

InnTense DESIGN OPTION PAPER

Development of new approach for supporting the application of Open innovation in SMEs through the Peer-to-Peer learning

Work Package No.: 2

Deliverable No.: 2.5

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Date: 29.03.2019



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Preface

The 21st century's companies are obliged to modify their traditional way of dealing and making business. Breakthrough innovations will impact like never before on the way we do business and it will also arrive to touch the sectors and the workers that, until few years ago, we thought were unreachable. Block-chain, 3D printing technologies, Cloud, Internet of Things (IoT) and Internet of Space (IoS), Industry 4.0 are changing the life of the citizens and of the SMEs' way of doing business by modifying radically our way to live. This technological trend must be faced by the SMEs, which in front of this challenge are obliged to radically innovate their business model, because "business as usual" is anticipated as not sustainable anymore. Thus, those researches on new models of running business and innovation bring to the adoption of new paradigms to accelerate the SMEs' innovation path.

One of the building blocks toward the full understanding of the innovation route is related to the larger framework defined by the Innovation system. In here, we describe the relations between actors of the different levels of economy¹ (Casaramona A, Sapia A, Soraci A, 2015). For an effective innovation system, it is crucial that all "parts" of the system - policy makers (those that set the framework conditions on which innovation can develop), innovation supporters (those that support research and development activity) and innovation producers (those that invent, build and sell) - cooperate, communicate, create, exchange and transfer knowledge as well as support dissemination and market penetration of new products and services. Europe's future is now connected to its power to innovate. *The innovation union, an action-packed initiative for an innovation-friendly Europe, seems to be the solution. It forms part of the Europe 2020 strategy that aims to create smart, sustainable and inclusive growth*² (EC, 2013). To contribute to this growth, the European summit in Lisbon in 2000, defined the support for innovation as the cornerstone for promoting the economic growth of the member states. *In order to raise living standards over the coming years, the Union should become a world reference for innovation*³ (Capellari S., Franco Angeli, 2006). On the track of the Lisbon's strategy in March 2010, the EU's Europe 2020 Strategy for smart, sustainable and inclusive growth was launched by the European Commission and it was approved by the Heads of States and Governments of EU countries in June 2010. Correspondingly, according to the scholars, there is a strong link between the concept of innovation and the role of the entrepreneur, with its structures firms, as trade unions, family farms, cooperatives, firms, industries, and Innovation system (university vocational training centres, Centres of Research and Development).

The term Open innovation refers to the active opening of innovation processes to the outside world. Open innovation is a paradigm that specifically integrates external partners and communities, i.e. external ideas into innovation processes. So far, Open innovation has been very well embedded in the innovation strategies by many large corporations. This trend is often motivated by market-related arguments, such as meeting customer demands or driven by needs such as collecting new ideas/knowledge, improving innovative performances, securing continuous growth and financial security. Alike, smaller businesses are still facing a spectrum of specific challenges when accepting and implementing Open innovation model. As the Open innovation strategies are considered to have a deciding role in a company's competitiveness,⁴ it is of high importance to promote and introduce this concept in SMEs, simultaneously creating the

¹ Casaramona A, Sapia A, Soraci A (2015) How TOI and the Quadruple and Quintuple Helix Innovation System Can Support the Development of a New Model of International Cooperation, *J Knowl Econ* 6:505–521

² European Commission (2013) *L'union dell'innovazione; Lussemburgo*

³ Capellari S., Franco Angeli (2006) *Ricerca, Innovazione e Territorio*

⁴ <https://www.steinbeis-europa.de/en/sectors-projects/open-innovation.html>

Quadruple Helix innovation ecosystem - government, industry/business sector, academia and civil participants working together to co-create the future and drive the structural changes.⁵

1. Introduction

1.1. Justification on the paper

This Design Option Paper is the main result of the InnTense Project – “Development of new approach for supporting the application of the Open innovation in SMEs through the Peer-to-Peer learning”. The central objective of the Project was to develop the recommendations for the organizations responsible for designing and applying the innovation support programmes and policies especially designated to the Small and Medium Enterprises (SMEs). Furthermore, the business environment institutions that provide the services dedicated to the SMEs (Innovation, National/Regional development agencies) have also been considered. The provided recommendations are aimed to facilitate the improvement of the innovation support system for SMEs in general and to make the services offered to the SMEs more effective and accessible.

In the first part, the document is giving the hypothetical outline related to the innovation processes in SMEs, focusing on Open innovation. The second part of the document is dealing with the results of the practical work implemented during the InnTense project - status quo analysis in the Partner regions, description of the identified challenges and solutions propositions. The final part is relating to recommendations aimed to the main stakeholders that this document is oriented to – Innovation support agencies and Regional authorities, which are designing and implementation innovation support programs for SMEs and lessons learned by the implementation of the InnTense project.

1.2. About the InnTense Project

Recognizing the importance of redirecting towards the new business options by SMEs and simultaneously aiming at enhancing the design and application of incentives which are supporting the implementation of Open innovation models by SMEs, the main objective of the InnTense Project was to (1) to explore current trends in application of Open innovation models by SMEs and (2) to provide the recommendations for facilitating the application of the innovation support programmes for SMEs, offered by decision-makers, responsible for the creation of policies to support innovation.

In this scope, InnTense Project partners analyzed, assessed and document the current state, factors, drivers, hindrances and benefits for the application of the Open innovation model in SMEs, aiming at reinforcement of the SMEs innovation capacities. Simultaneously, by the application of the Twinning Advanced methodology,⁶ three Innovation Agencies produced the recommendation for the national /regional authorities' responsible designing the innovation support programs and facilitated the establishment of the permanent learning instrument for Innovation support agencies.

⁵ <https://ec.europa.eu/digital-single-market/en/open-innovation-20>

⁶ For more information on Twinning Advance Methodology, please see Paragraph 1.4

1.3. InnTense Project Consortium

Steinbeis-Europa-Zentrum – Germany

Steinbeis-Europa-Zentrum of the Steinbeis Innovation gGmbH (SEZ), belongs to the Steinbeis Foundation for Economic Promotion. The Foundation runs approximately 1.000 so-called “Technology Transfer Centres” mainly in Baden-Württemberg, but also in other regions in Germany and Europe. The Technology Transfer Centres are mostly attached to research organisations in order to guarantee close connection between R&D and industry. More than 3.000 researchers, consultants and engineers carry out more than 20.000 contracts per year to improve strategy, product and process development of companies. SEZ was founded in March 1990 and has been a member of the European network of Innovation Relay Centres (IRC) since 1995 and head of the IRC consortium responsible for Baden-Württemberg, Thuringia and North of Switzerland. SEZ is a member of the Enterprise Europe Network (EEN) since 2008 with close to 600 participating organisations in over 50 countries, and is a reliable and experienced partner in the network for European technology transfer, promotion of exploitable European research results and innovation capacity building. For several years, SEZ has been the Contact Point (CP) for SMEs in the region of Baden Württemberg. The core activities of Steinbeis-Europa-Zentrum are assistance for organisations to participate in European R&D projects, support of the management of international research projects, assistance in the exploitation of research results, promotion of trans-national technology transfer, stimulation and support of the innovation process in industrial companies and provision of professional training. SEZ also has a lot of experience in the organisation of workshops, conferences and brokerage events for technology transfer, as well as in finding partners for RTD-proposals. SEZ was involved in more than 50 European funded projects in the last years.

Business Innovation Centre s.r.l. - Italy

Innova BIC s.r.l was established in December 1994 on the initiative of DGXVI in the field of a Community programme actuating “European Centres of enterprise and innovation” (CEII or Business Innovation centre). Its shareholders are the Municipality of Messina, the University of Messina and the Provincial administration of Messina. Innova BIC represents the interface between productive and social world, local authorities and research institutions, facilitating dialogue and the local development. In addition, it acts as link between the local context and local industries and the foreign markets, fostering the internationalization of the local economy and the attraction of investments. Innova BIC is an organization specialized in technology transfer and in the support of S&T policies, in particular in the Mediterranean Area. Innova BIC acts as an agency for the development of the territories through training, project management, strategic consultancy, etc. Innova BIC has an extensive background in European Programme on energy, water treatment and transport fields. In particular, in the FP7 and H2020, it was project coordinator of ETRERA_2020 (www.etrera2020.eu) & InnoMedia (www.innomediaproject.eu) and partner in several projects, such as 5TOI_4EWAS (www.5TOI.eu), FP4BATIW project (www.fp4batiw.eu), the BILAT EU-TUNISIA FETRIC (www.fetric.eu), FrontierCities and frontierCities2 projects (www.fi-frontiercities.eu & frontierCities2) and relevant projects such as ERECI under EuropeAid and CERTUS project by Intelligent Energy Efficiency Programme. Innova BIC is also involved in Regional and National Programmes aiming to enhance entrepreneurial skills and local development.

Croatian Chamber of Economy – Croatia

The Croatian Chamber of Economy (CCE) is an independent professional and business organization for all legal entities engaging in business within the Republic of Croatia. It was established in 1852, organized along European tradition lines as an institution which represents Croatian economic interests and on the so-called continental Chamber system, with compulsory membership. The Headquarters are located in Zagreb, while the entire territory of Croatia is covered by regional (county) chambers, under the scope of the headquarters in Zagreb. The CCE covers all industry sectors, from trade to metal production, tourism, energy and so on. Based on that, the CCE has the largest database of information about Croatian economy. Furthermore, in addition to its own database, the CCE co-operates with the database of the Commercial Court, Financial Agency, Tax Administration, Central Bureau of Statistics and with companies. In this manner the CCE has been entrusted to: promote Croatian economy; organize a continuous process of professional and business education; work upgrade and general business of member companies, all of it in order to accomplish higher grade of members' competitiveness; expand the network of economic representations abroad; offer assistance in the process of selection and professional training of commercial attachés and economic advisors and support competitiveness of Croatian economy.

Along with it, the cooperation between CCE and Croatian universities is continuously harmonizing economic needs with the labour market. Their aim is to establish a strong connection between the economy and academic community, thus they continue to advocate the implementation of the system of dual education in Croatia.

Centre for Industrial development (CIRAZ), as a organizational unit within CCE, is in the cooperation with Ministry of Economy, entrepreneurship, and crafts as a partner institution in charge for implementation activities of three major national strategies in the field of business sector competitiveness: Smart Specialization Strategy (S3), Industrial Strategy, and Innovation Encouragement Strategy. Implementation of mentioned strategies is carried through 2 strategic projects financed from Regional Development Funds (1) Strategic project for support of cluster competitiveness initiatives and (2) Strategic project for support of the establishment of Innovation network for industry and thematic innovation platforms.

The overall objective of the Strategic project for support of cluster competitiveness initiatives is to contribute to the increase of competitiveness and specialization of Croatian economy according to Smart Specialization Strategy, its transformation and structural changes of the economy, and to encourage commercialization of innovations and internationalization of business sector through smart skills strengthening. One of the main activities within the project is strategic analysis and evaluation of the competitiveness of Croatian economy within global value and supply chain in order to identify specific niches and markets with the objective of a proactive approach to attain foreign direct investment.

The purpose of the Strategic project for support of the establishment of Innovation network for industry and thematic innovation platforms is to create an efficient and self-sustainable framework for support and encouragement of business sector investment in R&D as well as raise the awareness about the importance of research, development and innovation in business sector for identifying new potentials of industrial growth, new jobs, competitiveness increase, modernization and diversification of Croatian economy.

1.4. Peer-to-Peer and Twinning Advanced methodology

The significant contributions in formulating the requirements for a permanent learning mechanism for SME Innovation Support Agencies are owed to PRO-INNO Europe INNO-Partnering Forum (IPF, 2009-

2012).⁷ This refers to the development of two important methodologies: a quality management system implemented through a peer review system based on the EFQM methodology and a 'Twinning+' methodology that combines elements of traditional peer reviews and twinning in small learning groups of interested agencies.

Traditional 'Twinning' is a flexible instrument, which can take place between two or more entities or organizations. Furthermore, it can be focused on a wide spectrum of issues and involve an extensive range of personal actors. A good Twinning partnership can bring many benefits to the participating organizations, e.g. bringing people to work together from different parts of Europe, giving the opportunity to share problems/issues and search for the joint solutions, exchange views, experiences and best-practices and understand different viewpoints on any issue where there is a shared interest or concern. Still, in the case of the traditional Twinning, one actor is having a role of the teacher while the other actor is has the role of the student and therefore the actors are defined as a non-equal. During the IPF, it has been estimated that Twinning works better when the equals work together and the student-teacher is the approach which is not recommended to be used in all circumstances. This is also due to the reason that the simple copying does not work well in the case of transferring and sharing the good practices.⁸

Twinning Advanced is an extension of the original IPF twinning method. It is not limited to transferring good practices among agencies, but it provides opportunity to the design and implementation of better practices. The basic idea of Twinning Advanced is to have innovation support organisations collaboratively address a common innovation support challenge. By using their collective experience and knowledge, the idea is to develop and test an approach to address the support challenge in a new and better way. The result of the effort is documented in a Design Option Paper that identifies and documents the implementation options, guidelines and implementation alternatives that the partners in the challenge have experienced and would recommend an agency which is interested in implementing the proposed better practice.⁹

The operational approach of the InnTense Project is anticipated the application of the Peat-to-Peer learning method, and specifically the application of the Twinning Advanced of three Innovation support agencies forming the Consortium. The learning method and the exchange of the best practices has been applied during the Project and it will included the application of the following steps:

- Interactive knowledge and up-to-date experiences exchange of the involved partners,
- Analysing the current trends related to the application of the Open innovation models by SMEs, including the screening of innovation supporting policies and initiatives on regional, national and EU level,
- Exchanging opinions and recommendations between the Project partners how to develop the effective methodology, tools and services to support innovation challenge in SMEs, especially focusing on Open Innovation,
- Definition and documentation of a recommendations for the common methodology for designing and implementing innovation support,
- Dissemination of the main Project outcome – Design Option Paper (DOP) and creation of a network of innovation agencies for extending the innovation support debates and secure the permanent learning process.

The Design Option Paper, as a main result of the shared efforts of the Project partners identify and documents the implementation options, guidelines and implementation alternatives that the partners

⁷ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/innosup-05-2018-2020>

⁸ Paragraph adapted from: <https://ec.europa.eu/easme/sites/easme-site/files/Paper-Twinning-advanced-methodology.pdf>

⁹ <https://ec.europa.eu/easme/sites/easme-site/files/Paper-Twinning-advanced-methodology.pdf>

have experienced and it will furthermore give the recommendations to the agencies which are interested in implementing the proposed better practices option. Taking these advantages into account project aims at shifting beyond the current-state-of-affairs related to the application of the Open innovation as it will provide in clear and comprehensive technique how SMEs can apply Open innovation and what are the related benefits and at the same time offering the encouragements for future learning to be applied by the innovation agencies.

1.5. Source of the Project financing and the target groups

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InnTense project has been financed through the resources of Horizon 2020 programme within the INNOSUP-05 Call Topic: Peer learning for innovation agencies. The main purpose of the present document are recommendations worked out for decision-makers responsible for the creation of policies to support innovation and specialized business environment organizations.

2. The SMEs innovativeness

As stated by the OECD in 2015 “Innovation is a key driver of productivity and long-term growth and can help solve social challenges at the lowest possible cost.”¹⁰ Innovation in SEMs is at the core of inclusive growth strategies: more innovative SMEs are more productive SMEs that can pay better wages and offer better working conditions to their workers, thus helping reduce inequalities. Furthermore, recent developments in markets and technologies offer new opportunities for SMEs to innovate and grow.¹¹

What are current trends and challenges?

