

# Open Innovation at the Root of Entrepreneurial Strategy: A Case from the Norwegian Oil Industry

Tatiana Iakovleva

*“As they say on my own Cape Cod, a rising tide lifts all the boats. And a partnership, by definition, serves both partners, without domination or unfair advantage. Together we have been partners in adversity – let us also be partners in prosperity.”*

John Fitzgerald Kennedy  
35th President of the United States

This article aims to extend the discussion about entrepreneurial strategies of small and medium-sized enterprises (SMEs) by including the concept of open innovation. How can SMEs overcome the challenges of resource scarcity and harsh competition? How they can gain competitive advantage in today's ever-changing business environment? The answer to both of these questions might be through open innovation: collaborating with researchers, customers, suppliers – even competitors – as well as research institutions and universities.

A common barrier to open innovation in an SME is the perception that it will be too time consuming to gain access to a knowledge base of external knowledge providers and link to “gatekeepers” of knowledge. However, an entrepreneurial mindset might help SMEs to move toward an open-innovation approach, where more codified and transferrable knowledge are important. This article discusses the implications of an entrepreneurial focus for open-innovation activities. The usefulness of the open-innovation principles are highlighted through a case study of an Norwegian SME operating in the maritime-oil industry.

## Introduction

Innovation is often viewed as the root of entrepreneurship, a roadmap leading toward sustainable performance and growth of enterprises (Schumpeter, 1932: [tinyurl.com/d5enwwo](http://tinyurl.com/d5enwwo); Davidsson, 2004: [tinyurl.com/cod6ba3](http://tinyurl.com/cod6ba3)). It is widely acknowledged that the stimulation of innovative activity is crucial for the competitive advantage and growth of both companies and regions. In most countries, a broad array of policy instruments that stimulate R&D activities, science, and technology are at hand (Jensen et al., 2007; [tinyurl.com/d2eub63](http://tinyurl.com/d2eub63)).

Although some innovations may be spectacular technological breakthroughs, the bulk of innovation in modern societies consists of relatively small improvements that come from day-to-day learning. This is particular true for small and medium-sized enterprises (SMEs), which constitute the driving force of the economy in the majority of European countries (Bosma and Levi, 2009; [tinyurl.com/chxg3jc](http://tinyurl.com/chxg3jc)). Smaller firms in particular may face difficulties in scaling up their internal innovation efforts to achieve radical innovations. One possible cause may be their lack of internal R&D departments that, in large firms, are able to push innovation throughout the organ-

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ization. SMEs often also have a limited resource base, do not have access to economies of scale, have a small strategic focus, and risk being locked into their present strategy (Schindehutte and Morris, 2009; [tinyurl.com/but24bo](http://tinyurl.com/but24bo)). To overcome these obstacles, SMEs may be forced to adopt an imitation strategy with the danger of being captured in between strategies (Anand et al., 2009; [tinyurl.com/ctn8gnw](http://tinyurl.com/ctn8gnw)). All these factors may hamper innovation and commercialization in this category of firms.

To overcome these challenges, it is useful for SMEs to adopt an open-innovation approach. Open innovation is "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation" (Chesbrough et al., 2006; [tinyurl.com/cp5rdys](http://tinyurl.com/cp5rdys)). At the heart of the open-innovation model is the recognition that today, competitive advantage often comes from inbound as well as from outbound connections. Leveraging inbound connections means leveraging the discoveries of others: companies need not, and indeed should not, rely exclusively on their own R&D. Leveraging outbound open innovation means that, rather than relying entirely on internal paths to market, companies can look for external organizations with business models that are better suited to commercialize a given technology (Chesbrough, 2002; [tinyurl.com/c72zhqt](http://tinyurl.com/c72zhqt)).

