Controlling + Computer

IT-gestützte Konzernergebnisplanung und -steuerung

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Für die Deckung des Informationsbedarfs einer Konzernführung ist der Aufbau einer Konzernkosten- und Erlösrechnung erforderlich. Um den Planungs-, Kontroll- und Dokumentationsaufgaben gerecht zu werden, findet man in der Praxis meist ein Zusammentragen von Zahlen nach Excel vor, häufig auch aus unterschiedlichen Systemen, um auf Basis unternehmensübergreifender Näherungsrechnungen von repräsentativen Einzelanalysen zu Durchschnittsprozentsätzen für den Ansatz von Zwischengewinnen für bestimmte Produktgruppen zu kommen. Selbst in homogenen Systemlandschaften werden konzernweite Wertschöpfungsketten durch z. B. nach regionalen Gesichtspunkten gezogene Systemgrenzen unterbrochen und damit eine in sich geschlossene Betrachtung erschwert. Neben der Ermittlung interner Gewinne und Verluste pro Produkt stellt sich der Charakter der Kostenkategorien (Kostenschichtung) anders dar als aus Sicht der Einzelgesellschaft (vgl. *Abb.* 2 unten) und erfordert daher eine gesonderte Aufbereitung für die Zwecke der Konzernkostenrechnung. Diesen Anforderungen kommen derzeit am Markt verfügbare Standardsoftwarelösungen nur ungenügend nach. Nachstehend wird ein Lösungsansatz vorgestellt, der eine Konzernergebnisermittlung sowohl ex post als auch ex ante unterstützt, mit Standardschnittstellen zu *SAP R/3* versehen ist und sich sowohl in der chemischen Industrie als auch im Maschinenbau im praktischen Einsatz bereits bewährt hat.

1. Der Lösungsansatz aus Sicht der IT-Strategie

Die Verbesserung unternehmensübergreifender und kollaborativer Prozesse sind immer häufiger die treibende Kraft für die Einführung neuer Standardsoftware. Die am Markt führenden Systeme sind dabei meist Best-of-breed Komponenten mit modularen gekapselten Funktionen, objektorientierten Ansätzen und standardisierten Schnittstellen. Auch die *SAP AG* vollzog einen W[illegible] weg von monolith[illegible]

Als Folge dieser Entwicklung muss Standardsoftware für die Ermittlung von Beschaffungs- und Herstellungskosten (HK) mit den Mengengerüsten von APS-, SCM- und CRM-Systemen umgehen können. Dies gilt umso mehr, wenn für Konzerne mit starken Lieferverflechtungen zwischen den Konzern[illegible] gesellschaften konsolidierte HK[illegible] gebnisse im Vordergru[illegible] ein Konzern se[illegible] me i[illegible]

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Planning and Controlling Consolidated Earnings based on Consolidated Cost of Goods Manufactured

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1 Business summary for management

A group cost and revenue accounting system is necessary to meet the information requirements of group management. In actual practice, the planning, control, and documentation tasks[1] are usually accomplished on the basis of Excel files (which are frequently located in different systems) to calculate average percentages for intercompany profits for particular product groups based on group-wide approximation computations of representative individual analyses. Even in homogeneous system landscapes, group-wide value chains may be interrupted by regional system boundaries, increasing the difficulty of aggregated analysis. Besides the question of determining internal profits for products, another issue is the character of the cost categories (cost component split), which differs depending on the point of view of the individual companies (see figure 2 below) and requires special treatment for the purposes of consolidated cost accounting[2].

These requirements are not sufficiently met by the standard software solutions currently available on the market. The following presents an approach that supports the determination of group earnings both ex post and ex ante, is equipped with standard interfaces to SAP R/3, and that has proven itself in practical application in both the chemical and engineering industries.

[1] See Dusemond, M., *Konzernkostenrechnung* [Group Cost Accounting], 1999, 2477; Küting, K. / Lorson, P., *Konzernmanagement* [Group Management], 1997, 8. See also Rein, M., *Grenzplankostenrechnung* [Marginal Costing], 1993, 110-144 for more on the connections between central/decentral coordination, the suitability of transfer prices as a coordinating instrument with decentral coordination of interdependent decisions (based on the internal exchange of activities), and the necessity of group costing.

[2] See Dusemond, M., *Konzernherstellungskosten* [Consolidated Cost of Goods Manufactured], 1994, p. 485 f.