The general narrative is that SMEs are, on average, less innovative than large companies are. However, aggregate figures conceal an extremely heterogeneous reality¹² (OECD, 2017a). Survey data shows that a significant proportion of SMEs engage in all forms of innovation, especially in higher-income countries (Figure 1) and that even the smallest employer enterprises (i.e. less than 10 workers) can reach productivity levels above the large-company average¹³ (OECD, 2017b).

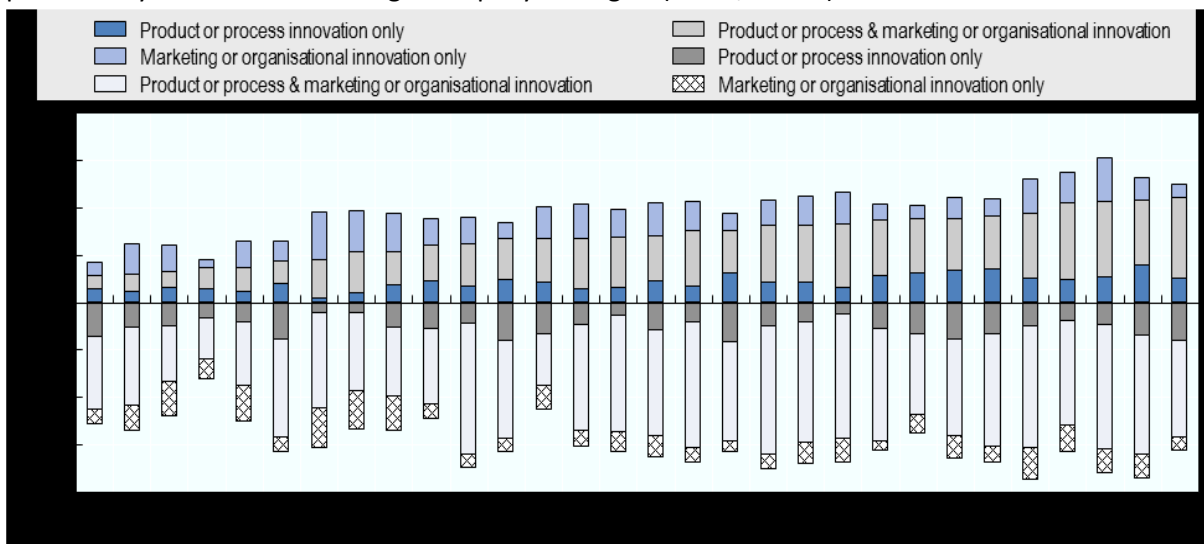


Figure 1 Innovation types by firm size, 2010-12

Source: OECD, 2015¹⁴

The contribution of SMEs to innovation has increased in recent decades thanks to changes in the way innovation takes place in the economy¹⁵ (OECD, 2017d). Enterprise innovation is no longer limited to corporate R&D labs and it is often the outcome of collaborative efforts in which businesses interact and exchange knowledge and information with other partners as part of broader innovation systems. This shift towards a ‘different model of innovation’ has reduced the need for innovation-related capital investments, making business innovation more accessible to SMEs¹⁶ (OECD, 2010a). Furthermore,

¹⁰ OECD (2015a), “Do Policies that Boost Aggregate Growth Generate Economic Instability for Individuals?”, OECD Economics Department Policy Notes, No. 25, April 2015

¹¹ OECD (2018) Promoting innovation in established SMEs, Policy note, 22-23 February 2018

¹² OECD (2017a), Small, Medium, Strong. Trends in SME Performance and Business Conditions, OECD Publishing

¹³ OECD (2017b), “Enhancing Productivity in SMEs: Interim Report”, OECD Working Party on SMEs and Entrepreneurship

¹⁴ OECD (2015), OECD Science, Technology and Industry Scoreboard 2015, OECD Publishing

¹⁵ OECD (2017d), “Towards an OECD Strategy for SMEs”, OECD Working Party on SMEs and Entrepreneurship

¹⁶ OECD (2010a), SMEs, Entrepreneurship and Innovation, OECD Publishing, Paris

especially in science-driven sectors (e.g. biotech and nanotech), small businesses are often the source of radical innovations, thanks to their flexibility and to their ability of working outside of dominant knowledge paradigms; for example, SMEs account for about 20% of patents in biotechnology-related fields in Europe (OECD, 2017d). SMEs also constitute the bulk of high-growth firms, which are quintessentially “innovative” enterprises able to grow fast over a short period of time thanks to disruptive changes in their ‘business as usual’ practices¹⁷¹⁸ (OECD, 2010b), (OECD, 2018).

As also evident from the OECD studies, traditionally new technologies have mostly been developed in-house. As and when they became more complex and require a broader portfolio of knowledge than a single firm is likely to have, collaboration with external partners (suppliers, customers and competitors) gains the ascendancy. Access to partners’ resources compensates for the lack of internal ones. This statement is even stronger if we consider like in the OECD study the science-driven sectors (e.g. biotech and nanotech), where small businesses are often the source of radical innovations. It is worth to highlight that a strong orientation to innovation is part of the DNA of those companies. However, SMEs are concerned in innovation collaborations with external partners but their characteristics (e.g. small size, lack of resources), at the same time positively influence their innovativeness and explain the barriers they must overcome¹⁹²⁰²¹.

According to (Boldrini et al., 2017)²² in SMEs the personality and the motivations of the managing directors or founders are key determinants for the innovative success of the company as they tend to formulate its strategy (Vickers and North, 2000). However, they are sometimes reluctant to delegate authority, they tend to reject external help, they may doubt the value for money or they may be skeptical about non-expert advice and prefer autonomy (North et al., 2001). A great deal of research has studied the strengths and weaknesses of SMEs in terms of innovation processes²³²⁴²⁵²⁶²⁷²⁸ (Vickers and North, 2000; North et al., 2001; Kaufman and Tödtling, 2002; Hausman, 2005; Tödtling and Tripl, 2005; Van de Vrande et al., 2009; Lee et al., 2010; Parida et al., 2012). These studies reveal that SMEs are in a paradoxical situation regarding innovation (Table 1). On the one hand, they have distinctive strengths (e.g. flexibility, reactivity), on the other hand, weaknesses (mostly lack of resources) restrict their innovativeness. There are also characteristics which may be positive or negative: depending on their personality, managers may be innovation champions or inward-looking.

¹⁷ OECD (2010b), *High-Growth Enterprises: What Governments Can Do to Make a Difference*, OECD Publishing

¹⁸ OECD (2018), *High-Growth Firms: Issues and Policies at the Local Level*, OECD Publishing

¹⁹ North, D., Smallbone, D., Vickers, I. (2001) *Public Sector Support for Innovating SMEs*. *Small Business Economics* 16 (4), 303-317

²⁰ Narula, R. (2004) *R&D collaboration by Smes: new opportunities and limitations in the face of globalisation*. *Technovation* 24 (2), 153-161

²¹ Hausman, A. (2005) *Innovativeness among small businesses: theory and propositions for future research*. *Industrial Marketing Management* 34 (8), 773-782

²² Jean-Claude Boldrini, Guy Caverot, Maxime Ezequel *The journey in Open Innovation to develop a SME: A longitudinal case study in a French robotics company*. 2017

²³ Vickers, I., North, D. (2000) *Regional Technology Initiative: some Insights from the English Regions*. *European Planning Studies* 8 (3), 301-318

²⁴ Kaufman, A., Tödtling, F. (2002) *How effective is innovation support for SMEs? An analysis of the region of Upper Austria*. *Technovation* 22 (3), 147-159

²⁵ Tödtling, F., Tripl, M. 2005. *One size fits all? Towards a differentiated regional innovation policy approach*. *Research Policy* 34 (8), 1203-1219

²⁶ Van de Vrande, V., de Jong, J. P. J., Vanhaverbeke, W., de Rochemont, M. 2009. *Open innovation in SME's: Trends, motives and management challenges*. *Technovation* 29 (6), 423-437

²⁷ Lee, S., Park, G., Yoon, B., Park, J. 2010. *Open innovation in SMEs. An intermediated network model*. *Research Policy* 39 (2), 290-300

²⁸ Parida, V., Westerberg, M., Frishammar, J. (2012) *Inbound Open Innovation Activities in High-Tech SMEs: The Impact on Innovation Performance*. *Journal of Small Business Management* 50 (2), 283-309

<i>Innovation strengths</i>	<i>Innovation weaknesses</i>	<i>Ambiguous characteristics</i>
<ul style="list-style-type: none"> ✓ Flexibility ✓ Proximity to customers and suppliers ✓ Superior customer or market knowledge ✓ High reactivity ✓ Risk acceptance 	<ul style="list-style-type: none"> ✓ Limited internal resources (human, organizational, time, financial...) ✓ Lack of know-how or capabilities in R&D, design, management, marketing ✓ Limited innovation portfolio ✓ Few external relations outside business partners ✓ No formalized methods to assess ideas and to manage projects 	<ul style="list-style-type: none"> ✓ Manager’s personality and motivations ✓ Small size ✓ Specialization in one business or in a particular know-how ✓ Emphasis on technical development ✓ Informal and highly personalized networks ✓ Weakly formalized structures ✓ Polyvalent employees ✓ Short term concerns ✓ Short time, operational and little formalized information processing

Table 1 SMEs paradoxical situation regarding innovation
 Source: Boldrini et al., 2017

From the above table it is evident how the large part of SMEs does not have the instruments and the capacity to start alone the “innovation journey” and to manage the whole path internally due to their lack of resources.

Starting from this evidence, how it is possible to support, the SMEs in their innovation journey? Which are the tools that could be put in place to finding the missing resources?

Starting from the 80’ to overcome these limits Regional Technology Transfer Agencies (RTTAs) or Technology Parks and other similar interface structures such as the Business Innovation Centers (BIC) were set up in European countries, in order to provide support to SMEs²⁹ (Hassink, R. 1996).

Prior to the emergence of the Open innovation concept, the value of inter-organizational relationships had already been extensively investigated. According to Barringer and Harrison³⁰ (Barringer, B.R., Harrison, J.S, 2000,) the potential advantages include:

- access to particular resources or markets,
- economies of scale,
- risk and cost sharing,
- learning,
- speed to market,
- flexibility.

The potential disadvantages may be:

- loss of proprietary information,
- management complexities,
- financial and organizational risks,
- becoming dependent on a partner,

²⁹ Hassink, R. (1996) *Technology transfer agencies and regional economic development*. *European Planning Studies* 4 (2), 167-184
³⁰ Barringer, B.R., Harrison, J.S. (2000) *Walking a tightrope: creating value through interorganizational relationships*. *Journal of Management* 26 (3), 367-403

- partial loss of decision autonomy,
- clash of cultures,
- loss of organizational flexibility.

A number of studies on Open innovation reiterate these arguments³¹³²³³³⁴³⁵ (Enkel et al., 2009; Van de Vrande et al., 2009; Lichtenthaler, 2009; Lee et al., 2010; Dahlander and Gann, 2010; Parida et al., 2012; Mazzola et al., 2012; Frishammar et al., 2012).

Benefits	Limits
<ul style="list-style-type: none"> ✓ Fuel internal innovation process and shorten innovation time. ✓ Allow the development of complex products through integration of tested and proven technologies. ✓ Improve the pre-emptive advantage of already developed technology. ✓ Use almost-ready technology to address merging gaps in the market. ✓ Provide revenue and access to knowledge. ✓ Commercialization of inventions by selling or licensing-out ideas. ✓ Freedom to operate thanks to cross-licensing agreements with other organizations. ✓ Set industry standards. ✓ Limit a competitor’s first-mover advantage. 	<ul style="list-style-type: none"> ✓ Difficulty of exploiting technology developed elsewhere (NIH syndrome, prominent barrier for external knowledge acquisition). ✓ Expertise required to search for and evaluate external ideas. ✓ Inadequate or insufficient absorptive capacity to benefit from external knowledge. ✓ Organizational and cultural issues due to number of external contacts. ✓ Difficult transfer of know-how if high level of tacit knowledge associated with the technology. ✓ Reduction of the ability to develop in-house core competencies if too much sourcing. ✓ Costs of coordination to bridge organizational boundaries. ✓ Costs of protecting ideas to which others have access. ✓ Free-riding, opportunistic partners. ✓ Inventors’ reluctance to reveal their developments, “only-used-here” syndrome (OUH). ✓ Fear of selling corporate crown jewels. ✓ Lock-in problems due to too much or not enough proximity (cognitive, organizational, social, institutional or geographical). ✓ Increase in short term profit may weaken specific R&D capabilities.

Table 2 Benefits and limits of inbound and outbound Open innovation for SMEs
 Source: Boldrini et al., 2017

³¹ Enkel, E., Gassmann, O., Chesbrough, H. (2009) Open R&D and open innovation: exploring the phenomenon. *R&D Management* 39 (4), 311-316

³² Lichtenthaler, U. (2009) Outbound open innovation and its effect on firm performance: examining environmental influences. *R&D Management* 39 (4), 317-330

³³ Dahlander, L., Gann, D.M. (2010) How open is innovation. *Research Policy* 39 (6), 699-709

³⁴ Mazzola, E., Bruccoleri, M., Perrone, G. (2012) The effect of inbound, outbound and coupled innovation on performance. *International Journal of Innovation* 16 (6), 27 p

³⁵ Frishammar, J., Lichtenthaler, U., Rundquist, J. (2012) Identifying Technology Commercialization Opportunities: The Importance of Integrating Product Development Knowledge. *Journal of Product Innovation Management* 29 (4), 573-589

By observing that ecosystem that was creating little by little, Chesbrough³⁶ could affirm “the last fifteen years the concept of Open innovation has emerged and developed to become the present dominant innovation paradigm”.

³⁶ Chesbrough, H.W. (2003) *Open innovation: The new imperative for creating and profiting from technology*. Boston, MA, Harvard Business Press

3. From Closed to Open innovation

When we talk about innovation, there are two basic knowledge approaches: an optic “closed” in which knowledge is seen as an asset that produces each for itself and for its own purposes and perspective, and the “open” approach when the knowledge is seen as a collective good, resulting from a complex process of exchange, sharing and development of creative information. In the first case, the transformation of research results into a product takes place within the enterprise, in a one directional sense and in a close environment.

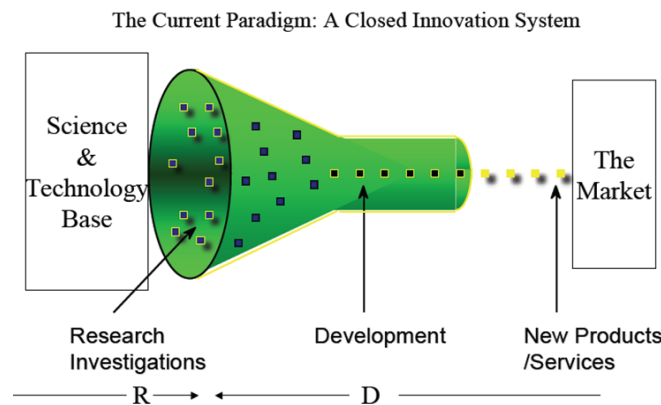


Figure 2 Close Innovation System
Source: Chesbrough, 2003

In the case of *Open Innovation*, the concept of innovation is seen as an open system in which the ideas produced by an individual or organization can be transferred by another organization to create a new product or service.

