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Letter from the Editor

Dark clouds are gathering

Dark clouds are gathering over global markets: The mortgage crisis in the USA and the high-flying prices for oil and other natural resources like steel or aluminium force the threat of a regression in European and North American countries. Did the motor of the world economy get too hot? Believing the predictions of experts and columnists, one should start to save for the bad times lying ahead. The coming downturn is going to hit not only the labour market and the industries close to the consumer, but the whole value chain. So even classical business consumer oriented industries like the chemical industry should prepare for the end of the fat years. Although companies have to adjust their strategies to a downturn period, everyone tries to achieve the best result possible. Thus, the current issue of the Journal of Business Chemistry deals with different aspects of optimizing profitability in such a downswing situation.

The fact that this profit securing does not always happen legally is the topic of the current issue's commentary. Marc Besen and Dimitri Slobodenjuk refer to the "Sector inquiry into the pharmaceutical sector" by the European Commission as a real-life example for a violation of competition law. Nevertheless, these anti-competitive practices are a negative example of profit securing measures in the downturn.

The second article of this issue "The value based portfolio management in response to REACh – A manual of different strategies for the chemical industry" by Christina Feldmeier and Sebastian Kienert highlights strategic opportunities for chemical companies to optimize profitability. In the framework of REACh, the two authors present an approach to identify profitable and non-profitable strategic business units. In a second step they give hints how to find adequate strategies for these SBUs.

The contributions to the Practitioner's section focus on a more operative dimension. Ray Adams concentrates on the forecasting of sales in his article "Beyond forecasting: Responsive supply networks". He states that responsive supply networks allow the companies to react better to market dynamics and presents different measures to succeed in that field.

Kai Pflug takes up this aspect of optimizing the supply chain in his article "Managing the effects of the business cycle in the chemical industry". However, he follows a different approach by not focusing on forecasting market dynamics but by concentrating on measures to make the company more robust against market cyclicality.

Finally, we want to thank all authors and reviewers for their contribution to this issue. Besides, we would like to take the opportunity to express our thanks to Clive-Steven Curran and Benjamin Niedergassel, our predecessors as executive editors, for their great work over the past years. We are looking forward to the next chapter of the Journal of Business Chemistry. Now enjoy reading the third issue of the Journal of Business Chemistry in 2008. If you have any comments or suggestions, please send us an e-mail at contact@businesschemistry.org.

David Große Kathöfer, Executive Editor (dgk@businesschemistry.org)

Commentary Sector inquiry into the pharmaceutical sector

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Introduction

More than 8 months ago (on 15 January 2008) the European Commission ("Commission") launched a sector inquiry into the pharmaceutical sector relating to the introduction of innovative and generic medicines for human consumption onto the market. The Commission believes that there are some indications of commercial practices by pharmaceutical undertakings intended to restrict competition in the pharmaceutical sector in the EU. In particular, the Commission stated that less innovative medicines reach the market and that in some cases the entry of cheaper generic medicines seems to be delayed. "Market monitoring suggests that these developments result from anti-competitive practices", said Competition Commissioner Neelie Kroes. With the inquiry the Commission intends to take a closer look at the commercial practices between pharmaceutical companies, particularly at patent disputes, vexatious litigation and settlement agreements, presumably creating artificial barriers for novel and generic medicines.

What is a sector inquiry?

The Commission is entitled to open sector inquiries relating to business sectors that do not seem to function as well as they should, e.g. when the trend of trade, price developments or other facts indicate that competition in a particular sector might be distorted. The data acquired then serves as a basis for further investigations in particular cases against undertakings suspected of infringing the competition law regulations. The variety of tools to carry out a sector inquiry ranges from simple information requests to undertakings and trade associations to unannounced inspections (dawn raids).

Inquiry's procedure

The starting signal for the inquiry into the pharmaceutical sector apparently was the AstraZeneca case in 2005 in which the Anglo-Swedish pharmaceutical company was accused of misusing the patent system and the procedures for marketing pharmaceuticals to block or delay market entry for generic competitors to its ulcer treatment Losec. The investigation resulted in a EUR 60 million fine which has been appealed by AstraZeneca.

In contrast to sector inquiries launched before, the Commission started the inquiry into the pharmaceutical sector with dawn raids of a number of innovative and generic pharmaceutical undertakings in Europe. Following the inspections the Commission sent out detailed, 42-pages strong questionnaires to approximately 100 undertakings as well as to other actors participating in the market, such as medical organisations, associations of doctors, pharmacies and governmental pharmaceutical price agencies. The Commission announced that it will publish an interim report on 28 November 2008 giving the market participants the opportunity to comment on the preliminary results of the inquiry. The final report can be expected in spring 2009. Depending on the inquiry's results, the Commission or the

national competition authorities may take appropriate measures regarding the most serious competition concerns.

Competition law aspects

The inquiry raises a number of questions from the competition law point of view.

First, it has to be noticed that (the duration of) any patent protection in the pharmaceutical sector constitutes a typical area of conflict between the intellectual property rights of the pharmaceutical undertakings and the interest of the producers of generic medicines in entering the market. A pharmaceutical patent grants to its holder a temporary protection from generic competition as a compensation for its efforts and significant investments into the development of the novel medicine. Taking into consideration the regular duration of a pharmaceutical patent of 20 years and the fact, that under certain circumstances the patent protection can be further extended, it becomes clear that the competition on the pharmaceutical sector can be inhibited in line with competition law provisions for a quite long period of time. However, the legal boundaries of the lawful distortion of competition are, for instance, crossed when an undertaking having a dominant market position extends its patent rights by manipulative or misleading practices, as the Commission was alleging in the AstraZeneca proceeding.

Second, the questionnaires sent by the Commission bear themselves a number of risks for the undertakings participating in the inquiry. Any failure to cooperate with the Commission in a proper way can result in a separate fine. Hence, the undertakings should treat the questionnaires carefully and should ensure that the information is provided in an accurate manner.

Furthermore, one should bear in mind that in their response to the questionnaires companies might reveal information concerning (unintended) anti-competitive behaviour. For instance, a company might unveil imprudent corporate communications which negligently were not considered to be anti-competitive or which were not approved by the legal department. In this case the companies could face a separate investigation resulting in a fine of up to 10% of the overall turnover. For this reason especially undertakings with a significant market power should assess the impact of the questionnaires quite carefully.

Finally, from experience with previous sector investigations it can be taken that the sector inquiry will inevitably lead to a period of legal and commercial uncertainty. Even though the Commission stated that innovation in the pharmaceutical sector is driven by patents and other intellectual property rights and that the inquiry will be conducted under consideration of these existing rights, i.e. the Commission is not willing to challenge the existing intellectual property law system, the final results of the inquiry will be published at the earliest in spring 2009. Until then the undertakings will not have the certainty that their commercial practices are in line with the competition law regulations as interpreted by the Commission.

