Focus Topics 2012 for the Chemical Industry
Outlook based on CheMonitor study results

- Outlook 2012
- End-2-end process organization
- Lean supply chain management
- Supply risk management
- Margin-based order management
- Operating model design
Management Summary

Having completed one of the best years the chemical industry has seen, the question at hand is the development for 2012 and the years ahead. After new records were established in 2011, the management of chemical companies has to face new challenges. The turmoil of the European crises will definitely affect business. But since most chemical companies have implemented new measures to deal with the crises, they are much better prepared for downturns than in 2008/09. A short-term decline of profits might hit businesses. But there is no sign the scenario three years ago being repeated.

Only those familiar with the trends in the chemical industry will identify future fields of action early on and strengthen their competitiveness. More and more chemical companies are steering their business and innovation strategy according to so-called mega trends. This makes sense since such mega trends linger for more than half a century. Especially trends in energy, environment and growing population will have a rising impact on the chemical industry.

On the other hand, it is crucial not to lose sight of the situation at hand. Volatile markets and bottlenecks will be on-going issues. Product portfolios are being readjusted on a global scale. But still, taking all relevant factors into consideration, there is a chance of another positive year ahead for the chemical industry. But due to expected economic slowdown and an increasing uncertainty chemical companies have to stronger focus on flexibility and capabilities to balance customer service as well as costs and working capital in different economic scenarios.

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In 2011 the different sectors of the chemical industry demonstrated impressive growth and top results. Camelot gained first hand insight by carrying out the CheMonitor survey in collaboration with Chemanager three times during 2011.

We got feedback from 300 executives of Germany’s chemical industry – small, mid-size companies and global corporations. Despite all the expected ups and downs in the world economy and European politics, throughout the whole year they expressed impressive optimism with respect to the level and further development of their business conditions. Evaluation of the current condition recovered after the economic crisis in 2008 and reached an overall maximum of 90% rating as rather favourable or favourable. Expectations of future developments were stable at 70%, but then decreased towards mid-year, in the face of first indications of slowing growth rates. However, at the end of 2011, more than 50% of the executives are still looking forward to stable or even improving conditions.

This is an excellent result and clearly shows the self-confidence of management in facing the challenges ahead. Figure 1 illustrates these perceived conditions:

![Figure 1: Current local conditions](image)

While this gives an impression of the home base of the companies, the expected growth is distributed over a range of countries, which drive the EU and world economy. According to global studies, China is still the major engine for growth, followed by India and Russia. For EU-based companies, Turkey is a driving force, giving slightly more momentum than Brazil. Global corporations are going abroad, while the smaller size companies are focusing their strategies around their home markets. Figure 2 illustrates the expected growth potential by different regions:
This optimism creates a highly competitive environment, which could easily be tightened by a slowdown in economy. To stay ahead of the crowd, it is key to maximize company performance and operational performance by focusing on **end-to-end process optimization**. Any frictions due to silo thinking will immediately weaken overall effectiveness and lead sooner or later to business losses. For all companies it is mandatory to strengthen their grip outside their home base. This is challenging their **operating models** and the strategic design of their **manufacturing and distribution footprint**. The positioning of new manufacturing sites and the streamlining of distribution networks can be supported by simulation of the new scenarios. This gives an optimal transparency to identify the best solution and facilitates implementation.

The high demand together with high levels of volatility put new challenges on planning strategies in the supply chain. Pure forecasting has been challenged after the crisis. The transfer of LEAN principles from manufacturing created **LEAN SCM** and changed planning paradigms. More streamlined planning processes, by making their first priority pull principles for production scheduling, allow more reliable and agile supply chain steering. Increased transparency and clear differentiation between operational scheduling and midterm sales & operations planning (S&OP) lay the foundation for better tactical management of the supply chain.

Facing on-going capacity limitations, companies increased their pace to transform from a volume S&OP to profit based decision-making. By applying financial evaluations to the planned scenarios they progressed from classical S&OP to the **integrated business management** level. The on-going bottleneck situations even led to the introduction of **margin-based order management** in the OTC processes of chemical companies, especially in the commodity business.
The optimism of the executives is also visible when asked for their priorities for the next 12 months. Figure 3 illustrates the changing priorities of chemical companies regarding cost reduction and growth:

During and after the crisis, the leaders had to keep their companies in solid financial conditions while facing huge losses in sales and turnover. Therefore the focus on cost reduction rose to 35%. In this period, only 15% still focus on growth as a first priority. With the improvement in the business environment since the end of 2009, the focus on growth increased to an all-time high above 50%. Companies that set their priorities on mere cost reduction dropped to 5%. Another 45% balanced both strategies. In total, this means that in 2011 95% of the executives went for growth.

This is fully in line with the strong economic results of the chemical industry. Huge demand along the value chains led to high capacity load and stock outs. Triggered at the beginning by empty supply chains, raw material supply became a major issue. And it still remains a new challenge due to the different behaviour of the market which still shows a high level of volatility. A new dimension of supply risk entered the scene with raw materials shortfalls in 2011 intensified by single events like the nuclear incident in Fukushima. Since then, the management of supplier risks and business continuity have become top items on the agenda of CEOs.