2 Solution approach from the IT strategy perspective

Improving collaborative processes is becoming the driving force behind software development. The leading systems on the market are usually best-of-breed components with modular, encapsulated functions, object-oriented approaches, and standardized interfaces. SAP AG, too, has moved away from monolithic, highly integrated systems such as R/2 and R/3 toward modular software components. This explains why APS systems such as APO or I2 handle only quantity flows and not value flows, since APS, SCM, and CRM systems do not have this focus.

As a consequence of this development, standard software must be able to handle the quantity structures of APS, SCM, and CRM systems in order to calculate procurement costs and the cost of goods manufactured (COGM), especially when groups with closely interlinked supply networks between the individual companies focus on the consolidated COGM and earnings. This is because the companies in a group may utilize heterogeneous systems, resulting in different quantity structures in the affected ERP, APS, SCM, and CRM systems. A prerequisite for determining and analyzing consolidated COGM and earnings is to map group-wide value chains into the target system. The goal of standard software with this focus, therefore, must be to provide standardized interfaces to widely differing source systems.

Business intelligence systems are now frequently discussed when deciding on appropriate solutions, since their architecture usually supports the transfer of data from heterogeneous system landscapes. These systems are typically optimized for reporting requirements but not for intensive calculation and multilevel rollups along group-wide value chains. Furthermore, a sequence must be determined before the algorithm can be run, since intercompany profit for the receiving company can only be determined when the COGM of the supplier company has been calculated. When selecting the system and developing the technical concept, one requirement to keep in mind is that it should be possible to calculate the entire group volume within a reasonable length of time.

3 What does this innovative solution look like?

This innovative approach is characterized by simplicity, clarity, and flexibility of the system design. The source systems concentrate on their actual tasks and do not need to translate currencies or perform the functions of group accounting. These functions are handled in a separate system whose customizing settings define the frequency, preciseness, and sequence of the extraction processes from the source systems. The customizing settings also specify how data is transferred into the homogeneous structures of the group.

The flexibility of the concept is also demonstrated by its versioning capability, which enables the use of identical input data from source systems to run parallel evaluations based on different assumptions (exchange rates, transfer prices, raw material prices, and so on). This applies for example to the calculation of COGM and profitability analysis in networks[3]. The companies involved need only be integrated into the extraction processes and converted to a uniform structure as defined by the customizing settings.

[3] Refer to the definition of network accounting in Veil/Hess (2000a).

4 Which requirements should be supported?

Due to the high complexity and interdependence of requirements involving a large number of business processes in individual companies, pragmatic solutions are often implemented although they may only deal with a small part of the problem. Hardly anyone is in a position to formulate the requirements into a full and coherent set of specifications that are applicable to the interests of a particular group. With step-by-step implementation (such as a planned solution followed by an actual solution), this poses risks for investment protection if it becomes apparent during the initial steps that changes are required or if later steps are not included in the overall concept.

4.1 Requirements for planned costs

Management requirements begin with the determination of consolidated cost of goods manufactured in group currency for consolidated profitability analysis. To achieve this, the entire value chain must be represented in a single system. For planned costs, this is only possible in the SAP standard system if all companies in the group work in one client and one controlling area. Additional prerequisites include the use of standardized material numbers and a consistent definition of cost component splits. A solution becomes even more difficult to achieve if multiple SAP systems are used, even with standardized material numbers and uniform cost component splits. The present approach is to define the required processes from the different source systems and establish the harmonization requirements in Customizing.

4.2 Requirements for actual data

Finding a solution for groups that want a consolidated actual cost of goods manufactured is more difficult. With the material ledger, for example, multilevel local actual costing can be represented in a SAP system, but implementing parallel valuation for the consolidated cost of goods manufactured is complex and involves a number of constraints. With heterogeneous system landscapes, this approach is not possible. The solution presented here takes the processes relevant for inventory valuation from the different source systems and assembles the entire value chain in one system.

4.3 Comparability of cost component splits, transparency

To enable the comparability of consolidated COGM with local COGM, an additional requirement is usually for reporting local COGM in group currency. Translating local COGM into group currency is not a trivial matter, especially in the case of actual costing. This is because it requires an additional parallel view since the consumption of a material must be determined using the average exchange rate of its procurements, which requires the price to be calculated in group currency independently of the price in local currency. Comparing the consolidated COGM against the local COGM in group currency shows which of the material

costs, in the local view, has been distributed to other cost components in the group view and to intercompany profits.