Open innovation has received increasing attention in the literature, but so far it has mainly been analyzed in larger enterprises using on in-depth interviews and case studies (van de Vrande et al., 2009; [tinyurl.com/bqgk4t5](http://tinyurl.com/bqgk4t5)). Since its emergence, evidence to support the open-innovation model was taken mainly from the so-called "high-technology" industries, such as computer manufacturing, information technology, and pharmaceuticals (Chesbrough, 2003; [tinyurl.com/d2l6bqx](http://tinyurl.com/d2l6bqx)). However, more recent work by Chesbrough and Growther (2006; [tinyurl.com/4xjse3r](http://tinyurl.com/4xjse3r)) has confirmed the relevance of this approach in more mature industries. In non-high-tech industries, when companies look outside for technologies to extend or defend their core business, they minimize risk by investing in technology that is often proven in other applications, rather than investing in "new to the world" technologies. Using the example of a Norwegian firm operating in the maritime-oil industry, this article shows how the innovative action of an SME may depend on the combined influence of entrepreneurial orientation within the firm and knowledge-providing cooperative links with knowledge providers. Moreover, this article examines the links between open innovation, the entrepreneurial behaviour of SMEs, and firm performance.

## Entrepreneurial Orientation and Open Innovation

For a small firm in a mature industry, the availability of suppliers and customers is often quite stable. However, while this stability has some positive aspects, such as the predictability of demand and a known path of knowledge, it often limits the firm's ability to innovate and to be more proactive. The extent to which firms emphasize open-innovation principles may depend on the entrepreneurial strategy of the firm (Miller, 1983; [tinyurl.com/cus88fa](http://tinyurl.com/cus88fa); 2011: [tinyurl.com/6jjzdkx](http://tinyurl.com/6jjzdkx)). Depending on firm structure, a firm can develop some aspects of the firm's "entrepreneurial orientation". A three-dimensional model of entrepreneurial innovation includes innovativeness, risk-taking, and proactive action (Miller, 1983; [tinyurl.com/cus88fa](http://tinyurl.com/cus88fa); Covin and Slevin, 1991: [tinyurl.com/boxoe7v](http://tinyurl.com/boxoe7v)) and represents a stream of literature that has examined innovation in a consistent way across over 100 studies (Rauch et al., 2009; [tinyurl.com/3kjbwfr](http://tinyurl.com/3kjbwfr)). The entrepreneurial firms may tend to take more risks and be more proactive in searching for new business opportunities, and they may be more willing to take new ideas all the way to commercialization.

Building on the work of these authors, Covin and Slevin (1991; [tinyurl.com/boxoe7v](http://tinyurl.com/boxoe7v)) introduced a scale to describe the strategic posture of firms: "The entrepreneurial-conservation orientation of a firm is demonstrated by the extent to which top managers are inclined to take business-related risks, favor change and innovation... and to compete aggressively with other firms." The conceptual argument suggests that firms benefit from highlighting newness, responsiveness, and a degree of boldness. There is a positive link between firms exhibiting innovativeness, risk-taking, and proactive action, and firm growth and performance (Rauch et al., 2009; [tinyurl.com/3kjbwfr](http://tinyurl.com/3kjbwfr)). Firm performance should be understood as the multidimensional concept that is attributed to firm sales, turnover, market share, growth of employees, and other measures. These results hold up across different nations, industries, and other contextual variables (Iakovleva and Kolvereid, 2005; [tinyurl.com/cbadur8](http://tinyurl.com/cbadur8); Grande et al., 2011: [tinyurl.com/cto9ukj](http://tinyurl.com/cto9ukj)). Revisiting his own research, Miller (2011; [tinyurl.com/6jjzdkx](http://tinyurl.com/6jjzdkx)) pointed out that the degrees of innovativeness, proactiveness, and risk-taking are dependent on the firm structure and type.

