Co-Innovation Supports the Research and Development (R&D) in Small & Medium Enterprises (SMEs)

Samar Hamed Abdel Monsef  
Teaching Assistant at Industrial Product Design Department, Faculty of Design & Creative Arts, Ahram Canadian University, 6th October, Egypt, samarhamed20.sh@gmail.com

Osama Yousef Mohamed  
Professor of Industrial Design, Faculty of Applied Arts, Helwan University, Cairo, Egypt, drosamayousefm@gmail.com

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Co-Innovation Supports the Research and Development (R&D) in Small & Medium Enterprises (SMEs)

Samar Hamed Abdel Monsef\textsuperscript{b}, Osama Yousef Mohamed\textsuperscript{a}

\textsuperscript{a} Professor of Industrial Design, Faculty of Applied Arts, Helwan University, Cairo, Egypt
\textsuperscript{b} Teaching Assistant at Industrial Product Design Department, Faculty of Design & Creative Arts, Ahram Canadian University, 6th October, Cairo, Egypt

Abstract

SMEs are subject to constraints in internal resources such as capital, human resources, and knowledge due to their small size. Also, access to external resources is limited due to market failures. Thus, SMEs have disadvantages in R&D and innovation when compared to larger firms. To overcome these gaps, SMEs should searching for innovative creative mechanisms to conduct R&D activities. Accordingly, this study describes the co-innovation approach, as one of the successful methods of value creation supported by a collaborative process that links the SMEs and external stakeholders in interactive experiences to achieve common goals, shows the importance of adopting Co-innovation networks in SMEs to enable them to deal with new technological and market boundaries and deal with the rapidly changing environment at a lower cost than traditional methods. For Extending the knowledge-based view of the SMEs this study focuses on the different types of R&D collaboration with external stakeholders: universities, suppliers, customers, and competitors, as each type of R&D collaboration differs in terms of the breadth of new knowledge provided to the SMEs, Co-innovation enables SMEs to acquire new complementary knowledge to overcome economic, environmental and societal challenges. The presented case study of the OIS platform shows how co-innovation can be successfully support SMEs to integrate external knowledge into their innovation processes. This study is meant to emphasizing the importance of applying the co-innovation approach to support R&D in SMEs, by establishing mutually collaborative relationships with various stakeholders.

Keywords: Small and medium enterprises (SMEs), Co-innovation, Stakeholders, Co-innovation networks (CoINs), Research and development (R&D)

Introduction

Small & Medium Enterprises (SMEs) face many challenges under the current competitive environment and economic variables, which led to their need to upgrade their products and services, especially with the expansion of the markets and changing methods of competition, as the ability of these SMEs to meet the needs of their customers has become conditional on their ability to innovate. It is difficult to define SMEs, not only with the fact that the definition changes with time but also the definition varies from countries to countries and in different size ranges. SMEs are generally considered to be non-subsidiary, independent enterprises, in our study, we follow the OECD definition of SME, small enterprises
from 10 to 49 employees; medium-sized enterprises between 50 and 249 employees (OECD, 2005).

SMEs face severe constraints in internal resources, due to their small size, such as capital (funding), human resources, and advanced knowledge. In addition to liquidity constraints, SMEs often lack sufficient knowledge and human resources to absorb external knowledge, which is essential for R&D and innovation. SMEs lack complementary assets for innovation (Cockburn and Henderson, 2001; Ceccagnoli et al., 2010). For a long time, innovation was confined in SMEs, and the characteristic of closure has been its related mark, as the internal innovation environment depends on the production of new ideas according to its own capabilities, innovation depends on what SMEs already know rather than what is available in the broader market, new technologies are developed in this model of with limited internal resources, and the return on investment for projects was inherently lower than in modern innovation structures (Wang and Kourouklis, 2012).

And within the framework of the enterprises’ search for innovation, knowledge and expertise wherever Found, Chesbrough pointed out that closed innovation has given way to the emergence of collaborative models of innovation to link the SMEs to its external environment as a source of innovation and new ideas in parallel with internal sources (Chesbrough, 2003). Chesbrough asserts that the economic pressures on innovation driven enterprises towards more open approaches:

“As development costs rise and as product life cycles become shorter, the net result is that companies are finding it harder to justify their innovation investment. [...] Open business models address both effects. It attacks the cost side of the problem by leveraging external research-and-development resources to save time and money in the innovation process Open business models also attack the revenue side” (Chesbrough, 2007, P.24).

