checkbox"/> MSE	<input checked="" type="checkbox"/> RMSE	<input checked="" type="checkbox"/> MAPE	<input type="checkbox"/> MPE	<input checked="" type="checkbox"/> Error Total		
<b>Promotion</b>							

### c) Define Planning Book

Planning books determine the content and layout of the interactive planning screen and it is based on the planning area. Planning books can be created for individual planner or department and corresponds to the planner requirements.

Transaction: /SAPAPO/SDP8B - Define Planning Book

▶ Here, you assign the planning book to the planning area

Planning Book Key Figures Characteristics Key Fig. Attributes Data View

Assign planning book to planning area

Planning book: ZDP\_V2R\_CBF\_SMATTA01  
 Planning book text: DP-CHARACTERISTIC BASED FORECASTING- SMATTA  
 Planning area: ZDP\_V2R\_CBF\_PA01

Include standard functions

Supply Network Planning       Manual Proportion Maintenance  
 Capacity Planning  
 Transport Load Builder  
 Deployment

Navigate to views

Promotion  
 Univariate forecast  
 Multiple linear regression  
 Composite forecast.

Here, you assign the key figures of the planning area to the planning book:

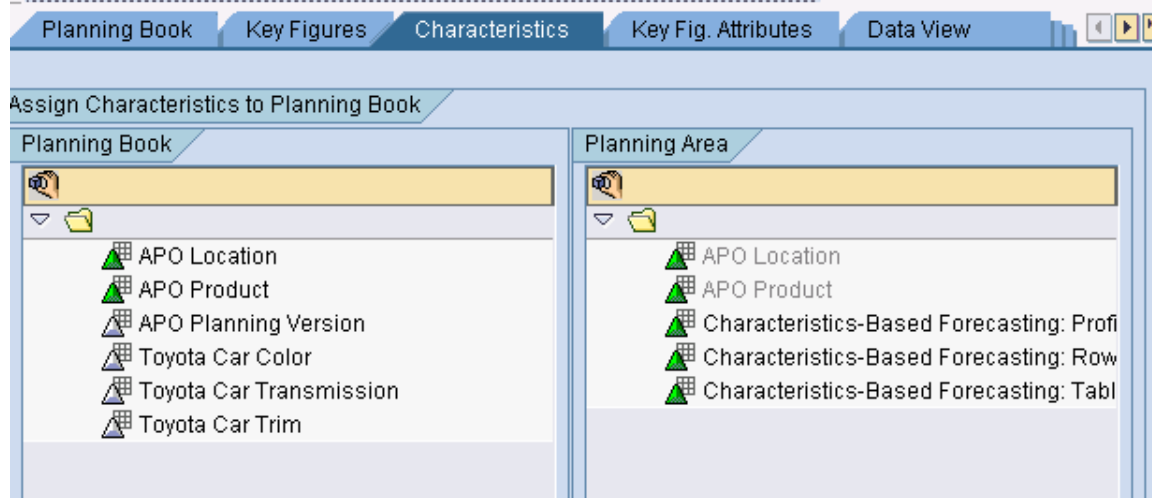
Planning Book Key Figures Characteristics Key Fig. Attributes Data View