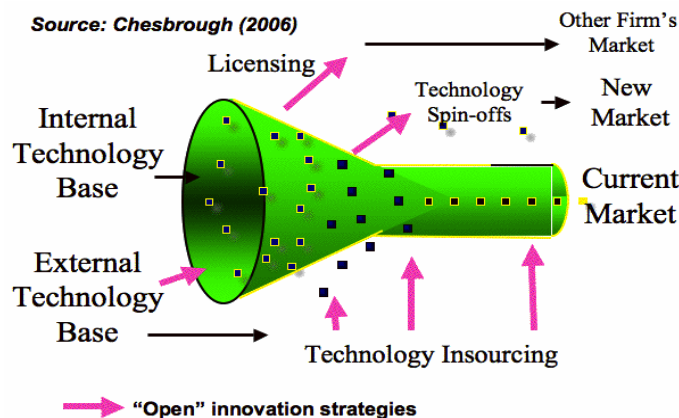


Figure 3 Open innovation System
Source Chesbrough, 2006

As defined by Chesbrough (2003), the Open innovation paradigm “assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology”. As evident in the figure above, the central idea behind Open innovation is that, in a world of widely distributed knowledge, companies cannot afford to rely entirely on their own research but should, instead, buy or license processes or inventions (i.e. patents) from other companies. In addition, internal inventions not being used in a firm's business should be taken outside the company (e.g. through licensing, joint ventures or spin-offs).

The Open innovation paradigm can be interpreted to go beyond just using external sources of innovation such as customers, rival companies, and academic institutions, and can be as much a change in the use, management, and employment of intellectual property as it is in the technical and research driven generation. In this sense, it is understood as the systematic encouragement and exploration of a wide range of internal and external sources for innovative opportunities, the integration of this exploration with firm capabilities and resources, and the exploitation of these opportunities through multiple channels³⁷ (West, J.; Gallagher, S. 2006).

Chesbrough et al.³⁸ defined Open innovation as “the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively.” Open innovation was firstly implemented and studied in high-tech and multinational enterprises. In those industries the Open innovation paradigm is evolving continually until the point where some large or multinational companies have established their Open innovation programme. This is the case of the Belgian Solvay or of the German Mercedes.

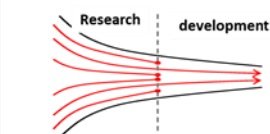
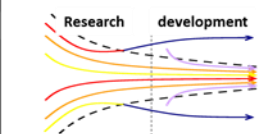
	CLOSED INNOVATION	OPEN INNOVATION
Who produce R&S	•R&S internal	•R&S internal and external
Role of R&S	•Design, develop and sell the internally conceived inventions	•Make sufficient R & D inside to be able to recognize the significant external R & D
IPR policy	•Property and IP protection	•Purchase and sale of IP. The company is a knowledge broker that uses both the licenses is the commercial development to monetize IP
Dominant value	•Not Invented Here / "we can do it, we'll do it"	•The best from anywhere
Distinctive competence	•internal knowledge development of product / process	•integration of external knowledge of product / process
		

Figure 4 Comparison between closed and Open innovation models
Source: Own presentation based on Chesbrough definitaion

Open innovation is often divided in two core processes:

- *Inbound Open innovation* is “the practice of leveraging the discoveries of others: companies need not and indeed should not rely exclusively on their own R&D”.
- *Outbound Open innovation* “suggests 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”³⁹ (Chesbrough and Crowther, 2006).

Some authors (Gassmann and Enkel, 2004; Mazzola et al., 2012)⁴⁰ consider a third process. *Coupled Innovation* as co-innovation with complementary partners that “combines the inbound with the outbound processes, to bring ideas to market and, in doing so, jointly develop and commercialize innovation.”

³⁷ West, J.; Gallagher, S. (2006): "Challenges of open innovation: The paradox of firm investment in open-source software". *R and D Management*. 36 (3): 319

³⁸ Chesbrough, H., Vanhaverbeke, W., West, J. 2006. *Open Innovation: Researching a New Paradigm*, London, Oxford University Press

³⁹ Chesbrough, H., Crowther, A.K. (2006) *Beyond high tech: early adopters of open innovation in other industries*. *R&D Management* 36 (3), 229–236

⁴⁰ Gassmann, O., Enkel, E. (2004) *Towards a theory of open innovation: three core process archetypes*. *Proceedings of the R&D Management Conference, Lisbon, Portugal, July 6-9*

Linking both technology exploration and exploitation increases the overall value orchestration (Chesbrough and Crowther, 2006; Lichtenthaler, 2008; Lindgreen and al., 2012)^{41,42}.

Starting from the work of Gassmann and Enkel, 2004; Van de Vrande et al., 2009; Dahlander and Gann, 2010; Chiaroni et al., 2011; Mazzola et al., 2012; Frishammar et al., 2012, Boldrini et al., 2017, summarizes the main characteristics of inbound, outbound and coupled open innovation.

Inbound, outbound and coupled open innovation

<i>Open innovation</i>	<i>Inbound</i>	<i>Outbound</i>	<i>Coupled</i>
Synonym	Technology acquisition Inward technology transfer Outside-in	Technology exploitation Outward technology transfer Inside-out	Technology acquisition and exploitation
Characteristics	<ul style="list-style-type: none"> ✓ Low tech industry for similar technology acquisition ✓ Act as knowledge brokers and/or knowledge creators ✓ Highly modular products ✓ High knowledge intensity 	<ul style="list-style-type: none"> ✓ (Basic) research-driven company ✓ Objectives like decreasing the fixed costs of R&D, branding, setting standards via spillovers 	<ul style="list-style-type: none"> ✓ Standard setting ✓ Increasing returns ✓ Complementary products with critical interfaces ✓ Relational view of the firm
Main practices / activities	<ul style="list-style-type: none"> ✓ Integration of customers, suppliers and external knowledge sourcing ✓ External networking ✓ Inward IP licensing ✓ Funding research 	<ul style="list-style-type: none"> ✓ Bringing ideas to market ✓ Technology commercialization ✓ Selling IP ✓ Divest, spin-off, venturing ✓ Multiplying technology different applications 	<ul style="list-style-type: none"> ✓ Co-patent ✓ Joint-venture ✓ Alliances with mainly complementary partners in R&D, manufacturing...
Associated capability needed	<ul style="list-style-type: none"> ✓ Absorptive capacity 	<ul style="list-style-type: none"> ✓ Multiplicative capability 	<ul style="list-style-type: none"> ✓ Relational capacity

*Table 3 Benefits and limits of inbound and outbound Open innovation for SMEs
Source: Boldrini et Al, 2017*

Despite strong complementarities, these types of innovation were not implemented simultaneously or together. Firms generally started by experimenting with inbound innovation, with only a few of them trying outbound innovation (Lichtenthaler, 2009; Huizingh, 2011; Chiaroni et al., 2011; Frishammar et al., 2012)⁴³. A possible explanation⁴³ for companies being more inclined towards inbound activities than

⁴¹ Lichtenthaler, U. (2008) *Open innovation in practice: an analysis of strategic approaches to technology transactions*. *IEEE Transactions on Engineering Management* 55 (1), 148-157

⁴² Lindgreen, A., Hingley, M.K., Gant, D.B., Morgan, R.E. (2012) *Value in business and industrial marketing: Past, present and future*. *Industrial Marketing Management* 41 (1), 207-214

⁴³ Huizingh, E.K.R.E. (2011) *Open innovation: State of the art and future perspectives*. *Technovation* 31 (1), 2-9

outbound ones is that outbound activities require “a higher level of managerial challenge due to imperfections in markets for technologies and a lack of systematic internal process to drive such initiatives” (Parida et al., 2012) and because “creating new markets takes time and requires a major investment of resources”⁴⁴ (O’Connor et Rice, 2013).

As described by Hossain and Kauranen (Hossain, Kauranen, 2016)⁴⁵, the “effective use of an Open innovation approach requires strong focus on the selection of practices and partners”⁴⁶ (Theyel, 2013). Searching strategy is an important step of SMEs for open innovation. SMEs formulate searching strategies for new knowledge, innovative ideas, partners, and potential market, among others. Caetano and Amaral (2011) argue that adjustments in the existing strategies of SMEs are necessary to adopt a particular searching strategy for Open Innovation⁴⁷. Searching strategy includes acquisition and exploitation. Here, acquisition means the absorption of external technologies and exploitation means commercializing technologies. Lichtenthaler (2008) found that acquisition and exploitation are positively related with each other⁴⁸.

However, acquisition and exploitation are not the only challenges that the SMEs must face in their innovation journey: resource scarcity for R&D, unsystematic innovation activities, complexity of scientific fields, inadequate coordination of innovation activities with operational functions and lack of sufficient access to scientific excellence are considered as the main challenges of SMEs for open Innovation.

3.1. Open innovation: State of the Art in Large Firms and SMEs

The Open innovation as a trigger for SMEs collaboration

Considering all the challenges that SMEs must face, how is it possible to trigger them and transform their modus operandi from closed to Open innovation?

Even if there is a change in their behavior SMEs are still pursuing closed innovation over Open innovation (Hossain and Kauranen, 2016). However, almost all SMEs are involved with Open innovation to some degree (Idrissia et al., 2012)⁴⁹. Theyel (2013) claimed that over 50 percent of SMEs in the USA are engaged in Open innovation activities at least to some extent. Grimaldi et al. (2013) argue that SMEs with strong sensing, seizing, and configuring capabilities have greater propensities to develop an Open innovation approach⁵⁰.

Communication management and motivation activities should be targeted to highlight the benefits of Open innovation among employees to overcome change resistance (Hossain and Kauranen, 2016). Tranekjer and Knudsen (2012) suggest that managers, particularly those who are responsible for innovation activities, should encourage their own firms to gain benefits from Open Innovation. In this

⁴⁴ O’Connor, G.C., Rice, M.P. (2013) *New market Creation for Breakthrough Innovations: Enabling and Constraining Mechanisms*. *Journal of Product Innovation Management* 30 (2), 209-227.

⁴⁵ Mokter Hossain Ilkka Kauranen (2016), “Open innovation in SMEs: a systematic literature review”, *Journal of Strategy and Management*, Vol. 9 Iss 1 pp. 58 - 73

⁴⁶ Theyel, N. (2013), “Extending open innovation throughout the value chain by small and mediumsized manufacturers”, *International Small Business Journal*, Vol. 31 No. 3, pp. 256-274.

⁴⁷ Caetano, M. and Amaral, D.C. (2011), “Roadmapping for technology push and partnership: a contribution for open innovation environments”, *Technovation*, Vol. 31 No. 7, pp. 320-335.

⁴⁸ Lichtenthaler, U. (2008), “Open innovation in practice: an analysis of strategic approaches to technology transactions”, *Engineering Management, IEEE Transactions*, Vol. 55 No. 1, pp. 148-157.

⁴⁹ Idrissia, M., Amaraa, N. and Landrya, R. (2012), “SMEs’ degree of openness: the case of manufacturing industries”, *Journal of Technology Management & Innovation*, Vol. 7 No. 1, pp. 186-210.

⁵⁰ Grimaldi, M., Quinto, I. and Rippa, P. (2013), “Enabling open innovation in small and medium enterprises: a dynamic capabilities approach”, *Knowledge and Process Management*, Vol. 20 No. 4, pp. 199-210

sense, a communication and awareness activity able, to permeate all the organizational level of the company should be necessary to create a favorable environment for the uptake the Open innovation model. This is crucial because, considering the new environment were the SMEs have to run today, in the medium and long period, a firm's closed approach weakens its competitive position substantially, whereas proactive openness may result in important strategic innovations Lichtenthaler (2008).

Open Innovation: State of the Art in Large Firms and SMEs – the Facilitators' role

20

Going back the question how to trigger Open innovation in the SME. To this question, replays Vanhaverbeke (2017)⁵¹, which states that the Open innovation can be of benefit of all the size of companies, but SMEs must adopt a different approach to implementation. *“The lack of financial and technical resources must be compensated/filled by external partners – suppliers, customers, research labs, universities, large companies or networks of other SMEs, as sources of innovation. However, the practice of Open innovation is not yet common in small firms, and although innovation is critical for survival of European SMEs, few understand how to benefit from innovating through partnerships”*. According to Vanhaverbeke *“Managing Open innovation in small companies is actually quite specific, and it is necessary to reinvent Open innovation to make it useful for entrepreneurs in small firms”*. Vanhaverbeke demonstrates that the paradigm according which innovation is usually associated with high-tech industries and leading-edge technology is not always true. He observed several examples of innovation applied in low- or medium-tech sectors such as: bicycle parts, quilts and pillows, chemical treatment of textiles, barometers and radiators, all “low tech” companies that that are representative of a large chunk of European SMEs. As demonstrated by Vanhaverbeke innovation and Open innovation in these industries is not about inventing new technologies or pushing forward technology frontiers. Rather, it is a matter of finding relevant, novel, applications of existing technologies.

Due to their size, SMEs have strong assets that can support their capacity to innovate, such as creativity, flexibility coupled with the Open innovation approach allows SMEs to stay connect with new partners from completely different industries and it can allow a cross fertilization among sectors, responsiveness, risk acceptance and closeness to customers. One of the most added value of the Open innovation approach for the SMEs is that, SMEs due to their dynamic capacity are able to apply technologies in a new context, which becomes over time a valuable asset for the innovating SMEs and can allow them to transform the company into a completely new business⁵². Going on in the analysis of the several advantages that should push the SMEs to adopt a more open approach Laursen and Salter (2006)⁵³ found that openness to external sources allows SMEs to bring ideas from outside to deepen their knowledge of the technological opportunities available to them. Moreover, Laursen and Salter (2006) recognized that over-searching might negatively affect innovative performances; therefore, external searching should be performed carefully since too many search channels may hinder the main goal of searching. In doing this, the figure of a technology broker that could support the SMEs' research is of fundamental importance. The broker should be adequately trained, and it should develop some core competence. According to Soraci and Taylor (2013)⁵⁴ the Technology Broker, whether active in the public or private sectors, is an essential figure in the Technology Transfer world, yet there remains limited formal recognition of the role

⁵¹ Vanhaverbeke, W. (2017), *Managing Open Innovation in SMEs*. In *Managing Open Innovation in SMEs* (pp. 1-11). Cambridge: Cambridge University Press

⁵² <https://sciencebusiness.net/news/80342/Re-invent-open-innovation-to-apply-it-to-small-firms> (Jul-2017)

⁵³ Laursen, K. and Salter, A. (2006), *“Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms”*, *Strategic Management Journal*, Vol. 27 No. 2, pp. 131-150

⁵⁴ Soraci A, Taylor S. (2013), *The Role Of The Professional Technology Broker*. University-IndustryInteraction Conference

and of the professional skills necessary to perform it well. Despite some advances, there is still a lack of formal recognition of the Technology Broker and in particular of the need for professional standards in this field. A differentiated education path that has to include recognition of on the job training and hands-on experience gained in the field.

According to Vanhaverbeke, “entrepreneurs and SME managers only start to innovate when other SME managers show that it can be done - SME managers learn from the experience of other managers.” As there is limited time to learn, this can only be done in local networks run by local organizations supporting SMEs. These local networks should be at the core of the European innovation policy for SMEs, according to Vanhaverbeke. Business coaches in these networks understand the needs of, and are trusted by, the SMEs of the local area/region.” *However, the main problem to this virtuosos’ approach that hinder the uptake is given by the barrier that good examples of Open innovation are few and far between on a local scale and managers who implemented Open innovation successfully get too many requests to be a testimonial of their positive results.* In addition, many business coaches do not have professional guidelines for instructing SME managers in Open Innovation. This problem could be solved by entrusting the role of facilitator or trainer/assessor of business coaches and mentor to the innovation agencies, which model has been defined during the InnoMedia project⁵⁵.