Example (see Fig. 1):

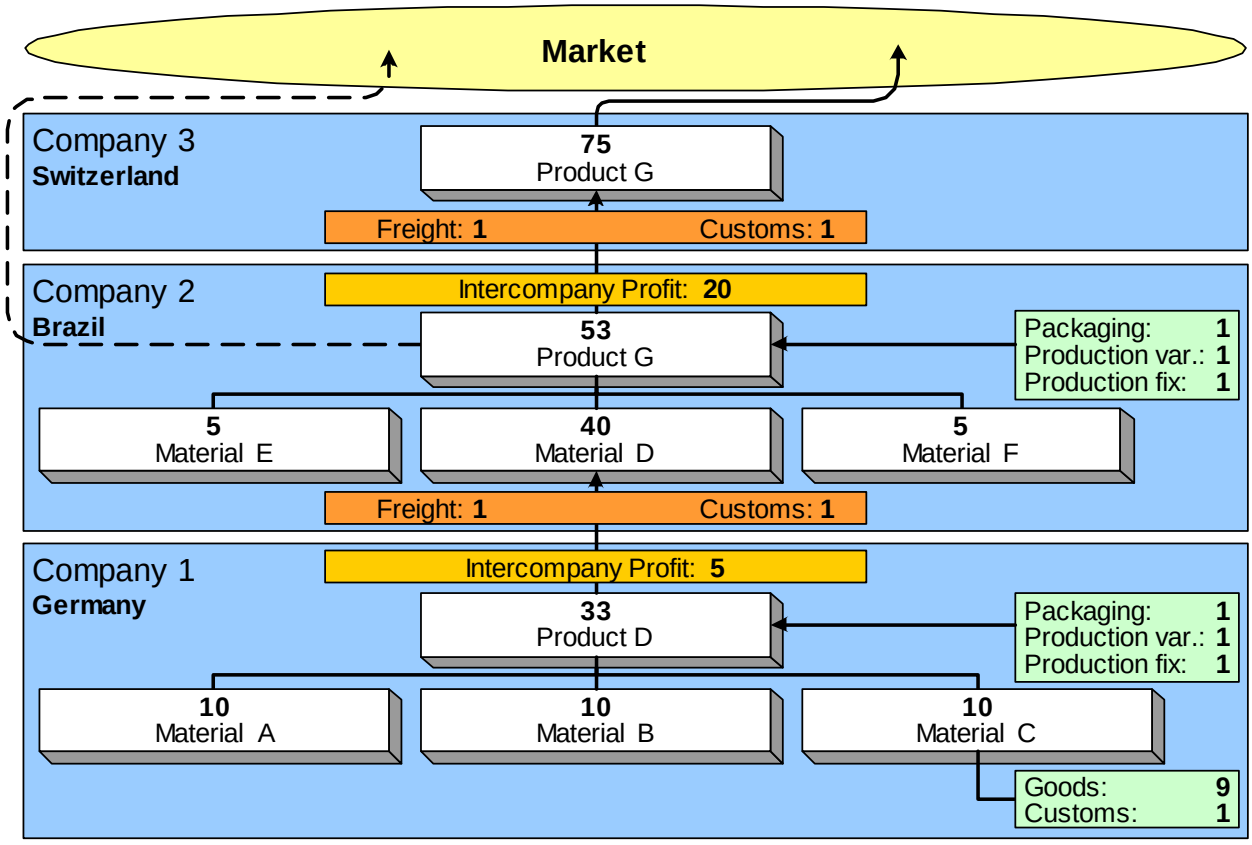

Fig. 1: Example of a value chain, delivery costs paid by recipient

- Product D is manufactured in Germany from products A, B, and C
- Product D is sold at a profit to a company in Brazil
- The company in Brazil manufactures product G from products D, E, and F
- Product G is sold at a profit to a company in Switzerland
- Finally, the Swiss company sells product G on the market

Figure 2 shows the defined cost component split with the following structure in the local view (translated into group currency) and in the group view:

- Material costs
- Fixed costs of production
- Variable costs of production
- Packaging
- Freight
- Customs
- Intercompany profit

