

This paper was presented at The ISIPM Innovation Conference – Celebrating Innovation, 500 Years Since daVinci, Florence, Italy on 16-19 June 2019. The publication is available to ISIPM members at www.ispim.org.

A process view and a framework of open innovation in SMEs

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Abstract: This work is a research-in-progress outcome of a large-scale study of open innovation in European SMEs. The study presents a process model of an open innovation in SMEs, which has been developed and validated through the course of studying the cases of 117 Europe-based SMEs (of various sectors, region and lifecycle stage) practicing open innovation. The proposed framework provides a non-linear, cyclic model of SME' open innovation, which considers not only internal company space, but also extra-organizational or open innovation space. This framework provides not only a contribution to the innovation management literature, but also appears a tool to support an informed decision-making in SMEs entering the open innovation space.

Keywords: SMEs; open innovation; process view; innovation process; Europe; INSPIRE project

Acknowledgement: This research forms a part of a larger European project – INSPIRE (H2020 project under grant agreement No 691440 – INSPIRE). The INSPIRE project is a Coordination and Support Action funded by the European Commission, which aims to professionalize Open Innovation (OI) processes within Europe's SMEs (for more information please see www.inspire-smes.info).

1. Introduction and research problem

Innovation in small and medium-sized enterprises (SMEs) is particularly important as a driver for technological innovation and economic growth. SMEs are found to be the agile innovation creators with often very rapid growth, and large firms constantly seek to understand and develop this capability of a small, agile innovator. This is illustrated by a growing trend of incumbents acquiring more SMEs, developing corporate incubators and accelerators. Open innovation in turn, has been found to be an instrument for SMEs to gain access to complementary knowledge and resources (Vanhaverbeke, 2017) – assets which SMEs lack due to their ‘liability of smallness’ (Van de Vrande, De Jong, Vanhaverbeke, & De Rochemont, 2009). Despite the importance of SMEs for innovation and economic growth, the process of innovation in SMEs remain unstudied – as a black box of constant changes happening in a turbulent environment (Vanhaverbeke, 2017). The open innovation concept research revealed the differences in collaborative practices adopted by large firms and SMEs (Vanhaverbeke, 2017).

Driven by a need to deeper understand innovation, and more specifically open innovation, in the context of small firms – which are often more agile and have to run its processes in agile cycles, we looked at an innovation process as a cycle. We, thus, aim to understand how the innovation process cycle looks like in SMEs practicing open innovation?

2. A process view towards open innovation in SMEs

Open innovation in SMEs

Innovation in SMEs and particularly its openness received considerable attention in the recent years both from practitioners and researchers (Hossain & Kauranen, 2016) – due to the important role of small firms alone in the economic growth, but also due to the growing inter-organizational dependencies and the growing role of innovative SMEs in the synergy of entire business networks and ecosystems.

Scholarly study of the relationship between firm size and innovation can be traced back to the Schumpeterian hypothesis that large firms are more innovative than small firms (Schumpeter, 1942). Hoffman et al. (1998) claim that SMEs are generally innovative, but not all SMEs in all sectors innovate. Rothwell and Zegveld (1986) reject the idea that innovation is related to firm size and instead view it as related to industry cycle, which varies with technology, markets and government policy. The current innovation management scholarship, in turn, often views innovation and entrepreneurship (or intrapreneurship) as co-evolving phenomena (Tidd & Bessant, 2013).

Originally introduced in 2003 (Chesbrough, 2003) open innovation (OI) is currently defined as ‘the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external innovation, respectively’ (Chesbrough & Bogers, 2014, p. 27). The objective and nature of inter-organisational open innovation engagement is often categorized in terms of the breadth and depth of collaboration with external partners (Laursen & Salter, 2006). Gassmann and Enkel (2004) highlight the three core processes in OI: the outside-in process; the inside-out process and the coupled

process. (1) The outside-in process (inbound): the acquiring, integration and commercialization of knowledge from suppliers, customers, the “crowd” and other sources inside the organizational boundaries. (2) The inside-out process (outbound): the external exploitation of ideas or IP in different markets with different organisations – start-up’s, spin-out’s, and IP licensing. There has been less focus on the inside-out process within the literature (Chesbrough & Bogers, 2014). (3) The coupled-process: linking outside-in and inside-out processes by “working in alliances with complementary partners in which give and take is crucial for success” (Gassmann & Enkel, 2004, p. 6).