Nor is this just about supplier risk management. If we look at the top items in focus for cost reduction, number one is the reduction of raw material cost, followed by energy. So supplier management gets a high priority and is promoting new approaches to manage portfolios on a global basis, even taking advantage of raw material hedging. Improved early warning tools are being implemented that allow screening for signals of fluctuation.
As Figure 4 shows, classical topics like general personnel reduction and R&D have receded in importance. On the contrary, the companies are worried about the availability of qualified personnel becoming one of the bottlenecks for their targeted growth strategies. The third in the list of cost reduction is administration. So LEAN thinking is now being transferred to internal administration processes. The application of end-2-end process thinking and the removal of ‘waste’ will drive efficiencies through LEAN Administration in the same way it happened in manufacturing and SCM.

Figure 4: Focus of cost reduction measures

Where will be the focus of cost reduction measures in the next 12 month?

What is driving the future strategies? As Figure 5 illustrates, executives clearly focus on the three megatrends energy, environmental protection and growth of population (health was taken out as we are not looking at the pharmaceutical sector). They expect these megatrends to drive further growth. In addition, sustainability is getting more and more important, spearheaded by the global corporations.
This leads to the conclusion that the chemical industry is putting the emphasis on long-term development. Together with the programs already achieved and those further planned to better cope with volatile markets and fluctuations in economy, the chemical industry is well prepared for 2012. Potential turmoil due to the currency crisis and other incidents to come will present them with a challenge. But due to the improved starting condition this should only lead to drops in turnover and will not be the start of a business breakdown comparable to the 2008/09 crisis scenario.

Keeping these facts in mind, the following major topics will be on the agenda for 2012:

- end-to-end process organization
- lean supply chain management
- supply risk management
- margin-based order management
- integrating the operating model & distribution network
Operational excellence has become a strategic imperative for global companies as they face more challenging customers and tough competition. Increasing complexity of organizations (global operations, evolving production networks, mergers and acquisitions) requires companies to continuously focus and improve their operational performance. In this context process orientation is becoming more and more important for global chemical producers.

End-to-end (E2E) perspective has become one of the leading principles, as global company structures have become increasingly complex during the last decade. Even simple processes like accounting or operational procurement are spread over organizational structures with global governance, regional shared services and local business partners.

Global chemical companies seek to harmonize their business processes across diverse business units and geographical regions for several reasons:

- better understanding and visualization of processes
- continuous improvement of processes
- transparency on operations
- standardization of transactional processes
- increase intercompany coordination and integration after M&A
- easier outsourcing of process capabilities

Redesigning processes that run from end-to-end across the enterprise lead to dramatic enhancements in performance. End-to-end process organization ensures that all activities in a business process work together and are aligned for the common purpose of serving customer needs. Focusing on redesigning and measuring the customer-facing and internal processes creates improvements in cost, quality, speed, profitability, and other key areas.

Business process management

Business process management describes how the organization works to accomplish a particular objective, i.e. the set of activities performed by one or more persons following certain business rules. Today most enterprises value processes as strategic assets and business process modelling is widely used to realize end-to-end management of processes.

There are several factors necessary to sustain business processes, such as process design (showing the detailed steps of how it is to be executed), people (who execute the processes in terms of skills), IT infrastructure (to support the process), measures (to track process performance), and owner (who has the responsibility for the process and its results), see Figure 6. For instance, ownership of core processes is a critical success factor. Without a clear assignment of ownership, management and evaluation of the process cannot be executed. Besides, in today’s complex corporate structures many processes interact with multiple functions of a company. This level of interdependence almost dictates the necessity of a single owner who has the end-to-end view of the process. For example, the order-to-cash process is associated with sales, finance and distribution. Therefore it is essential to have an owner who has cross-functional overview of the order-to-cash process.
E2E process government execution in the chemical industry

Current organizations of chemical companies are often not suitable for an effective E2E process government. Most small and medium-sized enterprises follow a functional structure on second level, many multinational companies in chemical industry are characterized by a business unit set-up supported by central functions. Both organizational principles do not fit an end-to-end process approach on first sight. For example, the order to cash E2E process includes process parts from sales, finance and supply chain management. The basic question is how to implement organizational end-to-end process responsibility.

One pure scenario is a complete organizational change to process orientation. In reality, and from the current management perspective, this scenario is quite unrealistic because EBIT and asset oriented set-ups promise higher synergy effects than a complete change to process orientation in one step. So we are looking for feasible organizational solutions with significant benefits and a good chance for implementation within existing enterprise structures. With this understanding there are three basic types of process organization in the chemical industry:

1. Process owner matrix
2. Major user model
3. Governance model
In the **process owner matrix** (Figure 7) process owners are defined to manage the processes across whole functions. Process owners manage the whole process cluster with an E2E authority. They are responsible for establishing the design, ensuring that the design is followed and improving the processes continuously. This model has many advantages through a defined leadership for end-to-end process harmonization and improvement.

