

Innovation and Technology Management in the Process Industries - In search of common denominators and sectoral idiosyncrasies

Call for a Special Issue

Setting the scene

Introducing the family of process industries

The family of industries generally denoted as “the process industries” spans multiple industrial sectors, constitutes a substantial part of the entire manufacturing industry and is generally considered to include petrochemicals and chemicals, food and beverages, mining and metals, mineral and materials, pharmaceuticals, pulp and paper, steel and utilities. In this context the following intentional definition is used (Lager, 2017a):

The process industries are a part of all manufacturing industries, using raw-materials (ingredients) to manufacture non-assembled products in an indirect transformational production process often dependent on time. The material flow in production plants is often of a divergent v-type, and the unit processes are connected in a more or less continuous flow pattern.

One of the principal differences between companies in the process industries and those in other manufacturing industries is that the products supplied to them and often delivered from them are materials or ingredients rather than components or assembled products (Flapper et al., 2002, Frishammar et al., 2012). Furthermore, whilst product innovation in assembly-based industries begins in the design office, the development of non-assembled products in the process industries generally starts with experimental work in the laboratory or pilot plant (Frishammar et al., 2014). This **inherent condition** for product and process innovation among sectors belonging to the cluster of process industries thus requires unique experimental facilities and development approaches of a clearly different kind than what is common in other manufacturing industries. Moreover, the importance of an integrative perspective on raw materials, process technology and products in innovation is another significant **contextual condition** of the process industries (Lager, 2017b); a situation which most likely favors a more amalgamated process- and product innovation approach (Hullova et al., 2016).

Perspectives on process-industrial Innovation and Technology management research

In a special issue of the journal R&D Management on the topical area of management of R&D and innovation in the process industries (Lager et

Guest Editors

Prof. Dr. Thomas Lager

Mälardalen University
School of Innovation, Design and Engineering
Högskoleplan 1
722 20 Västerås, Sweden
thomas.lager@mdh.se

Prof. Dr. Koteswar Chirumalla

Mälardalen University
School of Innovation, Design and Engineering
Högskoleplan 1
722 20 Västerås, Sweden
koteswar.chirumalla@mdh.se

Editors-in-Chief

Prof. Dr. Jens Leker

Managing Director of the “Institute of Business Administration at the Department of Chemistry and Pharmacy”
University of Münster, Germany
Leonardo-Campus 1
48149 Münster, Germany

Prof. Dr. Hannes Utikal

Managing Director of the “Center for Industry and Sustainability”
Provadis School of International Management and Technology, Germany
Industrial Park Höchst
65926 Frankfurt am Main, Germany

www.businesschemistry.org



Contact the editor team:
contact@businesschemistry.org

al., 2013), the lack of innovation management research in a process-industrial context was described as follows: *“It could be that the industry environment in the process industries is not as “glamorous” compared to other industries like IT, design, and service. Additionally the production process of process firms could appear complicated and hard to understand for scholars lacking an appropriate technical background.”*

In a special issue on operations management research in the process industries, Van Donk and Fransoo (2006) remarked that: *“Much of the work and models lack specific knowledge of the process industry domain, enforcing that many of the characteristics are either assumed too general or not addressed specifically.”* This lack of process-industrial operations management research has been confirmed in a recent literature review (Samuelsson et al., 2016).

In an early study of the 2,000 top worldwide investors in research and development (R&D), about 30% of those companies belonged to the process-industrial cluster (Lager, 2010). However, in spite of the importance of this cluster of industries within the disciplines of innovation management and production management, as well as for industrial production and innovation in general and for the world economy at large, the family of process industries is surprisingly “under-researched”.

A call for a cross-sectoral approach in process-industrial Innovation and Technology management research

Pavitt (1984) argued that it is important to study sectoral patterns of technology change because it has implications for our *“understanding of the sources and directions of technical change, firms’ diversification behavior, the dynamic relationship between technology and industry structure, and the formation of technological skills and advantages at the level of the firm, the region and the country.”* However, the findings from Hirsch-Kreinsen (2008a, 2008b) also suggests that the concept of sectoral boundaries has to be conceived more broadly as well as more systematically in order to make it possible to understand the relevant aspects of the courses of technological innovation: *“Comparison between high and medium tech industries shows that recurring principles and similarities with respect to innovation patterns can have a cross-sectoral character. These contexts are only insufficiently grasped by well-established approaches of the systems of innovation.”*

The specific and strong coupling and interplay between raw materials, production systems and products, and the unique experimental environment shared by most of the process-industrial sectors are generally not experienced among other manufacturing industries. While different sectors of the process industries share a large number of characteristics related to their production systems, those characteristics significantly differ from the production system characteristics in other manufacturing industries (Lager, 2017a). As a result, sectoral experiences from process-industrial innovation and technology management, can be shared within the process-industrial cluster but are of less interest for other manufacturing industries. The “family” of process industries is thus similar within itself, but dissimilar to other manufacturing industries.