The need to learn of the manager is even accurate if we consider the managers may overemphasize internal sources and underemphasize external sources due to the lack of openness to the external environment Laursen and Salter (2006). Thus, this miss interpretation of the reality could provide the managers with the wrong input and it could impact on the strategic decision of the management.

3.2. The companies’ Open innovation models

The “Harnessing the Power of Entrepreneurs to Open Innovation”⁵⁶ report, published in 2015 by Accenture in collaboration with the G20 Young Entrepreneurs Alliance, has explored the opinion of over two thousand entrepreneurs and as many large companies in the G20 economies. According to the Digital Collaboration Index, - the economic model developed by Accenture and included in the report - greater collaboration between large companies and G20 entrepreneurs could boost the global economy by \$ 1.5 trillion, and an increase of 2,2% of world GDP. Elaborating the survey data through economic models able to predict the potential dividend of greater use of the collaboration, the index shows that the companies most involved in Open innovation (defined as Collaboration Champions) have achieved higher rates of revenue growth.

A joint study between Accenture and the Research Center for Open Digital Innovation at Purdue University, Narsalay et al (2016)⁵⁷ analyses the R&D operations of dozens of large corporations with headquarters in the United States and Europe. From the study emerges that when these corporations work with external parties to augment their internal R&D, they have been using four basis modes of Open Innovation:

⁵⁵ https://ec.europa.eu/easme/sites/easme-site/files/757400_innomedia20design20option20paper.pdf

⁵⁶ Accenture *Harnessing the Power of Entrepreneurs to Open Innovation* (2015)

⁵⁷ Narsalay, Raghav & Brunswicker, Sabine & Bagherzadeh, Mehdi (2016), *The smart way to open your innovation process. Outlook: The journal of Accenture high-performance business*

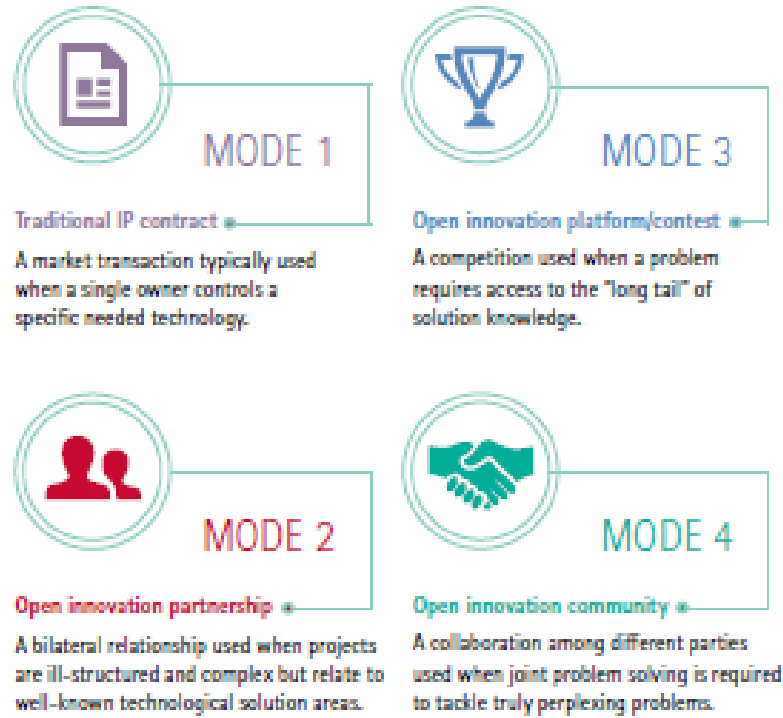


Figure 5 The companies Open innovation models
 Source: Narsalav et al., 2016

Each model can be put in place following a defined set of attributes:

	MODE 1 TRADITIONAL IP CONTRACT	MODE 2 OPEN INNOVATION PARTNERSHIP	MODE 3 OPEN INNOVATION PLATFORM/CONTEST	MODE 4 OPEN INNOVATION COMMUNITY
Communication channels	Limited	Strong	Limited but wide	Strong and wide
Incentives	High	High	Moderate	Low
Control over IP	Owned by external partners	Negotiable between firm and external partners	Owned by firm	Usually owned by firm
Knowledge sharing	Limited	Strong	Limited	Strong
Access to external partners	Limited	Limited	Strong access to wide range	Strong access to wide range

Figure 6 The companies Open innovation attributes
 Source: Narsalav et al. (2016)

Those attributes and the above modes can be combined by the companies in order to reach the desired level of "openness", that it is often the result of a combination between the several models, as for example showed in the following picture:

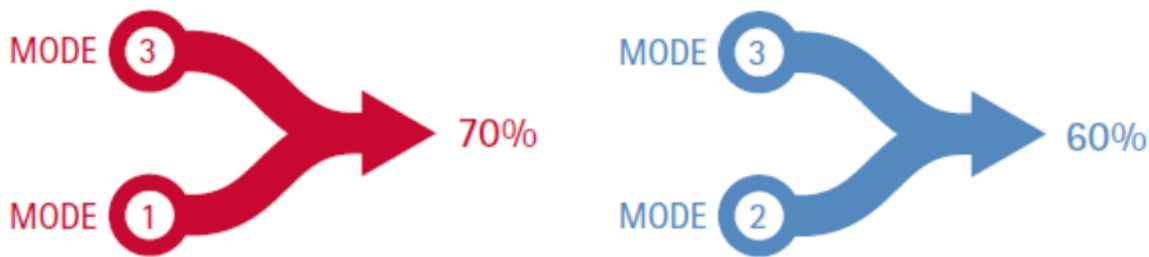


Figure 7 The combination of attribute according to the different strategies
 Source: Narsalav et al. (2016)

As it is possible to observe, from above, a strategic approach to Open innovation requires more than a change in mindset and a willingness to embrace external help in the R&D process. It also requires knowing when and how to use each of the four basic modes of Open innovation (or some combination of them) in the most effective ways. Those decisions will be influenced heavily by the problem complexity and by whether the location of the knowledge sought is known or hidden. It is important to highlight how each mode requires executives to manage the associated risks, IP rights, knowledge sharing and incentives in very different ways. And it's only through the strategic selection of the best mode (or combination of modes) that companies will be able to maximize the benefits of the Open innovation process while minimizing the potential downsides (Narsalav et al. 2016)⁵⁸.

From the results of the Accenture and Purdue University research, even if they are related to a research focused on large companies, and from the wider literature analyzed, it is possible to suppose that also the SMEs could to put in place some mechanisms close to the 4 modes above described.

3.3. The areas where SMEs could more easily cooperate

Looking at the reasons that push SMEs to collaborate, we can observe a different collaboration pattern/reason why, between SME and large companies. “For a SME’s collaboration with partners increases its chance of launching new products and services, which is not the case for large firms who routinely launch new products and services” (Spithoven et al., 2013)⁵⁹. An appropriate type of collaboration depends on what an SME wants to achieve. For technology, Parida et al. (2012)⁶⁰ found that vertical collaboration is relevant for radical innovation and horizontal collaboration for incremental innovation. For vertical specialization, open system may result in a decrease in the size of firms Lecocq and Demil, (2006)⁶¹.

Something extremely relevant that make the difference between SME and large companies, it is the fact that collaboration not only includes collaboration in science and technology, but also value chain partnerships that bring new knowledge bases that SMEs can absorb easily (Spithoven et al., 2013)⁶². The

⁵⁸ Narsalav et al. (2016), *The smart way to open your innovation process. Outlook: The journal of Accenture high-performance business*
⁵⁹ Spithoven, A., Vanhaverbeke, W. and Roijackers, N. (2013), “Open innovation practices in SMEs and large enterprises”, *Small Business Economics*, Vol. 41 No. 3, pp. 537-562.
⁶⁰ Parida, V., Westerberg, M. and Frishammar, J. (2012), “Inbound open innovation activities in high-tech SMEs: the impact on innovation performance”, *Journal of Small Business Management*, Vol. 50 No. 2, pp. 283-309.
⁶¹ Lecocq, X. and Demil, B. (2006), “Strategizing industry structure: the case of open systems in a low-tech industry”, *Strategic Management Journal*, Vol. 27 No. 9, pp. 891-898.
⁶² Spithoven, A., Vanhaverbeke, W. and Roijackers, N. (2013), “Open innovation practices in SMEs and large enterprises”, *Small Business Economics*, Vol. 41 No. 3, pp. 537-562

reason of this preference is clear looking at the difficulties that the SMEs have to reach the market, difficulties that are not proper of the large companies that can afford the budget for large commercialization and marketing campaigns (Wynarczyk, 2013)⁶³. In these regards, many authors believes that the “SMEs applying the Open innovation paradigm prefer to collaborate in new product introductions, whereas closed innovation SMEs tend to collaborate to make incremental changes to their existing products”⁶⁴.

This line of thought is also followed by other authors that recognized that the “SMEs have a stronger attitude toward Open innovation in the commercialization stage than in the early stages of innovation” (van de Vrande et al., 2009; Hemert et al., 2013; Theyel, 2013)⁶⁵.

In line with what said before, Lee et al. (2010) argue that SMEs are good at inventions but lack in commercialization and collaboration, which are more important for SMEs. Several studies found that, for SMEs, Open innovation is less effective for innovations than for sales (Chaston and Scott, 2012; Hemert et al., 2013; Spithoven et al., 2013)⁶⁶. SMEs face difficulty in commercialization, which can be overcome through cooperation with industry incumbents (van de Vrande et al., 2009). Theyel (2013) revealed that SMEs are more innovative when they collaborate with suppliers for product improvement and with their customers for processes development. In the same line is, van de Vrande et al. (2009) which point out that SMEs collaborate with external parties mainly for market-related activities, such as meeting customer demands and remaining competitive. SMEs need to be very careful, observe markets closely, and develop their internal R&D capabilities to satisfy customers (Kim and Park, 2010)⁶⁷. Moreover, Teirlinck and Spithoven (2013)⁶⁸ argue that SMEs’ engagement in R&D cooperation and outsourcing has a positive impact on the internal R&D personnel of the firms to assimilate external ideas.

Finally, by observing the SMEs behavior it emerges that SMEs are mainly motivated by market-related targets, as their main problem is less invention than commercialization. Collaboration with industry incumbents might overcome this difficulty (van de Vrande et al., 2009). Lee et al. (2010) also suggest that technology exploitation, for market opportunity, should be addressed more than technology exploration in SMEs (Enkel et al., 2009); Parida et al., 2012)⁶⁹.

As described by the Open innovation paradigm another element of the “connection and development system” is the coopetition. In fact, due to their size and financial capabilities SMEs are willing to cooperate not only with complementors, but even with the competitors (Ritala & Hurmelinna-Laukkanen, 2009)⁷⁰; both solutions have their roots in increasing needs to acquire multiple competences (Granstrand, Patel,

⁶³ Wynarczyk, P. (2013), “Open innovation in SMEs: a dynamic approach to modern entrepreneurship in the twenty-first century”, *Journal of Small Business and Enterprise Development*, Vol. 20 No. 2, pp. 258-278.

⁶⁴ Mokter Hossain Ilkka Kauranen, (2016), “Open innovation in SMEs: a systematic literature review”, *Journal of Strategy and Management*, Vol. 9 Iss 1 pp. 58 – 73).

⁶⁵ Hemert, P., Nijkamp, P. and Masurel, E. (2013), “From innovation to commercialization through networks and agglomerations: analysis of sources of innovation, innovation capabilities and performance of Dutch SMEs”, *The Annals of Regional Science*, Vol. 50 No. 2, pp. 425-452

⁶⁶ Chaston, I. and Scott, G.J. (2012), “Entrepreneurship and open innovation in an emerging economy”, *Management Decision*, Vol. 50 No. 7, pp. 1161-1177

⁶⁷ Kim, H. and Park, Y. (2010), “The effects of open innovation activity on performance of SMEs: the case of Korea”, *International Journal of Technology Management*, Vol. 52 No. 3, pp. 236-256

⁶⁸ Teirlinck, P. and Spithoven, A. (2013), “Research collaboration and R&D outsourcing: different R&D personnel requirements in SMEs”, *Technovation*, Vol. 33 No. 4, pp. 142-153

⁶⁹ Enkel, E., Gassmann, O. and Chesbrough, H. (2009), *Open R&D and open innovation: exploring the phenomenon*. *R&D Management*, 39: 311-316

⁷⁰ Ritala, P. & Hurmelinna-Laukkanen, P. (2009), *What’s in it for me? Creating and appropriating value in innovation-related coopetition*. *Technovation*, 29(12)

& Pavitt, 1997); Rothwell & Dodgson, 1991)⁷¹⁷². Coopetition, despite of potential risks and disadvantages could be also an effective way of creating innovations (Ritala & Hurmelinna-Laukkanen, 2009). This importance of relationships with different stakeholders (presented on the Figure 1) is very much in line with depth of search for sources of external knowledge leading to increase of innovation performance (Laursen & Salter, 2006).

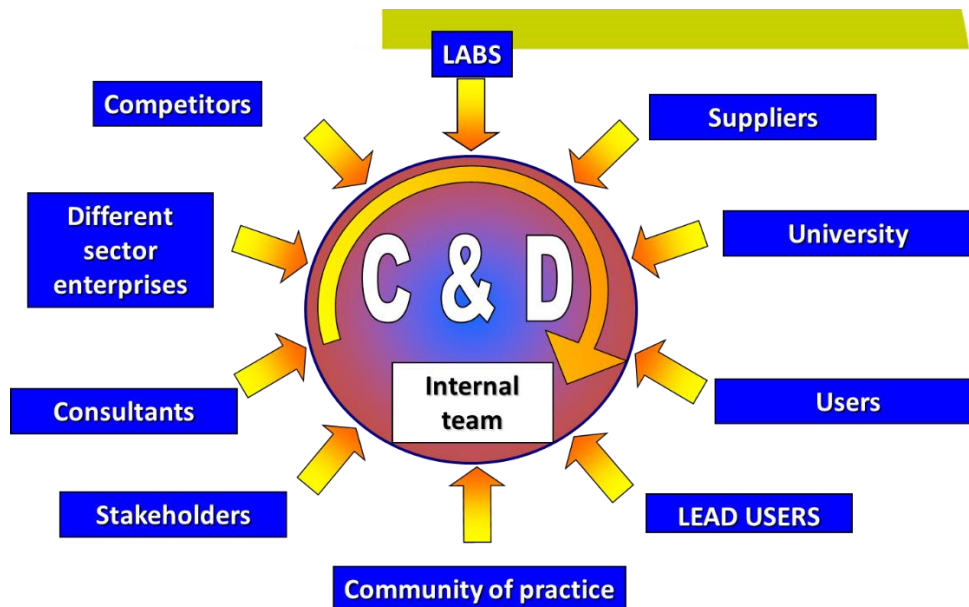


Figure 8 The actors of connection and development
Source Laursen & Salter, 2006

Moreover, customization or innovation through customization is perceived as user driven innovation, due to users’ involvement in development and production process and is perceived by SMEs as one of their strengths. The role of user innovation or involvement creates the need to appropriate process to transfer the users’ sticky knowledge to the SME, possibly through the development of (SME) specific toolkits (Bogers, Afuah, & Bastian, 201; Franke & von Hippel, 2003; von Hippel, 1994)⁷³⁷⁴⁷⁵. Nevertheless, it is also important to develop the demand on the market and create something new; however, this requires trust and credibility, which may be a challenge for SME. Moreover, in the product development process it is not enough to listen to the customers and suppliers, but also have to be able to contribute to the process with your own competences and ideas (Radziwon, Bogers, & Bilberg, 2014)⁷⁶.