![Figure 7: Process owner matrix organizational structure](image)

<table>
<thead>
<tr>
<th>Function</th>
<th>Procurement</th>
<th>Production</th>
<th>SCM / Logistics</th>
<th>Sales</th>
<th>Finance / Controlling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purchase to pay (P2P)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Make to inventory (M2I)</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td>(X)</td>
</tr>
<tr>
<td>Forecast to schedule (F2S)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prospect to order (P2O)</td>
<td>(X)</td>
<td>(X)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order to cash (OTC)</td>
<td></td>
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<td>X</td>
<td></td>
</tr>
<tr>
<td>Record to report (R2R)</td>
<td>(X)</td>
<td>(X)</td>
<td>(X)</td>
<td>(X)</td>
<td>X</td>
</tr>
</tbody>
</table>

X = to be coordinated  (X) = limited interface

The major disadvantage of the process owner matrix is the significant increase in interfaces and the higher demand for coordination and escalation processes. While in smaller companies with high innovation potential this coordination might be useful to accelerate innovative processes, in big multinational enterprises with high volume processes overall efficiency might decrease due to the rising demand for coordination.

In the **major user model** (Figure 8) processes are assigned to relevant functional units. For instance, the P2P process is assigned to the procurement function. The performance of the process is directly related to the performance of other functions as process limits are beyond one function. In addition, functional units act largely unaware of one another as they pursue different performance objectives. The major user model is pragmatic and resource efficient, however due to the above reasons it may lead to conflict of interests and increased administrative costs. Especially in the case of multi-interface processes like OTC the major user models tend to be managed from an individual and opportunistic perspective if end-to-end responsibility is assigned to a single functional unit like sales or finance/controlling.
In the governance model (Figure 9) a corporate centre is established with at least dotted line responsibility for end-to-end processes. The single governance units are responsible for end-to-end process synergy management, continuous improvement and decisions on change requests. This governance role can also be linked to service functions to support process improvement project across the business organization. In any case, operational responsibility will remain in functional units or business units so that additional coordination is focused on synergy management and realization of benefits. An advantage can be seen in the specific organizational set-up of governance units which are independent of functional units and play a neutral role in case of interest conflicts. Although this organizational model combines many best practices of modern multinational organizations, it has to be mentioned that it requires significant set-up time and efforts. To evaluate the pay-off for an individual corporate structure, a set of criteria have to be taken into account (e.g. size of company, heterogeneity of business, maturity level of processes and systems).
Summary of key findings

Business processes are corporate assets and their management has paramount impact on a company's performance. End-to-end process management aligns functional units, business units and process experts to deliver on customer needs effectively and efficiently.

Execution of E2E processes requires profound process and IT knowledge. In addition, creating an expert network within the company is essential to handle the complexity of today's chemical companies. Present organizational structures align differently to global chemical companies, because of the companies' differences in size and complexity. From an organizational perspective, a governance model promises clear advantages in comparison with matrix building or a pragmatic major user solution, although additional efforts for the set-up should not be underestimated.
Chemical supply chain management is facing increasing volatility, both on the market and supplier side. This is caused by the effects of global networks and the emerging markets, price fluctuations and changing customer buying patterns after the recession.

This increasing volatility is adding more uncertainty to estimated future demand. Uncertainty is the driver of the bull whip effect. Preparing for the unexpected, adding a safety buffer element to every stage of the value chain is creating an amplifying effect of impressive magnitude. Upstream producers in particular are facing tremendous demand fluctuations. Often these exceed capacity flexibility and cash constrained buffer stocks, leading inevitably to stock outs (Figure 10).

In the to-be model inventories are specifically used to synchronize product flows and to mitigate the effect of demand and supply variability (Figure 11). This approach increases added value contributed by operations and results in more stable capacity utilization as well as in reduced average levels of inventory across the supply chain.

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**Figure 10:** Traditional planning approach

**Figure 11:** Innovative planning approach
Collaboration may be a remedy, but is a planning approach and therefore could still be infected by the bullwhip virus. If we are looking at the value chain within the boundaries of your company, there is a simple antidote:

**Apply the principles of LEAN SCM**

**First principle:**
Replace demand planning by pull signals to schedule short term production and cap the inventory

Applying pull signals to schedule production is the key lever to get rid of the bullwhip effect. Pull signals prevent bullwhip buffer stocks building up. If there is not enough demand from the market, they simply switch off your production. This creates an intrinsic cap on your inventory levels. The times when production is terminated only when running out of warehouse space are over.

The pull signals are created by comparing your actual stock levels with predefined target stock levels – what we call the inventory replenishment level. These levels include safety stock levels, strategic inventory and what is required to cover demand until the next production run. In order to come up with these values you still need to estimate your future demand. But this estimate is done on an aggregated level compared to forecasting on SKU level.

**Second principle:**
Combine pull signals with rhythm wheel to ensure optimal production sequencing

In chemical operations, production lines normally produce a range of products. Changeover procedures are quite often time consuming, create changeover output with limited quality and take away capacity. Therefore producing in a changeover optimized sequence is essential for optimizing production cost and output. LEAN SCM takes care of that. The scheduling sequence is mapped into a rhythm wheel. This is then used together with historical and future sales information to define a capacity reservation for the individual products. However, the actual amount produced is scheduled according to the pull signals.
In Figure 13 you can see the basic design. The products are lined up on the wheel in the optimal changeover sequence. When the individual product in the row is to be scheduled, the inventory replenishment level creates the according pull signal. If the inventory level is above, the production campaign is skipped.