Today, with the development of digital technologies: the web as a collaborative network, ease of communication, and the emergence of virtual communities, caused a seismic shift towards the possibility of ever increasing collaborative approaches (Dibley et al., 2012). Collaboration has emerged as the hallmark of innovation and growth in almost all sectors, the forces of collaboration have become a way of thinking, which has changed the way enterprises innovate. Accordingly, in this study the co-innovation was utilized as the logical outcome of social, technological and environmental change, co-innovation a new approach describes how enterprises work with large groups of stakeholders to achieve shared value together for the mutual benefit of all parties involved, co-innovation is defined as:

“The creation and development process that involves many actors outside and within enterprises, working together to generate ideas, concepts, or solutions in the form of a product, process, or service” (Skippari et al., 2017).

In this aspect Bughin et al. (2008) pointed that:

“What facilitates this new approach to innovation is the rise of the Web as a collaborative network. What will drive its adoption by an increasing number of companies is the growing competitive need to uncover many more good ideas for products and to make better and faster use of those ideas.” (Bughin et al., 2008, pp. 112).

Accordingly, R&D collaboration with stakeholders is becoming increasingly important for SMEs, as it provides SMEs with the knowledge it lacks, the stakeholders’ insights have become value in the thinking and development stage, and that R&D always has more to learn from the various stakeholders to drive innovation in SMEs, each type of collaboration provides different types of knowledge (Ahuja, 2000), the co-innovation approach enables SMEs to acquire new complementary knowledge to overcome economic, environmental and societal challenges (Chesbrough, 2006). This study assumes that by applying the co-innovation approach in SMEs, it positively supports R&D and contributes to the development of more new products and services, and solving internal innovation problems faster and more efficiently.

Objectives

This study is meant to emphasizing the importance of applying the co-innovation
approach to support R&D in SMEs, by establishing mutually collaborative relationships with various stakeholders, making the innovation process more open, and expanding in dealing with ideas and innovations, within the framework of SMEs in a new, more collaborative way.

Literature Review

An extensive literature review was carried out, the authors synthesised literature from both academic journals and practitioner sources covering the following areas: Small & Medium Enterprises (SMEs), co-innovation approach, Stakeholders, co-innovation networks (CoINs), research and development (R&D), types of R&D collaboration. This allowed the authors to explore the area of co-innovation, with the aim of generating new insights for SMEs. This study follows the Theoretical method, it is detailed in three phases, as follow:

The first phase describes the co-innovation approach, describes stakeholders, the co-innovation principal elements and the framework of co-innovation.

The second phase focuses on co-innovation networks as a way to build an endless stream of new and innovative ideas, its objectives and benefits for SMEs.

The third phase illustrates the role of R&D, and the transition to collaborative R&D, Types of R&D Collaboration and its impact on the innovation process in SMEs.

The Concept of Co-Innovation

Co-innovation concept is back to the 1990s, co-innovation in the form of partnerships with dynamic SMEs has emerged as a key strategy for delivering corporate innovation and is constantly evolving in line with today's world of business. During the past years, the topic of co-innovation has become the dominant perspective in the innovation literature through the argument that innovations are effectively developed through interaction between different parties of individuals and enterprises (Chesbrough, 2006). Co-Innovation is defined as:

“The activities that organizations use to improve innovation rates and solve problems by more effectively leveraging the diverse ideas and insights of the stakeholders” (Carpenter, 2015).

Stakeholders

According to the international standard that provides guidance on social responsibility ISO 26000 defines stakeholders as:

“An individual or group that has an interest in any decision or activity of an organization, whether internally or externally” (ISO, 2010).