Thanks to Open innovation some companies succeeded to emerge in the market. Activities such as acquisition of products, services, processes or equipment developed by third parties; outsourcing of

⁷¹ Granstrand, O., Patel, P. & Pavitt, K. 1997. Multitechnology corporations: Why they have “distributed” rather than “distinctive core” capabilities. *California Management Review*, 39(4): 8–25

⁷² Rothwell, R. & Dodgson, M. (1991), *External linkages and innovation in small and medium-sized enterprises*. *R&D Management*, 21(2): 125–138

⁷³ Bogers M., Afuah A, & Bastian B., (2010), *Users as Innovators: A Review, Critique, and Future Research Directions*. *Journal of Management* Vol. 36 No. 4, July 2010 857-875

⁷⁴ Franke N., von Hippel E (2003), *Finding commercially attractive user innovations: An exploration and test of “lead user” theory* MIT Sloan School of Management Working Paper No. 4402-03

⁷⁵ Von Hippel, E. (1994), “Sticky information” and the locus of problem solving: Implications for innovation. *Management Science*, 40: 429-439

⁷⁶ Radziwon, A & Bogers, M & Bilberg, A. (2014), *Managing Open Innovation Across SMEs: The Case of a Regional Ecosystem*. *Academy of Management Proceedings*

upstream or downstream activities; as well as outward licensing intellectual property can be elements of an Open innovation approach. Focusing on their core competencies and getting better and stronger in what they already do is for them much more beneficial acquire external knowledge than trying to do everything. Findings show that SMEs from the investigated ecosystem recognize suppliers as one of the key partners in doing business. Suppliers are perceived as partners, which provide not only good service, but also knowledge about newest technology and possible product optimization. Instead of acquiring knowledge by themselves, some companies prefer to cooperate with partners that already have this specific knowledge. Therefore, suppliers can be a part of mutually beneficial relationships with SMEs^{77,78} (Kogut et al., 1992; Lee et al., 2010); competitors or even more competitor could do that too.

It is worth to report here some parts of the case study published by Radziwon, Bogers, & Bilberg, (2014), where some managers of companies applying the Open innovation model have been interviewed. Below are reported some of the statements extracted from the study:

“An interesting part of the experience is the fact that not all of these companies had mechanical engineers employed at that time; only 4 of them were able to ‘supply’ the manpower to this initiative, so for one year specialists from 4 companies worked on projects coming from 5 partners. Thanks to these skills ‘sharing’ specialists were put into an improved work environment, where they could discuss and solve engineering problems within this experts’ group. This archival evidence together with the data gathered during interviews suggest that relationships between companies embedded in our case are far above regular cluster networks. We are close to each other, we can help each other; outside the framework of the mechatronics”. From those sentences, we can see an interesting case of cooperation that is also close to a form of industrial symbiosis.

In the context of open innovation, there is moreover a strong link to customers and their expectations, which a company tries to fulfil by creating a value added product:

“I think real innovation starts with what it is that the customer needs, and then we can say ok, how should we fulfil it (...). It’s not actually always what we are doing, we have one product that is new, and none of our competitors have.”

Besides, the involvement of employees in the decision-making process, it is also important in the innovation process. This is also mirrored in the company’s strong focus on recruiting people, with some new (to a company) knowledge and skills.

“And we have from the beginning also been very focused on innovation, we joined innovation camps - some years ago decided not to continue with this competition - but we still use what we have learned from that time having this whole organization to bring up ideas and have it structured so it’s not up to two or three managers to come up with new good ideas, but it is instead the whole company.”

Another perception of Open innovation is also related to the knowledge that current or potential customers could provide for the new product development process. One of the threats in the traditional (closed) innovation model used to be divergence between customers’ needs and the product features. Not all of the interviewed companies would agree that special customers’ involvement in the product development process would give satisfactory results. According to the Managing Director of an interviewed company E listening to the customers may not be enough:

⁷⁷ Kogut, B, Shan, W, & Walter, G. (1992), *The make-or-cooperate decision in the context of an industry network*. In Granovetter, Mark and Nohria, Nitin and Eccles, Robert G (Ed.), *Networks and organizations: structure, form, and action*: 25–56. HBS Press, Boston

⁷⁸ Lee, Park, Yoon, & Park. (2010) *Open innovation in SMEs—An intermediated network model*. *Research Policy*, 39(2): 290–300

“I used to say a phrase from what Henry Ford said “If I have asked my customer what they really wanted? They would have said a faster horse, because they didn’t know it was possible to make a car. So, nobody was asking for a car.” (...) if you are only doing what you asked to do, we don’t really do innovations. Because you have to bring in (...) the need, the problems that have to be solved, you need to get from A to B. It is not a faster horse you actually need.

You need to get from A to B, if it was back in Henry Ford’s time. And then you have to bring in new engineers and the technology how can we do this.” The problem may lie somewhere else as the user is pointing out. What is more, in his view the company has to have its own contribution to the solution. *“I would not say if we are only doing what you asked us to do, we don’t really do innovations.” “(...) our main target is always to create value for our customer and their customers. Because at the end of the day, we all trying to create added value for the end customer. (...) So we need to have the knowledge and what is the demand out there and to have this cooperation with our customer and to bring in our own ideas. And not just only do what they all ask us to do but also bring our own ideas.” ...*

“Then we also try to influence the market by visiting conferences and doing speeches at transport conferences. So, we try to sell them this idea of modular solution and we try to tell them why we think it is a good idea to have a modular concept, instead of one of the projects.” We are creating a demand. Before us there would not be [product name] in any other Danish city”

“The biggest challenge for a company like ours is the credibility in the outside, which makes it possible for you to sell to bigger player than yourself. This is always a problem for an entrepreneur in a niche market – why should we believe in you. “We don’t understand your technology, we cannot the evaluate it. So, we have to kind of rely on you.” (...) Building credibility in the outside is a big challenge. Then, of course, the finance, but those things are connected, because if you are credible, you can borrow money.

“Our suppliers are very, very important, without good suppliers we could not exist.” Good relationships with suppliers could not only allow better knowledge inflows to the company, but also it could be a matter of saving money. It may be the reason why for some SMEs suppliers are not only a part of their vertical network, but an important business partner, which helps the SME to develop and deliver a value proposition to the customer.

“(...) we don’t have suppliers, we have partners.” “The suppliers are making the research to make the products we need. And in this case, company like [supplier’s name], where we got robot technology, and put into our own house. We want to work together, to create solution together for our customers.”

This very special perception of “collaborators” is playing an important role in the Open innovation ecosystem.

3.4. The challenges of SMEs for Open innovation and how to overcome them

Arrived at this point, the analysis of the status of the art it is clear. It is also undisputable that SMEs are weaker than large firms in overcoming challenges for Open innovation are. Resource scarcity for R&D, unsystematic innovation activities, complexity of scientific fields, inadequate coordination of innovation activities with operational functions, and lack of sufficient access to scientific excellence are considered as the main challenges of SMEs for open innovation (Kim and Park, 2010; Abouzeedan et al., 2013)⁷⁹.

The main point now is how to overcome the challenges? SMEs need to be very careful, observe markets closely, and develop their internal R&D capabilities to satisfy customers (Kim and Park, 2010). Padilla-

⁷⁹ Abouzeedan, A., Klofsten, M. and Hedner, T. (2013), “Internetization management as a facilitator for managing innovation in high-technology smaller firms”, *Global Business Review*, Vol. 14 No. 1, pp. 121-136

Meléndez et al. (2013) argue that transfer and exchange of knowledge are two pivotal parts of Open innovation, and these issues involve recognition of researchers, making IP contracts, and defining timescales of projects⁸⁰. Those authors found that SMEs give less than necessary emphasis on these issues from Mokter Hossain Ilkka Kauranen, (2016).

From what above described it emerges, again, the preeminent role of Technology/Knowledge Transfer. Technology Transfer is a process that can lead to the creation of new businesses in new areas, starting with a core of mainly academic knowledge - the so-called spin-off from public research - or new products/processes to new areas through the R&D that can also lead to the creation of spin-offs. In addition, exists a very large number of definitions literature of the term "technology transfer".

It can be identified a wide range of organization and institutional interactions that somehow imply exchange of technological knowledge.

Below, some definitions of Technology Transfer are given:

- *“Active process during which a technology (information) is transferred between two entities that, depending on the point of view observer, may be countries, companies or individuals. The mechanism TT is a specific form of interaction between two or more entities social”*, Autio and Laamanen, (1995)⁸¹
- *“The use by an organization or institution of a technology, as well as a process or product, either tangible or immaterial, developed in another organization or institution”*, Bozeman, Kingsley, Coker, (1996)⁸²
- *“Process or active flow, during which the shift occurs technology between two distinct entities, sources and users, which time to time may assume different identities, through appropriate communication channels and in a certain amount of time”*, Coccia, (1999)⁸³
- *“Every process aimed at transferring knowledge from one donor to one or more recipient”*, Buratti, Penco (2001)⁸⁴
- *“Conversion application of information-knowledge, which involves a source of technology, which has expertise specialized techniques, and transmission to a receiver that does not possess and that cannot or will not produce independently technology”*, Perez and Sanchez (2002)⁸⁵.

From the analysis of this wide range of definitions, we can identify some key aspects that characterize the Technology Transfer. In particular, we have focused on the definition of the following:

- The reference framework for the implementation of technology transfer (regional, national, business-oriented, focused on the public sector, etc ...),
- The actors involved in the process,
- The transfer process and mechanisms implemented for the passage of technological knowledge.

⁸⁰ Padilla-Meléndez, A., Del Aguila-Obra, A.R. and Lockett, N. (2013), *“Shifting sands: regional perspectives on the role of social capital in supporting open innovation through knowledge transfer and exchange with small and medium-sized enterprises”*, *International Small Business Journal*, Vol. 31 No. 3, pp. 296-318

⁸¹ Erkkö & Laamanen, Tomi (1995), *Measurement and evaluation of technology transfer: Review of technology transfer mechanisms and indicators*. *International Journal of Technology Management*

⁸² Kingsley, G., Bozeman, B., & Coker, K. (1996), *Technology transfer and absorption: An 'R & D value-mapping' approach to evaluation*. *Research Policy*, 25(6), 967-995

⁸³ Coccia M. (1999), *“Trasferimento tecnologico: analisi dei fruitori”*, in *Working paper Ceris-CNR*, n.13

⁸⁴ Buratti, N. and Penco, L. (2001), *Assisted Technology Transfer to SMEs: Lessons from an Exemplary Case*, *Technovation*, 21, pp.35–43

⁸⁵ Perez Perez, M. and Sanchez, A. (2002), *Lean production and technology networks in the Spanish automotive supplier industry*. *Management International Review*, 42(3), 261

Regarding the reference context, it ranges from a vision that takes into account situations restricted to two bodies or organizations, to a “systemic” Bessant, Rush (1993)⁸⁶, Luberto, Mazzei (1995)⁸⁷. Also with regard to the actors, they range from visions that consider only two organizations involved Roessner (2000)⁸⁸, to visions that hold on behalf of a plurality of actors and of stakeholders Obasi, Topfer (1997)⁸⁹. About the process and mechanisms put in place for the transfer of technological knowledge, the authors considered discussing simple “motion/movement of knowledge, Gibson, Rogers (1994)”⁹⁰, “conversion application information/knowledge” Perez, Sanchez (2003)⁹¹, but also “process” Autio, Laamanen (1995)⁹² in some cases “interactive/complex” Bessant, Rush (1995). As regards the type of relationship that the actors establish, it ranges from a more “mechanistic” that define it as a movement of innovation from one organization to another, other more focused on the complexity of the relationships that govern this process. It is sought, therefore, to arrive at a definition of high degree of abstraction, on the basis of previous reflections, which are practicable for the purpose of the present work: *“technology transfer is the process leading to the economic and organization development and commercialization of practical applications and products, starting from a core of knowledge coming from the results of R&D, but also the know-how acquired experience”*.

The analysis of the above literature shows as the technology transfer is one of the components of the Open innovation system and in this regards the technology broker is the one (person or organization) able to trigger/favour the application of the Open innovation paradigm.

⁸⁶ John Bessant, Howard Rush, (1995), *Building bridges for innovation: the role of consultants in technology transfer*, Research Policy, Volume 24, Issue 1, Pages 97-114

⁸⁷ Luberto, Mazzei, Palermo, Ricciardi (1995), *Trasferimento tecnologico e innovazioni finanziarie*. Franco Angeli
Roessner, J.D., (2000), *Technology transfer*. In: Hill, C. Ed. *Science and Technology Policy in the US, A Time of Change*. Longman, London

⁸⁸ Luberto, Mazzei, Palermo, Ricciardi (1995), *Trasferimento tecnologico e innovazioni finanziarie*. Franco Angeli
Roessner, J.D., (2000), *Technology transfer*. In: Hill, C. Ed. *Science and Technology Policy in the US, A Time of Change*. Longman, London

⁸⁹ Obasi G.O.P., Topfer K., (1997), *Methodological and technological issues in technology transfer*, Intergovernmental Panel on Climate Change (IPCC)

⁹⁰ Gibson D., Rogers V.(1994), *R&D Collaboration on Trial: The Microelectronics and Computer Technology Corporation*, Harvard Business School Press Boston, MA

⁹¹ Pérez M.P., Sánchez A.M., (2003), *“The development of university spin-offs: early dynamics of technology transfer and networking”*, *Technovation*

⁹² Autio, E. & Laamanen, T. (1995), *Measurement and evaluation of technology transfer: Review of technology transfer mechanisms and indicators*. *International Journal of Technology Management*

4. Results on the portfolio research of the current state of the Innovation support programmes in InnTense Partner regions

4.1. Germany

Germany is one of the most innovative countries worldwide and has a longstanding tradition of creating new and innovative ideas, products and technologies. Not only in the automotive and mechanical engineering sector German companies are market leaders in their fields, but also in the information technology, chemical industry, medical sciences and transport and communication.

Innovations, new ideas and technologies are necessary to remain competitive in light of an increasing globalized and competitive economy. Therefore, it is no longer enough to carry out innovations in a process of “closed innovation” by and for the company itself. Given the highly competitive world market, German companies are in great need for cooperation, exchange and transfer of ideas, expertise as well as technical and organizational knowledge in order to stay competitive.

The notion of “Open Innovation” became well known in the past years. Open innovation not only provides the opportunity to use external knowledge, ideas and research findings more efficient, but also the possibility to get in touch with clients and thereby meet their specific demands more precisely. The Innovation Strategy of companies can benefit from a culture of open knowledge and open innovation. Through the interchange of ideas and knowledge in the key technologies, new products and services can be planned and produced more efficiently and sustainably. Particularly German SMEs, which are utmost important and decisive for the country’s economy, can benefit from opening their innovation processes. The chances to solve global challenges, such as globalization, digitalization or knowledge growth in the past years, improve through cooperation with strategic (international) partners.

The German economy has a great potential for Technology Transfer and successful implementation of Open Innovation. With initiatives and programmes, such as the “Digital Strategies 2025” of the Federal Ministry of Economics and Energy or the “Allianz Industrie 4.0 Baden Württemberg” of the Ministry of Economic Affairs, Labour and Housing in Baden-Wuerttemberg, Germany made its first steps towards a more open, cooperative and interactive economy.

National and regional Innovation support programmes and initiatives

In the following, the selection of the Innovation support programs on national and regional (Baden-Wuerttemberg) are briefly introduced (for more information, the links for the web-pages for each initiative is provided).