Real life is of course more complicated. In most cases in chemical production you have minimum production quantities. And the production range is quite often a mix of fast moving products and special products that are only produced once in a while. However, Camelot has developed an approach that is able to take these constraints into consideration. On top of that, the approach determines the campaign allocation of the different materials that optimizes your inventory levels for a given changeover scenario. The according modules have been developed to realize this approach in R/3 as well as in APO.

**Third principle:**
**Introduce production levelling to balance capacity utilization and inventory**

In the classical planning approach using MRP logic, replenishment volumes are calculated to balance the estimated demand, ensuring the coverage of the safety stock levels at the end of the planning period. This means that all demand fluctuation is mapped directly into production planning. Following this logic, the increasing volatility of the market needs to be covered by the production units. However, up to now the flexibility of the units falls far short of meeting that challenge. Short term changeovers create additional cost and reduce the overall capacity.

In the IRL driven LEAN SCM approach, the introduction of a single parameter can prevent this from happening. Like a filter it controls the level of volatility that is allowed to impact the scheduling of production. The remaining volatility is buffered by the inventory. By using this parameter, the balance between varying capacity utilization and inventory can be easily adjusted to the overall situation.
Fourth principle:
Apply demand and supply focused segmentation to allocate the optimal planning and replenishment approach

Not every chemical product is suitable to pull strategies. This depends on the level of demand fluctuation as well as on the characteristics of the production setup. Therefore the introduction of pull principles in chemical production is not just a simple shift from a one size fits all approach, from ‘make to forecast’ to ‘pull’. This transformation is a supply chain planning redesign that is based on upfront product segmentation.

In order to achieve a reasonable segmentation, market and production related criteria need to be taken into consideration. If the segmentation is only focused on demand criteria, there is a high risk that the design will not get along with constraints from the production and supply side.

When looking at value chains with several stages, the best solution in many cases is a mix of push strategy at the less complex upstream end and a pull strategy for the market-focused, complex downstream end. This means that within your value chain you will define a push-pull boundary. Applying LEAN SCM principles helps to determine this boundary and the handling of the integrated planning.
Fifth principle:
Embed the LEAN planning in a periodic S&OP and renewal process

The key element to ensure a forward looking management of the supply chain is the sales & operations planning (S&OP) process. The clear separation of short term scheduling by pull principles and the mid-term aggregated planning in LEAN SCM facilitates the S&OP process by keeping out fire fighting.

On the other hand, the S&OP is the right forum to guarantee a periodic review and approval of changes in segmentation and parameter setting on an aggregated level. By embedding this renewal process into S&OP, the key parameters of the LEAN SCM approach are regularly updated to changing market conditions. As a consequence, LEAN SCM delivers a stable and efficient planning and scheduling environment.
Supply risk management remains one of the key areas of procurement. Data from the CheMonitor survey indicates that most chemical companies are strongly concerned about future raw material prices. Even with an uncertain development of the global economy, this is one of the main issues for most chemical companies. Since margins are dropping, the focus on raw materials is continuously increasing in the chemical industry, especially for businesses that plan to reduce costs in 2012. Forty-seven percent of chemical companies see prices of raw materials as the leading concern compared to administration or personnel. The greatest threat to further growth is seen as rising prices and the availability of sufficient resources. Almost 40% see this threat as strongly increasing, while over 50% say it will remain stable or grow slightly. More than 70% also see a negative impact on operating margins due to the rising prices of raw materials. These figures illustrate the importance of an integrated supply risk management in 2012.

Lately, a lot of businesses in the chemical industry have realized cost savings due to successful implementations of strategies like lean manufacturing, process optimization or purchasing spend initiatives. Those strategies led to a significant increase in process efficiency. The benefits of these strategies were accompanied by a rise of risk along the value chain. While the benefits are spread over the whole value chain, the risk is mostly concentrated on the procurement department. Whereas currency risks through fluctuating currencies are well-known, other risks that may have a huge impact on a company’s success may be disregarded, especially those risks connected to the supply chain.

If one considers the raw material bottlenecks in 2011, the necessity for a strategic role of the purchasing department in the risk management process is obvious. The lack of Xirallic supply, a specific pigment, which is mainly used in the automotive industry for paints, is one of the most familiar examples of these bottlenecks. After the catastrophe in Japan, Xirallic was not available on the world market for several months. Bottlenecks can occur for lots of different raw materials, especially for a wide range of precious metals and rare earths.
The role of the purchasing department in the risk management process

The purchasing department has to face a much broader spectrum of risks compared to any other functional unit, due to the high number of external partners and interfaces which need to be coordinated. Therefore, the purchasing department has a vital responsibility for the overall company’s success by identifying potential risks as early as possible and handling risks in a proactive way. Furthermore, the purchasing department has a strategic position in the overall risk management in the chemical industry. Driving this risk management process increases planning reliability and adds a sustainable value to business success. Figure 16 illustrates the typical risks in the supply chain:

Chances & risks:
As often indicated, risk management is not about avoiding all possible risks, but about managing risks in an appropriate way. Active risk management is accompanied not only by additional efforts, but also enables new chances. Business developments and trends can be identified and anticipated, the scope of actions and activities is wider. Furthermore, the analysis of risk sources along the value chain enhances understanding of the company's partners and thus promotes a more intensive collaboration with benefits for all. Hence, successful risk management in procurement is not only about minimizing potential loss, but also about generating sustainable comparative advantages over competitors.
Risk management process

A holistic approach for a risk management process has different phases. Figure 17 illustrates this multi-step approach which has to be aligned for the specific context of the business and the risk situation at hand.