And recognition of the social responsibility of enterprises includes recognizing the roles of stakeholders in the process of creating solutions and new ideas. According to the American Society for Quality, stakeholders can be classified as internal and external (ASQ, 2021), as shown in “Fig. 1”. Internal Stakeholders are those parties, individual or group that participates in the management of the enterprise, they can influence and can be influenced by the success or failure in the enterprise, they are also called primary stakeholders, such as owners, shareholders, managerial, and non-managerial employees. External Stakeholders are those interested parties, who are not a part of the management, but they indirectly affected by the work of the enterprise, they are the external parties that are part of the business environment, they deal with the enterprise externally through the products and services it provides, and they have no idea about the internal affairs of the enterprise, they are also called Secondary Stakeholders, such as customers, suppliers, government agencies, external investors, research institutes, universities, and communities.

Objectives of Co-Innovation

SMEs committed to co-innovation pursue several specific goals that can be grouped in three major groups: enabling knowledge creation and new product designs, improved efficiency of the production processes, ad reduction of time-to-market (Skippari et al., 2017).
Co-Innovation Principal Elements

There are five principal elements within the idea of co-innovation: collaboration, coordination, convergence, complementarity, co-creation (World Economic Forum, 2015). Then it will be continued with the framework of the five co-s of co-innovation.

Collaboration
Collaboration refers to the multi-actors active collaborative actions with each distinct characteristics and resources (Bitzer and Bijman, 2015). Collaboration is meant to diminish boundaries between enterprises and the outsiders, making the innovation open by involving not only internal but also external sources (Chesbrough, 2006).

Coordination
Coordination is defined as the mechanisms through which people, technology, and other resources are combined to carry out the activities required to attain project goals (Zigurs et al., 2008). The enterprise must coordinate and ensure that everyone involved in the innovation process is directing it and using it completely at the same time towards a specific direction and goal.

Convergence
The notion of convergence by Lee et al. is therefore indispensable, they noted that Value-focused innovations demand convergent thinking (Lee et al., 2012, P. 817). Vesterberg demonstrated that:

“the idea of co-innovation must be directed towards a specific purpose, All the resources and capabilities possessed by the various actors in the innovation process must be mentioned, the technical, organizational and institutional process must be arranged in a complementary manner to achieve the desired goals” (Vesterberg, 2014).

Complementarity
Complementarity between technological, institutional, organizational resources and capabilities shall be incorporated properly. Technological capability refers to the enterprises’ ability in managing existing and potential technology; institutional capabilities relates to the formal governance and norms applied and constituted by the enterprise as well as its external stakeholder; lastly, organizational capability refers to the enterprises’ ability in managing the enterprises’ organizational culture and behavior, Where those aspects, if properly exploited, can lead to a unique value.
proposition in the marketplace, it may not always be rooted in technological resources and capabilities; Rather, it was created out of organizational and institutional capabilities (Bitzer and Bijman, 2015).

Co-creation

Co-creation refers to the process by which products, services and experiences are jointly developed by enterprises, their partners and the final consumer, leading to a new space where the value created would be shared (Nedra, 2018). As this aspect plays an important role in the co-innovation process, as explained by Romero & Molina, and they stated that the ability of enterprises to manage costs, quality and response time to gain competitive advantage. Maintaining them will still be required (Romero and Molina, 2011). However in today's era it is critical for enterprises to learn and acquire new capabilities to create shared value with partners (Vargo and Lusch, 2004).

A Framework of Co-Innovation

The co-innovation framework consists of three stages, as shown in “Fig. 2”.

Stage 1: Collaboration & Co-creation

The first stage represents a model of collaborating actors who are no longer isolated but integrated as a collective group of players to co-innovate value, given these contributors with diverse needs, opinions, and motives, coordination mechanisms and converging objectives must be stated and discussed collectively. Thus, contributing actors can come up with the necessary agreements and policies that they may need along the collaborative processes.

Stage 2: Coordination and Convergence

It is completed on the second stage, and emphasizes that collaborators must be able to direct their complementary resources and capabilities in terms of technology and institutional and organizational capabilities - in a coordinated and convergent manner.

Stage 3: Outcomes of Co-Innovation

Finally, the five possible outcomes of co-innovation: new products or services, new business model, new customer base, new customer value, or new effective value chain. Co-innovation can result in all of the five aspects if not one or two (Lee et al., 2012).