Innovativeness (i.e., the ability to introduce new products, services, or processes) is seen as the key element of the entrepreneurial orientation concept. Scholars generally define innovation as the development and

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commercialization of new ideas in organizations manifested in terms of a new product, service, or method of production or a new market, organizational structure, or administrative system (Foss et al., 2011; [tinyurl.com/cs3q8f](http://tinyurl.com/cs3q8f); Damanpour and Wischnevsky, 2006; [tinyurl.com/bqdvcmr](http://tinyurl.com/bqdvcmr)). In his classic treatment on the subject of innovation, Schumpeter (1934; [tinyurl.com/cqcnrfs](http://tinyurl.com/cqcnrfs)) defined innovation as "new combinations" of existing knowledge and resources, arguing that innovation thus defined the source of economic and social change. Without innovative efforts by the entrepreneurial individuals, society would in his view be stagnant. However, the scarcity of resources makes the task of innovation extremely challenging for small firms. A mature environment demands significant effort just to stay "above water" because competition is intense and the available resources often are only just enough to continue the existing lines of products and services. In these circumstances, thinking in terms of open innovation might provide new ways of solving the specific challenges facing a small firm.

As van de Vrande and colleagues (2009; [tinyurl.com/bqgk4t5](http://tinyurl.com/bqgk4t5)) indicate: "Due to labor mobility, abundant venture capital and widely dispersed knowledge across multiple public and private organizations, enterprises can no longer afford to innovate on their own, but rather need to engage in alternative innovation practices". Indeed, recent findings confirm that innovation in SMEs is becoming more open, and many SMEs attempt to benefit from the initiatives and knowledge of their employees. In addition, most SMEs "try to involve their customers in innovation processes by tracking their modifications in products, proactively involving them in market research, etc." (van de Vrande et al., 2009; [tinyurl.com/bqgk4t5](http://tinyurl.com/bqgk4t5)). One may claim that open innovation in SMEs is mainly motivated by market-related targets, since the main problem for small enterprises is not so much invention but commercialization (Gans and Stern, 2003; [tinyurl.com/bnyvk7z](http://tinyurl.com/bnyvk7z)).

Open innovation comprises both outside-in and inside-out movements of technological ideas (Lichtenthaler, 2008; [tinyurl.com/bwvx23w](http://tinyurl.com/bwvx23w)), and we may expect SMEs to rely on both inbound and outbound open innovation simultaneously (van de Vrande et al., 2009; [tinyurl.com/bqgk4t5](http://tinyurl.com/bqgk4t5)). The adoption of open innovation may be sequential, starting with customer involvement, followed by employee involvement and external networking, and ending with more "advanced" practices such as IP licensing, R&D outsourcing, venturing, and external participations (Johannisson, 1996; [tinyurl.com/cwjwoxo](http://tinyurl.com/cwjwoxo); van de Vrande et al., 2009; [tinyurl.com/bqgk4t5](http://tinyurl.com/bqgk4t5)).

### A Case Study from the Norwegian Oil Industry

In order to illustrate the above argument for the implementation of an open-innovation strategy, the following case study of a small company operating in the Norwegian maritime-oil industry, is provided. The oil industry is one of Norway's largest sources of income, and it is characterized by large customers that have strong ties to government and that yield considerable market power. The suppliers are more fragmented in terms of company size and market power (cf. Fagerberg et al., 2009; [tinyurl.com/btv87g9](http://tinyurl.com/btv87g9)), however, new entrants in the industry meet barriers to entry in terms of demands for capital and a high level of risk. The demand for new technology gives an incentive for the larger oil companies to invest in smaller, startup companies. This description applies to the oil industry generally, but also describes the closely related maritime-oil industry, which provides transportation services and supply for the off-shore oil exploration activities.

Product innovation is of extreme importance in the oil industry for several reasons. First, the industry is capital intensive because drilling and exploration activities are costly. In order to maximize the return of each oil field, the licensees collaborate to apply the best technological solutions for extracting the petroleum resources. Second, drilling and exploration take place in increasingly challenging environments, resulting in greater use of unmanned installation and subsea technology and drilling techniques (Fagerberg et al., 2009; [tinyurl.com/bvncmrh](http://tinyurl.com/bvncmrh)). Thus, existing technological solutions approach their technical limits and their cost limits, generating an increasing demand for new technologies. Further, the environmental challenge has received increasing public attention, generating pressures to develop more environmentally friendly technologies. Finally, the demands for increased safety and security are substantial in the sector due to the severe economic, environmental, and social consequences of errors due to technology or processes (Norwegian Petroleum Directorate, 2009; [tinyurl.com/ceykJr](http://tinyurl.com/ceykJr)).