Suggested research topics of interest

The overall topic for this Special Issue is the identification of common denominators and sectoral idiosyncrasies within the broad family of process industries, in search of enhanced process-industrial management of innovation and technology. Interesting empirical insights or theoretical and conceptual contributions are invited to show where other manufacturing industry best practices and methodologies might be adapted for process-industrial innovation and technology management. Possible research topics include but are not limited to the following lines of inquiry:

- *Referring to the title of this call, could individual sectors in the family of process industries benefit from more specific work processes, tools, and best practices for innovation and technology management in their specific sectoral environment?*
- *Referring to the title of this call, how can several sectors in the family of process industries develop and share innovation and technology management practices because of similarities in their industrial environments?*
- *Strategic process-industrial sustainability challenges in the perspective of necessary new or improved innovation management capabilities and organizational frameworks.*
- *Process-industrial project management perspectives (e.g. managing long-term innovation projects in times of changing organizational company environments).*
- *Frugal and inclusive innovation in a process-industrial context – how to integrate low cost production systems, simplified product architectures and new business models for both emerging and mature markets.*
- *How to develop and foster sustainable innovation cultures in “production oriented” process-industrial operational environments.*
- *Strategies and best practices for process-industrial Immaterial Property Rights (IPR) focusing on process innovation – publish, patent or keep secret.*
- *Experiences from company innovation through company “internal start-ups” (autonomous hubs within company R&D demarcations).*
- *Open innovation in a process-industrial context – new opportunities for consumer interaction or “old wine in new bottles”?*
- *Open production as “wall-to-wall” raw material, ingredient or equipment supplier integration in company production systems.*
- *In search of effective orchestration, coordination mechanisms and collaborative models for customer and end-user interactions in complex process-industrial supply/value chains.*
- *Innovative new perspectives on business model development adapted to process-industrial contexts.*
- *Intra-and inter-firm collaboration and technology transfer challenges and future capabilities in a process-industrial context.*
- *Product introduction in the perspective of “management of industrialization and related work processes” in a process-industrial context.*

Submission process & important dates

Prospective authors are welcome to contact the guest editors to discuss initial ideas for papers in this Special Issue (SI) and related questions about submissions. Full papers must be submitted to the Journal of Business Chemistry no later than **September 30, 2019**. Papers will be subject to the JoBC double-blind peer-review process. A guide for authors, sample copies and other relevant information for submitting papers are available on <http://www.businesschemistry.org>. The timeline for the Special Issue is as follows:

- *Deadline for full paper submission: September 30, 2019.*
- *Submission of all reworked papers after guest editors’ comments: December 31, 2019.*
- *Notification to authors of which papers have been selected for this Special Issue, and start of the peer review process: January 31, 2020.*
- *Expected time of publication: Fall 2020.*

A workshop entitled “*The third international workshop on Innovation and Production Management in the Process Industries: Bridging the industry-academy interface and in search of a cross-disciplinary research agenda*” will be convened at Mälardalen University, Campus Eskilstuna, Sweden, on 10-11 October, 2019. This workshop is being held in collaboration with the Institute of Business Administration at the University of Muenster, Germany, and the Center for Industry and Sustainability, Provadis School of International Management and Technology at the Industrial Park, Frankfurt Höchst, Germany. As a part of the paper development process

for this Special Issue, prospective authors are welcome and encouraged to attend this workshop, and to develop an early abstract of their paper. Please see www.mdh.se/ipm2019 for further information.

Workshop participation is by no means a prerequisite for SI authors, and will not influence the selection of SI papers for full peer review.

- *Deadline for submission of abstracts for workshop participation: April 30, 2019.*
- *Notification of acceptance for workshop participation: May 15, 2019.*
- *Workshop registration: May 31, 2019.*
- *Full paper or working paper submission: September 30, 2019.*
- ***Workshop: 10-11 October 2019.***

References

- Flapper, S. D. P., Fransoo J. C., Broekmeulen, R. A. C. M., Inderfurth, K. (2002): Planning and control of rework in the process industries: a review. *Production Planning & Control*, **13**, 26-34.
- Frishammer, J., Lichtenthaler, U., Kurkkio, M. (2012) The front end in non-assembled product development: a multiple case study of mineral- and metal firms. *Journal of Engineering and Technology Management (JET-M)*, **29**, 468-488.
- Frishammer, J., Söderholm, P., Bäckström, K., Hellsmark, H., Ylinenpää Hakan (2014): The role of pilot and demonstration plants in technological development: synthesis and directions for future research. *Technology Analysis & Strategic Management*.
- Hirsch-Kreinsen, H. (2008a): "Low-Tech" Innovations. *Industry and Innovation*, **15**, pp. 19-43.
- Hirsch-Kreinsen, H. (2008b): "Low-Technology": a forgotten sector in innovation policy. *Journal of Technology Management & Innovation*, **3**, 11-20.
- Hullova, D., Trott, P., Simms, C. D. (2016): Uncovering the reciprocal complementarity between product and process innovation. *Research Policy*, **45**, pp. 929-940.
- Lager, T. (2010) *Managing Process Innovation - From idea generation to implementation*, London, Imperial College Press.
- Lager, T. (2017a): A conceptual analysis of conditions for innovation in the process industries and a guiding framework for industry collaboration and further research. *International Journal of Technological Learning, Innovation and Development*, **9**, 189-219.
- Lager, T., Blanco, S., Frishammer, J. (2013): Managing R&D and Innovation in the process industries. *R&D Management*, **43**, p. 189-195.
- Lager, T., Storm, P. (2014): Application development in the process industries. *Journal of Business Chemistry*, **11**, 101-115.
- Pavitt, K. (1984): Sectoral patterns of technical change: Towards a taxonomy and a theory. *Research Policy*, **13**, 343-373.
- Samuelsson, P., Storm, P., Lager, T. (2016): Profiling company-generic production capabilities in the process industries and strategic implications. *Journal of Manufacturing Technology Management*, **27**, pp. 662-691.
- Van Donk, D. P., Fransoo, J. C. (2006): Operations management research in process industries. *Journal of Operations Management*, **24**, 211-214.