Co-Innovation Networks (CoINs)

CoINs is a social construct with a huge potential for innovation, it has been defined by the originator of the term, Peter Gloor from MIT Sloan's Center for Collective Intelligence as: “A cyberteam of self-motivated people with a collective vision, enabled by the Web to collaborate in achieving a common goal by sharing ideas, information, and work”. (Gloor, 2006).

CoINs constitute a virtual ecosystem that can be used as a platform for interaction between SMEs and the various stakeholders directly, and has enabled them to benefit from the stakeholder's creativity and ideas to develop and deliver innovative products and services together, this is a way to build an endless stream of new product ideas (Song et al., 2019).

Co-Innovation Networks Characteristics

According to Gloor (2006) CoINs have 5 main characteristics:

Dispersed Membership: Technology allows members to participate from all over the world apart from spatial considerations, members share a common goal and are convinced of their common cause.

Interdependent Membership: collaboration between members is key to achieve common goal, the work of one member is affected and interdependent on the others' work.

No simple chain of command: there is no superior command, it is a decentralized and self-organized system. Conflicts are solved without the need of a hierarchy or authority.

Work towards a common goal: Members are willing to contribute, work and share freely, coming together with a common vision, They are intrinsically motivated to donate their work and
seek to collaborate, create and share knowledge for the benefit of a common goal.
Dependence on trust: collaborative behavior and mutual trust is needed to work efficiently within the network. Members act accordingly to an ethical code that states the rules and principles to be followed by all members.

**Co-Innovation Networks Objectives**

CoINs aim to provide online R&D services more efficiently away from spatial considerations, presents many competitive advantages to the participating enterprises, which can reduce the transaction costs in R&D and promote the sharing of innovation resources, knowledge transfer, and technology diffusion among SMEs, stakeholders and related fields (Murray, 2002; Agrawal and Henderson, 2009). CoINs aim to connect the SMEs (problem owners) to the various stakeholders directly (problem solvers), as the SMEs can poses specific challenges to obtain ideas and creative solutions to the questions of developing products and services, or even improving customer experience, as shown in “Fig. 3”.

**Importance of Co-Innovation Networks**

CoINs support continuous improvement, ideas management, and innovation management, enhance the co-innovation process and are an integral part of the innovation culture.
CoINs allow providing different perspectives on innovation development, presenting and evaluating new innovative idea, and transferring new discoveries and ideas faster to the enterprise to meet current innovation challenges.
Early participation of all stakeholders in the process of innovation and development, forming long-term relationships with them,
increasing their confidence that new technologies respond to societal needs and values.

Research & Development (R&D)

According to Frascati Manual R&D is defined as: “creative work undertaken on a systematic basis in order to increase the stock of knowledge ... and the use of this stock of knowledge to devise ... new materials, products, or devices ... new processes systems and services, or ... improving substantially those already produced or installed” (OECD, 2015).

R&D Collaboration

R&D collaborations provide the SMEs with the knowledge it lacks, by integrating external knowledge with internal innovation to enhance the co-innovation performance in SMEs as shown in “Fig. 4”.

Each type of collaboration provides different types of knowledge because no SMEs is able to provide all the knowledge needed for its R&D activities on its own (Ahuja, 2000) the SMEs can establish many R&D collaborations at the same time, Which can be useful for access to a larger body of knowledge (Faems et al., 2005). Collaboration have a greater chance of success much more when both parties have clear objectives, linked to a well-thought-out business case that shows how value can be captured and delivered to the relevant partners. The R&D management literature basically distinguishes between science-based and market-based types of R&D collaboration, as shown in “Fig. 5” (Belderbos et al., 2004; Du et al., 2014).

Science-based R&D Collaboration

Science-based R&D collaborations enable access to fundamental research when enterprises need to solve technical or design-related problems, re-orient R&D and develop new products (Lee, 2000). They support the exploration of new markets, provide inputs from the
technological frontier, and help to achieve product innovations (Belderbos et al., 2004). Collaboration with universities and Public research organizations (PROs) deliver new knowledge from the technological frontier in multidisciplinary areas (Miotti and Sachwald, 2003), Universities target exploratory knowledge creation with a long-term (Giannopoulou et al., 2019), PROs are highly specialized in technical fields and mainly intend to commercialize products developed in the R&D process (Readman et al., 2018).