Supply Risk Management in the chemical industry

Supplier management is one of the core processes in purchasing and an important lever to generate value for the company. Due to the complex value and supply chain of the chemical industry there are particularities of Supply Risk Management in the chemical industry which need to be addressed in the overall risk management process.

Depending on the supply category different trends, risks and impacts on supplier management are found. Figure 18 shows selected supply categories:
### Figure 18: Specific risks in selected supply categories

<table>
<thead>
<tr>
<th>Supply category</th>
<th>Trends</th>
<th>Risks</th>
<th>Impact on supplier management</th>
</tr>
</thead>
</table>
| Petrochemical feedstock | ▶ Rising and volatile oil price  
▶ Increasing captive use in oil producing countries  
▶ Declining future availability of oil and gas (-30% by 2030) | ▶ Cost increase threatens profitability  
▶ Dependency on middle east producers  
▶ Supply reliability | ▶ Insourcing of raw material supplies (e.g. crude oil crackers)  
▶ Search for alternative feedstock sources (e.g. biomass, tar sands, coal)  
▶ Implement volatile price management processes (e.g. financial hedging)  
▶ Supplier risk management |
| Organic basic chemicals | ▶ Feedstock providers extend the production of basic chemicals in Middle East/Asia | ▶ Pressure on European suppliers results in mid-term shut-downs and higher prices  
▶ Supply from Middle East/Asia causes longer lead times and reduced supply reliability | ▶ Maintain strategic sourcing from European suppliers  
▶ Long-term contracts with domestic suppliers  
▶ Participate in new production through joint ventures  
▶ Close supplier performance and risk management to avoid supply shortages |
| Organic fine chemicals | ▶ Sourcing shifted to Asia due to price pressure  
▶ Shut-downs in Europe  
▶ Increasing prices in Asia (monopolies) | ▶ Cost increase  
▶ Supply reliability (e.g. unexpected closures due to regulatory issues)  
▶ Long lead times | ▶ Insource raw material production  
▶ Identify alternative supply regions  
▶ Secure alternative suppliers  
▶ Close supplier performance and risk management to avoid supply shortages |
| Inorganic basic chemicals | ▶ Cost of chlorine and caustic soda production (electrolysis) linked to rising energy prices based on oil and gas prices | ▶ Energy cost increase threatens profitability of electrolysis bases processes  
▶ Domino effect on downstream industries | ▶ Insource raw material production  
▶ Identify alternative supply regions  
▶ Secure alternative suppliers  
▶ Implement volatile price management processes to limit impacts of energy costs |
| Precious metals – catalyst precursors | ▶ Scarcity of precious metals  
▶ Recycling to meet total demand: “urban mining”  
▶ Rising prices  
▶ Future technologies require even more precious metals (e.g. fuel cells) | ▶ Cost increase for catalyst precursors threatens profitability of processes based on precious metal catalysts  
▶ Supply reliability | ▶ Focus on sourcing of recycled precious metals  
▶ Long term sourcing agreements  
▶ Investments in supply sources (backward integration)  
▶ Identification of alternative production methods  
▶ Implement volatile price management processes to limit impacts price on variations |

### Basic strategies to manage these risks are
- Insourcing (e.g. contracting or long-term cooperation)
- Substitutions (e.g. different raw materials)
- Financial hedging
- Supplier portfolio and performance management
The selection of the risk strategy depends on the specific situation. For example, a supplier portfolio and performance management can only perform well when purchasing power is very high. Financial hedging helps to prevent a drop in profits from currency risks, but cannot avoid a shortfall in supply of a specific raw material. Substitutions and insourcing strategies may be valid in some cases, but definitely not in all.

To cover all possible supply risks a holistic risk management approach is needed. Initially a supply risk quick scan or a supply risk assessment helps to enable a deeper understanding of the companies supply chain and the supply risk situation at hand.

Benefits of a supply risk quick scan (two to four weeks)
- Roadmap to establish risk management in the procurement department
- Structuring of relevant risks
- Early integration of other functional units
- First overview of risk portfolio of the procurement department

Benefits of the supply risk assessment (two to three months)
- Hands-on understanding of risk management processes in procurement
- Mobilizing across all functions of the organization as a foundation for high acceptance
- Focusing on the individual context and business of the company
- First traceable payoffs regarding risk minimization

Along with rising prices for raw materials and supplies the importance of supply risk management will grow steadily. Thus, the strategic value of an integrated supply risk management system is crucial for success in the chemical industry.