Despite their importance to economies and societies, open innovation literature on SME firms is limited and this gap has been recognized as one worthy of study (Gassmann, Enkel, & Chesbrough, 2010). Hoffman et al. (1998) suggest that there are no significant structural impediments in terms of availability or access of SMEs to a variety of external knowledge sources and that these linkages can directly strengthen the technological competencies and competitive strength of the SMEs. Nieto and Santamaría (2010, p. 61) emphasize the importance of inter-organizational partnering for SME innovation since: “collaboration is a critical input for the innovation processes of SMEs, one that enables them get closer to the levels of innovativeness of their larger counterparts”.

Studies of SMEs innovative capabilities identify constraints such as lack of financial and specialized human resources which encourage the sector to “heavily draw on their network to find missing resources” (Van de Vrande et al., 2009, p. 426). Narula (2004, p. 159) concluded that despite significant constraints, SMEs “have been able to maintain their competitive position through a more astute use of non-internal R&D, with less in-house R&D than larger firms”. However, van de Vrande et al (2009) reported that medium size organizations are doing so to a greater degree than small scale firms since they have relatively larger resources and knowledge repositories to support innovation practices. Rothwell and Dodgson (1991) identified SME’s ability to exploit non-internal knowledge sources for innovation as a behavioural advantage of SMEs over their larger counter-parts and the basis of competitive advantage. However, Narula (2004, p. 154) suggests that leveraging external networks is becoming a core element of the strategy of large organizations, “thereby diminishing one of the major advantages that SMEs have had when competing...”.

The existing discussion on open innovation in SMEs is ongoing and constitutes the ongoing debate on the effects of firm size in open innovation context (Hossain & Kauranen, 2016). However, a holistic picture of open innovation in SME context is still being built with the substantial efforts of scholars in the field (Brunswick & Ehrenmann, 2013; Radziwon & Bogers, 2018; Vahter, Love, & Roper, 2014; Van de Vrande et al., 2009; Vanhaverbeke, 2017). Thus, an understanding of the underlining process is still limited (Pullen, De Weerd-Nederhof, Groen, & Fisscher, 2012; Svejnova, Planellas, & Vives, 2010).

A process view in innovation management studies

There has been a number of evidences of treating innovation as a stage process (Bernstein & Singh, 2006; Guan & Chen, 2010; Nelson, 1993; Roper, Dub, & Love, 2008; Rothwell, 1994) and a process encompassing the variety of resources and capabilities / capacities (Edquist and Hommen, 1999).

Tidd & Bessant (2013)' innovation model (Figure 1) offers a high-level outlook at the general innovation process. It is a highly relevant model for diverse contexts and applications of innovation. The model depicts the innovation as a process from opportunity recognition, through idea generation and development, towards implementing and value capture.

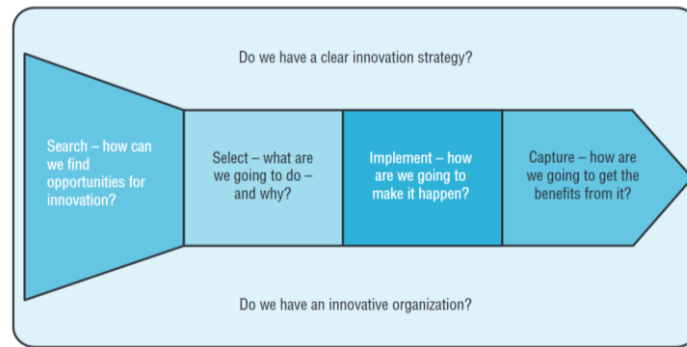


Figure 1 – Simplified model of the innovation process (Tidd & Bessant, 2013, p. 47)

Firms initiate, organise and manage innovation process by finding optimal solution and combination of resources (Tidd & Bessant, 2009). One peculiarity of this model is its linearity, while SMEs, due to their ‘liability of smallness’ often cannot afford following a linear process to the letter (Brunswick & Vanhaverbeke, 2014). With only a few exceptions (Gould, 2012), the process view has not yet been applied to the context of open innovation in SMEs, and this submission aims to fill this gap.

