

## Commentary

# The focus of the Journal of Business Chemistry: Good management practices in the chemical industry

Jens Leker\* and Hannes Utikal\*\*

\* Institute of Business Administration at the Department of Chemistry and Pharmacy, Leonardo Campus 1, 48149 Münster, leker@uni-muenster.de

\*\* Center for Industry and Sustainability at the Provadis School of International Management and Technology, Industriepark Höchst, Gebäude B845, 65926 Frankfurt am Main, hannes.utikal@provadis-hochschule.de

The chemical industry is one of the major global industries with specific management challenges. It is an industry in transition. Compared with its economic importance and its role in providing solutions for grand societal challenges, this industry as well as companies from pharmaceutical and biotech sectors receive comparatively little attention from management literature. With the Journal of Business Chemistry, we intend to create an international platform for discussions between scholars and practitioners on good management practice in these sectors. We thereby promote an interdisciplinary and transboundary approach and encourage authors and readers to look at developments at the intersection of natural sciences and management.

The chemical industry affects all aspects of human life. Advances in chemicals and pharmaceuticals have contributed to improve living conditions, in particular through innovations in the area of health and nutrition worldwide. Progress in the automobile industry such as new developments concerning electric mobility were only made possible thanks to new materials and new formulations originating from the chemical industry. Also new electronic devices such as smartphones have only been made possible due to a change of pace in the development of electronic materials and an increase in their purity. Continuous research for and production of active pharmaceutical ingredients (APIs) are essential for fighting (new) diseases and improving therapeutic methods. From an economic perspective, the crucial role of the chemical industry is also reflected by its impressive size of more than €4,710 billion world chemicals sales in 2015 (Verband der Chemischen Industrie e.V., 2016), its average global growth rate slightly above the global gross domestic product (GDP), and an impressive growth in Asia. All of these characteristics make the chemical industry to one of the most fascinating industries, not only from a

scientific, technological or societal perspective, but also from a business point of view.

The Journal of Business Chemistry (JoBC) focusses on current developments and insights at the intersection of management and chemistry, biotechnology or pharmacy.

Our goal is to provide an international forum for researchers and practitioners in companies, research institutes, public authorities, consultancies or NGOs to present and discuss current challenges as well as potential solutions in an interdisciplinary manner. Thus, the Journal of Business Chemistry aims to foster the dialog between science and business, to support management practice in the chemical and pharmaceutical industry and to indicate where further research from academia is needed. With this multidisciplinary and boundary-spanning approach, the Journal of Business Chemistry is set to become the leading journal for decision makers in the chemical and pharmaceutical industry.

All articles focus on the chemical industry, including the biotechnology, pharmaceutical or process sectors in general. They are typically rooted in one

field (e.g. chemistry) and explore implications for others (e.g. management) or can stem from interdisciplinary research. The Journal of Business Chemistry publishes peer-reviewed research papers, essays from practitioners' perspective and commentaries. Research papers are based on empirical or conceptual research and advance the understanding of an important issue in the chemical (or a related) industry. Articles in the practitioner's section describe current developments in the chemical industry and share the lessons learned from practice. Commentaries are short statements regarding current research/ business problems or previous articles of the Journal of Business Chemistry. They mainly reflect the author's personal opinion and should encourage scientific discussion. It is our intention to catalyze the reasoning in good management practices in the industry in this phase of industry transition and to foster the dialogue between academia and practice.