**R&D Collaboration with Universities**

Tether suggests that Collaboration with universities generally aim at breakthrough product innovations that may open entirely new markets or new market segments (Tether, 2002). On the other hand, Monjon and Waelbroeck found that: the presence of multiple disciplines within the university provides a wide range of knowledge in areas that do not usually coexist in other enterprises, which makes it easier to obtain new knowledge to improve their activities (Monjon and Waelbroeck, 2003).

**Market-based R&D Collaboration**

Market-based R&D collaborations, suppliers are integrated in the upstream part, competitors belong to the core part, and customers are positioned in the downstream part of an industry (Stephan et al., 2017). While suppliers deliver components for integration into a market-related core product, customers bring the core product into a usage context (Miotti and Sachwald, 2003). Competitors, in contrast, produce similar core products (Hamel et al., 1989).

**R&D Collaboration with Suppliers**

R&D collaboration with suppliers provides new knowledge that is useful for innovation activities, as suppliers are represent part of a dynamic network, suppliers expand the manufacturer’s strategic vision and technical knowledge by highlighting potential blind
spots and opening new opportunities that may The SMEs does not realize it without an additional external perspective. They understand customer needs and different aspects of a purchasing decision that the manufacturer may not experience every day. Suppliers can recommend innovations to certain manufacturing processes to improve manufacturability and increase efficiency, by working intimately with other enterprises in the industry, suppliers also acquire knowledge about best practices used in other firms compared with industry standards, as a result, suppliers can help the enterprise identify best practices and decontextualize them to match its processes in need of innovation without revealing the sources of these practices, especially because the way these practices work tends to be tacit and ambiguous. Finally, the closer relationship between suppliers and the enterprise enables the integration of enterprise-specific tacit knowledge and external knowledge of best practices. Suppliers participation can also help the enterprise gain new efficiencies, share risks, transition faster to new markets, and conserve resources, through process innovation (Hagedoorn, 1995).

R&D Collaboration with Competitors

Competitors are close in contextual knowledge distance to the enterprise, Competitors belong to the same industry as the enterprise (Tsai et al., 2011). Best practices developed and held by the competitors therefore can be quite relevant and potentially useful to the enterprise, if obtained (Murtha et al., 2001). Although an enterprise and its competitors may have different knowledge bases due to differences in their resources and how they use those resources, these knowledge bases are still relatively similar because they are designed to meet similar customer needs (Knudsen, 2007). Which does not mean that an enterprise does not can learn from its competitors conversely, some processes of collaboration with competitors are designed with learning in mind, collaboration with competitors may be useful for initiating joint ventures to provide innovative products and services, coordinate actions, increase investment and reduce risk (Brandenburger and Nalebuff, 1996). The objective behind collaborating with competitors is the need to share R&D costs.

R&D Collaboration with Customers

R&D collaboration with customers can provide the SMEs with extensive knowledge, and support innovation of products and services (Un and Asakawa, 2015), as enterprises have a huge range of customers can benefit from by posing challenges to obtain ideas and creative solutions, as an enterprise’s customer base is a rich source of information not only for complaints but also for improvements, customers participate in all stages of the innovation and development process, and real-time feedback during development reduces misunderstandings, as customers have knowledge about their unfulfilled preferences and needs, which leads to a better understanding of enterprises of their actual needs, and provides opportunities to create innovations by accessing a wide and more diverse range of ideas, solutions, observations and viewpoints, which in turn is a very cost effective form of market research, and validation of lessons learned from formal market research. The result is new products and services that reflect the way real consumers think and ensure a richer value proposition for each development, and help R&D avoid wasting time and costly changes to orders later in the development process (Koufteros et al., 2005), co-innovation with customers drives increased marketing and the development of an enterprise’s brand ambassadors, both of which are essential in today’s online reputation management world. Cohen, Nelson and Walsh found that:

“90% of enterprises they studied indicated that knowledge provided by customers contributed to the initiation of the enterprise’s new R&D projects, in addition to collaborating with customers to identify their needs and preferences, these R&D collaborations can be useful for identifying ways to fulfill these needs and wishes” (Cohen et al., 2002).