			Local Production Costs in Group Currency							Group Production Costs							
		Transfer Price	Material	Production fix	Production variable	Packaging	Freight	Customs	Total	Material	Production fix	Production variable	Packaging	Freight	Customs	Intercompany Profit	Total
Switzerland	**Product G**		**73,00**				**1,00**	**1,00**	**75,00**	**39,00**	**2,00**	**2,00**	**2,00**	**2,00**	**3,00**	**25,00**	**75,00**
	Material G	73,00	73,00				1,00	1,00	75,00	39,00	2,00	2,00	2,00	2,00	3,00	25,00	75,00
Brazil	**Product G**		**48,00**	**1,00**	**1,00**	**1,00**	**1,00**	**1,00**	**53,00**	**39,00**	**2,00**	**2,00**	**2,00**	**1,00**	**2,00**	**5,00**	**53,00**
	Production			1,00	1,00	1,00			3,00		1,00	1,00	1,00				3,00
	Material D	38,00	38,00				1,00	1,00	40,00	29,00	1,00	1,00	1,00	1,00	2,00	5,00	40,00
	Material E		5,00						5,00	5,00							5,00
	Material F		5,00						5,00	5,00							5,00
Germany	**Product D**		**29,00**	**1,00**	**1,00**	**1,00**		**1,00**	**33,00**	**29,00**	**1,00**	**1,00**	**1,00**		**1,00**		**33,00**
	Production			1,00	1,00	1,00			3,00		1,00	1,00	1,00				3,00
	Material A		10,00						10,00	10,00							10,00
	Material B		10,00						10,00	10,00							10,00
	Material C		9,00					1,00	10,00	9,00					1,00		10,00

Fig. 2: COGM, local view and group view

While for product D in Germany the two views are the same (no deliveries from affiliated companies), for product G in Brazil they differ.

Both cost component splits (including the intercompany profit components in the group view) must have the same total.

The difference of 9 euros in material costs breaks down into the following cost components:

- Fixed costs of production 1 euro
- Variable costs of production 1 euro
- Packaging 1 euro
- Customs 1 euro
- Intercompany profit 5 euros

Such analyses are particularly easy if the local view is available in both local currency and group ("historical") currency.

4.4 Cost of goods sold for sales within the group

It is frequently the case that sales and administration overhead, special direct costs of sales, and freight costs for the selling company are involved, even when goods are sold to another company within the group. In such cases, these costs may not be allocated to the local cost of goods manufactured (not allowed for capitalization). For consolidation purposes, however, they must be recorded by the receiving company as cost of goods manufactured; they reduce the intercompany profit and must be capitalized.

4.5 Simulation

There is also a need to calculate the consolidated COGM using different exchange rate and transfer price scenarios. The group wants to know how exchange rates and transfer prices affect its income and cost structure, all other factors staying the same. The consolidated COGM is often of only secondary interest, however. The watchmaking and jewelry industry focuses on the price of silver and gold, while other industries have other strategic raw materials that are their primary concern.

Finally, there is a need to simulate alternative quantity structures such as for outsourcing, moving overseas, moving factories, closing factories, opening factories, and so on. The simulation of wage changes only plays a role in isolated cases.

4.6 Periodicity

The requirements with respect to periodicity are different as well, and must be defined through suitable customizing functions. The requirements start with simple annual planning, quarterly planning, and monthly planning including ending inventories, and continue on to multiyear planning, rolling planning, and mixed planning. Mixed planning refers to determining actual data for a defined time frame in the past combined with calculating planned data for a future time frame. This is frequently done to determine the extent to which historical planning can still be realized from the perspective of the present.

4.7 Alternative runs

The consolidated actual cost of goods manufactured is usually determined on a monthly basis, although year-to-date figures are frequently required as well. Year-to-date is usually cumulated across all monthly periods since the start of the year. This is because the year-to-date figures of the current year are normally compared against the year-to-date figures of prior years. In most cases the year-to-date figures (if available) are then used as a basis for the consolidated financial statements.

5 Prerequisites for successful implementation

5.1 Mapping mechanism

Successful implementation of the solution requires mapping mechanisms that enable the identification numbers from heterogeneous system environments to be mapped onto a central identification number. If a customer meets this requirement using an SAP tool such as MDM (Master Data Management), that "layer" will be used without defining special mapping rules. This is not required if the identification numbers for materials, customers, vendors, companies, and plants are uniform worldwide.

With the solution presented here, costs are calculated without additional settings in Customizing at the material and plant level. It is, however, possible to configure the system to track costs at lower levels (such as for batches or valuation types). However, costs at higher levels are frequently needed as well. For example, managers may want to group materials with similar cost and revenue structures into product groups, or combine two neighboring plants with identical cost structures. This saves both processing time and memory space.