So what should companies do? The first step is risk identification. Most companies already do well here. But after identifying their risks a lot of companies fail to set up a clear strategy for dealing with these risks. The real challenge is to set up a sustainable supplier risk management system with various activity programs and execution agendas. Due to the dynamic changes of the chemical industry, a constant reassessment process should be implemented, for example with a supply risk management office. This management office would be responsible for benefit tracking and executes the different activity programs. Furthermore it would include different measures like warning indicators, IT-support of data and transparency to enable a constant review of the current supply risk situation. With the establishment of a risk management office, companies in the chemical industry would be able to react fast and in a targeted manner to avoid possible losses and discover new opportunities in their value chain. However the organizational solution looks like it is time to switch from a “risk analyst champion” to an implementation oriented supply risk manager. Managing raw materials bottlenecks will be one of the most important challenges for chemical industry over the next decade.
Current supply chain management faces the dilemma of how to meet increasing sales expectations with a decreasing operations buffer. Sales challenges are increasing due to net working capital reduction initiatives on the customer side resulting in the request for higher service levels. The globalization of supply chain networks extends process lead times, putting additional pressure on sales. The operations buffer is decreasing because of finished goods inventory reductions also caused by net working capital reduction efforts and high capacity utilization. After the crisis in the chemical industry a large proportion of production facilities is running at or close to capacity maximum. Partly this shortfall is artificially created by intentionally keeping production lines closed to keep price levels high. The way out of the current supply chain dilemma is an integrated and truly global sales and operations planning process. When demand is constantly exceeds capacity as it does these days, classical allocation of volumes is not sufficient. The key is to make significant information on margins and profitability available to enable the evaluation of financial scenarios and thus optimized margin-based allocation of finished goods. This is a core principle of state-of-the-art integrated business management, one of the leading concepts to ensure margin-based order management.

Integrated business management

Integrated business management goes beyond classical sales & operations planning with its merely tactical supply and demand balancing. It is a strategic process that delivers financially evaluated scenarios to reach the integrated strategic plan, the business plan and performance metrics. Integrated business management comprises five steps as consecutive meetings: product management review, demand review, supply review, integrated reconciliation meeting and management business review meeting. The most important is the integrated reconciliation meeting in which the plans that were developed in the three previous meetings are pulled into an integrated business plan and financially evaluated. Gaps to strategic plans, business plans and performance metrics are identified and gap filling actions developed. This is the preparation and core input for the management business review meeting enabling senior management to effectively control and steer the business.

The application of integrated business management with strong focus on business targets leverages a number of financial benefits:

- Labour cost can be lowered, because statistical forecast and segmentation reduce the effort for account managers.
- Automated processes for global distribution networks decrease the workload for regional demand planners and procurement.
- Financial evaluation allows margin-driven decisions.
- Gap-to-target monitoring drives operational processes towards business targets and inventory targets reduce and control working capital.
- On the supply side higher transparency and anticipation of bottlenecks increase availability of finished goods, reducing lost sales and improving customer satisfaction.
- The increased availability of intermediates raises overall asset utilization, thereby reducing labour and production cost.
Sales & operations planning 2.0
A comprehensive and advanced solution to fully support integrated business management is the sales & operations planning 2.0 methodology. The concept is named S&OP 2.0 because it is a platform for participatory information sharing similar to Web 2.0. It provides the platform for sharing and real time analysing all information required for building a single demand, supply and value plan covering all major business functions. S&OP 2.0 allows all participating users to create and adjust plans and scenarios at any time and to see the contribution of other users. Information visibility is leveraged by advanced analytics, thus bringing information quality to the next level. S&OP 2.0 tools and processes provide a platform for joint decision-making on all levels of planning for process-driven collaboration through clearly structured S&OP meetings and ad-hoc collaboration based on real-time high quality information between the meetings.

S&OP 2.0 supports all essential elements of current integrated business management: executive end-to-end visibility of the SC makes value creation and problem areas visible, allowing management of all issues from a total business perspective (Figure 19). Segmentation of products, customers and supply chains become an integrated part of the S&OP process. Collaborative demand planning and advanced demand control based on segmentation is empowered. S&OP 2.0 integrates tactical planning with detailed scheduling, execution and with strategy through collaboration. Value (margin / profitability) planning is part of scenario simulation and visibility of the supply chain. Fast what-if scenario simulation enables agility and faster response time of business decisions. Product lifecycle management and people capability assessment and management are embedded into S&OP 2.0.

Figure 19: S&OP 2.0 integrates processes from strategy to execution

Vision, mission, corporate strategy

Strategic planning

Tactical planning (S&OP 2.0)

Scheduling & execution

Performance monitoring, advanced analytics

Order to cash

Consensus demand, supply, inventory and P&L projections

S&OP 2.0 integrates processes from strategy to execution

Competitive positioning
Segmentation
Strategic SC configuration & network design

Strategic target setting; forward-looking analytics

Collect forecasts
Base demand plan
What-if demand shaping

Collect supply input
Base supply plan
What-if supply scenario

Base financial plan
What-if financial scenario

Consensus demand, supply, inventory and P&L projections

Performance monitoring, advanced analytics

Order to cash

Consensus demand, supply, inventory and P&L projections

Performance monitoring, advanced analytics

Order to cash

Consensus demand, supply, inventory and P&L projections

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Performance monitoring, advanced analytics

Order to cash

Consensus demand, supply, inventory and P&L projections

Performance monitoring, advanced analytics

Order to cash
Demand Control

The current shortfall situation in the chemical industry requires a margin-based allocation of finished goods. Integrated business management based on S&OP 2.0 needs to be complemented by a system supporting daily order execution on a margin basis. It is important to provide an advanced demand control system which covers the requirements for margin-based allocation and is ready to be seamlessly integrated with S&OP 2.0. The basic concept comprises a segmentation of customers based on strategic importance and a segmentation of products based on margins, forecasts and sales behaviour. The S&OP 2.0 demand planning process yields an approved total demand plan which is balanced with capacity and allocated to the customers / customer groups in an allocation grid.