The innovation process assumes the company accumulates general and specific capabilities associated with different stages of the process. Such capabilities can refer the knowledge creation, ideas generation and internal knowledge dissemination (Monge, Cozzens, & Contractor, 2008), organisational structures, strategy and communication (Lemon & Sahota, 2004) and collaborative capabilities (Laursen & Salter, 2004), employees participation in innovation (Slappendel, 1996; Wei & Wang, 2011; Wheelwright & Clark, 1995).

3. Research design and methodology

This study represents a foundational building block in an extensive research project on open innovation in SMEs – INSPIRE (INtegrated Support of oPen Innovation pROfessionalization initiative¹). The iterative research process behind this study included multiple phases.

First, a preliminary innovation process cycle was created based on the prior literature on innovation, open innovation in various contexts including SMEs. This initial model was discussed and re-shaped multiple times with a help of a focus group of twenty experts in

¹ A three-year project co-financed by the European Commission under the Horizon 2020 Programme, devoted to leveraging open innovation in SMEs. For more information, please check the project info website: www.inspire-smes.info.

innovation management – researchers and practitioners (business consultants and entrepreneurs).

Second, the revised process model was tested during 120 interviews with the CEOs and managers of Europe-based SMEs practicing open innovation in various sectors and European regions. Out of the 120 interviews conducted between October 2016 and July 2017, 117 case studies were written. Table 1 includes a summary of the cases finalized for each region. When looking at the industrial context, we see that most of the cases had high technological intensity, were at the mature stage of their life cycle, and were in the manufacturing sector. Some key points are as follows:

- 58.9% of cases were High Tech SMEs with regions like France and Germany and Scandinavia having a significantly higher proportion. At the same time, 41.1% of cases had Low to Medium technological intensity, with the largest number coming from Small Developed countries.
- 52.1% of the cases were classified as either Mature or Established, with 47.9% being classified as early stage.
- 59.0% of cases were in the manufacturing sector, with most regions having a similar percentage of cases in this sector. The only exception of this was Scandinavia and France and Germany, there were more cases in the service sector rather than manufacturing.

Table 1 Cases of SME OI used for the framework validation and further development

<i>Region</i>	<i>Tech Intensity</i>		<i>Life-cycle</i>			<i>Sector</i>		<i>Total per region</i>
	<i>LMT</i>	<i>HT</i>	<i>Early Stage</i>	<i>Establ.</i>	<i>Mature</i>	<i>Service</i>	<i>Manuf.</i>	
Eastern Europe	8	8	6	9	1	1	15	16
France & Germany	3	14	12	5	0	7	10	17
Scandinavia	5	16	11	10	0	13	8	21
Small Developed	13	7	7	13	0	10	10	20
Southern Europe	10	10	8	11	1	6	14	20
UK & Ireland	9	14	12	10	1	11	12	23
Total	48	69	56	58	3	48	69	117

Source: INSPIRE Project Deliverable 1.2, Selection of 120 Good Practices

Third, as an outcome of 117 personal interviews conducted with the studied case companies and secondary data collected for the studied cases (from companies websites, materials shared by the interviewees) and in-depth cases analysis, the process model was further revised and developed. Finally, the revised model was returned to the expert focus group for the final polishing, adjustments and checks against the existing body of knowledge. This stage helped to shape the final structure of the framework, which reflects the cycle process of open innovation in SMEs.

4. Findings

The key output of this study is a new framework outlining the process cycle of open innovation in SMEs (Figure 2). It consists of multiple layers including 3 high-level stages of innovation process (trigger points; development; commercialization & follow-up); the internal, SME-level innovation activities (9 sub-categories) and an open innovation space – a set of open innovation practices and capabilities required for managing SME’ innovation in collaborative (open) way at each of the stages described. This section proceeds with a brief overview of each layer of the framework and reflections on each of those from the research data.