5.2 Extraction

Extraction is controlled and called centrally via RFC using the Get principle. Customizing settings specify which organizational units are extracted, the source systems from which they are extracted, and the run numbers used. The Schedule Manager in the SAP system can be used to repeat these runs at certain intervals (such as monthly). Messages are collected in a log for each run number, which provides information on the run and the exceptions that occurred. An error database is updated for this purpose, which can be evaluated based on different criteria. It is possible to assign the error messages to users based on the error number, material, and organizational unit, and then e-mail the messages to the users automatically.

5.3 Broken links

Certain validations, however, can only take place after all extraction processes have been completed, at which point problems such as broken links can be detected.

Example:
A company makes a purchase from another company in the group. For the selling company, however, no transaction is found that would explain the resulting inventory.

The successful conclusion of the extraction processes must therefore be followed by an iterative validation and data cleansing process that is repeated until the missing data is entered and the system inconsistencies are corrected.

Since some group locations may use systems that are less sophisticated than SAP R/3, a standard interface was designed that can load the data into the central instance in that format. This standard interface can also load data from Excel files if they are appropriately formatted, and it is possible to use Excel to correct data as well. This enables decentralized maintenance of data (with support from corporate offices if necessary) in a globally available front end.

5.4 Organizational prerequisites

One of the key organizational prerequisites for successful implementation of such a project is that it receive full support from top management. If the potential benefits for planning and control are not recognized by top management, projects of this scope are condemned to failure.

6 Implementing the solution

The solution was implemented on the basis of an SAP system into which it was fully integrated using extractors. Implementation would, however, also be possible in other system landscapes. SAP-specific issues are only discussed to the extent necessary to clarify the integration and benefits in SAP environments. Decisive factors for deciding on an SAP-based solution were the existing hardware-independent development environment and the prevalence of the applications whose processes were to be utilized in the implementation. The goal was to map only the group functions that were not already available on the market as standard software.

6.1 Setup Options

On the basis of SAP R/3 Enterprise Release 47x200, the system can be installed in R/3 or in BW:

As a separate instance
In an existing R/3 or BW system for the group
In an another existing R/3 or BW system
In a separate client
In an existing client

It is necessary to configure corresponding RFC connections to the source systems. In exceptional cases, it is also possible to use file transfer; the extraction programs must then be started in the source systems.

6.2 Modular design

The system has a modular design consisting of the following elements:

Extraction process for CO-PC based on saved itemizations
Extraction process for actual data based on goods movements and adjustments
Extraction process for CO-PA based on planned and actual sales
Aggregation process on totals records by period
Sequence determination (first raw materials, then semifinished products, etc.)
Top-down costing (only required for planned costs)
Bottom-up costing (the proper costing process)
Correction functions
Simulation by means of versioning
Display functions
Reporting (R/3 or BW)

6.3 Uniform data model

The system is based on a uniform data model for planned, actual, and simulation scenarios. All parts of the program can be applied to planned, actual, and simulation versions. In the SAP standard, the planned and actual data are stored in different tables (except for CO-PA) and therefore require different extractors.

6.4 Support of heterogeneous systems-landscapes

Figure 3 illustrates a scenario in which the R/3 systems on the left side are handled by an extraction process for actual data or planned data based on the stored itemizations of the local cost estimates. For the non-SAP systems on the right side, a defined GCP format must be created by means of a program.