Outlook

From the present point of view it is hard to predict which results the inquiry will have and which conclusions the Commission will draw from its findings. If in the course of the inquiry the Commission determines that undertakings have infringed the competition law regulations, it may impose severe fines on the undertakings involved. It might also recommend structural changes to the way the pharmaceutical industry is functioning, as it was the case after the inquiry into the energy sector.

In any case, due to the vital importance of the pharmaceutical sector for the public, the eagerness to produce novel medicines must not be hindered. The rigorous enforcement of the competition law regulations is certainly an appropriate tool towards affordable medicines. However, pharmaceutical manufacturers should not be discouraged from further investments into innovative drugs!

Research Section The value based portfolio management in response to REACh – A manual of different strategies for the chemical industry

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The registration, evaluation and authorisation of chemical substances in the context of the European regulation called REACh influence the profit of the chemical industry. If the chemical enterprises want to keep their competitiveness and the availability of products in the European market they have to pursue a REACh-strategy. By using a value based portfolio management they are able to analyse their portfolio, to identify profitable and non-profitable strategic business units (SBUs) and to find adequate strategies for each of them.

1. Introduction

The costs for registration, evaluation and authorisation of the chemical substances in the context of REACh debit the profit of the chemical industry. In the long term reactive behaviour patterns like cutting costs or deleting substances out of the portfolio cause more losses than using an adequate REACh-strategy. This contains a value based portfolio strategy for each business unit, which is the fundament for further strategic measures like a systematic cost management (Feldmeier, 2008). Therefore the article demonstrates the possibilities of being competitive by using value based portfolio strategies. For this purpose the main features of a value based portfolio management are presented at first. Afterwards the effects of REACh on the portfolio of chemical enterprises are explained. Based on this analysis REACh-portfolio strategies are demonstrated and adopted for an example of different SBUs to give an overview of the strategies and their effects. Because REACh can influence several products within one SBU in a different way, it is also possible to choose the products as the level of analysis by using the same procedure in order to get a more differentiated conclusion.

2. Value based portfolio management

Portfolio management is used as an instrument of the corporate strategy. It supports managing the entirety of the SBU in the most profitable way. Therefore each business unit's contribution to the value of the enterprise should be controlled regularly. This can be realised by using the portfolio analysis. The objectives of this instrument are the control and coordination of the business units, the allocation of the (financial) resources, the accomplishment of a balance between cash consuming and cash creating business units as well as a balance between low-risk and highrisk ones and the identification of core businesses (Welge, 2003). To achieve these objectives the enterprises can use different types of portfolio analysis. The most common concept was created by the Boston Consulting Group in the late sixties: the so called BCG-Matrix, which uses the growth of the market and the market share as criteria to classify the units in different categories. Subject to the categories the strategies can be developed. Other concepts focus for example on competencies and



market attractiveness (Welge, 2003). The portfolio analysis used in this paper should support the main objective of the chemical enterprises, which is to gain profit. Nowadays it is not enough to achieve a profit that is accounted in the annual balance sheet. The investors risk the loss of their capital and therefore require an adequate return according to their taken risk. This return represents the cost of the equity for the firm, which is not included in the costs accounted in the profit and loss statement. Therefore it is possible that the annual balance sheet reports a profit, although value has been destroyed, because the profit is lower than the cost of equity. As a result the objective of the chemical enterprises should be a return above the capital costs in order to create a shareholder value to avert a disaffection of the investors (Kajüter, 2002). The value based portfolio analysis is a modern concept of the portfolio analysis and supports such a value creating corporate strategy by using the returndelta-value-proposition-Matrix, which is illustrated in figure 1.

The abscissa shows the variation of the

value proposition with regard to the last period. A variation of value proposition lower than zero indicates a decrease, a variation higher than zero implies an increase of the value proposition. The ordinate demonstrates the return. If the return is lower than the weighted average cost of capital (WACC) the enterprise has destroyed value, if the return is higher, value has been created. The operating figures for both coordinates have to be compatible. It is possible to use figures which base on the profit or those which base on the cashflow. In opposite to the profit based key data, the advantage of the cashflow based ones is that it is more difficult to manipulate the data. Due to the fact that the cashflow contains the cumulated depreciations, the success cannot be influenced by the age of the assets. Within the profit based key data it is possible that the only reason for an increase of the return is the age of the assets, the terms stay the same. Therefore the recommended operating figures are the cashflow based ones: the Cashflow Return on Investment (CFRoI) and the Cash Value Added (CVA) (Ballwieser, 2002). A value destroy-



ing business unit has a decrease in value proposition according to the former period and does not gain a CFRoI above the WACC. If a turnaround is not possible the company has to disinvest the business unit. A value catching up business unit has an increasing value proposition, but it does not gain a CFRoI over the WACC yet. Because the development is positive, the company should induce measures, which raise the CFRoI, for example by increasing the success or decreasing the capital base. The melting off business unit is characterised by a positive value proposition which has developed negatively in comparison to the former period. A recommended strategy for this kind of business unit is to receive the profits as long as the CFRoI is higher than the WACC. If it gets lower the company should prepare the business unit for disinvestment. A value creating business unit has a positive development of the value proposition and a CFRoI over the WACC. Therefore the company should invest in growth and maintain the returns by implementing measures, which keep or raise the success and keep or decrease the capital base (Kajüter, 2002).

The value based portfolio analysis is a simple instrument to derivate strategies for different business units. Nevertheless, it should be combined with other tools, because it considers only one criterion per environment and one per company analysis. Other criteria may also be relevant for the strategic decision (Welge, 2003).

3. REACh-Effects on the portfolio of chemical enterprises

REACh stands for the Regulation, Evaluation and Authorisation of Chemicals. The objectives of this EU-regulation are the increase of the security level for humans and environment and the promotion of the European internal market and innovations (EG, 2006). Therefore only those substances are allowed to be placed on the market which are registered at the European Chemicals Agency (ECHA) in Helsinki (EG, 2006). The influence of the EU-regulation REACh on the portfolio depends on the duties which the chemical enterprises have to fulfil. These duties differ according to the position which an enterprise occupies concerning the chemical substance. A producer or importer has to enregister their substances at the ECHA. For this purpose they has to collect the chemical properties and the application of the downstream user as well as the pattern of exposure to evaluate the hazard of the substances. A package of technical information on the chemical and its hazard have to be provided to the ECHA for registration. Additionally, the producer or importer has to refer a Safety Data Sheet with recommendation for a secure appliance to the user down the supply chain. Downstream users, who apply the substance on their own or in a preparation for industrial or professional activities, do not have to register these chemicals. They have to consider the recommended measures in the Safety Data Sheet and inform the supplier about the appliances of the considered substance. Only if the producer or importer has not prepared a Safety Data Sheet it is the duty of the downstream user to arrange a safety evaluation of the substance. A distributor or consumer is not a downstream user. The distributor has fewer duties than a producer, an importer or a downstream user. He just has to refer the relevant information of Safety Data Sheet or the appliances to his direct customers or suppliers. (vbw, 2007)

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The more duties an enterprise has to fulfil, the more costs will accumulate and impact the profit of the enterprise. Thus the portfolio of a producer or importer is more influenced by REACh than one of a downstream user or distributor. Therefore the effects of REACh on a portfolio are demonstrated for a producer. For this purpose the consequences of REACh are presented in general. After that the effects on the portfolio are shown for special business units.