Assign Key Figures to Planning Book

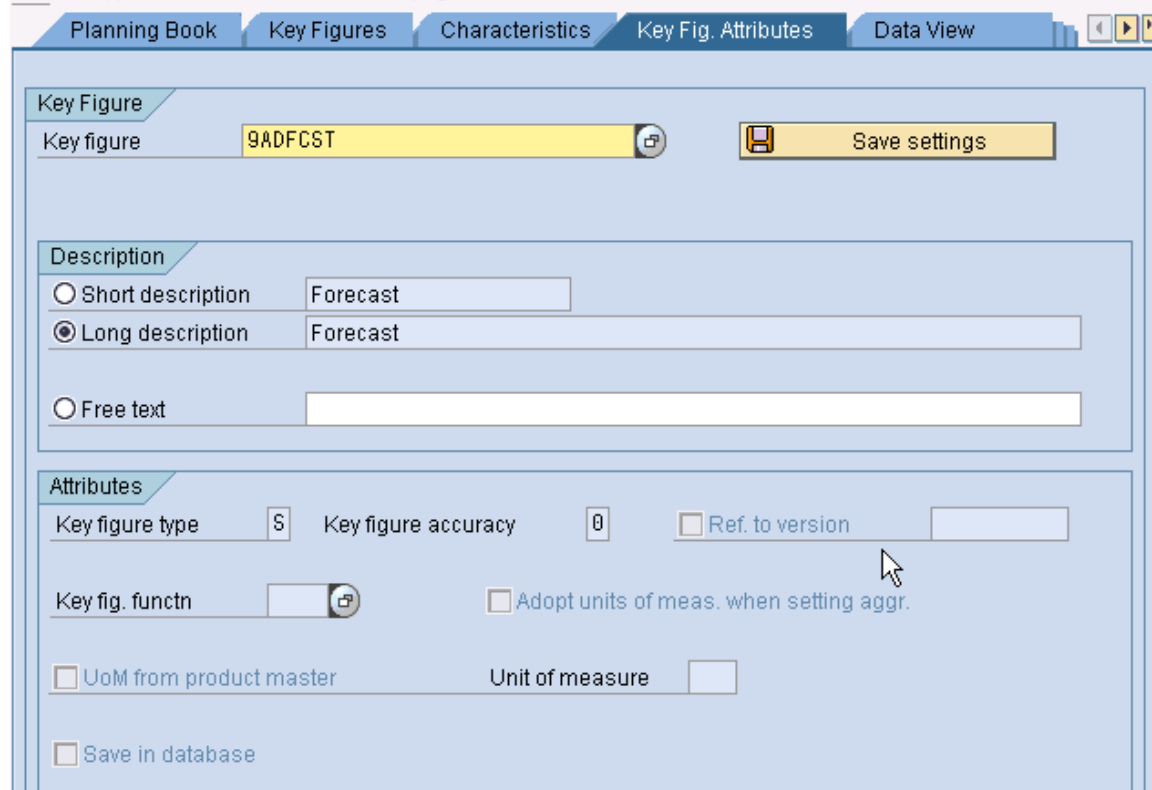
Key Figure Used in Macros

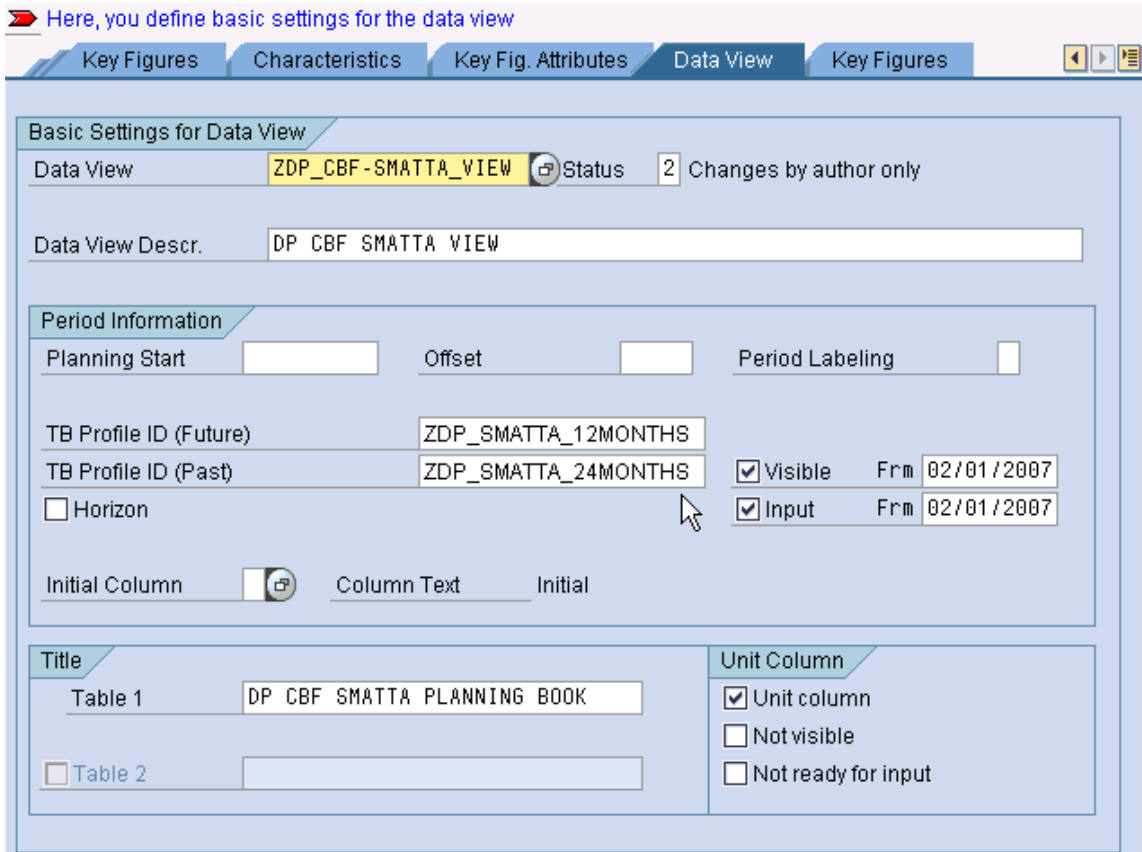
Planning Book	Planning Area
<ul style="list-style-type: none"> <li>Corrected Forecast</li> <li>Forecast</li> <li>History</li> <li>Manual adjusted forecast</li> </ul>	<ul style="list-style-type: none"> <li>Corrected Forecast</li> <li>Forecast</li> <li>History</li> <li>Manual adjusted forecast</li> </ul>

▶ Here, you assign the characteristics of the planning area to the planning book:



▶ Here, you set the attributes of the key figures





**d) Interactive Demand Planning**

Transaction: /SAPAPO/SDP94 - Interactive Demand Planning

Interactive demand planning can be used for several purposes that include to create the demand forecast interactively, to validate different univariate forecast models, to verify the results of a forecast created in the background and to process alerts issued in background jobs.