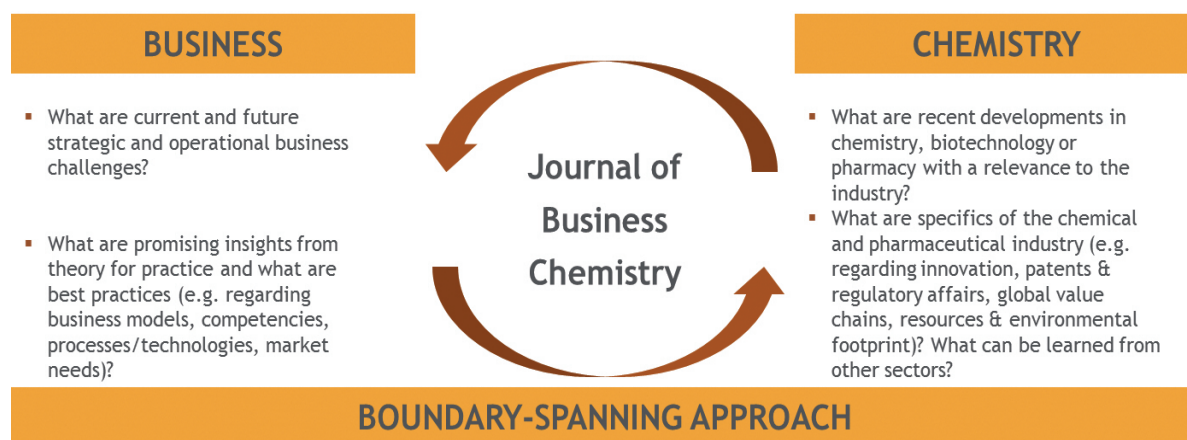
In the following, the chemical industry – encompassing in our definition companies from the chemical, pharmaceutical and biotech industry – will be characterized with regards to selected aspects influencing management decisions. Starting with the commonalities of the chemical, pharmaceutical and biotech industry, the Journal of Business Chemistry also aims to take the difference between these sectors into account. In the following, six topics are depicted and presented in more detail, along with their influence on management decisions in the chemical industry.

Firstly, the chemical industry is profoundly char-

acterized by **underlying basic research**. Alfred Chandler, a business historian, states that the success of chemical and pharmaceutical companies resulted in the past from transferring basic research findings into marketable products. Furthermore, he stated that in the past successful companies invested the profits and learning from each product generation to commercialize the next generation. Summarizing this pattern in one expression he called this capability the „engine of success“, which implies that in the past, inventions from the academic discipline of chemistry led to economic success of companies in the chemical industry. Nowadays, however, companies operating in the chemical industry need to wake up to the fact that chemistry as a science has stopped being the driver of innovation and growth. Nowadays, incremental product and process developments are more importance important for successful companies in the chemical industry than basic research. Also, the success model of pharmaceutical companies developing new products based on basic research findings (blockbuster products) has faltered. Nevertheless, since the 1960s and 1970s, biology as well as related disciplines such as microbiology, enzymology and the beginnings of molecular biology contributed to generating new pharmaceutical products. Since the 1980s, advances in the field of biotechnology have fueled the development of innovative products from basic research findings.

Given these developments, the chemical industry is no longer exclusively characterized by developments in the academic field of chemistry. The future of the industry will depend to a very high degree on its ability to integrate findings from other

Figure 1 The Journal of Business Chemistry focusses on current developments and insights at the intersection of management and chemistry, biotechnology or pharmacy.



academic disciplines and to cooperate with other industries. Companies therefore need to abandon the beaten track. These developments profoundly influence managerial decisions in the field of strategy, technology and innovations management. Consequently, all parts of the company (all business functions, the necessary skills of employees and the companies' corporate culture) are affected by this change. The chemical industry is thus an industry in transition, relying on a greater range of academic disciplines and with increasing emphasis on cooperation with other industrial sectors. The Journal of Business Chemistry strives to publish articles reflecting these developments and resulting implications for managers and academia (Whitesides, 2015; Chandler, 2009; Schröter, 2007).

Secondly, the chemical industry is a **process industry** where firms “add value to materials by mixing, separating, forming, or chemical reactions”. Process industries differ from so-called discrete industries with regard to the production process. In discrete industries, e.g. the automotive or engineering industry, production pathways converge as final products are assembled by using multiple discrete input components. In contrast, a product in the chemical industry can simultaneously act as an intermediate, processed further to synthesize other products, or serve as a finished, salable product. Production processes can therefore be convergent and divergent at the same time, which increases the complexity of planning and optimizing such processes. In each process, components are mixed and react under well-defined physical conditions. Technological characteristics in the “technical core” of companies in the chemical industry set the frame for all managerial decisions. For companies in the basic chemical sector, production processes need to be stable and optimized for high quality product generation. The need to build up capital-intensive production facilities inhibits the “agility” and “flexibility” of companies in this sector. In contrast, the pharmaceutical industry with batch production can be more flexible. The degree to which companies are flexible highly depends on the kind of production process implemented. Managers in chemical, pharmaceutical and biotech companies are thus bound by process characteristics and cannot easily transfer “management insights” from other industries. The Journal of Business Chemistry seeks to publish cutting edge research on the impact of technological requirements on management decisions (Wallace, 1984; Kannegiesser et al., 2008).