Firstly, REACh raises the direct and indirect costs. The direct costs result from the registration and include the costs for the evaluation of the chemical properties, the costs for creating the Safety Data Sheet and the fees of the ECHA, and - as the substance may be dangerous - the costs for the evaluation. The costs are not unitary fixed, but depend on factors like the volume of registration and production, the number of registered appliances, the quality of the existing documentations about the chemical properties, the appliances and the pattern of exposure, the rules for the use of it and the possibility of distributing costs



to the members of the Substance Information Exchange Forum (SIEF). According to the approximation of the Federal Environment Agency in Germany the costs for a production of 100-1.000t/a could rise about $282.130 \in$ (UBA, 2004). The indirect costs for the chemical producers or importers are more difficult to quantify and include the costs for the employees who support the enterprise in the preparation for REACh, their advanced training and the costs for consultancy (UBA, 2004 and ECORYS, 2004).

Secondly, REACh can influence the availability of chemicals. Only substances which are registered by the producer or importer are receivable on the market. The decision for or against the registration is an investment decision. The non-recurring costs for the registration have to be compared with the revenues of the disposals. If they are higher than the revenues, for example because of the low demand, a registration is not profitable (UBA, 2004). There are two different levels, which have to be discussed considering the availability: the supply and the distribution portfolio. For example a special substance is necessary to produce one of the chemicals of the distribution portfolio. If not only one of the suppliers of this special substance, but all of them come to the same decision against the registration, it is no more available in the European internal market. The enterprise has to examine if it is possible to use a substitute or if it is profitable to register and produce it by oneself. Otherwise the chemical of the distribution portfolio cannot be produced and the business unit must be closed. If most of the producers do not register the substance the price will rise because of the altered competition. Consequences are higher exercise prices, which debit the profit. Therefore the availability of the resources influences the availability of the products and in consequence the price. The registration of a substance, which is too expensive for other enterprises, has the advantage to achieve a product which is distributed by only a few other producers. The revenues rise because of the increase in price and amount. (UBA, 2004)



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Thirdly, REACh can influence competitive ability of the enterprises in the European internal market. Producers, importers, downstream users and distributors, which conduct their businesses in the EU, are similarly affected by REACh. Therefore effects on the competitive ability result from enterprises which work outside the EU. They may lose their interest in exporting products into the European market. This would be an advantage for the European enterprises, because of the fewer stress of competition, so it would also lead to an increase in the revenues. On the other hand it could influence the functionality of the European Market in a negative way, what would lead to higher prices for the customers. Contrariwise, REACh causes a competitive disadvantage for European enterprises which export products into countries outside the EU. There, they compete against enterprises, which do not have to fulfil the duties of REACh and can offer their product at a lower price. The price depends on factors like the number of competitors and substitutes and the force of the customers. If there is a high competition, the European enterprises cannot fix the price and therefore the revenues decrease. (UBA, 2004)

The total effect on the portfolio depends on the special situation of the SBU. For example there is an enterprise with four SBUs: vanish for automotive original equipment manufacturer (OEM) (A), vanish for automotive repair and maintenance (B), vanish for constructions (C) and other vanishes (D). SBU "A" supplies one half of its products in the European market and the other half in countries outside Europe. SBU "B" operates in the European internal market and expects a supply stop for one resource. SBU "C" places its products on a market which is characterised by a high contingent of products from outside the EU. SBU "D" expects no further problems than the additional costs caused by REACh. The size of the circles represents the share of sales of each business unit. The effects are demonstrated in figure 2.

SBU "A" is no more competitive outside the EU. Just a few non-European customers will carry on purchasing its products. Therefore the demand for their products decreases by about 40-50%. This has a large negative influence on the CFRoI and the CVA. "A" is no longer a value creating business unit, but almost a value destroying one. SBU "B" has to buy the resources for a higher price as long as it is still available in the European market. Consequently, the profit decreases. "B" is no longer a value melting off business unit, but a value destroying one. The situation of "C" depends on the reaction of the competitors. If the imports in the EU diminish, a higher price and an increase of the amount of sold products are the consequences. The costs are lower than the revenues, therefore a registration is profitable. The CFRoI and the CVA heighten. "C" is no longer a value catching up business unit, but a value creating one. The CFRoI and the CVA of "D" decrease because the costs of the registration debit the profit. Furthermore, they cannot raise the price because the strength of competition remains on the same level. "D" is no longer a value melting off business unit, but a value destroying business unit. On closer examination of the importance of the business units for the portfolio, "B" has the largest, "A" the second largest and C" the third largest share of sales. The improvement of the competitiveness for "C" caused by REACh is advantageous for the whole enterprise. By contrast, "A" and "B" feature a serious impairment of competitiveness. "D" is the business unit with the lowest share of sales and experiences losses as well. "A", "B" and "D" debit the profit of the whole enterprise. Therefore REACh-portfoliostrategies are necessary to raise the shareholder value.

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4. Managing the portfolio in context to REACh

Within the framework of the strategic portfolio management decisions have to be made with regard to the portfolio as a whole. The previous comments have shown that the consequences of REACh can influence the performance of the different SBUs. Therefore corporate management has to determine the strategic direction for the several SBUs to maintain an ideal portfolio. In context to the value based portfolio management the optimal composition of the portfolio is the one with the best prospective performance. The fundamental decision, which has to be made for each SBU, is: invest, stabilise or disinvest (Bea, 2005).



4.1 Investment strategy

An investment strategy should be chosen for those SBUs which will achieve a CFRoI above the WACC in the future. In this case c.p. the growth will lead to value enhancement.

In current markets growth can be reached by market penetration or product development.

Within the market penetration the enterprise tries to achieve a higher market share in current markets. In context to REACh this is a successful strategy for SBUs with small market shares (respectively a CFRoI below the WACC) in diminishing markets (respectively with a negative value proposition) and is called "Under-Dog-Strategy" (Gelb, 1982). The enterprise would normally tend to a disinvestment, but in context to REACh it could be profitable to stay in the market and register the substance, because the competitors also intend to exit the diminishing market. In consequence the SBU named Under-Dog gains its market shares and uses its new market power for achieving higher prices. As a result the CFRoI and the value proposition increase. (Macharzina, 2005). Furthermore, a higher market share means a higher production volume. Because the registration costs are gradually fixed costs, a degression of costs per kg by using an investment strategy is possible. Nevertheless, this strategy is dangerous if a CFRoI above the WACC cannot be achieved and needs a detailed analysis of the competitor behaviour and the market development.