First, the majority of the studied cases confirmed an assumption of the *triggers* preceding the SME innovation processes. Put simply, all of the studied cases demonstrated their innovation process as a response to either internal triggers (founders’ ideas, intelligence, entrepreneurial mind-set), external ones (market demand and emerging opportunities, market turbulence and crises) or a combination of those. While the *market opportunities* and *initial business strategies* were predominantly sensed and scoped by the entrepreneurs (internally), the external knowledge sources were also utilized at these initial stages. Particularly, a great share of the studied cases in high-tech sector utilized the scientific expertise of such partners as research institutions and universities, while in grasping the market opportunity the customer feedback and user-involvement were commonly utilized. Overall, the public sector research partners (PSR) appeared to be the most common partner across all the studied cases (see Table 2).

Table 2 Overview of the case companies’ innovation partners for each region

<i>Region</i>	<i>PSR</i>	<i>Large Company</i>	<i>SME</i>	<i>Lead Customer</i>	<i>Individual Expert</i>	<i>Crowd Sourcing</i>	<i>Partners average</i>
Eastern Europe	12	6	13	8	3	3	2.60
France & Germany	15	10	7	8	7	5	3.00
Scandinavia	16	8	10	9	8	2	2.52
Small Developed	10	8	11	2	5	1	1.85
Southern Europe	17	6	13	12	3	0	2.42
UK & Ireland	18	12	11	7	3	2	2.30
Total	88	50	65	46	29	13	2.42

Source: INSPIRE Project Deliverable 1.2, Selection of 120 Good Practices

Second, after the SME innovation has been triggered to kick-off, the concept *development stage* is starting. This stage includes three sub-stages as per results of our study. First, the *initial concept* is being designed and the *concept development* process follows. On the open innovation landscape that may imply framing the IPR behind the SME’ innovation (for potential outbound OI – the technology out-licencing) or acquiring the external knowledge – either tacit (as e.g. in case of collaboration with public research institutions) or explicit (in-licencing the complimentary technology). Knowledge exchange with experts and expert communities is essential for particularly the initial

concept development stage as a source of the leading-edge knowledge in various expert fields. Collaboration with (lead) users, clients or customers is helpful in testing and further developing the initial concept. What is also important at this stage and particularly challenging for the resource scarce SMEs, is the need to comply with various standards, requirements and regulations (if not co-developing an industrial standard itself), but necessary to demonstrate the validity and reliability of the developed product/service. Finally, at the concept development stage a particular competition strategy should be already drafted and collaboration with external parties at this stage appeared useful for the studied SMEs. Collaboration with large companies allowed an access to their extensive networks and potential clients (also through joint business model), work with other SMEs allowed gaining the first sales and credibility, participation in business incubation and acceleration programs also supported an informed decision-making amongst studied SMEs when it comes to the competition strategy and business model development.