Thirdly, the **relations towards the market** are different in comparison with other industries: the chemical, pharmaceutical and biotech industries

are made up of a myriad of different products and markets. The importance of “business to business” versus “business to consumer” marketing varies across the three sectors: Business to business markets are of very high importance to companies in the chemical industry. Many of the products are used in industrial production, sold to other companies, or used within the same company in a separate production process. The biotechnology industry also relies very heavily on business-to-business income. Through their structure of licensing agreements they are very closely interlinked with other firms. On the other hand, the pharmaceutical industry must market its products to the medical profession and the public, where characteristics of business to business as well as business to consumer markets often prevail (especially in the field of “over the counter products” sold in pharmacies). Overall, the chemical industry has a mixed profile of market relations, developing products for industrial processes and agriculture as well as for the general public. For the Journal of Business Chemistry this implies that aspects of marketing and supplier-customer-relations need to be analyzed in a highly differentiated manner, taking into account the specifics of the different segments (Kortmann and Piller, 2016).

Fourthly, companies in the chemical industry highly depend on **non-renewable resources** such as fossil fuel as input factors for their production processes and on heat and electricity made from coal, gas or oil. Substitutes for these limited raw materials and energy sources are of strategic importance for companies in the chemical industry. In addition, chemical products affect the ecological footprint of all final products that are to a greater or lesser extent made up of chemical products. The combination of chemicals included in production processes at all stages of the value chain influences opportunities for product recycling. The chemical industry is therefore strongly affected by the idea of a circular economy. Activities at different stages of the value chain are seen in their interdependencies and closed loops for using and reusing materials are created. Applying this idea of a circular economy to the chemical industry provides opportunities for product, process and business model innovation. The analysis of linkages between chemical companies and their suppliers, their customers and the final consumption processes is a prerequisite for realizing benefits of the circular economy idea. The implications of the circular economy paradigm for chemical companies and their innovation activities will be another major topic for the Journal of Business Chemistry (Lieder and Rashid, 2016; Jenck et al., 2004).

Fifthly, the chemical industry is a **global industry**. Geographically, the chemical industry affects at least three different markets. The global footprint is determined by production, raw material and energy costs on the one hand, and the need to guarantee immediate market access on the other. For a very limited number of products, companies produce the entire global supply at one location. In this case, transportation costs must be negligible in view of the total cost of a good and economies of scale. As a consequence, consolidation of production in one plant is preferred over a global duplication of production activities. This is particularly valuable for producing APIs where production processes typically have to be accredited. Nevertheless, regional production for the European, North American and Asian market is pursued for the majority of products. While there are limited trade flows between these main manufacturing regions, trading within the regions, e.g. within the European Union, is more intense. In addition to global and regional markets, local markets can also be identified, where products are only delivered around or even within one specific production facility. This can be observed in a so-called Verbund (combined) production system. Such a system is characterized by an integrated production where products are, via pipes, directly delivered to customers based at the same location via pipes. Industrial parks where distinct companies use one common infrastructure are an additional pattern of organizing chemical companies. Overall, the chemical industry occupies a multiregional role. Managerial questions related to this characteristic focus on the question of how to handle opportunities and risks related to centralizing and decentralizing activities for a company as a whole and for its different business functions. How close should the company be to its lead markets? How should learning and innovation processes be organized? How can a chemical company with the need for capital-intensive production facilities exploit market opportunities in a growing emerging market – and how can volumes be adjusted if the emerging market has growth problems? To what degree is the concept of the “agile enterprise” applicable to companies in the chemical industries? These issues will be analyzed by both management scholars and practitioners in the Journal of Business Chemistry (Hofmann and Budde, 2006; Cesaroni et al., 2007).