Within the product development enterprises intend to grow by developing new products for current markets. As described above one serious problem for the chemical sector – concerning REACh – is the availability of substances. If a resource is no longer available, product development is the only chance to stay in the market. If a complete functionality is dropped, big growth opportunities accrue for an enterprise, which is able to develop a new product with this functionality. The market shares will be redistributed. Nevertheless, this strategy is dangerous because of the high costs of development. Therefore it is just recommended for enterprises with an outstanding high innovative and financial strength.

Another alternative to meet with the consequences of REACh is to invest in the development of new markets. Through new customers the sales could increase respectively the loss in sales that has been caused by REACh could be balanced. With higher sales the costs of REACh – at least the direct costs – would proportionally decrease. However, development costs have to be considered. If the development costs compensate the positive effects - prospective payments surplus - the enterprise should not step into the new market. In connection with the outsourcing of the production the development of non-European markets could be an alternative to escape from the REACh-requirements. Especially for medium-sized businesses, which often produce specialties in small volume and for this reason are disproportionately high affected by REACh, it is a strategic alternative. Their customers, e.g. the automotive industry, shift their production into other countries. As the local presence is a critical factor within the choice of the supplier, the enterprise has to decide if they follow their customer or lose them (Follmann, 2007). Therefore the tendency to follow the customers will be strengthened by REACh.

A further possibility for growth against the background of an increasing commoditisation and a decreasing growth rate (especially for specialties) is the change of the business model from the "normal" supplier to a "performance contractor" by offering added services (diversification). By this, it is possible to realise higher revenues without having additional REACh-costs.

A further trend, which could be supported by the consequences of REACh, is the increase of the dynamic in transactions within the chemical industry. The valuation of the enterprises is close to the peak in the year 2000/2001. For 2008/2009 an economic slowdown in the chemical industry is expected. These matters of fact in connection with the changes through REACh may dispose many owners to consider the sale of the whole or a part of their business as a strategic option (Fitzner, 2007). In this context a big chance for growth through mergers & acquisitions could arise. Nonetheless, there are considerable risks because the seller is often not able to give adequate information about the effectiveness of the EU-regulation. Therefore the buyer cannot evaluate the situation adequately. He can use

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this fact to lower the price. Whether an investment turns out to be a bad buy or not depends to a great extent on the quality of the REACh-Due Diligence (Schneider, 2007). Furthermore, strategic investors, which have already built the necessary infrastructure to deal with the REACh regulations, are able to realise synergies. Through mergers & acquisitions the existing SBUs can be starched and completed or the portfolio can be adjusted by new SBUs.

However, for each investment strategy there has to be enough financial strength to avert insolvency before reaching amortisation.

Relating to the sample enterprise an investment strategy can be considered for the SBUs "A", "B" and "C".

The SBU "A" – without the effects of REACh - has shown the highest positive value proposition and realises a CFRoI above the WACC. "A" is a "value creating business unit" and generates the second largest share of sales. This SBU belongs to the core business of the sample enterprise. Through REACh it will lose a high degree of competitiveness on the non-European markets, where it realises half of its sales. Without a strategic reaction REACh will have a huge negative influence on the CFRoI and the CVA. In consequence there is a high risk that one of the top-selling SBUs becomes a "value destroyer". In the case of "A" a shift of the production into the non-European countries, where its customers are located, seems to be an option to meet with the consequences of REACh. Approximately, half of their customers are already located outside the EU. Because of the existing tendency of the automotive industry to shift the production there is a great chance that the rest of the customers are also planning to go abroad. If the enterprise follows their customers, the option to continue as a fixed vendor can be used. The company escapes from the REACh-regulations. In addition, there is a great chance to penetrate the market, because the local presence acquires new customers, which are in business relations with competitors from abroad. An investment strategy by relocating the production should come along with a penetration strategy in the market abroad to tap the full potential of growth.

The SBU "B" has a negative CVA variation but a CFRoI above the WACC. "B" is a "value melting off business unit". Against the background of the fact that "B" is the top-seller and belongs to the core business an investment strategy seems to be wise. In consequence of REACh, "B" expects a supply stop for a substance, which is essential for their customised products. Provided that the sample enterprise has the necessary know-how and capabilities, they should invest in the product development to produce and register it by themselves. Through this the sample enterprise is the only or at least one of a few suppliers which is able to offer the specific product. This will lead to a positive value proposition. "B" could become a "value creating business unit". Without a strategic reaction "B" will not be able to serve its customers and would probably become a "value destroying business unit".

SBU "C" has a CFRoI lower than the WACC, but a positive value proposition in comparison to the period before. With an adequate investment strategy "C" becomes a "value creating business unit". In the current market (inside the EU) there are many competitors from outside the EU. If these competitors decide to stop their engagement in the EU, there is a big chance to expand the market share by using a market penetration strategy. In this case the SBU should stay in the market as the "Under-Dog". However, this strategy is only profitable if a CFRoI above the WACC can be achieved through a systematic cost management (Feldmeier, 2008). Otherwise, a greater market share will lead to negative Δ CVA and "C" will become a "value destroyer". Therefore the sample enterprise should first take measures to raise the efficiency and reduce the WACC before making the investment.

4.2 Stabilisation strategies

Stabilisation strategies are geared to hold the previous position of the SBU. Therefore they have a defensive character. They should be chosen for SBUs with an uncertain future: the "value melting off business unit" and the "value catching up business unit". Stabilisation strategies constitute a form of "transitional strategy". They conduce to gain time to make an informed decision on the definite strategic direction, namely to invest or to disinvest (Bea, 2005). The benefit of the stabilisation strategy is to watch for the changes and to avoid overhasty decisions, which may turn

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out to be wrong. However, there is a risk to miss the optimal moment for (dis)investment.

In context to REACh, a stabilisation strategy means to hold the position as it has been before REACh. Strategic measures are the shift of the production into non-European countries, the allocation of costs onto the customers and the syndication for registration-purposes.

The shift of the production into non-European countries is only profitable if a part of the production is already there. Otherwise, the costs will be too high just to make an informed decision. Furthermore, there are more relevant criteria for the determination of the location, e.g. the closeness to the customers. Nevertheless, with a shift of the production the enterprise can escape from the REACh-registration. According to a study of the German Chamber of Industry and Commerce the probability of a shift of the production into non-European countries will increase by REACh up to 31% for the chemical enterprises. Broken down by size range the probability of a shift rises up to 41% for the big enterprises, to 32% for the middlesized businesses and decreases to 23% for the small enterprises (DIHK, 2004). The reason for the higher probability of the big enterprises is caused by the fact that these enterprises often already pursue global or at least international locations. Therefore the risks and costs are not as high as for the first engagement abroad. In case the customers are located in the EU a shift of production is not reasonable, because the imported goods have to be registered as well.

Another possibility to stabilise the existing position is to transfer the additional costs through REACh directly to the customer. This option is only profitable if the enterprise does not anticipate a relevant decline in sales in connection with the rise in price. This opportunity depends on the market power of the enterprise, which is determinated by the intensity of competition in- and outside the EU as well as the degree of substitutability. To make an informed statement if the transfer of costs is possible or not, the enterprise has to know the price elasticity of demand. Because of its market power the contractor of customised specialties has the best ability to allocate the additional costs.