Digital Hub Initiative – The Federal Ministry of Economics and Energy

Development of new digital Hubs in Germany which are co-working spaces and meeting points for different players. New ideas and digital transformation will be implemented. Role Model is Silicon Valley (already existing co-working spaces such as the “House of IT” or the ARENA2036 (Stuttgart) will benefit from the initiative).⁹³

⁹³ <https://www.de.digital/DIGITAL/Redaktion/DE/Downloads/digital-hub-initiative-kurzportrait.html>

Digital Strategy 2025 (Digital Strategie 2025) – The Federal Ministry of Economics and Energy

New Strategy for the realization of potentials in OI in the German economy. The aim is to create a digital Germany.⁹⁴

Research and Innovation Plattform (Plattform Forschung und Innovation) – The Federal Ministry of Economics and Energy

The Plattform presents an advisory body for the Federal Ministry for Economic Affairs and Energy, hosting a dialogue on the strategic direction of energy research with the national stakeholders in the Federal Government and the business and scientific communities. With a view to facilitating the rapid market launch of new energy technologies and innovative procedures, the aim is to pinpoint how the various research activities in Germany can become better networked and used more effectively.⁹⁵ Furthermore, the aim is to establish virtual Open innovation platforms to improve networking in an intelligent way and to create social and economic innovations out of digital networking.

Smart Networking (Intelligente Vernetzung) – The Federal Ministry of Economics and Energy

The Initiative has been launched in order to make better use of the major social and economic opportunities deriving from digital networking in the five sectors: education, energy, health, transport and administration. It aims to improve the exchange of ideas (through Open innovation platforms), networks and collaborations between companies, research institutes and associations in the sectors education, energy, health, traffic and public administration (e.g. Smart Grid, Smart Home, Smart City, E-Health, E-Learning).⁹⁶

Central Innovation Program for SMEs (Das Zentrale Innovationsprogramm Mittelstand (ZIM)) – The Federal Ministry of Economics and Energy

ZIM is a nationwide, technology and industry-open funding program. The aim of the ZIM is to sustainably support the innovative strength and competitiveness of companies, thereby contributing to their growth, together with the creation and safeguarding of jobs.⁹⁷ The main objective to the program is to improve the innovation capacity of companies in a sustainable manner, financing single and cooperation projects and also supporting international partnerships in cooperation projects as well as in networks.

SME-innovative (KMU-innovativ) – The Federal Ministry of Education and Research

SMEs anticipated as the forefront of technological progress in many areas of cutting-edge research. With this Initiative, the Federal Ministry of Education and Research aims to simplify the application and approval of subsidies for SMEs. Furthermore, the initiative started in technology fields that are particularly important for Germany's future.⁹⁸

Educational Camps (Forschungscampus - öffentlich-private Partnerschaft für Innovationen) – The Federal Ministry of Education and Research

This initiative supports universities, research institutions and companies that want to work on a common research topic in partnership and for a longer period of time. Within this initiative, the Federal Ministry of Education and Research supports challenging, long-term approaches to cooperation between science and industry. Thus, complex and multi-layered research fields with high research risk and particular potential for innovative breakthroughs can be processed. The topics range from new methods for the

⁹⁴ <https://www.bmwi.de/Redaktion/DE/Publikationen/Digitale-Welt/digitale-strategie-2025.html>

⁹⁵ <https://www.bmwi.de/Redaktion/DE/Textsammlungen/Energie/energiewende-plattform-forschung-und-innovation.htm>

⁹⁶ <https://www.bmwi.de/Redaktion/DE/Dossier/intelligente-vernetzung.html>

⁹⁷ <https://www.zim.de/ZIM/Navigation/DE/Home/home.html>

⁹⁸ <https://www.bmbf.de/de/kmu-innovativ-561.html>

diagnosis of infectious diseases to the conversion of the power supply to support the energy transition to material development and innovative production technologies.⁹⁹

Allianz Industrie 4.0 Baden Württemberg – Baden-Wuerttemberg Ministry of Economic Affairs, Labour and Housing (Baden-Württemberg)

The main objective of Allianz Industrie 4.0 Baden Württemberg is to accompany the SMEs in the direction of Industry 4.0. The network aims to connect the relevant players of production-, information-, and communication technology (SMEs) and to facilitate the improvement of the innovation transfer.¹⁰⁰

Open innovation für den Baden-Württembergischen Mittelstand – Baden-Wuerttemberg Ministry of Economic Affairs, Labour and Housing / Steinbeis Zi GmbH (Baden-Württemberg)

Improve cooperation, innovation and technology transfer for SMEs.¹⁰¹

Open innovation supported by Baden-Wuerttemberg Ministry of Economic Affairs, Labour and Housing (Baden-Württemberg)

Support SMEs offered Steinbeis-Europa-zentrum for the SMEs from Baden-Wuerttemberg through workshops, coachings and handbooks with good practices and recommended actions.¹⁰²

Open innovation Congress – Baden-Wuerttemberg Ministry of Economic Affairs, Labour and Housing (Baden-Württemberg)

The congress takes place once per year in Stuttgart, BW and it offers a whole day of discussions, lectures and parallel forums and thus many opportunities to gathered impulses to exchange ideas with company representatives and to get to know practical Open innovation approaches. Policies to support OI, best-practices of OI in companies, new methods in the field of OI (e.g. Makerspaces, Popup-Labors) and new chances for technological development are some of the highlights.¹⁰³

Innovationsallianz Baden-Württemberg (Baden-Württemberg)

The Alliance is composed of 13 independent research facilities working together in the areas of sustainable mobility, environmental technology and applied research.¹⁰⁴

4.2. Italy

According to Mestiere Impresa,¹⁰⁵ an Italian website entirely dedicated to Italian companies, startups and entrepreneurs, developed and maintained by one of the most important Italian banks the Banca Nazionale del Lavoro – BNL, the Italian companies are too closed. The entrepreneurial culture of Italian companies is still resting on traditional paradigms that stop openness to innovation processes. This reluctance to interpret the opportunities provided by the Open innovation risks making entrepreneurs lose the opportunities offered them by Open innovation and that they can face the challenges that await the Italian companies in the near future, becoming more competitive and innovative.

Some of the reasons lies first of all on the Italian corporate culture anchored to models of the past, traditional and closed. Models that do not allow error as an important component of a transformation process, and where it is preferred to not take any risk in order to prevent to possible failing. The adoption

⁹⁹ <http://www.bmbf.de/de/forschungscampus-oeffentlich-private-partnerschaft-fuer-innovationen-562.html>

¹⁰⁰ <https://www.i40-bw.de/de/>

¹⁰¹ https://www.steinbeis-europa.de/open_innovation

¹⁰² <https://www.steinbeis-europa.de/branchen-und-projekte/open-innovation/unterstuetzung-fuer-kmu.html>

¹⁰³ <https://www.wirtschaft-digital-bw.de/service/veranstaltungen/detailseite/open-innovation-kongress-baden-wuerttemberg-2018-114/>

¹⁰⁴ <https://www.baden-wuerttemberg.de/de/innovation/wirtschaftsnahe-forschung/innovationsallianz-baden-wuerttemberg/>

¹⁰⁵ <https://mestiereimpresa.bnl.it/it/home-guest>

of the Open innovation paradigm is also blocked by the conception of "not invented here", i.e. there is a certain difficulty - especially in the high lines - to demand the creation of innovation outside. Skepticism, therefore, and fear of making mistakes are perhaps the main elements that block open innovation.

Furthermore, there is a widespread lack of trust in innovation, there is a certain tendency among Italian entrepreneurs not to open up completely to startups, with the result of being particularly protective and exercising a strong control over the activity of reality, young and promising, realities that instead by their very nature and definition should be left free to innovate. Entrusting outside the construction of a more innovative culture able to increase competitiveness, also causes companies to be afraid of putting in hand other important issues for their business, linked for example to intellectual property.

In the same line of Mestiere Impresa is the report published by Accenture "the Harnessing the Power of Entrepreneurs to Open Innovation". The Big companies today are aware that they can grow faster by working together with small entrepreneurs and startupper, but they still cannot realize the collaboration that would allow them to innovate and innovate together. In Italy, the failure to activate this level of cooperation risks losing an opportunity for growth of 35 billion euros, or an additional 1.9% on our country's GDP¹⁰⁶. From the data of the study relating to Italy, emerges that 76% of large companies believe they can leverage startups or small entrepreneurs to transform their business by making it truly digital, and expects the share of revenue generated by the collaboration to grow from the current average 7% to 16% within five years. Big companies and entrepreneurs agree that the current models of collaboration will increasingly tend towards more open and participatory forms of innovation, according to which companies will not only fund startups, but will also use collaboration to create an ecosystem together of innovation in more extensive partnership networks. However, companies and entrepreneurs are struggling to find effective models of collaboration today.

In fact, although 49% of large Italian companies recognize that working with entrepreneurs and startups is important or essential for growth and innovation, only 17% believe that in collaboration they are committed to the growth of the company, so as only 22% of small entrepreneurs believe that the big partners devote an adequate commitment to supporting the growth of their small businesses. Moreover, the differences in managerial culture accentuate the divisions. The report shows that, for example, even if large companies believe they have a sufficiently entrepreneurial approach, 67% of entrepreneurs who previously worked in large companies left them because they could not express their entrepreneurship in the corporate environment.

National and regional Innovation support programmes and initiatives

The Region Lombardia's model of open innovation

In Italy as a wider system, the Open innovation Lombardia was founded with the aim of proposing a new regional innovation policy model. This platform is also one of the tools for implementing the S3 (Intelligent Specialization Strategy) of the Lombardy Region by supporting the creation of favorable conditions for companies, their growth and evolution in emerging industries. So far, the Platform has allowed to put in circulation 8.000 opportunities for collaboration from all over the world. Open innovation also allows the public administration to establish a more immediate relationship with citizens: the "innovative citizen" - no longer just the recipient of policies but the bearer of skills, ideas and solutions - is the real cultural turning point that these tools make possible

¹⁰⁶ <https://www.accenture.com/it-it/company-studio-open-innovation>

Open innovation is aimed at all actors of innovation processes in companies, research centers, public administrations, civil society and all citizens who want to play an active role in research and innovation policies.

With the Open innovation platform,¹⁰⁷ the Lombardy Region wants to reach a multiplicity of collective needs:

- connect: connecting the academic world and the industrial world in a relationship and encouraging networking between different professional figures,
- growth: enhance the resources, know-how, human capital and social capital of the territory,
- disseminate: stimulate the sharing of innovation in case studies and best practices,
- knowledge: make known and promote as best cases the excellence of the territory both in the industrial field and in that of scientific research.

The platform is structured to offer work tools and daily interaction to make the skills system and encourage the development of projects.

The platform offers:

Sharing, collaboration and support tools

- community for the creation of work groups and / or projects or sharing common interests,
- discussions and news: tools to inform, start discussions, engaging participants based on interests and skills,
- support for research and innovation projects: project management tools for the definition and monitoring of activities, times and budgets,
- tools for document management.

From the platform can arise numerous opportunities:

- from the territory: collaboration proposals and events of interest for the creation of partnerships to start research projects, offer and identify innovative solutions,
- from the world: research and supply of commercial and technological partners for the realization of research projects in collaboration with the Enterprise Europe Network.

The Regione Lombardia Open 2.0 platform

To stimulate the collaboration among the actors of the innovation ecosystem the Region has implemented collaborative platform designed to improve the competitiveness of the Lombardy system of knowledge moving from a "personalised" tool for the creation of projects and networks (Open innovation platform) to a "shared" tool to generate value and exploit the potential of interoperability (Open 2.0 platform).

The Open 2.0 platform has been designed for:

- Public and private entities that need tools to support research processes, technological and social innovation,
- Business networks, districts and clusters, groups of companies operating within "network contracts" or more or less structured partnership agreements. ATI, groups of international projects, consortia, industrial districts, "hubs", science and technology parks, associations and organisations that aggregate multiple public or private entities.

¹⁰⁷ <http://www.openinnovation.regione.lombardia.it/it/open-innovation>

The Open 2.0 ICT¹⁰⁸ tool provides a set of pre-configured platforms (by context and/or topic) designed with the aim of extending the cooperation, participation and sharing to new fields of innovation.

Functions:

- profiling of users and organisations,
- creation and management of user groups (community),
- publication and management of discussions, news and distributed documents based on profiling criteria,
- partnership on concrete projects (project management),
- supports the matching of supply and demand (collaboration proposals, expressions of interest).
- other, including the creation of surveys and public consultations; communications between individuals; event management; email notifications.

4.3. Croatia

The notion of the Open innovation and Technology Transfer is not a complete unknown in Croatia, but it is still inadequate and not well-known among potential users - universities, entrepreneurs, scientists. There are several strategies and legislative documents in which these terms are mentioned or attempted to define, but there is no specific legal framework defining it. In Croatia one or two examples of good practice of transferring technology to small and medium-sized enterprises have been observed. One of the most famous is the company „PIP“ that deals with the production of honey and various honey products and their cooperation with the University of Zagreb. Main way how Open innovation is introduced in Croatia is through EU projects.

National Innovation support programmes and initiatives

National Operative Programs

In Operational Programme Competitiveness and Cohesion 2014 - 2020 in section Overview of the investment strategy of the operational programme open innovations are mentioned as one of the activities that should Promote business investments in R&I, develop links and synergies between enterprises, research and development centres and the higher education sector, in particular promoting investment in product and service development, technology transfer, social innovation, eco-innovation, public service applications, demand stimulation, networking, clusters and Open innovation through smart specialisation, and supporting technological and applied research, pilot lines, early product validation actions, advanced manufacturing capabilities and first production, in particular in key enabling technologies and diffusion of general purpose technologies.

Within the Operational Program „Competitiveness and Cohesion“ 2014-2020 there are priority axes and specific goals related to innovation: Priority Axe 1 - PA1- strengthening the government by applying research and innovation. Specific goal: increase R&D capacity for performing top quality research and meeting the needs of the economy and new products and services as a result of Research, Development and Innovation (IRI). PA3 - , Strengthening the business sector's research, development and innovation (IRI) through creating a favourable innovation environment. Specific goal: support SMEs' capacity for growth in regional, national and international markets and engagement in innovation processes.

¹⁰⁸ http://www.openinnovation.regione.lombardia.it/it/eng/open_2-eng

The Centers and offices for Technology Transfer

Over the past few years, centers and offices for technology transfer have been set up in Zagreb, Split, and Rijeka and they have their own regulations and strategies on technology transfer.

Technology Transfer Offices (UTTs) are intended to provide support to researchers at public scientific organizations in all phases of technology deployment; from the idea, the identification of market potentials, the process of protection and commercialization of intellectual property through the licensing or establishment of spin-offs (spin-offs). The largest offices for technology transfer are:

- Center for Research, Development and Technology Transfer of the University of Zagreb
- Technology Transfer Office of the University of Split
- Technology Transfer Office of the University of Rijeka
- Ruđer Bošković Institute for Projects and Technology Transfer Technology
- Terra Tehnopolis d.o.o.
- Bicro-biocentar - BIOCentar was established as an incubation center with an area of approximately 4500 square meters with a central laboratory, a handy laboratory and office space to provide the new, knowledge-based companies with all the necessary conditions to carry out their activities in the field of bioscience, all for the purpose of merging scientific groups and industries to commercialize technology.

According to the Law on Scientific Activity and Higher Education, the Science and Technology Park is a trading company founded to commercialize scientific results, encourage collaboration between scientists and businessmen, and strengthen science-based economies.

5. Results of the applied survey on application of Open innovation by SMEs and Intermediary organisation provided within the InnTense Project

5.1. Methodology

In order to particularly assess the current trends in the application of the Open innovation approaches by the SMEs and also by the Intermediary organizations, InnTense Partners applied the survey among the stakeholders from their regions. In addition, a certain number of organizations have been contacted outside from Germany, Italy and Croatia, as the Partners used their networks to obtain those results.