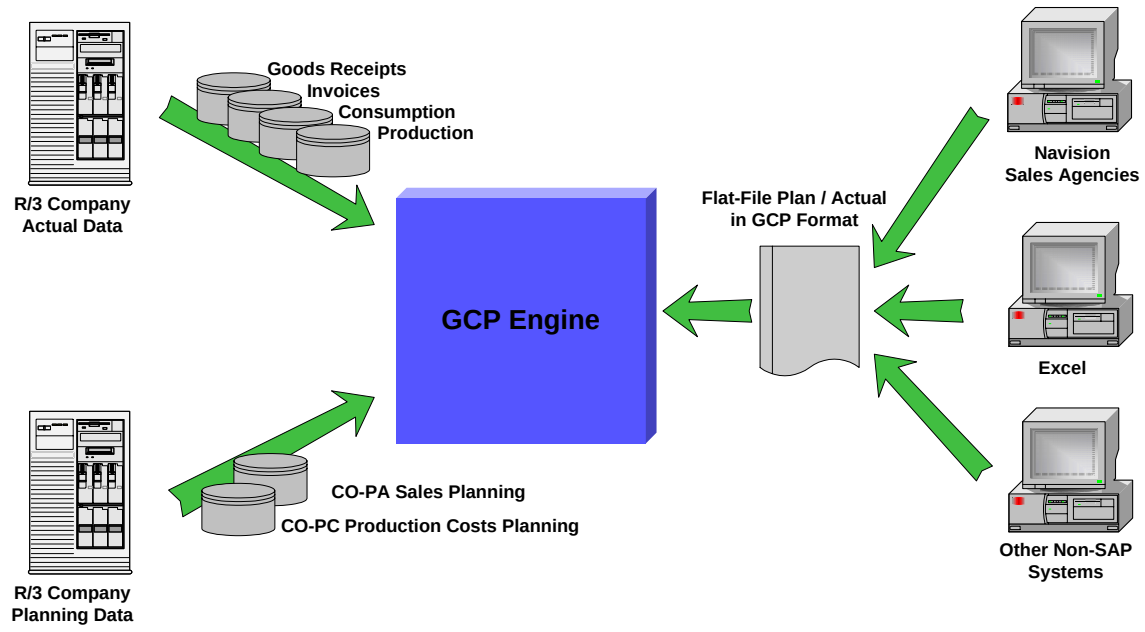

Fig. 3: Extraction processes for planned and actual profitability analysis in a heterogeneous system environment

6.5 Determination of required data

For actual data, the system must read all sales, goods movements, and adjustments from invoice receipts for outsourced materials and final cost estimates for materials manufactured in-house. If the CO-PC-ACT component (Material Ledger) is being used, it is also possible to transfer cumulative data.

All other source systems can be connected across a standard interface which receives the data in a predefined GCP format (or Excel).

Recalculating the purchasing and production quantities from the planned sales for a planning or simulation scenario requires an intermediate step involving top-down costing.

6.6 Costing

After bottom-up costing, the consolidated COGM can be seen for each costing item. The costing level is the level at which the costing item is defined through the customizing settings.

Example:

Material 4711, plant 1000, product group A

With costing level *material/plant* the costing item is 4711/1000
With costing level *product group/plant* the costing item is A/1000

All extracted business transactions for 4711/1000 or A/1000 are then shown in tabular form with quantities and values for the cost components as follows:

	Beginning inventory	(= ending inventory of previous period)
+	Purchases from third parties	
+	Intercompany purchases	
+	Production	
+	Subcontracting	
=	Precosting balance	(beginning inventory plus receipts)
-	Consumption	(for production)
-	Sales to third parties	
-	Intercompany sales	
-	Other goods withdrawals	
=	Ending inventory	(of the period)

The precosting balance serves the purpose of an intermediate calculation and provides a better pricing basis for valuating goods issues. A quotient is always calculated between the value of the cost component and the quantity, multiplied by the quantity of the goods issue.

6.7 Option of cost component splits

Depending on the customizing settings, the following cost component splits may be activated:

- Local cost component split (see currency/valuation category 10)
- Local cost component split in group currency (see currency/valuation category 30)
- Group cost component split (see currency/valuation category 31)

It is possible to include primary cost component splits.

Although the above design shows purchases from third parties as an aggregate, the database nevertheless contains individual records showing the individual purchases per vendor. In most cases, therefore, it is possible to drill down to more detail.

If a review of the results indicate that corrections are necessary, for example because a document was entered in the source system in the current period but applies to the previous period, they can be made in the system itself. In the subsequent net-change procedure, only the costing items that are higher up in the value chain need to be recalculated.

For sales to third parties, revenue elements such as the following are stored:

- Revenue
- Sales deductions
- Discounts
- Sales and administration overhead
- Special direct costs of sales
- Freight
- etc.

For intercompany sales, these elements are rolled up to the next level and the intercompany profit is reduced accordingly. This point should be emphasized because it is a common mistake to assume that the intermediate profit is always calculated as:

Transfer Price – COGM of Supplying Company

Instead, standard software must meet the requirements of consolidation for intercompany sales by transferring costs such as sales and administration overhead into a primary cost component split for the company receiving the goods. The primary cost component split

enables flexible standard costing and contribution margin accounting based on full or variable costs by rolling up the fixed and variable costs along the group value chain[4]. This creates the basis for reporting the consolidated results based on the cost-of-sales accounting method in the same way as for individual companies.