Demand plan can be created for the characteristics or characteristic combinations. This can be done either in interactive demand planning or by running a background job. You can use the drill-down functions in the header to see all the characteristic values.

- In this scenario, maintain the history for 24 months (032007 to 022009):

**Planning Book: [Live] DP-CHARACTERISTIC BASED FORECASTING- SMATTA / DP**

DP CBF S.	Toyota Car Color	Toyota Car Trim	Toyota Car Transmission	Unit	M 03/2007	M 04/2007	M 05/2007	M 06/2007	M 07/2007
History	Total	Total	Total	EA	510	492	546	432	462
	BLACK	Total	Total	EA	255	246	273	216	231
		SEDAN 4CYL	Total	EA	170	164	182	144	154
			AUTO TRANSMISSION	EA	85	82	91	72	77
			MANUAL TRANSMISSION	EA	85	82	91	72	77
		SEDAN 6CYL	Total	EA	85	82	91	72	77
			AUTO TRANSMISSION	EA	85	82	91	72	77
	WHITE	Total	Total	EA	255	246	273	216	231
		SEDAN 4CYL	Total	EA	170	164	182	144	154
			AUTO TRANSMISSION	EA	85	82	91	72	77
			MANUAL TRANSMISSION	EA	85	82	91	72	77
		SEDAN 6CYL	Total	EA	85	82	91	72	77
			AUTO TRANSMISSION	EA	85	82	91	72	77

- Execute demand forecasted for next 12 months (032009 to 022010):