The syndication for registration-purposes

is another chance to reduce the costs and therefore to stabilise the former position. Through the "one substance, one registration-principle" (OSOR-Principle) the costs and work should be reduced. With the pre-registration the potential registrant gets the access to the SIEF where he should meet other enterprises which are also willing to register the same substance. In the SIEF they could bargain about sharing information and documentations, co-registration and therefore sharing costs (Heitmann, 2007). But in practice, the opportunity of syndicating depends on the existence of other enterprises that register the same substances. In addition, the enterprise has to consider if production of the substance is a core competence. In this case it is dangerous to share information with the competitors, because it leads to a loss of competitive advantage.

A stabilisation strategy should, for the present, be chosen for every SBU, because the changes through REACh couldn't be evaluated accurately for now.

As described above a shift of the production into non-European countries is only advisable if a part of the production respectively the customers are already located abroad. In the sample enterprise "A" offers its products on markets outside the EU. Therefore "A" is the only SBU, for which a relocation of the production could be profitable.

The strategy to pass the REACh-costs to the customers cannot be used for the sample enterprise because of the stagnation of sales in the vanish industry. Only the SBUs "A" and "B", which offer specific customised products, have a slim chance to transfer the additional costs. "C" and "D" offer standardised products. A rise in price will lead to a migration of the customers to the competitors.

The syndication for registration purposes as a strategic alternative to stabilise the current position depends, as aforementioned, on the risk of losing know-how. The more specific the products are, the higher the risk is. This leads to the conclusion that syndication could be possible in "C" and "D" and not in the knowhow-based SBUs "A" and "B".

4.3 Disinvestment strategies

The disinvestment is often defined as the last (enforced) reactive behaviour based on a

The value based portfolio management in response to REACh



strategic danger and not on an active, systematical, anticipative portfolio management. But through the gain in importance of the Shareholder Value-approach and the concentration on core competences a strategic disinvestment management becomes more and more important (Bea, 2005). A disinvestment strategy should be chosen for those SBUs, which have shown a CFRoI below the WACC and for which a positive value proposition in the future is not expected ("value destroying business unit").

Within the disinvestment strategies there are two cases of disinvestment: Firstly, the object of the disinvestment should be obtained by selling it as a whole or secondly, it should be liquidised.

In case of obtaining the object, there are different possibilities to disinvest. Within a "sell-off" an external buyer is the new owner. If a SBU becomes an independent entity – with current or new shareholders – formed by split from the rest of the enterprise it is called "spinoff". In case the former management acquires the enterprise as a whole or a part of it and continues it as an independent business, it is called "management buy-out".

If a further existing is not possible or not wanted by the former respectively the new shareholders a "liquidation" is the last option. Within this strategy it is possible to generate cash from fixed assets.

As aforementioned the dynamic in transactions in the chemical industry has raised through REACh. In this context there are not exclusively chances for growth. The chemical enterprises have to decide if a disinvestment strategy is advisable. However, the disinvestment strategy can fail if most of the competitors also want to disinvest their business units. In this case it could be difficult to find an investor, who offers an adequate price.

The consequences of REACh will not be the only reason for a disinvestment of a business unit. Most of these SBUs do not belong to the core business and have bad performances. Because of the low spread between revenues and costs the REACh-costs easily debit the profit. REACh therefore just has an influence on the date of disinvestment, not really on the strategic decision. The revenues from the disinvestment could be used for investment

Figure 3: The possible REACh-strategies for the classified strategic business units



△ VALUE PROPOSITION

 $\Delta = delta$





strategies in other SBUs.

A disinvestment strategy should be taken into account for "D". This SBU has a negative value development and a CFRoI only marginal above the WACC. In addition it does not belong to the core business and has the fewest share of sales. Through REACh the negative development of this SBU will be strengthened and "D" will become a "value destroying business unit".

A review of possible strategies according to the classified SBUs is given in figure 3.

4.4 Effects on the sample enterprise

Through the mentioned strategic measures the portfolio structure of the sample enterprise could be optimised in terms of the value based view. Present potentials for value enhancement could be realised respectively upcoming value destruction – e.g. through REACh – detected and eliminated, which c.p. will also lead to an increase in value. The negative effects by REACh on the costs and the income of the several SBUs could be alleviated and emerging chances could be perceived. Figure 4 shows the possible development of the portfolio of the sample enterprise after REACh. The white circular areas represent the position without adequate strategic measures and the coloured ones the possible position, which could be achieved by the mentioned measures. After a period of stabilisation the sample enterprise decides to invest in the SBUs "A", "B" and also "C" (by using the aforementioned strategic measures) and disinvests in "D". In comparison to the situation without adequate measures the negative consequences by REACh can be attenuated through a value based portfolio management.

These strategic measures should exemplarily show which development the sample enterprise is able to fulfil through a value based portfolio management. In practice, an internal and external analysis for every SBU is also necessary to find the ideal REACh-strategy. The value based portfolio management in response to REACh



5. Conclusion

The explanations above have shown that REACh influences the performance of enterprises in the chemical industry. The impact on each enterprise can differ within the different SBUs. The value based portfolio management is an instrument for the corporate management to show these different effects for each SBU and to offer a database to decide on the general strategic direction. Therefore the chemical enterprises can identify the negative consequences. By the use of the strategies "invest", "stabilise" or "disinvest", the performance of each single business unit and, as a consequence, the performance of the whole portfolio can be improved. Due to these facts the value based portfolio management as the basic of business tools is necessary for the chemical industry for staying competitive. To implement these strategies and to earn more market power other adequate business tools should be applied to REACh in the chemical enterprises, e.g. a systematic cost management and a suitable reporting system and - in case of mergers - the REACh-Due Diligence. The development of these tools with regard to REACh is one of the future tasks for the theory and praxis.

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Practitioner's Section Beyond Forecasting: Responsive Supply Networks

Ray Adams

The chemical industry has been hampered by poor forecasting for years. There are many reasons why this industry has lagged behind other industries in its adoption of advanced forecasting techniques, but a key reason is that the supply chain has been largely based upon petro-chemical feedstocks in a push-driven mode. Historically, large quantities of bulk product were manufactured and then pushed into the market place driven by the high cost of product transitions at the plant. In addition, the chemical industry is several steps away from the actual end consumer, meaning that point of sale (POS) information cannot be leveraged.

With the emerging economies in China, the Middle East and Eastern Europe, the chemical industry is thriving in a global environment. This globalization has added additional complexity to the supply chain as chemical companies have taken advantage of low cost country sourcing strategies and moved production to these emerging markets. The traditional supply chain has been replaced by multimodal, multi-border complexity where demand fluctuations can be based upon numerous factors, including the unpredictable nature of the local currency. Teams are formed with Six Sigma black belts to drive better collaboration between Sales and the Supply Chain to improve the forecasting process and often yield only marginal improvements. If forecasting is not the answer, then what is?