The goal of the survey was to collect the information related to the main factors which are allowing and factors hindering SMEs and Intermediary organizations to apply Open innovation approaches. In this scope, two questionnaires for each stakeholder group has been developed and applied. Survey included the most important factors of the Open innovation (e.g. application of the existing tools, phases for implementation, significance of the cultural environment, etc) and best practice examples (establishment of networks, business-customer relations).

The collected data have been analyzed using the methods of descriptive statistics.

In the following subchapters 5.2. and 5.3. the main outcomes of the preformed survey are presented.

5.2. Survey analysis for SMEs

Expressed relatively, 65% of surveyed SME's fall into the group of micro size companies (eg. <10 employees) according to the EU SME definition. According to sector distribution, which is based on the EU classification (NACE), 18% of SME's are in group Professional, scientific and technical activities, 18% in Manufacturing and information and communication, while the rest is equally distributed to Human health and social work activities, Construction, Agriculture, forestry and fishing, Financial and insurance activities, Wholesale and retail trade, Administrative and support service activities, Optic and electronic detection instruments and Water supply (Figure 9).

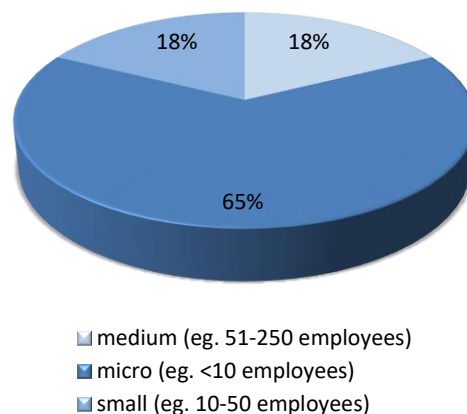


Figure 9 Division of the SME's
Source Author based on collected data

As presented in Figure 10, the main output of the survey is that 59% of the surveyed SME's is still not familiar with the Open innovation concept.

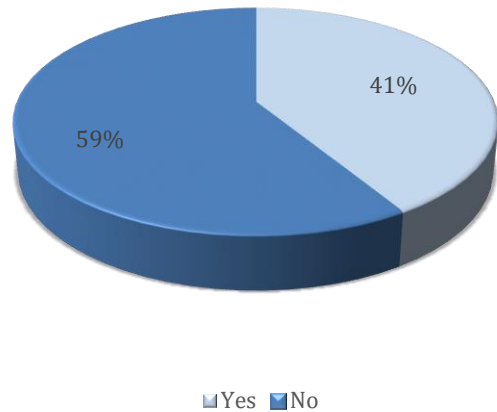


Figure 10 Familiarity with Open innovation concept
 Source Author based on collected data

According to listed challenges, which affect implementation of open innovation, most of the surveyed SMEs stated that organizational and cultural barriers have lower impact while limited resources in terms of available funds, time and skills have very high impact on implementation of Open innovation concept. Open innovation processes are wrapped with various barriers, the question of added value in relation to cost is shown as greatest challenge for 29% of surveyed SMEs. Increased cost through consistent coordination and complicated contractual regulations could be unequal and quite high compared to the outcome. Loss of control over innovation processes comes as a second most significant barrier for 24% of surveyed SMEs. Difficulties in finding a suitable cooperation partner and a fair distribution of costs and profits between cooperation partners are in third place of significance. Although formal and informal exchange of knowledge cannot be adequately controlled, loss of intellectual property is ranked as least significant for surveyed group (Figure 11).

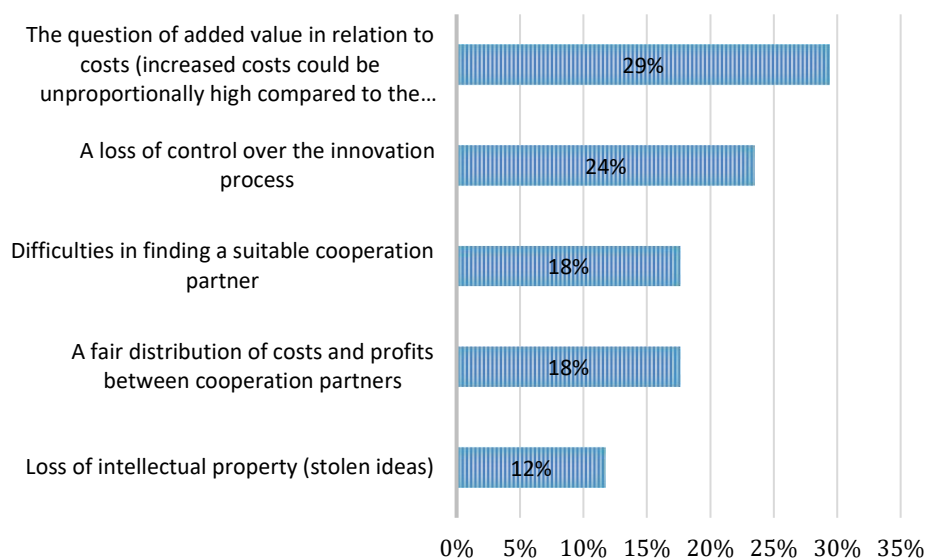


Figure 11 Barriers for using Open Innovation
 Source Author based on collected data

Pellegrino¹⁰⁹(2017) described eight needs why SMEs are interested for open innovation:

- Gaining control over activities and process organization
- Obtaining clear focus on firm’s competencies and activities
- Improving innovation process and innovativeness
- Gaining new knowledge and expertise
- Decreasing costs, increasing efficiency and profitability
- Counterbalancing lack of capacity
- Keeping up with current market developments
- Increasing growth and/or market share.

Interesting results showed that certain number of surveyed SMEs are actually carrying Open innovation activities, although some of them are not aware of the fact that these are Open innovation processes. Figure 12 below gives the overview of the activities which most of the SMEs are carrying out in the frame of their business scopes. Here, working together with external partners is the most common activity, while the use of support programmes, participation at cluster activities, knowledge and technology transfer and external licencing of knowledge are applied on slightly lower level.

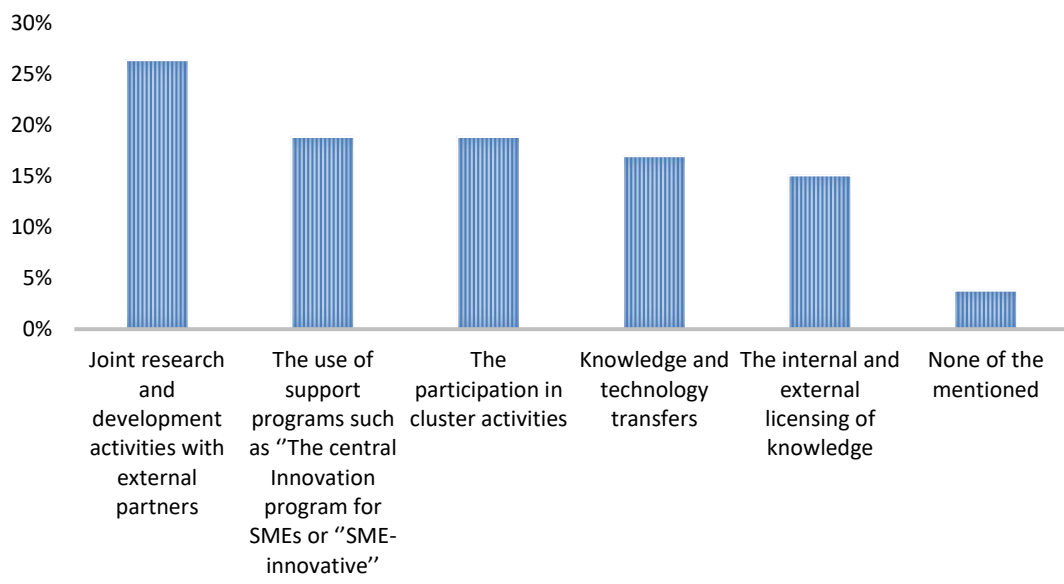


Figure 12 Open innovation activities carried out in SMEs
 Source Author based on collected data

Among surveyed SMEs that stated that are using Open innovation processes, 56% of them stated that they implement Open innovation at exploitation phase - used when firm wants to commercialize an already existing innovation. In 44% of SMEs, Open innovation models are implemented is in exploration phase, where firm wants to carry out R&D activities to develop an innovation.

In relation to that, as pretend in the Figure 13, the majority of the interviewed companies also reported that the major factors to enable this kind of process are the financing instruments as well as having the competent and skilled work force. The role or the intermediate organisations in this process are significantly underestimated by the SMEs, especially if taking into account low level of knowledge and awareness related to the EU, National/Regional programmes that are in fact providing the financial support for this kind of activities.

¹⁰⁹ Pellegrino, C. Anna (2017) *Open Innovation in SMEs: a Process Model for Successful Implementation*

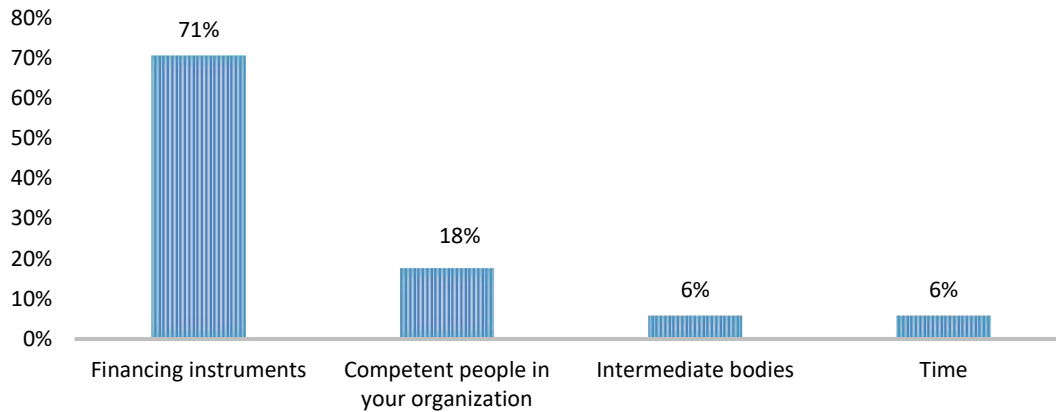


Figure 13 Incentive factors to get started with open innovation
 Source Author based on collected data

Open innovation mechanisms are among interviewed SMEs ranked in order that co-creation and outsourcing are the most common mechanisms used in SMEs (Figure 14).

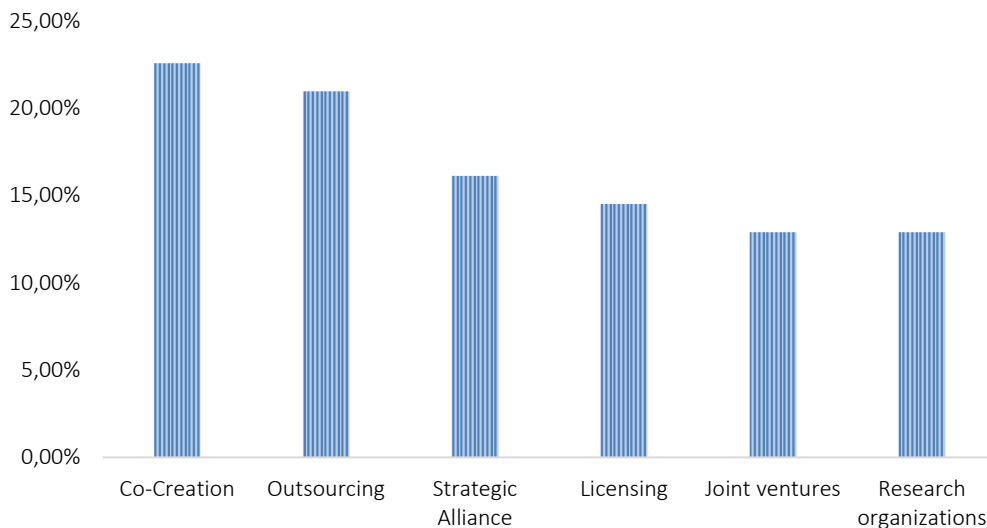


Figure 14 Open innovation mechanisms
 Source Author based on collected data

- Co-creation means the collaboration with customers to develop a product or service based on customer’s needs,
- Outsourcing refers to giving up control of an activity in order to gain access to another company’s expertise. It allows focus on core business by outsourcing secondary activities; it leads to saved time, cost and effort,
- Strategic alliances allow companies to leverage core competences, penetrate new markets and protect old ones and gain new strategic capabilities,
- Licensing means giving or buying the right to use knowledge or technology,
- Joint venture refers to a specific type of strategic alliances where two firms pool their resources into an organization and it allows firms to overcome R&D costs barriers and to eliminate duplication of effort

- Research organisations represent a longer commitment compared to most of the other methods and allow a firm to leverage and build upon existing competences while learning from the other partners.¹¹⁰

According to survey in ca. 50 % of the SMEs are involving intermediaries in the process of partner search for Open innovation (Figure 15).

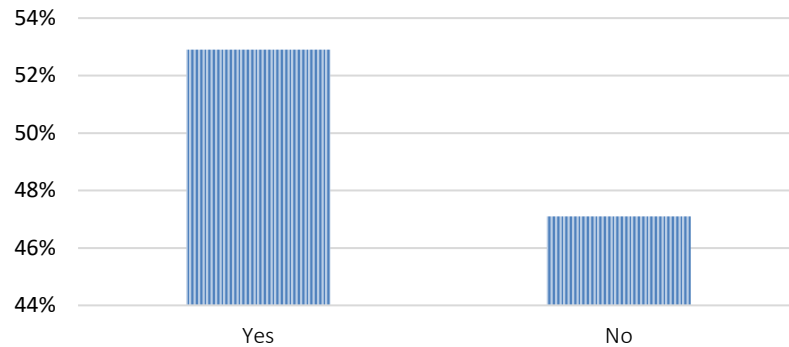


Figure 15 Using intermediaries in the process of partner search for Open innovation
Source Author based on collected data

According to survey results, most significant needs in the SMEs are improving innovation process and innovativeness, as well as gaining new knowledge and expertise. On the other hand, as less significant needs are gaining control over activities and process within the organization and keeping up with current market developments, as the interview SMEs mainly suggested that they possess the proper process and mechanisms which are allowing them to keep in track with these tasks.

5.3. Survey analysis for Intermediary organisations

The interviews performed with the Intermediary organizations (facilitators) mainly included those which have the status of the Regional agencies (Figure 16).