7 Hierarchy and segment reporting

As mentioned previously, bottom-up costing makes all results available at the costing item level. For the sales, revenue elements are created for each customer. If corresponding hierarchies are defined for the material/plant and customer level in a Business Warehouse, it is possible to see aggregate values by product group, product area, and business segment, or by customer group, country, and region.

Such information could also be used for segment reporting based on IAS/IFRS. Functionality for creating consolidated balance sheets and income statements is sufficiently covered by the standard software available on the market and is therefore not the primary objective of this solution. Nevertheless, it may be useful to feed these systems with cumulative data such as evaluations across business segments or customer segments. It would then be quite easy to meet the information requirements for segment reporting simply by defining the appropriate hierarchy nodes.

[4] See Dusemond, M., *Group Cost of Goods Manufactured*, 1994, p. 495 et al.; Jäger, H., *Valuation*, 1987, pp. 237-239.

8 Benefits of the new information basis

The solution provides a fresh view of the data that can be supplied by the system without having to enter any new data. All required data is needed for local reasons as well and should be stored in the source systems. At the same time, the source systems are freed of unnecessary ballast and can concentrate on their core task of meeting the legal requirements of individual companies. The group functions are handled by a different system, providing additional benefits through greater security, restricted authorization, and protection against access by tax authorities. This also makes the group functions less dependent on the release cycles and maintenance levels of the source systems.

The group enjoys improved transparency and better instruments for controlling its profitability. When supply networks are closely interlinked, it was previously not possible to gain information about the share of fixed costs or intercompany profits of a sold product without running complex calculations. Only the transparency provided by this solution enables make-or-buy decisions that are optimal for the group as a whole. In production, knowledge of the variable group cost of goods sold enables the group's managers to define efficient production combinations for a given set of conditions. In sales, group costing provides information to support the price policy of group management. The full or variable cost of goods sold is used to evaluate sales prices. If no bottlenecks exist, the short-term price floor is the variable cost of goods sold[5].

Thanks to their uniform structure, planned and actual data can be more easily and reliably compared and copied into new analysis versions. It suddenly becomes possible to answer questions such as "What would the cost and revenue structures for the year-to-date actuals look like with different exchange rates?"
Planning data in different systems such as APO, SEM, non-SAP systems and of course Excel can be read in and validated. Only when quantities and values are integrated and the planned cost of goods manufactured and the profit are known down to the product and customer level does it become apparent whether overall planning is plausible and supports management objectives.

Another significant advantage here is that the aggregate quantity flows are always known. Instead of applying unit costs to the quantity sold, the system reports the absolute quantities purchased, produced, consumed, and sold based on the planning. It goes without saying that the annual planning function can show a beginning inventory at the start of the year, an ending inventory at the close of the year, and other ending inventories during the year. These quantities are linked to the corresponding costs (cost component splits) and revenues (revenue component splits).

[5] See Kirsch, H., *Group Cost Accounting*, 1998, pp. 213-215; Müller, E., *Controlling*, 1996, p.118 f.

Companies that have not used planning tools up to now and would rather plan on the basis of historical data have been provided for as well. In such cases the actual data should be copied to a plan version and modified as needed. The system can then support new planning runs based on the new quantities and prices.

9 Outlook and summary

The flexibility of this solution would conceivably allow continuous improvement of system functionality. Extractors could be provided for the most common SCM systems on the market. The transfer of consolidated data to other systems could be optimized and standardized. Thought has been given to deriving postings for the consolidated balance sheet and income statement. Finally, discounting results for valuation of an enterprise as a whole would be conceivable.

Although the solution is currently designed mainly for inventory valuation and profitability analysis for products kept in stock, it could also be extended to include assets, projects, and sales orders.

Additional calculations from a profit center accounting perspective and transfer prices from a profit center perspective would also be possible. From the profit center perspective, exchanges between profit centers would, in principle, correspond to the exchanges between individual companies from the group perspective.
This solution provides management with optimum support for establishing targets. If targeted results are part of a Balanced Scorecard, they would also be documented in the context of defined prerequisites and supported quantitatively. For example, if currency fluctuations lead to different results than planned, it should be possible to apply the planned exchange rates to the actual results to remove the influence of factors over which management has no control.