Responsive supply networks allow companies with fluctuating demand and high product complexity to sense and respond faster and smarter to demand and supply dynamics in a globally distributed environment. The core principles are based upon relying less on statistical forecasting and more on demand-pull generation through real time responsiveness and better collaboration. Improvements in forecasting will always yield results, however one must balance the effort required to obtain these results. The supply chain has to have the capability to sense changes that have occurred, both planned and unplanned events, and respond to these changes in a near real-time fashion in order to truly improve the fulfillment process.

The traditional supply chain was configured on a build to last model. Manufacturing plants were separated from the Corporation in a command and control organizational model where the focus was on lowering variable costs by maximizing volume and throughput. The plants would focus on a uniform product line and minimize product transitions to keep costs down. In the globalized marketplace, manufacturing had to become more agile and collaborative with the rest of the organization – the supply chain demanded responsiveness and adaptability.

Causal Factors – History doesn't always repeat itself

Statistical forecasting can be easily determined for high volume customers in a repeat buy mode. Some customers are very predicta-

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Figure 1: Business networks will drive future competitive advantage



ble and this information should be leveraged. Products that are heavily influenced by seasonality (such as the building and construction industries (i.e. paints) or in the agricultural markets (herbicides, fertilizers, etc.)) can also be modeled in any reputable supply chain planning tool. However, the chemical industry has been heavily influenced by globalization, product innovation, and the unpredictability of the oil and natural gas markets. What little certainty that did exist in the chemical industry has further dwindled. In order to improve forecasting, the chemical industry must be able to anticipate changes to demand through other methods.

In this world, additional statistical factors must be reviewed in order to gain insight into market dynamics. Building permits, automotive inventory, PVC inventory, or consumer confidence and spending indices can all be modeled to yield an indication as to the direction of the market through multiple linear regression. These causal factors (and many others) must be reviewed to determine if there is a significant statistical relationship between the demand pattern and the potential causal factor. For example, Company X manufactures a resin that is sold to automotive companies to produce a bumper guard. By reviewing automotive inventories, Company X may be able to better predict when demand is going to pick up or when demand will trail off.

Once these variables are identified, they can then be used to predict the demand of a product or a product family. This information can then be used in your planning tool to yield an alternative statistical view of the anticipated demand. With a traditional statistical view of the forecast based on history and an alternative view of the forecast based on causal factors, an agreed upon plan can then be determined in the Sales and Operations Planning meeting. With multiple views of anticipated demand and knowing the financial goals of the organization, a business can make better decisions to meet the agreed upon goals by setting more strategic pricing, for example. In addition, general managers love to talk about causal factors and market dynamics.

From Safety Stock Planning to Multiechelon inventory optimization

The concept of the ABC analysis was first derived from the 19th century Italian economist Pareto, who stated that 80% of the land in Italy was owned by 20% of the population.

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He then applied this principle to many other events where 80% of the effects come from 20% of the causes – the most common being that 80% of your sales tend to come from 20% of your clients. The use of the Pareto Chart graphically depicted the relationship between cause and effect and has become one of the basic tools for quality control.

The 80-20 principle was then applied to logistics and inventory management where the category of inventory was characterized by the number of turns¹ and the quantity or dollar value of the items. Each product or stock keeping unit (SKU) was given a classification – 'A' items would tend to have lower safety stocks in terms of days on hand because they were replenished more frequently.²

'A' items would also be cycle-counted more frequently to drive inventory record accuracy.³ By having the entire product line characterized, there was then a formal method to classify safety stocks. 'A' items would typically represent 70% of the volume followed by 'B' items at 20% and 'C' items at 10%. The exact break point for each classification was determined by many other factors, including customer service goals, costs, and demand variability. However, as the product line grew in complexity, this process became very onerous - technology could help make inventory classifications, but the ABC analysis was limited in considering demand variability based upon poor forecasts.

Note: it is important to differentiate cycle stock from safety stock. Cycle stock is the amount of inventory available to cover planned demand for a given period, and safety stock is the amount of inventory maintained in addition to cycle stock to buffer against stock outs (i.e. to cover variability). If demand were 100% deterministic, there would be no need for safety stock (for example, I receive one order for a full container every Wednesday).

The safety stock settings, once known, would then have to be entered into the plan-

ning tool being used for each manufacturing plant which was often a spreadsheet. Advanced planning and simulation tools would automatically update the ERP system to further optimize material requirements planning (MRP), however the setting of safety stocks became a master data nightmare that occurred annually at best and normally at the hands of a summer intern. Thus, safety stock settings were often out-dated and did not consider changes in supply or demand variability. A different type of hedging strategy must be used in order to minimize net working capital without sacrificing customer service.

Variability IS Intelligence

Multi-echelon inventory optimization takes safety stock planning to an entirely new level. The fact is there is variability in the world, thus embrace the variability and use it as intelligence. Safety stock settings are constantly changing and are not static. The demand forecast is variable, the plant production is variable, transportation lead times are variable, as are other factors. However, some factors are known: current on-hand inventory, on-hand orders, batch sizes, batch cycle times, etc. The production schedule is reasonably fixed within a given time fence. The key point is to take the information that is deterministic and factor in the information that is variable to determine what changes should be made to safety stock parameters to improve the fulfillment process with a dynamic planning cycle.⁴ Customer responsiveness must also be factored into meet strategic requirements and any contractual obligations. Instead of changing safety stocks on an annual basis (or less frequently), change them as part of a routine master production schedule (MPS) planning cycle. By right-sizing inventory and not just setting random reduction targets, on time deliveries will actually improve with less working capital.

As shown in the example below, multi-echelon inventory optimization (MIPO[™] by Smart-

¹⁾ Inventory turns measure the number of times the average stock level of an item is sold in a given period – the higher the turns, the more rapid the turnover of stock.

Safety stock is the amount of product held in inventory to buffer against the uncertainty in demand or supply to prevent a possible stock-out. Days on hand is a measure of the amount of product in stock divided by the average demand per day.

³⁾ Inventory record accuracy (IRA) is a measure of the amount of inventory 'on the books' versus the amount actually present – the higher the IRA, the greater the ability to commit to customer orders (and of course to prevent accounting surprises...). IRA is obtained by cycle-counting the inventory on a routine basis.

⁴⁾ Master production schedule is the short term planning horizon (normally 8-13 weeks) that defines production, inventory and procurement requirements as part of materials requirements planning (mrp).



Figure 2: MIPO Recommended change in Safety Stock

Ops) will make recommendations based on advanced algorithms to modify existing inventory settings and then synchronize these settings automatically with the base ERP platform. This synchronization is a key step in the master data management of complex supply chains and product portfolios.