Despite these incentives for innovation, the high levels of risk and cost that characterize the industry cause it to remain conservative in actually employing new technology. This conservatism creates an environment where only a fraction of newly developed technology succeeds in the marketplace. Today, only very large actors can afford to develop innovations in-house. The general trend is toward collaboration between customers and suppliers, sometimes between competitors, in order to develop new, efficient, and money-saving technologies.

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This trend is particularly apparent in the maritime-oil industry. One of the considerable costs associated with oil exploration are the costs of off-shore shipping. For each day off-shore, the costs may reach hundreds of millions of dollars. Oil companies therefore welcome any solutions that might reduce the off-shore time or make shipping more efficient.

### Case details

The case study of this company was performed from 2009 to 2012, allowing us to observe longitudinal changes. This study encompasses semi-structured, in-depth individual interviews to explore the ways in which different actors within a company reflect on their experience with new technology and market challenges. We interviewed a limited number of knowledgeable informants from the company, including the CEO, two engineers, and a business manager. The first interview occurred in 2009; the last one occurred February 2012. Altogether, seven interviews with company representatives were conducted over a four-year period. In addition, we interviewed a business advisor and representative from the region's Chamber of Commerce to obtain an external view on how innovations occur in the maritime-oil industry. The informants were selected to provide inputs from different professional areas, as well as from people with different levels of responsibility and seniority in an attempt to gather and integrate a variety of perspectives. Following Eisenhardt and Graebner (2007; [tinyurl.com/ckek69c](http://tinyurl.com/ckek69c)), it is unlikely that such a varied group of informants engage in retrospective sense-making or impression management. Above all, we followed the firm development through available secondary information, including register information, press releases, and the company's web page.

When the company was created in the late 1980s, the traditional maritime industry in the region experienced a shift toward cooperating with oil industry needs. For approximately 20 years, the company produced off-shore equipment for oil industry ships. The firm therefore had an established market with stable development, and it was mainly relying on its own resources and capabilities to satisfy demand. The company was closely tied to its customers and was dependent upon a few large ones. However, in 2000, the Norwegian oil industry experienced a downshift, which harmed the satellite maritime industry as well. The downshift reduced the demand for the products and services the case company provided, and the company did not allocate any resources to the development of new technologies or products. In 2002, one of the company's engineers come across innovative techno-

logy that held promise for the company. The main technological idea behind the new product was to reduce manual labour operations in the offshore platforms and to produce a robotic solution for connecting pipes.

As mentioned earlier, the offshore industry is quite conservative, and the commercialization of a technological innovation is a daunting task. New products should be compatible with existing technology, and they should satisfy all existing rules and regulations, which are quite strict in this industry. Moreover, this is a "financially heavy" industry, and substantial investment is needed in order to develop any technology. The challenges were further compounded by high levels of competition in the industry at that moment and the lack of available resources for companies to implement "side projects".

The case company overcame the challenges of resource scarcity through the principles of open innovation. Instead of accumulating financial and human resources to implement the innovative idea inside the firm, a daughter company was created to allow this product to be tested. With minimal resources, the firm invited valuable partners to cooperate in the development of the product. The technological idea was inspired by the automobile industry, where robotic solutions are often used for automobile production. Although the key idea belonged to the mother company, trusted suppliers from the automobile industry were invited to join the team and to contribute their expertise with robotic production. Moreover, because the product was to be integrated into existing technology, it was essential – for both technological development and for commercialization purposes – to collaborate with future customers. That is, the future customer's involvement and expertise are what makes this story different from the classical scenario of a spin-off company.