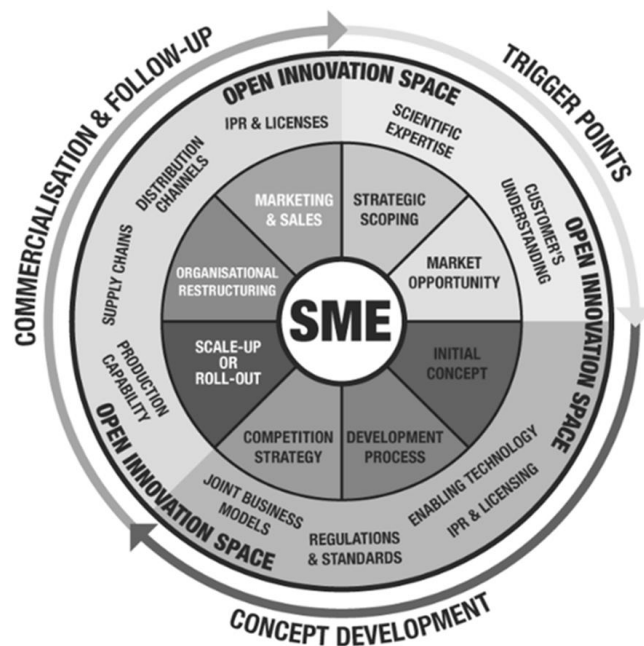


Figure 2 – Open innovation in SMEs: a process model

Finally, at the latest stage – *commercialization and follow-up* the SMEs have been going through the *scaling-up stage* – achieving a greater number of sales and activating the economies of scales through resource-efficiency. On the open innovation front, the companies were lacking production capabilities and often relied on an external one from their larger counterparts. Inevitably, many of these moves required a subsequent *organizational restructuring*. In case when SME is extensively involving an external expertise on a subcontracting or freelance base, that may imply a strategic downsizing the SME staff. Alternatively, when the SME business is scaling up and growing and the business required a greater engagements with external supply chain actors or the

distributors, a creation of specific departments within the SME (as e.g. marketing and sales) reflected the organizational restructuring. When the end of the cycle is reached the SME IPR could be commercialized – as a source of additional revenue, as an exit strategy or as a change of the business model from e.g. solely a product company to a service business.

5. Discussion and conclusions

This study takes a rather novel approach towards open innovation in SMEs – a process approach. Thus, it contributes to such streams of literature as open innovation, entrepreneurship as well as process studies. It first, bridges these research streams, identifies the linkages between them as well as validates those empirically. One of the specific benefits of this model is its cyclic structure – as for any agile and innovative company, the proposed framework (Figure 2) assumes a constant movement along the innovation cycle with the existing innovative products/services being developed on both value creation and capturing ends (product/service offering and business model); and new offerings being created.

This submission also has a great practical relevance. The process framework developed is a practical tool for SMEs managers as well as consultants working with SMEs as it allows planning, tracking, benchmarking as well as visualizing the process of SME opening up during various stages of their internal value creation or value capture. This process framework will aid informed decision-making, which is critically important for small and medium-sized companies lacking internal capabilities, time and resources while constantly facing the environmental turbulence and, thus, need to rely on external partnerships.

References

- Brunswick, S., & Ehrenmann, F. (2013). Managing Open Innovation in SMEs: A Good Practice Example of a German Software Firm. *International Journal of Industrial Engineering and Management*, 4(1), 33–41.
- Brunswick, S., & Vanhaverbeke, W. (2014). Open Innovation in Small and Medium-Sized Enterprises (SMEs): External Knowledge Sourcing Strategies and Internal Organizational Facilitators. *Journal of Small Business Management*, 53(4), 1241–1263. <https://doi.org/10.1111/jsbm.12120>
- Chesbrough, H. (2003). Open Innovation The New Imperative for Creating and Profiting from Technology Xerox PARC The Achievements and Limits of Closed Innovation. *Harvard Business School Press*, 1–10. <https://doi.org/10.1111/j.1467-8691.2008.00502.x>
- Chesbrough, Henry, & Bogers, M. (2014). Explicating Open Innovation: Clarifying an Emerging Paradigm for Understanding Innovation Keywords. *New Frontiers in Open Innovation*, 1–37. <https://doi.org/10.1093/acprof>
- Gassmann, O., & Enkel, E. (2004). Towards a theory of open innovation: three core process archetypes. In *R&D management conference* (pp. 1–18). <https://doi.org/10.1.1.149.4843>
- Gassmann, O., Enkel, E., & Chesbrough, H. (2010). The future of open innovation. *R&D Management*, 40(3), 213–221. <https://doi.org/10.1111/j.1467-9310.2010.00605.x>
- Gould, R. W. (2012). Open Innovation and Stakeholder Engagement, 7(3), 1–11.
- Hoffman, K., Parejo, M., & Bessant, J. (1998). Small Firms , R & D , Technology and Innovation in the UK : A Literature Review Small firms , R & D , technology and