The total demand plan is based on an individual forecast of order income for each material (Figure 20). The forecast is modelled by means of advanced analytics based on historical data. The statistical inaccuracy of the model causes a variance in projected order income. Depending on required service level, the parallel translation of the modelled income curve entered into the total demand plan is defined. If the actual order income exceeds the defined modelled order income (case A), the requirements for production / replenishment are amended if possible, otherwise alternative volumes out of pooling or substitution determined. In case B actual order income is below projected income; excessive quantity of material becomes available for automatic pooling and can be reallocated within the distribution grid.

![Figure 20: Modelled order income curve vs. actual, project example. Case A: Modelled income exceeds forecast. Case B: Modelled income is lower than forecast.](image-url)
Camelot advanced demand control provides users with excellent order execution capabilities enabling automated margin-optimized product allocation for daily business (Figure 21). At order taking an availability check against the allocation grid is performed for each product. If the product is not available according to the allocation grid, but free production capacity disposable, production volumes are increased to fulfil the requirement. If the finished good is unavailable and no free production capacity disposable, the system checks for alternative pooling volumes. In case there are no disposable pooling volumes, possible substitution volumes are determined. In order to reflect either production volume increase, allocation of pooling volumes or substitution, dynamic changes are automatically incorporated into the allocation grid and into the total demand plan. Correlated changes are made to requirements for production & replenishment plans accordingly. If none of the three alternative options is feasible, backorder processing is initiated.

To summarize the benefits of the applications presented a margin-based order management approach helps to improve margin-driven decisions, reduce labour and production costs as well as net working capital. Furthermore it increases transparency on the supply side and thus lowers the leverage of bottlenecks.
With this article we would like to show that post-merger integration can be regarded as a stepwise approach on every single business level – from planning to execution. Hereby, we would like to focus on the development of a new supply chain network design, because we think this is one of the key issues companies have to deal with and holds major potential for chemical industries.

Every merger or acquisition is associated with high expectations especially regarding new revenues or increase in profits. But many objectives are often not met, for example benefiting from synergies, acquisition of new customers and markets, access to know-how or technology and securing raw materials. Companies often link mergers with challenging merger objectives.

They can be described as

- a smooth integration process
- a fast track realization of synergies and EBIT improvement from cost cutting, increasing revenues, improving asset productivity and
- an enhanced strategic positioning from the revised strategy, building scale and leveraging capabilities.

Thus, the expected benefits do not occur as initially desired.

To deal with postmerger integration (PMI), companies often face various challenges such as determination of a new common strategy, identification of management know-how, consolidation and especially harmonization of business processes of the new common joint enterprise. Thus, the merger of two (or more) firms requires a detailed investigation of all business processes within a company. One of the key issues, which companies are facing during a PMI, is to identify, establish and introduce new business processes within the newly merged company to benefit from all potential synergy effects as soon as possible. The holistic approach to integrate a new company can be seen in Figure 22:

---

**Figure 22:** Integration approach

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<tr>
<th>Core questions</th>
<th>Layers</th>
<th>Examples</th>
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<td>Integrated operating model</td>
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<tr>
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<td>Integrated management structure &amp; systems</td>
<td>Organization &amp; skills, Performance management, Information technology &amp; systems</td>
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This top-down approach should cover every single layer in detail – from strategy to management systems. At the top level, business objectives and go-to-market-decisions are defined, as well as first core processes which build up the new structure of the operating model. Defining the new operating model is one of the main issues that companies face during a merger process after customer requirements have been identified and joint business strategies have been described. For a well running new business, the operating and business model have to be determined in detail to avoid problems after the merger and to ensure that processes can be described along ERP requirements.

Besides a high degree of uncertainty in the organization regarding the new strategic alignment and its organizational change, expectations of a PMI are not met due to an undefined operating model. Therefore it is absolutely necessary to define the operating model in the early stage of the merger. It should consists of well defined

- flow of transactions
- flow of goods
- flow of information

A major challenge within the post-merger process is to specify these three parts accurately within the specific context of the merged companies. Implementing the new business processes is crucial to gain synergies and other benefits. Figure 23 shows the main issues of the operating model in detail:

---

**Figure 23:**
The operating model consists of 3 elements defining the requirements for ‘to be’ processes.
One essential part of the operating model is to define and develop the new supply chain configuration. After a successful integration of a company, a new distribution network solution has to be implemented to meet new business requirements. Questions concerning the future outlook of the new logistics structure and a new supply chain network should be answered. They should determine the optimal number of warehouses or the implementation of central or local distribution centres. Chemical companies, for example, should not have a high number of warehouses for dangerous goods. They can combine storage classes in one warehouse to meet legal and safety requirements and to save costs. Additionally, goods which need to be stored within a specific temperature range should be separated from those goods which do not need any cooling at all.

After the merger, redundant production lines and suppliers should be eliminated to avoid unnecessary activities like shipments or double-barcoding. Concerning the new distribution network design, the basic principles for the set-up of flow of goods have to be defined. Therefore basic scenarios have to be described and evaluated (see Figure 24).