The idea was presented to three major oil-exploration companies in the region, which agreed to participate both financially and by providing their platforms for testing the new equipment. The tacit knowledge, experience exchange, and collaboration with these customers are difficult to overestimate. These collaborative efforts were crucial for the success of new product. The funding gained from the collaboration also allowed the company to work with the best research institutions, both in Norway and abroad, to find the best technological solution. As the CEO of the company said: "We have very good partners... their expertise means a lot for the success for this project. Without trusted partners, it would not be possible to achieve this ambitious goal".



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The new company has only seven employees and about 12 advisors that worked on a contract basis. Above that, the company had access to a significant network through its Board of Directors. The Board of Directors was used strategically to enforce company developments, with different members entering along the company development line. Table 1 outlines the main collaborative partners that have contribute to the overall success of the new produce.

Through all the collaboration and knowledge exchange that were emphasized during the launch of the new product, the company was able to successfully create and commercialize a new and exciting technology. Today, the technology is not yet at a mass-production stage, however, the development of the new products is almost complete and potential customers/partners that were involved into the creation process will most likely become first consumers.

### Conclusion

Over the past decade, both academics and practitioners have increasingly recognized the need for collaboration and knowledge exchange for successful business development. Innovation, which is often claimed to be the driver of success, is too costly and difficult to implement for small firms operating on their own. The challenges are especially large in resource-intensive industries, where huge investments are needed to develop new products. The overview of the literature suggests that the only way to overcome these costs and to stay competitive is by incorporating the principles of open innovation and combining them with entrepreneurially oriented strategies.

Extending this line of thinking, this article argues that firms employing open innovation are releasing risks because they share the expenses that are related to the generation of innovations. As illustrated by the case presented here, the creation and development of a new product was too daunting a task for the small case company. And, for the young spin-off company, it would have been extremely difficult to succeed if they chose to

**Table 1.** Collaborative partners and their contribution

Collaborative partners	Contribution
Consultants	Responsible for concrete tasks related to product development and input of expertise
Board of Directors	Links to financial sector, industry, and potential customers
Three oil companies	Potential customers, basis for testing of equipment, shared knowledge for developing of new product
Research institute in Norway	Improvement of technology
Research institute abroad	New radical solutions

rely on their very limited human and financial resources alone. Inviting collaborative partners, such as potential customers, research institutes, and contractors, allowed them to pool together a more varied and rich base of resources and knowledge. For small firms, which are limited in their resources, access to this valuable pool can be a great argument to enter an open-innovation relationship. This moderately positive attitude toward risk can facilitate the open innovation approach of the firm. The intensity of knowledge transfer should increase with the degree of openness. The firm's overall strategy can either stimulate or decrease the intensity of these processes. For example, a continuous search for market opportunities and experimentation with the potential responses to changing environmental trends might facilitate contacts with universities and research institutes, as well as interactions and links between suppliers, competitors, and internal interactions. From relying on the traditional relationships with suppliers and customers, the strategy may gradually change toward "opening the gates" for both inbound and outbound open innovation. The firm may see the benefit in communicating their knowledge to potential customers and the potential for exchange with external knowledge gatekeepers. Thus, proactive firm behaviour is positively related to degree of open innovation in the firm.

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**Tatiana Iakovleva** is an Associate Professor in the Stavanger School of Business at Stavanger University, Norway. She received Master of Science degrees in Business in Norway (1998) and in Russia (1999), and a PhD in Management (Innovation and Entrepreneurship) from Bode Graduate School of Business, Norway (2007). Dr. Iakovleva's research interests include personal and organizational antecedents leading to innovation and superior entrepreneurial performance, female entrepreneurship, as well as factors affecting entrepreneurial intentions. Dr. Iakovleva has published over 20 articles in international journals and has received multiple best paper awards at entrepreneurship-related conferences. She also does consulting work in relation to firm strategies and entrepreneurial startups.

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