Event Manager – Tracking and Tracing is not enough

2005 was a very trying year for the chemical industry. Hurricanes Katrina and Rita crippled the ports of New Orleans and the Gulf Coast. Thousands of shipments and containers were held hostage for most firms, but some companies had better visibility and intelligence than others. These companies were able to sense and respond to anticipated gridlock on the ports and re-route their shipments to safer harbours. The concept of event management is certainly not new (Fed-Ex tracking numbers, for example), however event management extends beyond tracking and tracing. Event management can be used to compare expected events to actual events to better identify cycle time improvement opportunities these improvements have a direct impact on asset utilization in a constrained industry. Flags can be setup to trigger an event based on a transactional posting (such as a shipment issue or shipment receipt) or on an actual device such as a RFID or a GPS. As incremental legs are identified, then further analysis can be done to pin-point improvement opportunities by following a Six Sigma methodology. Event management can also indicate if a shipment has been tampered with by having a device located on a valve or dome to determine open/close status. Devices can also be configured to determine if a railcar has been jolted or in an accident - with Event Management the appropriate personnel can be immediately notified of any of these unplanned events.

Payment terms are often based upon shipment receipt in the chemical industry. In many chemical yards, railcars may be staged beyond the gate waiting for a spot. If the customer has not 'received' the railcar shipment, the payment terms may not be initiated yet. With event management, the triggering event could be the posting to a geo-spatial area based on a GPS reading – thus as soon as the device hits the geo-spatial fence, the shipment could be received and payment terms commence. This is just a simple example of how to leverage event management capabilities to improve payment conditions by analyzing a specific portion of the entire ship to receive process.

With constrained fleets, many firms incur large demurrage charges when the amount of 'free' time for a container is exceeded – if a container is held up at a customer's location, the rail company or logistics service provider will often issue a demurrage charge on an hourly or daily basis. With event management, the assets can be tracked to assign the demurrage charge to the responsible party. In addition to reducing the demurrage charges, this process will help improve asset utilization to help keep these constrained fleets moving and improve over-all customer service.

Collaboration: Extending the Traditional Supply Chain

Communication is often the weakest link in the supply chain. Chemical manufacturers have always used toll manufacturers to supplement capacity shortfalls or for alternative technologies, but dealing with tollers is often a manual process based more on relationships. Suppliers are often the whipping-post of a wonderfully-executed marketing plan to increase product sales, yet their planned preventative maintenance outage was never factored into the equation. The manufacturer must have some type of visibility into the supplier's plans in order to execute flawlessly. With the number of force majeure's increasing annually, manufacturers must consider the limitations of their suppliers and can no longer assume that they can execute any plan. And these limitations cannot be verbal in this globalized marketplace. The supply and demand plans from all suppliers and contract manufacturers must be visible to the chemical manufacturer to ensure that they can commit to the downstream customer. Without this visibility, chemical manufacturers will continue to disappoint the marketplace.

Collaboration today must extend to contract manufacturers, suppliers, customers and logistics service providers in order to execute a flawless supply chain. Through web-based portal technologies, companies can be informed of forecasts, supply plans, order changes, inventory levels and other supply chain triggers with a mere internet connection. It is clear that more and more transactions are being done over the web at reduced costs with fewer errors and with timely information exchange. This portal-based collaboration is a key enabler to responsive supply networks and is no longer wrought with high barriers to entry.

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Whereas the initial wave of collaboration services were designed for the consumer products industry to satisfy demands from Wal-Mart (RFID) and to satisfy EPC standards for the pharmaceutical industries to combat counterfeits, the new class of applications is having a wide-reaching affect on numerous processes in all industries. In order to truly determine the optimum point of operation, the aforementioned three elements (causal factors, multi-echelon inventory optimization and event management) must be balanced with real time information by leveraging collaboration across the extended supply chain network.

Conclusion

The traditional plan and execute supply chain is being replaced by responsive supply networks that extend to all partners in the order fulfillment process, including contract manufacturers, suppliers, customers and other service providers. There are key technology enablers that have addressed the inherent problems of statistical forecasting, supply and demand variability, and the expensive and time-consuming EDI or B2B connections. These technology enablers have often been piloted by other leading edge industries such as hightech or consumer products. The chemical industry has thus benefited from these trials and is ready to embrace these enablers to satisfy its own business processes. The chemical industry is shifting to a collaborative environment that relies heavily on event management triggers that yield true intelligence to a connected, innovative and secure supply chain.



Practitioner's Section Managing the effects of the business cycle in the chemical industry

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Companies in many segments of the chemical industry – particularly in the more commoditized segments – are highly exposed to the business cycle. In other words, their businesses tend to be quite profitable at the peak but margins are low or even negative in downturns of the business cycle. Throughout the article, this phenomenon will be referred to as cyclicality.

In general cyclicality on its own does not give an indication of the overall amount of profit throughout the cycle. If the profit margin at the peak of the cycle is sufficiently high, the average profitability throughout the business cycle may still be very satisfactory despite low profitability at the downturn. In fact, average profitability may well be higher than that of a non-cyclic business which has neither the very high peak profitability nor the low profitability of the downturn periods.

Why then, if average profitability is not necessarily affected by cyclicality, do many chemical companies still try to move into less cyclical segments of the chemical industry, as indicated by the following statements?

- "The purchase and sale of businesses have afforded us greater cyclical resilience ... [For 2008 we intend to focus] all our concentration and energies on making BASF even more profitable and cyclically resilient" (BASF Letter from the Chairman 2007)
- "Expanding business with low exposure to cyclical fluctuations is another way of minimizing [our] risk" (Degussa Annual Report 2007)
- "DSM's Vision 2010 aims at further redu-

cing the cyclical element" (DSM Annual Report 2007)

 "With this acquisition, we would expand the contribution of our life sciences business to total sales by our subgroups from 60 percent at present to around 70 percent, thus significantly reducing our dependence on cyclical economic developments" (Bayer statement on announcing the Schering acquisition)

From a practitioner's point of view, there are a number of reasons why huge variations of profitability throughout the business cycle are undesirable:

- Fluctuations of cash flows do not always allow cyclical companies to time their investment decisions optimally – they may be forced to follow "boom and bust" cycles for simple cash flow reasons. For example, for cash flow reasons they may not be able to take over a competitor in a downturn even though strategically this may be the right move
- Despite long-term experience regarding the average profitability over the business cycle, there is never an absolute guarantee that profitability will return to previous levels

after a downturn. This leads to a high level of insecurity (similar to the situation after a bust at the stock market)

- Making business owners understand the fluctuations of the cycle takes up management resources and requires substantial communication skills
- The motivation of employees suffers in downturns, when e.g., promising business trips are cancelled due to cost cutting measures
- Finally, low cash flows in downturns may even threaten the existence of the whole company.

One additional clarification must be made before discussing the individual aspects of cyclicality and the ways companies can limit their exposure to them. Obviously any way a company can increase profits in general also helps it to survive a downturn. Or to put it differently: a company that is already in a weak position will also be more affected by a cyclical downturn. However, in this paper we will only look at those phenomena and measures that are directly related to cyclicality, i.e., any measure that is recommendable whether a business is cyclic or not (e.g., a reduction in production cost or increasing competitiveness via innovative new products) is not examined any further. This does not mean companies should not put efforts into those activities, but rather that the scope of this paper is limited to a more narrow definition of cyclicality.