- innovation in the UK : a literature review. *Technovation*, 18(1), 39–55.
[https://doi.org/10.1016/S0166-4972\(97\)00102-8](https://doi.org/10.1016/S0166-4972(97)00102-8)
- Hossain, M., & Kauranen, I. (2016). Open innovation in SMEs: a systematic literature review. *Journal of Strategy and Management*, 9(1), 58–73.
<https://doi.org/10.1108/JSMA-08-2014-0072>
- Laursen, K., & Salter, A. (2004). Searching high and low: what types of firms use universities as a source of innovation? *Research Policy*, 33(8), 1201–1215.
<https://doi.org/10.1016/j.respol.2004.07.004>
- Laursen, K., & Salter, A. (2006). Open for innovation: The role of openness in explaining innovation performance among U.K. manufacturing firms. *Strategic Management Journal*, 27(2), 131–150. <https://doi.org/10.1002/smj.507>
- Lemon, M., & Sahota, P. S. (2004). Organizational culture as a knowledge repository for increased innovative capacity. *Technovation*, 24(6), 483–498.
[https://doi.org/10.1016/S0166-4972\(02\)00102-5](https://doi.org/10.1016/S0166-4972(02)00102-5)
- Monge, P. R., Cozzens, M. D., & Contractor, N. S. (2008). Communication and Motivational Predictors of the Dynamics of Organizational Innovation. *Organization Science*, 3(2), 250–274. <https://doi.org/10.1287/orsc.3.2.250>
- Narula, R. (2004). R&D collaboration by SMEs: New opportunities and limitations in the face of globalisation. *Technovation*, 24(2), 153–161.
[https://doi.org/10.1016/S0166-4972\(02\)00045-7](https://doi.org/10.1016/S0166-4972(02)00045-7)
- Nieto, M. J., & Santamaría, L. (2010). Technological collaboration: Bridging the innovation gap between small and large firms. *Journal of Small Business Management*, 48(1), 44–69.
- Pullen, A. J. J., De Weerd-Nederhof, P. C., Groen, A. J., & Fisscher, O. A. M. (2012). Open innovation in practice: Goal complementarity and closed NPD networks to explain differences in innovation performance for SMEs in the medical devices sector. *Journal of Product Innovation Management*, 29(6), 917–934.
<https://doi.org/10.1111/j.1540-5885.2012.00973.x>
- Radziwon, A., & Bogers, M. (2018). Technological Forecasting & Social Change Open innovation in SMEs : Exploring inter-organizational relationships in an ecosystem. *Technological Forecasting & Social Change*, (October 2016), 0–1.
<https://doi.org/10.1016/j.techfore.2018.04.021>
- Rothwell, R., & Dodgson, M. (1991). External linkages and innovation in small and medium-sized enterprises. *R&D Management*, 21(2), 125–138.
<https://doi.org/10.1111/j.1467-9310.1991.tb00742.x>
- Schumpeter, J. A. (1942). *Capitalism, Socialism and Democracy*. Retrieved from <https://eet.pixel-online.org/files/etranslation/original/Schumpeter, Capitalism, Socialism and Democracy.pdf>
- Svejenova, S., Planellas, M., & Vives, L. (2010). An Individual Business Model in the Making : a Chef ’ s Quest for Creative Freedom. *Long Range Planning*, 43(2–3), 408–430. <https://doi.org/10.1016/j.lrp.2010.02.002>
- Tidd, J., & Bessant, J. (2013). *Integrating Technological, Market and Organizational Change. Managing Innovation: 5th edition*. Wiley & Sons.
<https://doi.org/10.1145/944868.944913>
- Vahter, P., Love, J. H., & Roper, S. (2014). Openness and Innovation Performance: Are Small Firms Different? *Industry and Innovation*, 21(7–8), 553–573.
<https://doi.org/10.1080/13662716.2015.1012825>
- Van de Vrande, V., De Jong, J. P., Vanhaverbeke, W., & De Rochemont, M. (2009). Open innovation in SMEs: Trends, motives and management challenges. *Technovation*, 29(6), 423–437. <https://doi.org/10.1016/j.technovation.2008.10.001>
- Vanhaverbeke, W. (2017). *Managing Open Innovation in SMEs*. Cambridge: Cambridge University Press.

Areas for feedback & development

1. What should be the most relevant theoretical viewpoints of departure?
2. How is it best to present the findings in the compact form?
3. How is it best to advocate the resulting framework being specific to SMEs or having a partial potential relevance also to large companies?
4. How is it better to position the contribution of this paper?