According to Un et al. (2010) The final goal of co-innovation is:

“Define a solution that provides customers with better experiences, and also to find ways to include customers where they haven’t been invited in the past,
where the customer’s voice is heard in the process before the usual process of waiting for survey results, and customers benefit from being included in ways that help them feel heard and part From the community”. (Un et al., 2010).

The Derived Value from Co-Innovation

The literature reveals that value is gained from co-innovation in a range of different ways. Firstly, as new ideas and fresh perspectives come from a range of parties, this can lead to a new kind of stronger innovation. This collaborative approach can deliver a range of valuable results: an increased pipeline of better ideas, reduced risk, increased quality and speed to market, reduced costs, new skills, competences, resources and relationship assets, enhanced brand image, strength and influence, and the ability to create value for the common good (Dibley et al., 2012).

Challenges of Co-Innovation in SMEs

SMEs are expected to gain most from co-innovation due to their inherently limited capabilities (Lee et al., 2010). However, these enterprises also face manifold challenges in co-innovation practice, leading to uncertainty and even renunciation of co-innovation project participation. Thus, SMEs often deal with the decision dilemma of having to cooperate with external partners in order to improve their own innovation capacity, regardless of their ability to cope with the correlated risks. Although it is essential for SMEs to find the right balance between positive effects and possible negative consequences of co-innovation project participation (Huizingh, 2011).

Equity in utilizing R&D results: because co-innovation is a form of partnership between various stakeholders and other enterprises, the success of which requires fair distribution of results, which means the need to put in place mechanisms to ensure that all parties benefit from the results of research and development, each according to its contribution, regardless of its size.

Establishing trust: trust is a critical factor in the success of partnerships, without which innovation will fail from its inception, which requires each party to commit a cooperative behavior away from all suspicion to monopolize the results of co-innovation, and raises trepidation among the rest of the participants.

Find partners: finding the right partner is an essential point for all enterprises, regardless of their size, type of activity, and type of partnership field, including co-innovation. If this challenge is bypassed implicitly, it guarantees overcoming previous challenges, as it ensures enterprises share research and development results, maintain their independence, and establish trust (Grivot, 2017).

Case Study: this study analyzes how hurdles for SMEs can be overcome by a collaborative innovation intermediary based on the case of a regional open innovation platform for SMEs.

Open Innovation South Tyrol (OIS Platform)

OIS Platform is an innovation initiative for SMEs, established in 2012 by the LVH, the South Tyrolean national association for craftsmen. The objective is to support SMEs in their innovation efforts by providing an online co-innovation platform and consultancy services for innovation implementation. The target enterprises of the initiative are small South Tyrolean companies. The OIS initiative aims to support and facilitate the innovation attempts and thus to improve the innovative capacity and the commercial success of the SMEs by: (1) developing a social software based co-innovation platform and granting access to SMEs; (2) the opening of innovation processes of the SMEs to integrate external ideas, solutions, products, and technologies; and (3) the global distribution of regional products and services. The OIS initiative seeks to support the SMEs in four innovation process phases: (1) idea generation and evaluation; (2) idea selection and concept elaboration; (3) development and prototyping; and (4) production and market introduction as shown in “Fig. 6”. The OIS initiative offers two services to foster the innovation activities of SMEs. First, an online innovation contest community platform supports the first two phases of the innovation process, which is the primarily focus of this case study. A second service is a brick-and-mortar laboratory, which supports the SMEs in rapid prototyping,
material investigation, computer simulations, and offline workshops (LVH, 2013).

A core element of the OIS initiative is the virtual innovation contest community platform. Prior to the development of the online platform, an analysis of the innovation activities of the South Tyrolean SMEs was conducted. The results provided insights on the SMEs’ requirements, needs, challenges, and barriers regarding their innovation efforts. These findings were considered in the development of the new virtual innovation platform to fit the specific conditions. The OIS platform allows regional SMEs to present an innovation challenge or innovation related problem in the form of competitions to a community of external individuals. The platform facilitates several objectives at the same time for all involved parties:

- Collective development of creative ideas and innovative concepts by utilizing external parties and external knowledge.
- Ideas and discussions providing valuable insights about consumer needs.
- New innovation projects can be initiated but also existing innovation projects can be further developed and continued.
- Company profiles on the platform enabling the emergence and maintenance of networks between the enterprises and a transfer of knowledge since companies can collaborate, exchange information, and present themselves.
- New customers can be contacted or existing contacts deepened since the initiative is construed to gain attention and marketing for all involved parties, and the OIS project aims to initiate collaborations and the exploitation of new markets (Hutter et al., 2013).