And a final – probably somewhat trivial – remark also needs to be made. The basic assumption here is that measures to reduce cyclicality are on average a zero-sum game, that is, the expected average wins from higher profitability in the downturns are compensated by corresponding lower profitability in the market peaks. Measures to reduce cyclicality are thus to be seen as an insurance to smoothen the business cycle, not as a tool to earn additional profit within the cycle. However, in reality there may be ways to profit from cyclicality depending on management capability and market structure, e.g., if increasing raw materials prices are passed on to the customers very quickly while lower prices are not passed on, or only after substantial pressure from customers.

Reasons for cyclicality

As other businesses, chemical companies acquire raw materials and other input factors on the market, subject these input factors to some transformations and finally sell the output on the market again. A number of factors result from this formal process that determine the extent to which a specific chemical company is exposed to cyclicality:

- Variations in input costs (low variations = low cyclicality)
- Variations in demand and subsequently in output prices (low variations = low cyclicality)
- Link between input costs and output prices (strong link = low cyclicality)
- Ratio of value creation within the company to input costs (high value creation = low cyclicality).

Let us look at these factors in detail and examine what kind of measures may be taken to reduce cyclicality with regard to each of them.

Input cost variations

Obviously if the prices of key raw materials are volatile, this exposes chemical companies, particularly commodity producers for which raw materials account for a large share of overall costs, to substantial cyclicality. Exposure to oil prices is a classic example. However, a number of measures are available to reduce these effects:

- Long-term purchasing contracts stabilize input prices at a given level and thus give chemical companies some security with regard to cost planning. For commodities that are particularly exposed to cyclical variations, often long-term contracts are used in which prices are determined based on certain key indicators such as oil prices etc. This protects both supplier and customer in case of huge variations
- Hedging with futures contracts in particular is a financial tool to reduce the effects of fluctuating raw materials. However, for the chemical industry hedging offers only limited opportunities as futures contracts are only traded for a small number of relatively basic raw materials





Cost

Time

Another way to reduce variations in input costs is to create vertically integrated chemical companies. Businesses whose activities thus extend over a number of value chain steps – thus practically producing their own raw materials – are less dependent on fluctuations of raw materials market prices

Profit

Finally, flexibility in raw materials can help a company to avoid the price peaks of specific raw materials. Of course, the higher flexibility in raw materials does itself come at a cost which has to be lower than the predicted savings.

Variations in demand and in output prices

Profit

Cost

Time

Similar to variations in input costs, variations in demand for the products of a chemical company also expose it to cyclicality, most likely via variations in the prices achieved for the output of the company. Fortunately, there are a number of ways chemical companies can smooth demand variations and the likely resulting price variations both on the level of individual customers and throughout their overall customer and product portfolio:

 Long-term sales contracts with individual customers may stabilize demand and/ or prices over an extended period of time.



However, often the counterparty expects to get some additional benefit for the long duration of the contract (e.g., lower prices)

- Demand fluctuations may also be reduced by focusing on customer industries with low volatility of demand, such as consumer goods, food or pharmaceuticals
- Any broadening of the portfolio, whether by products, regions, or customers, lowers the dependence on demand for individual products or customers
- From a company-internal point of view, this may require flexible production. For example, plants employing batch production tend to be more flexible than plants with continuous production, so production can be shifted to other products more easily in case of low demand. However, specific production costs tend to be higher, and in the production of many pure commodity chemicals batch production therefore is no alternative to continuous production
- Shifting fixed costs to variable costs (e.g., by outsourcing of non-core functions such as logistics and maintenance based on variable fees) allows cost-efficient production at relatively low capacity utilization. This may allow chemical companies to keep prices stable despite lower demand as it limits the pressure on them to achieve high capacity utilization at all times ("price before margin").

Link between input costs and output prices

Particularly if the value added by a chemical company is quite small compared to input prices, the company runs a relatively high risk of losing money in case of bigger price fluctuations. However, this can be avoided if – in the perception of the market – there is a strong link between input costs and output prices. If such a strong link exists, any changes in input costs simultaneously affect output prices while leaving the margins of the chemical company in the middle untouched, as the following example shows:

A company making platinum catalysts may base its catalyst prices on the current platinum market prices plus a premium for the additional chemical steps carried out. Thus, it can achieve a relatively stable margin independent of cyclical fluctuations of the platinum market, as any platinum price changes affect both input costs and output prices simultaneously and in a way that is transparent to the customer. In practical terms, the sales price is calculated first without the cost of the expensive raw material, and this cost is then added at current market rates

If this idea is pursued to its full extent, the chemical company is effectively offering toll manufacturing. Instead of selling a product at a volatile price, a service is performed at a fixed fee (e.g., the service of cracking naphtha, the service of synthesizing a specific fine chemical) while the raw materials prices are only passed through.





Figure 4: Ratio of input costs to value creation and exposure to cyclicality

Ratio of input costs to value creation

Finally, higher value creation increases the buffer zone to compensate for changes in cost or demand. Thus, any increase in value creation also potentially lowers the impact of cyclicality. There are a number of ways chemical companies can increase their value creation. These include:

- Widening of the value chain participation as a company participates in more steps of the value chain, its value creation increases. For example, a company may cover a larger number of production steps (e.g., fully integrated production of LDPE versus process from ethylene only). Integration does not have to include the acquisition of physical assets; virtual integration, e.g., by partnering may also be employed to reduce cyclicality
- Introduction of value pricing. In this pricing method, prices for different customer segments are based on their different specific payment reserves. While a great method in theory, the implementation of value pricing is not always straightforward, and value pricing may not be very suitable for products that are easily interchangeable with products from other suppliers
- Shifting the portfolio towards more differentiated products or specialty chemicals. Differentiated products have a higher value for their customers, reducing their price sensitivity. However, this will require permanent active

portfolio management as without such management, portfolios tend to commoditize. To avoid this, new specialties have to be introduced permanently

 Forward integration towards segments closer to the end customer. This includes the extension of service offerings (an extended portfolio of services related to current products increases the value these products can create for the customers).

Conclusion

The ideas outlined in this paper allow a substantial reduction of the effects of the business cycle on the profits of chemical companies. The basic concept is to reduce risk by a combination of measures regarding the individual business (e.g., hedging, long-term contracts, flexibilization of production etc.) and measures effective by widening the overall business or customer portfolio (move towards services, broadening of customer base etc. – this seems to be the preferred approach of the companies quoted at the beginning of this paper).

However, it should be mentioned that there are limits to sensible risk reduction.

There is an inherent risk of any chemical company with a clear strategy. This risk does exist, however, it is not a risk to be eliminated, but one to be appreciated as an opportunity by the investor.