Sixthly, companies from the chemical, pharmaceutical and biotech sector have to manage a very broad range of **stakeholders** in order to secure their “license to operate”. Companies from all three sectors may help solving societal challenges (e.g. by providing nutrition to a growing global population or by providing drugs against illnesses). At the same

time, they have a very high impact on the ecological environment and receive much attention from different societal actors (e.g. civil society, politics, customers, suppliers). Some topics related to the three industries, such as genetically modified organisms, animal testing and pricing of pharmaceuticals, are inherently controversial in the public domain. Furthermore, the chemical industry in particular looks back on a history of sometimes pervasive environmental accidents. The biotechnology industry has inherent ethical dilemmas because it, by definition, deals with living organisms by definition. Business ethics and issues regarding environmental and social sustainability are pertinent to the chemical and pharmaceutical industry as they need consumer support and trust to market their products. Thus, important tasks for companies in all three sectors are to (a) understand and manage a variety of stakeholders, (b) integrate the concept of sustainability in their strategic management processes and to balance requirements from economic, ecological and social perspectives, (c) to position an individual company as a “responsible societal actor” in the public domain. These topics are also featured in the Journal of Business Chemistry (Henderson, 2015).

## Topics of interest

The chemical, pharmaceutical and biotechnology industry is characterized by their its changing environment, as mentioned above. The Journal of Business Chemistry focusses on the developments in the chemical industry and encourages scholars to submit papers highlighting management specifics of these industries or comparing these industries with other important industrial sectors. At the same time, the Journal would like to invite practitioners to share their insights on successful management practices.

In the following some relevant topics are listed:

- strategy, innovation and technology management (e.g. interdisciplinary innovation; cross-industry collaboration; business model innovation),
- process optimization and digitalization (e.g. with an focus on production processes; sales processes; value networks),
- sustainability, green chemistry and the circular economy
- competencies for employees (e.g. technical expertise, social skills, and „transition competencies“)

The Journal of Business Chemistry is looking forward to discussing authors’ and readers’ perspectives on the future of the chemical industry, an industry in transition. Together with all relevant

stakeholders, the Journal hopes to strengthen the academic field of “successful management in the chemical industry” in a way that is relevant to practitioners. Furthermore, the Journal believes that our interdisciplinary (“business meets chemistry”) and boundary spanning (“academia meets practice”) approach will create benefits for all actors involved.

*agement terminology and phrases*, 5th ed. American Production and Inventory Control Society, Falls Church, VA.

Whitesides, G. M. (2015): Reinventing chemistry, *Angewandte Chemie International Edition*, **54** (11), pp. 3196-3209.

---

## References

Cesaroni, F., Gambardella, A., and Mariani, M. (2007): The evolution of networks in the chemical industry, in: Galambos, L., Hiniko, T., and Zambagni, V., (eds.), *The Global Chemical Industry in the Age of the Petrochemical Revolution*, Cambridge University Press, Cambridge, pp. 53-80.

Chandler, A. D. (2009): *Shaping the industrial century: The remarkable story of the evolution of the modern chemical and pharmaceutical industries* (Vol. 46), Harvard University Press.

Henderson, R., Gulati, R., and Tushman, M. (Eds.). (2015): *Leading sustainable change: An organizational perspective*, OUP, Oxford.

Hofmann, K., and Budde, F. (2006): *Today's Chemical Industry: Which Way Is Up?*, Wiley-VCH, Weinheim.

Jenck, J. F., Agterberg, F., and Droescher, M. J. (2004): Products and processes for a sustainable chemical industry: a review of achievements and prospects, *Green Chemistry*, **6** (11), pp. 544-556.

Kannegiesser, M., Günther, H. O., Van Beek, P., Grunow, M., and Habla, C. (2008): *Value Chain Management in the Chemical Industry - Global Value Chain Planning of Commodities*, Physica, Heidelberg.

Kortmann, S., and Piller, F. (2016). Open Business Models and Closed-Loop Value Chains, *California Management Review*, **58** (3), pp. 88-108.

Lieder, M., and Rashid, A. (2016): Towards circular economy implementation: a comprehensive review in context of manufacturing industry, *Journal of Cleaner Production*, **115**, pp. 36-51.

Schröter, H. (2007): Competitive Strategies of the World's Largest Chemical Companies, 1970-2000, in: Galambos, L., Hiniko, T., and Zambagni, V., (eds.), *The Global Chemical Industry in the Age of the Petrochemical Revolution*, Cambridge University Press, Cambridge, pp. 53-80.

Verband der Chemischen Industrie e.V. (2016): Branchenporträt der deutschen chemisch-pharmazeutischen Industrie, VCI, Frankfurt.

Wallace, T. F. (1984): *APICS dictionary: the official dictionary of production and inventory man-*