Each competition is set up and supervised by the open co-innovation intermediary (LVH), consisting of a team of experts in the open co-innovation field. The OIS platform is based on three central components: the community, the contests, and a market place as shown in “Fig. 7”.

The OIS Contests and Contributions

The OIS platform offers the possibility to launch three different types of innovation competitions depending on the SMEs’ intention:

**Problem Solving Contests**

In this case the OIS community is confronted with a particular problem the company is facing in its daily business. The objective is to find a fast solution and to generate solutions for the problem by combining and concentrating on interdisciplinary knowledge.

**Product Development Contests**

The community is used to transfer incipient ideas into real product concepts. In addition to the interdisciplinary knowledge of the community, the know-how concerning technologies, materials, the market and a comprehension of customer needs is required.

**Market and Marketing Contests**

These types of contests aim to support SMEs in the key market definition and marketing of new products with assistance of the community since a new or finalized product does not guarantee success in the market. Thus, challenges for the community might be to identify or define the key markets of a product, or to develop new and innovative positioning, marketing and sales strategies.

So far, ten contests have been conducted for regional SMEs on the OIS platform. Typically, a contest runs about five to twelve weeks, depending on the complexity and the scope of the innovation challenge. The contests strongly vary in their subjects (see Table 1). To show details for some contests (Lampel et al., 2012). After each competition, the submitted ideas and designs are evaluated by a jury of experts.
from inside and outside the sponsoring company. The selected contributions are rewarded with monetary and/or non-monetary prizes. In this selection process of the jury, the community evaluation is taken into account and helps to handle the large amount of contributions.

Table 1. Some of OIS contest subjects and the corresponding sponsoring SMEs. Source: Hutter et al., 2011.

<table>
<thead>
<tr>
<th>No.</th>
<th>Contest Subject</th>
<th>Duration (Weeks)</th>
<th>Sponsoring SMEs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Design: Souvenirs made of wood.</td>
<td>8</td>
<td>Hofer Heinrich KG (Carpentry)</td>
</tr>
<tr>
<td>2</td>
<td>Packaging and branding: Concepts for MoCem.</td>
<td>12</td>
<td>Moling Alberto GmbH (Painting)</td>
</tr>
<tr>
<td>3</td>
<td>Packaging and branding: Egg seeks new packaging.</td>
<td>5</td>
<td>Buchhütterhof (Barnyard)</td>
</tr>
<tr>
<td>4</td>
<td>Design: Design the new Elektra outside LED luminaire.</td>
<td>6</td>
<td>Elektra GmbH (Electronics)</td>
</tr>
<tr>
<td>5</td>
<td>Conceptual: Identify fields of application of multifunctional drones.</td>
<td>6</td>
<td>SoLeon GmbH (Technology)</td>
</tr>
<tr>
<td>6</td>
<td>Packaging: Seeking for an innovative cookie packaging.</td>
<td>5</td>
<td>Bäckerei Moser KG (Bakery)</td>
</tr>
</tbody>
</table>

Fig. 7. The starting page of the OIS innovation platform. Source: Kathan et al. (2014).
Further, the community evaluations provide insights on the popularity of contributions and thus might offer great market potential for the SMEs.

The first contest on the platform, “Souvenirs made of wood” was launched in May 2012 and was open for submissions for eight weeks. The objective of the contest was to develop innovative ideas and creative designs for modern and high-quality souvenirs made of wood. The sponsor of the contest was the South Tyrolean carpentry Heinrich Hofer KG, which employs 30 people. Since the material wood was the main focus of the contest, a precondition for the submission was that the ideas include wood in any form, preferably sustainable and regional. A sales price of maximum €50 and a maximum weight of the final product that can be carried home by any person were further preconditions of the demanded product idea. The community was called to submit their ideas in the form of graphics, design, drawings, or photos. In this first OIS contest, 298 ideas were submitted. 346 participants joined the contest and evaluated the ideas 1672 times. The innovators seized the opportunity to discuss the ideas and contributed 691 comments. A jury consisting of five members, including the SMEs’ CEO, selected three winning concepts, which were prototyped and produced and sold by the sponsoring carpentry (Hutter et al., 2011).

