S07.06-VPV

Variance analysis (Price/Volume analysis)

1. Goal of VPV (Volume/Price Variance) analysis

Compare the financial indicators of one period *(actual period)* to a reference period *(same period of previous year, budget period, ...)*

By characterizing the evolution between these periods on different axes (price, volume, variable costs, fixed costs, exchange rate impact, ...)

In order to **measure and explain the business performance evolution** (internally).

Within the Group, VPV is used to understand and explain ***sales, contribution margin and Underlying EBITDA*** .

- by GBU or by activity: for the GBU or Group Management
- by Customer, Product, Technology: to discuss with business, sales and marketing, etc...

This indicator is also used in Financial Communications (Press Releases)

Examples:

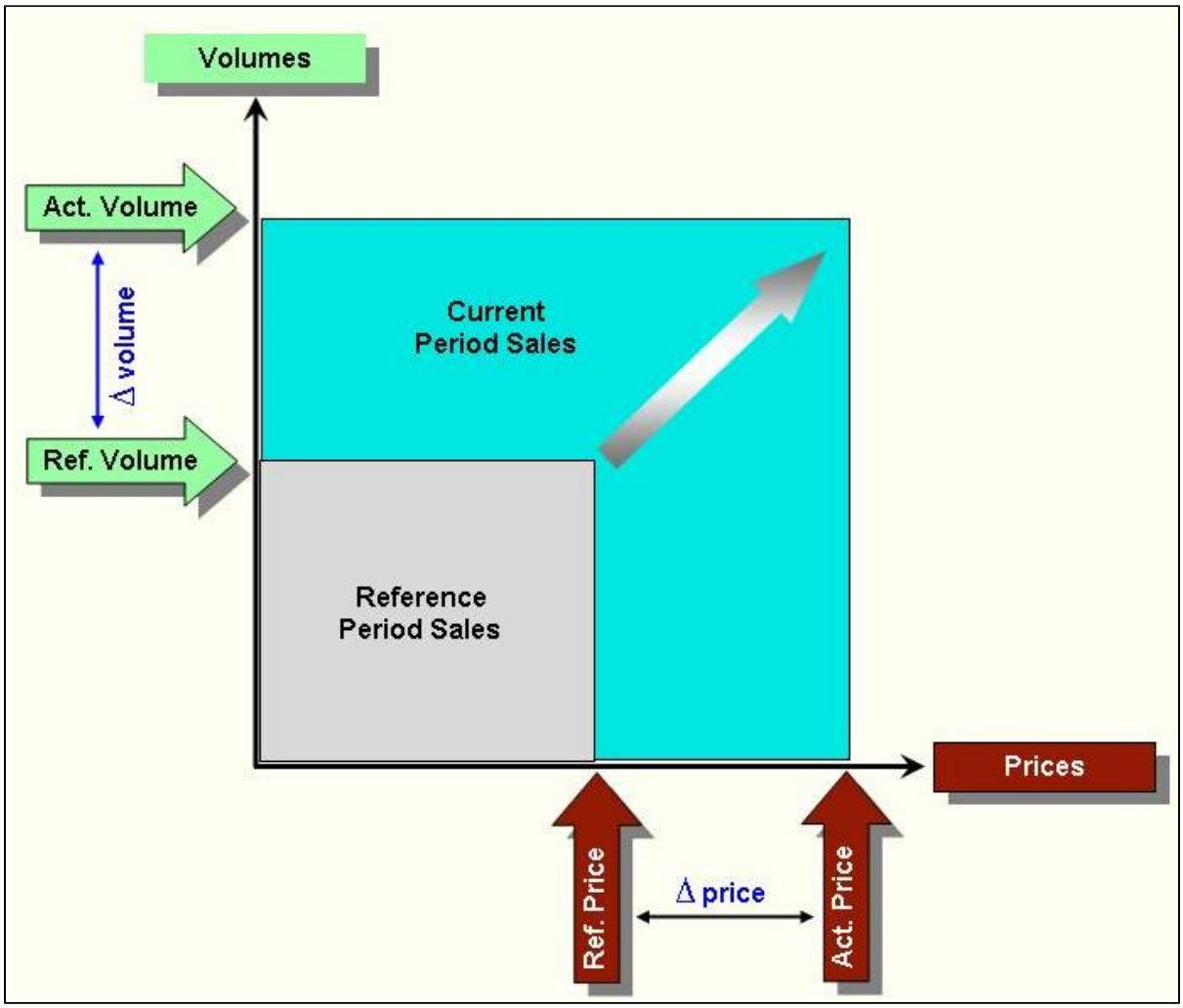
- Sales of Soda Ash

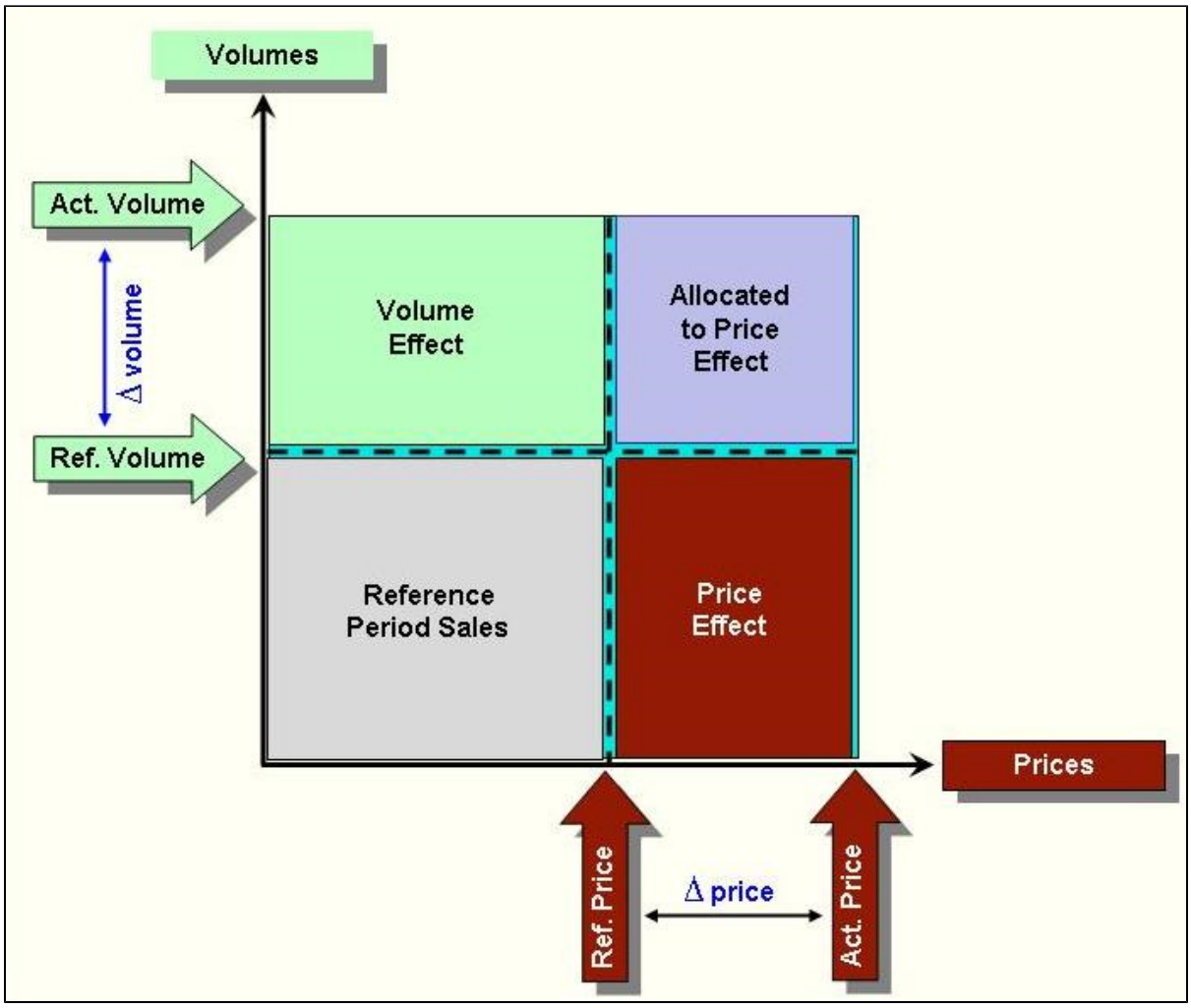
Q1 Y-1	Q1 Y	Variance		Of which	
				Price	Volume
100	120	+ 20		+ 15	+ 5
100	120	+ 20		+ 25	- 5

- Contribution margin of Soda Ash

Q1 Y-1	Q1 Y	Variance		Of which		
				Price	Volume	Costs
20	25	+ 20		+ 15	+ 1	- 11

2. Sales Variance


Volumes
Act. Volume
Δ volume
Ref. Volume
Current
Period Sales
Reference
Period Sales
Prices
Ref. Price
Δ price
Act. Price



Price/Volume Variances

- **P** : The **Price effect** is the **variation of unit selling prices** between the current period and the reference period *times* the **volume sold** of the **current period**.
- **V** : The **Volume effect** is the **variation of volumes** between the current period and the reference period *times* the **unit selling price** of the **reference period**.

Other Variances

- **Conv** : The **Conversion effect** is the **variation of exchange rates** (local currency to EUR) between the current period and the reference period *times* the **amount sold** in the **reference period** in local currency.