**Drop shipment**
Orders are placed locally and are forwarded to the manufacturer or wholesaler who delivers goods. Invoices are brought in account by a local entity. This approach gives on the one hand the chance to eliminate local inventories and has a positive impact on cash flow cycle. On the other hand, it contains higher risk of back orders and conflicts occurring due to different master data management systems. Various ERP-systems are in use in the whole distribution process and can cause data errors. Therefore, harmonization of ERP systems and to be-processes is crucial for an efficient drop shipment approach. Through the high service level, this is a valid option for speciality chemical companies.
Indent business (principal)
Order placing and delivery dispatch is planned centrally and also includes invoicing. Local entities are not part of the distribution concept and do not cause additional costs. On the one hand, the master data management is centralized and therefore the data quality is very transparent for the relationship between customer and wholesaler. Additionally, local inventory is eliminated and inventory holding costs will be reduced. Furthermore, local customer service is no longer essential. In addition, the central entity typically covers a wide area of distribution or delivers to region key accounts with decreased shipment sizes. While this fits perfectly to a bulk chemical manufacturer, in the case of small quantity distribution this might have a negative effect on the service level or on distribution costs.

Local distribution
Locally placed orders are fulfilled locally with an on-going replenishment to the local subsidiaries and retailers. This approach offers country-specific customer services and contains only a low risk of back orders if planned properly. On the other hand, the master data management is also based locally and centrally and thus, the same negative aspects can occur (see: drop shipment). Due to local stock and local administration, additional cost cannot be avoided. This approach seems to fit as well to companies which also offer specialty chemical products.

Those basic scenarios open various pros and cons which should be reviewed very carefully to identify the best distribution network solution in the specific context of the merging businesses.

What we have learnt from various implementations is that companies should develop a clear merger approach and they should follow it throughout the entire process: First of all, business and customer requirements should be defined, as well as the customer interaction and logistic service model. Secondly, industry specific requirements must be considered. In our case, companies must investigate the flow of goods, supply structure and its risks, as well as physical and legal restrictions (e.g. temperature conditions such as cooling, storage of hazardous material or different storage classes). After that, the handling and administration expenditures should be analysed and integration scenarios should be simulated and evaluated qualitatively and quantitatively. Finally, the implementation concerning regional scope, organizational model and ERP-system should be conducted. Hence it is crucial to clearly distinguish between the different approaches for the different initial business situations of the integrating companies. In this context, the key drivers include customer and business requirements, legal and tax requirements as well as synergies respecting critical mass and local entrepreneurship.
The chemical industry is currently facing a highly complex situation. On a strategic level, product portfolios are being readjusted. Globalization is opening up new opportunities in emerging markets, but at the same time requires targeted investments in strategically important regions such as the Middle East and India. On an operational level, new efforts are being made on process efficiency, cost flexibility and scalability of platforms. The main subjects of today are once again lead times and debottlenecking.

Camelot Management Consultants has profound expertise in transforming and optimization of value chains in chemical industry. Figure 25 gives an overview about the whole range of our industry specific expertise:

On the upstream range we divide the chemical industry into four main categories which all belong to basic chemicals: industrial gases, inorganic chemicals and organic chemicals (petrochemicals and bio-sources). Six out of the ten biggest players in the petrochemicals sector belong to our clients. On the downstream range customer needs get more specific and complex. To provide high quality service our consultants and industry experts exactly know the specific customer requirements and value chains in the different specialty sector. At the tail of the value chain several value adding services are offered to the end customer such as mixing, filling, logistics, formulations and prefabrication. Our consultants serving this segment are specialists in chemical distribution and logistic services due to their long lasting experience within logistic service providers or relevant industry lines.
Camelot has been specializing on value chain excellence in the chemical industry for many years and offers tailored process and industry solutions. With our vertical approach – from strategic concepts to realizing palpable results – we offer services (Figure 25) along the whole value chain; from procurement, manufacturing, marketing & sales to logistics and distribution.

In the field of business change management our consultant team offers services regarding change management and organizational development. As an example our services within the sales & marketing field mainly meet the new requirements regarding product life cycles, complex brand portfolios, specialized sales channels and the growing power of key account customers. Over the whole range of service offerings Camelot delivers concepts, methods and solutions which will ensure significant long-term change and improvement to the organization of your value chain management. We help our clients to develop the necessary targets and roadmaps for the three operational cornerstones: market performance, operational costs and working capital. Camelot Management Consultants have extensive knowledge and varied experience within the process industry. We can deliver our knowledge on a global scale due to our global partners, e.g. we realized several projects in the USA and Asia in 2011.

We offer consulting teams with diverse backgrounds. On the one hand, we have consultants who have widespread industry experience. Our teams consist of chemists and engineers who have worked for global players. On the other hand, we have consultants with a particular career in the consulting sector focusing on the process industry. Due to these diverse backgrounds, we have an excellent understanding of our clients. We know how our clients operate and we are familiar with the diverse cultures which differ within every global company. This enables us to work in a very cooperative and successful way with our clients.

Camelot service offerings for chemical industry

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Value Chain Excellence. Strategy to Results.

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