The OIS Marketplace

The OIS marketplace section of the platform is intended to serve as an interface for companies’ and users’ concerns, requests, questions, and offers regarding innovation topics. On the marketplace ideas, services, and products can be searched and offered easily by both the private as well as by the company users. Hence, many different small innovation challenges can be set up by the community members on their own. For instance, questions regarding materials, experts, cooperation partners, or little technical problems and challenges can be posted. On the other hand, users’ own skills, interests, possibilities for co-operations, or technologies can be presented (Kathan et al., 2014).

Discussion

This study aims to shed light on the impact of co-innovation approach on SMEs. Following the extant literature, co-innovation approach consists of five pillars: collaboration, coordination, convergence, complementarity, co-creation. SMEs committed to co-innovation pursue several specific goals that can be grouped in three major groups: enabling knowledge creation and new product designs, improved efficiency of the production processes, ad reduction of time-to-market. Co-innovation is an ideal approach for SMEs as the co-innovation group acts as a market research group, and a wide and more diverse range of ideas, solutions, observations and perspectives are accessed and it is a very cost effective form of market research, and will enable the SMEs to ensure that they offer the right content, and develop the product according to market needs. R&D collaboration will provide SMEs with the knowledge it lacks, and enables SMEs to acquire new complementary knowledge. SMEs will become more innovative if co-innovation networks are adopted, as they support continuous improvement, management of ideas, uncover hidden business opportunities, reduce costs, and transfer new discoveries and ideas faster to the SMEs to meet the current innovation challenges and develop its products and markets locally and even globally. Because co-innovation is the exchange of ideas between inside and outside and finding internal and external paths for marketing, in which SMEs have the ability to enter new markets, including international markets, and at the same time in the market for external competition that contributes to the development of the local and national market.

Conclusion

In this study, we have presented the co-innovation as an ideal approach for SMEs, the importance of co-innovation networks in SMEs to enable them to deal with new technological and market boundaries and deal with the rapidly changing environment, which in turn supports the various collaborative activities and
increases their effectiveness away from spatial considerations, and transferring new discoveries and ideas faster to the SMEs to meet the current innovation challenges at a lower cost than traditional methods. And types of External R&D collaboration to overcome the problems of internal innovation, especially with the lack of human resources, and advanced knowledge, in addition to liquidity constraints.

This study assumes that by applying the co-innovation approach in SMEs, it positively supports R&D and contributes to the development of more new products and services, and solving internal innovation problems faster and more efficiently. Through the previous submitting, we find that Co-innovation positively supports SMEs, it enables SMEs to acquire new complementary knowledge if it is adopted, and it will enable SMEs to survive in the market, as the co-innovation offers several advantages for SMEs such as: an increased pipeline of better ideas, reduced risk, increased quality and speed to market, reduced costs, new skills, competences, resources and relationship assets, enhanced brand image, strength and influence, and the ability to create value for the common good, improving financial performance, expanding intellectual resources, strategic vision and technical knowledge of SMEs, and the possibility of expansion and entry to new markets and opening new opportunities that the SMEs may not realize without an external perspective, exploration of new technological knowledge. Moreover, it reduces transaction and contract costs and allows for risk sharing when conducting joint R&D activities, and facilitates entry into new R&D collaborations.

The presented case study of the OIS platform shows how co-innovation can be successfully support SMEs to integrate external knowledge into their innovation processes. OIS Platform can close the SMEs’ gaps of expertise and knowledge regarding the implementation and operationalization of open innovation contest communities. Time and resources are the most important constraints of SMEs in open innovation. SMEs can continue to focus on their core competencies and daily business whilst the specialized intermediary (including the central and virtual innovation platform) manages the co-innovation initiative. The presented concept is in line with the intermediated network concept by Lee et al. (2010) who proposed involving intermediaries and networks to facilitate the co-innovation capability of SMEs.

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