To avoid misinterpretation:

- Compute unit prices in local currency
- Convert the results to the Group currency
- Assign the difference arising fron the exchange rate evolution to a **Conversion effect**.

Use the **actual period exchange rate** if the figures are expressed in local currency, and have to be converted to EUR.

- **FX** : The **Transactional Foreign Exchange (FX) effect** is the **variation of exchange rates** (transaction currency to local currency) between the current period and the reference period *times* the **amount sold** in the **reference period** in transaction currency.

The **Sales variance** is the sum of all effects mentioned above (price, transactional FX, volume, conversion) which corresponds to:

> **Sales variance at actual period exchange rate = Price + Transactional FX + Volume effects**.

Formulas of the various effects (P, V, FX, Conv)

$$\Delta P = \frac{(P_{act} - P_{ref}) \times V_{act}}{XT_{act} \times X_{act}}$$

$$\Delta V = \frac{(V_{act} - V_{ref}) \times P_{ref}}{XT_{act} \times X_{act}}$$

$$\Delta FX = P_{ref} \times V_{ref} \times (\frac{1}{XT_{act}} - \frac{1}{XT_{ref}}) \times \frac{1}{X_{act}}$$

$$\Delta Conv = P_{ref} \times V_{ref} \times (\frac{1}{X_{act}} - \frac{1}{X_{ref}}) \times \frac{1}{XT_{ref}}$$

P $_{act}$	=	Unit price of the current period in transaction currency
P $_{ref}$	=	Unit price of the reference period in transaction currency
V $_{act}$	=	Quantity of the current period
V $_{ref}$	=	Quantity of the reference period
X $_{act}$	=	Exchange rate consolidation currency TO local currency FOR actual period
X $_{ref}$	=	Exchange rate consolidation currency TO local currency FOR reference period
XT $_{act}$	=	Exchange rate local currency TO transaction currency FOR actual period
XT $_{ref}$	=	Exchange rate local currency TO transaction currency FOR reference period

3. Variable Costs Variance

The definitions used for Sales Variance can be extended to **Variable Costs**.

> **Variable Costs variance = Variable Costs + Transactional FX + Volume + Conversion effects**

- **C** : The **Variable Costs effect** is the **variation of unit costs** between the current period and the reference period *times* the **volume sold** of the **current period**.
- **V** : The **Volume effect** is the **variation of volumes** between the current period and the reference period *times* the **unit cost** of the **reference period**.
- **Conv** : The **Conversion effect** is the **variation of exchange rates** (local currency to EUR) between the current period and the reference period *times* the **variable costs** in the **reference period** in local currency.
- **FX** : The **Transactional Foreign Exchange (FX) effect** is the **variation of exchange rates** (transaction currency to local currency) between the current period and the reference period *times* the **amount sold** in the **reference period** in transaction currency, **for costs incurred in non-local currency** .

Formulas of the various effects (C, V, FX, Conv): same as for Sales Variance except for **P** which is replaced by **C** .

4. Variance on Contribution Margin or Underlying EBITDA

The **volume effect** on Contribution Margin or Underlying EBITDA is the sum of the volume **effect on sales and on variable costs**.

The sum or Price, Foreign Exchange on Sales, Variable Costs and Foreign Exchange on Costs is called the **Pricing Power**.

Consequence on Contribution Margin and Underlying EBIDTA

P&L	Volume	Price	FX on sales	Var Costs	FX on costs	Fixed Costs	Conversion
Sales	Yes	Yes	Yes	-	-	-	Yes
Variable Costs	Yes	-	-	Yes	Yes	-	Yes
Contribution Margin	Volume	Price	FX on sales	Var Costs	FX on costs	-	Conversion

Fixed Costs	**-**	**-**	**-**	**-**	**-**	**Yes (FC)**	**Yes**
Other Operating gains & losses	**-**	**-**	**-**	**-**	**-**	**Yes (Other)**	**Yes**
Underlying EBITDA	**Volume**	**Price**	**FX on sales**	**Var Costs**	**FX on costs**	**FC + Other**	**Conversion**
		Pricing Power					

5. Default rules and keep in mind

If **no unit price or unit costs** can be computed for reason that:

- no sales in current or reference period
- no costs in current or reference period
- no quantities in current or reference period

the **variance is defaulted to the volume effect for sales and variable costs**.

Perimeter effect:

> **To avoid unwanted volume effects**, differences in the perimeter between the current and reference period have to be handled in order to make the reference period comparable to the current period.
>
> The use of the perimeter effect applies only in the following cases:
>
> - acquisition or sale of companies
> - changes in consolidation method or in accounting rules
> - transfer of activities between GBUs and/or between GBUs and CBS
>
> It is **not used for organic business impacts** such as new products and temporary shutdowns.

The **transactional exchange rate impact on costs** is usually based on amounts declared by the BUs