1596		Toyota Car Color	Toyota Car Trim	Toyota Car Transmiss	Unit	M 03/2009	M 04/2009	M 05/2009	M 06/2009	M 07/2009	M
Forecast	Total	Total	Total	EA	516	504	492	480	468		
	BLACK	Total	Total	EA	258	252	246	240	234		
		SEDAN 4CYL	Total	EA	172	168	164	160	156		
			AUTO TRANSMISSION	EA	86	84	82	80	78		
			MANUAL TRANSMISSION	EA	86	84	82	80	78		
		SEDAN 6CYL	Total	EA	86	84	82	80	78		
			AUTO TRANSMISSION	EA	86	84	82	80	78		
	MANUAL TRANSMISSION		EA	86	84	82	80	78			
	WHITE	Total	Total	EA	258	252	246	240	234		
		SEDAN 4CYL	Total	EA	172	168	164	160	156		
			AUTO TRANSMISSION	EA	86	84	82	80	78		
			MANUAL TRANSMISSION	EA	86	84	82	80	78		
		SEDAN 6CYL	Total	EA	86	84	82	80	78		
			AUTO TRANSMISSION	EA	86	84	82	80	78		

- Add Manual Adjusted Forecast:

1596		Toyota Car Color	Toyota Car Trim	Toyota Car Transmiss	Unit	M 03/2009	M 04/2009	M 05/2009	M 06/2009	M 07/2009	M
Manual adjusted forecast	Total	Total	Total	EA	12	18	12	24	30		
	BLACK	Total	Total	EA	6	9	6	12	15		
		SEDAN 4CYL	Total	EA	4	6	4	8	10		
			AUTO TRANSMISSION	EA	2	3	2	4	5		
			MANUAL TRANSMISSION	EA	2	3	2	4	5		
		SEDAN 6CYL	Total	EA	2	3	2	4	5		
			AUTO TRANSMISSION	EA	2	3	2	4	5		
	MANUAL TRANSMISSION		EA	2	3	2	4	5			
	WHITE	Total	Total	EA	6	9	6	12	15		
		SEDAN 4CYL	Total	EA	4	6	4	8	10		
			AUTO TRANSMISSION	EA	2	3	2	4	5		
			MANUAL TRANSMISSION	EA	2	3	2	4	5		
		SEDAN 6CYL	Total	EA	2	3	2	4	5		
			AUTO TRANSMISSION	EA	2	3	2	4	5		

- Execute Macro to calculate Corrected Forecast (Final demand) which is the sum of the Forecast and Manual adjusted Forecast:

1596		Toyota Car Color	Toyota Car Trim	Toyota Car Transmiss	Unit	M 03/2009	M 04/2009	M 05/2009	M 06/2009	M 07/2009	M
Corrected Forecast	Total	Total	Total	EA	528	522	504	504	498		
	BLACK	Total	Total	EA	264	261	252	252	249		
		SEDAN 4CYL	Total	EA	176	174	168	168	166		
			AUTO TRANSMISSION	EA	88	87	84	84	83		
			MANUAL TRANSMISSION	EA	88	87	84	84	83		
		SEDAN 6CYL	Total	EA	88	87	84	84	83		
			AUTO TRANSMISSION	EA	88	87	84	84	83		
	MANUAL TRANSMISSION		EA	88	87	84	84	83			
	WHITE	Total	Total	EA	264	261	252	252	249		
		SEDAN 4CYL	Total	EA	176	174	168	168	166		
			AUTO TRANSMISSION	EA	88	87	84	84	83		
			MANUAL TRANSMISSION	EA	88	87	84	84	83		
		SEDAN 6CYL	Total	EA	88	87	84	84	83		
			AUTO TRANSMISSION	EA	88	87	84	84	83		



## Related Content

1. SAP Help: <http://help.sap.com>
2. [http://help.sap.com/saphelp\\_scm50/helpdata/en/58/39df3a6610696ae10000000a11402f/frameset.htm](http://help.sap.com/saphelp_scm50/helpdata/en/58/39df3a6610696ae10000000a11402f/frameset.htm)

For more information, visit the [Supply Chain Management homepage](#).

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