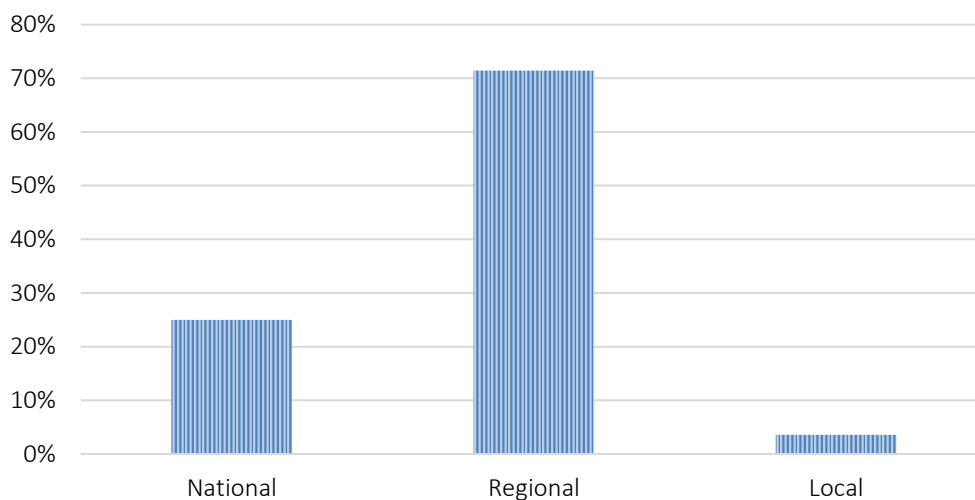


Figure 16 Geographical area covered by the intermediate organization
Source Author based on collected data

¹¹⁰ Pellegrino, C. Anna (2017) *Open Innovation in SMEs: a Process Model for Successful Implementation*

From all surveyed intermediary organizations, ca. 75% responded that they are familiar with the Open innovation concept (Figure 17). This shows a significantly higher positive results when comparing to the interviewed SMEs, where ca. 41% responded being familiar with the Open innovation concept. These are especially due to the bigger involvement of the intermediary organizations in the different kind of activates, such as EEN meetings/events, national/regional events and info days committed to the development of the business sector, cluster activities, direct contact and provision of the services to SMEs (e.g. in the scope of performance of the Innovation Audits) and contact with national/regional public authorities and administrations.

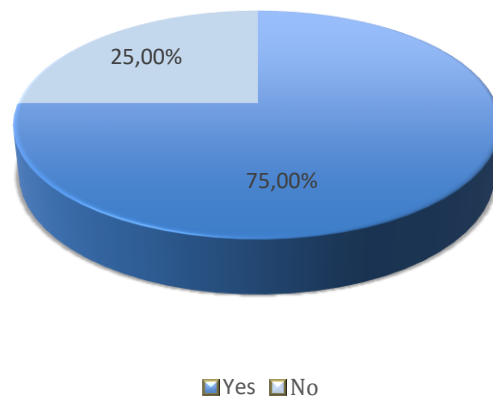


Figure 17 Familiarity with Open innovation concept by the Intermediary organizations
 Source Author based on collected data

Form the following Graph 18, it is evident that Open innovation function of intermediary organizations is mainly creating new partnerships, for ca. 43% and identifying right experts to answer the specific problem of innovation.

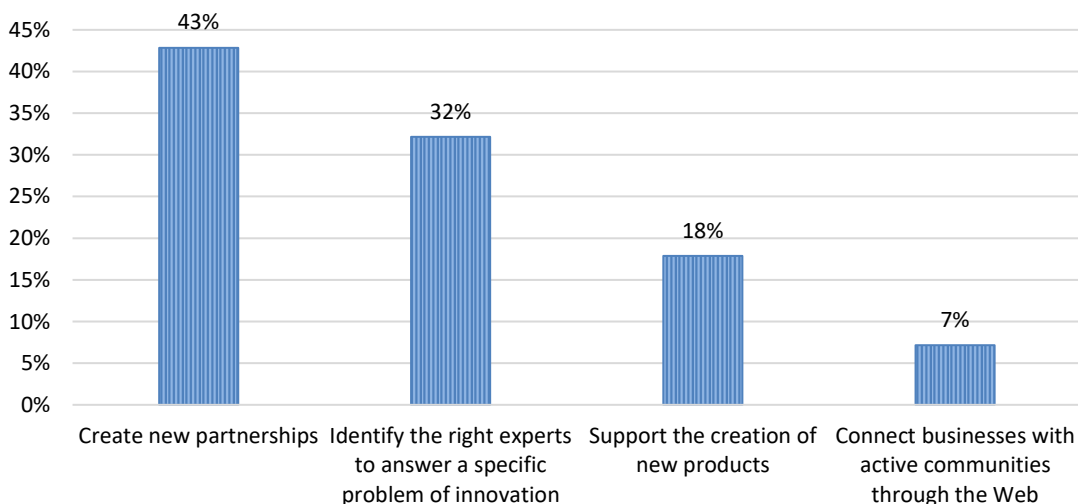


Figure 18 Mostly used Open innovation functions in intermediate organizations
 Source Author based on collected data

The key activity in Open innovation processes for intermediate organizations is to connect organizations in their network. To do so there are using several methods:

- For 50% of surveyed intermediate organizations the method is to contact organization in their network.
- 18% are searching the web for the competences,
- 14% are having the scouting activities to specialized organization,
- 7% are strategic approach and implementation of action plan,
- 4% are dealing with Open innovation items in lectures, seminars and conferences.

When talking about the main challenges related to the implementation of the Open innovation models by the intermediary organizations, the results are similar to ones obtained for SMEs. As presented in Figure 19, the biggest challenges are relating to the limited resources and terms of available funds, time and skills. These can be also connected to the short-, medium- and long-term objectives of the intermediates which are related to this activities.

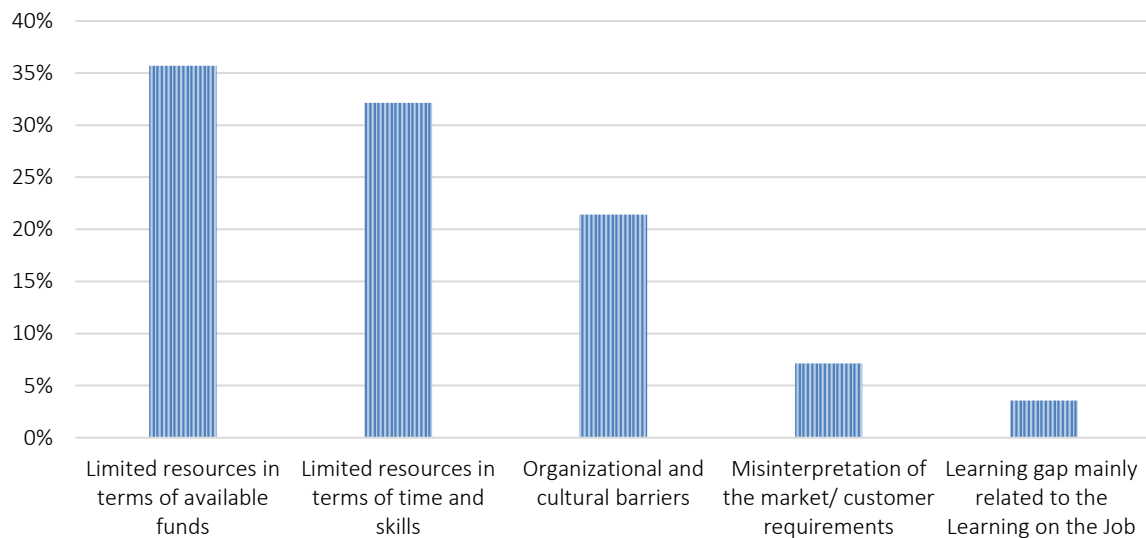


Figure 19 Challenges by accepting and implementing Open innovation model in intermediate organizations
 Source Author based on collected data

Checking the incentives which could help and stimulate the intermediates to apply on the broader level and transfer the Open innovation models to the SMEs, employment of the experts, financial support model and of course the demand for this kind of activities on the regional or national level are estimated as a main drivers (Figure 20).

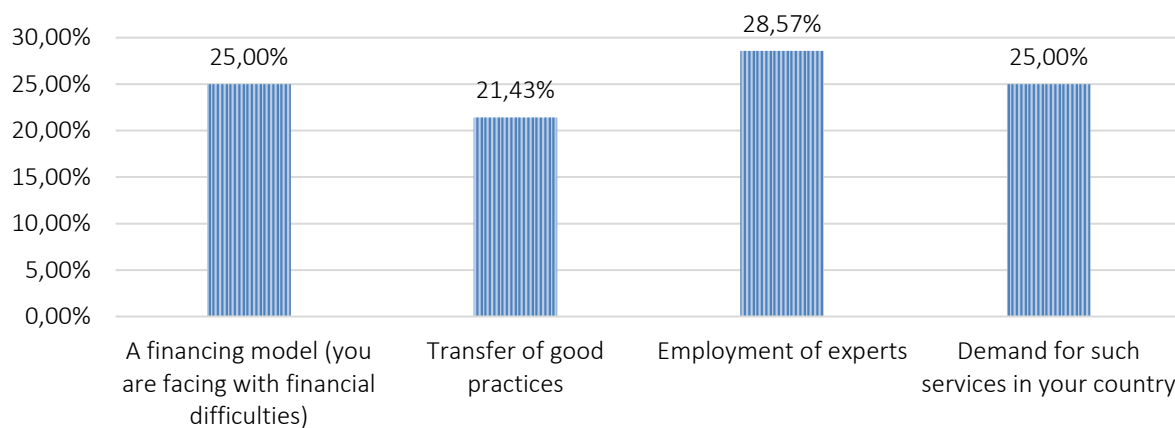


Figure 20 Incentive factors to get started with Open innovation
 Source Author based on collected data

In the framework of Open innovation process 43% of intermediary organizations have regional focus of their activities (Figure 21). This aspect is especially important as in this way a better estimation of the regional needs, strengths opportunities can be estimated and the development of the regional level can be facilitated. Furthermore, significant information flow between the involved actors – regional authorities and administrations – facilitators – business sectors is better established and maintained.

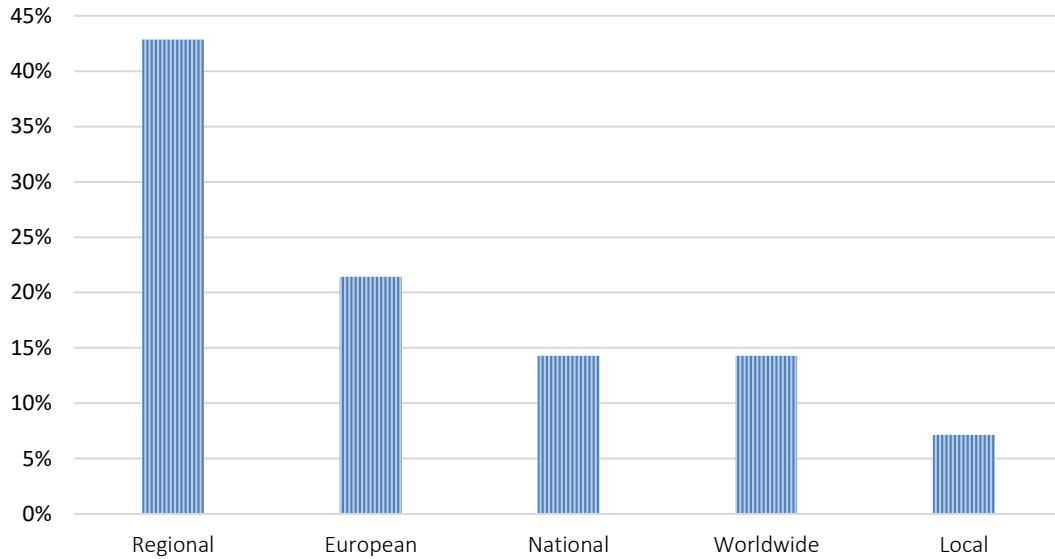


Figure 21 Focus of activity for intermediate organizations in Open innovation process
 Source Author based on collected data

6. Towards the broader application of Open innovation models

Collected works and the results of the preform survey in the frame of InnTense Project suggest that the knowledge related to the Open innovation and procedures to be applied by the companies to boost their innovation process can still be improved in a large manner. Even though there are many positive examples of the successful collaborations, there are still certain obstacles that are preventing the implementation of this approach by SMEs.

As identified by the performed survey, among others, barriers for applying Open innovation by SMEs are related to the benefits of using this approach in relation to costs and to the loss of control over the innovation process, which could have implications on the company’s core business. Opposite to that, majority of the interviewed SMEs also showed the willingness to take a part at certain collaboration developments, in the case of clear relations with the external partners. Due to this, it could also be perceived, that some of the main issues which SMEs are challenged by are not exclusively related to the development of the new ideas, but also how these idea are collected, applied and further managed. Thinking in consideration different aspects collected and presented in chapters 3 and 5 of this document, the identified challenges for application of Open innovation by SMEs can be clustered in following groups:



Figure 22 Most common challenges related to the Open innovation
 Source Author based on Chapters 3 and 5

Challenge No. 1: Strategic challenges

As research and survey result showed, the significant needs for SMEs are improving innovation process and innovativeness, as well as gaining new knowledge and expertise. It is evident that the strategic opening of innovation processes in SMEs, for active integration and the use of external knowledge requires not only internal and external structures, but above all a consistent innovation management. As discussed in the paragraph 3, SMEs hold strong assets that can support their capacity to innovate, such as creativity, flexibility and better risk acceptance. Coupled with the Open innovation approach, they allow SMEs to make connections and generate new business models with new partners from completely different industries. These can especially contribute to the cross-fertilization among sectors, responsiveness, better acquaintance to the customers and also shifting towards the international business scopes. On the other hand, it is estimated that motivating the SMEs for adopt Open innovation processes and to take them along in their implementation is a challenging task.

As explained by Püchner, Fischer, Schmidt (2017)¹¹¹, the analytic-strategic coaching¹¹² which aims to help the companies to develop and exploit their own innovation culture and processes can be applied. Here, the goal is to formulate an individual “Open innovation starter” process, which results in an enterprise-

¹¹¹ Püchner, Fischer, Schmidt (2017), *Open Innovation, Strategische Herangehensweisen für kleine und mittlere Unternehmen*

¹¹² More information at <https://www.steinbeis-europa.de/branchen-und-projekte/open-innovation/unterstuetzung-fuer-kmu.html>

oriented Open innovation strategy and an appropriate Open innovation ecosystem. This enterprise-based Open innovation starter process involves three steps:

- Analysis of innovation competences,
- Environmental analysis of existing markets and trends,
- The derivation of goals as well as one's own motivation.

In the following, more detailed presentation of these three steps is explained.

Analysis of innovation competences

Besides the identification of the innovation capabilities, the analysis of the innovation competences also scans the critical innovation bottlenecks and provides an important basis for decision-making for further strategic developments. In particular, the question of whether own resources and competencies are sufficient to keep future competitiveness on the market is crucial. If these competencies are not enough, it becomes obvious that external knowledge has to flow into the company.

By considering company-specific competencies, an application of the competence matrix is valuable instrument to evaluate relevant competences. Matching strong competences (resources) with the strategic relevance allow the company to smoothly operate in its core business. In the case that the company possess the moderate or low competences is the areas that are also of the strong strategic relevance, the company should necessarily expand - here the knowledge inflow through Open innovation is needed. The high company's competences which do not have strong strategic relevance, can be used as knowledge assets and can be offered in the form of licenses on the market.

At this point, it is clear that the company management as well as the employees involved in the processes correctly assess their own competencies and their strategic importance. There is often a debate and consequently the correction of results, as for example, the vision of the management is sometimes difficult to reconcile with reality.

Innovation process

The innovation process starts with the collection of innovative ideas, of which the best flow into a conception phase. Initial design and feasibility studies provide information in regard to which direction the journey might go. The planning and implementation phases based on these, are most likely to be considered as successful or profitable.

Each phase can, but don't necessary need to include the standardized business processes. At the same time, external sources can be integrated in all phases. Participations also referred to as Open innovation 2.0,¹¹³ include:

- Inclusion of the "user groups" which can be useful in all phases,
- Involvement of the "crowd" - the mass of unknown users - in terms of product ideas or expectations. This can be initiated by e.g. web-based open innovation platforms with corresponding price tenders or competitions become.

¹¹³ More information about Open Innovation 2.0 at <https://ec.europa.eu/digital-single-market/en/open-innovation-20>

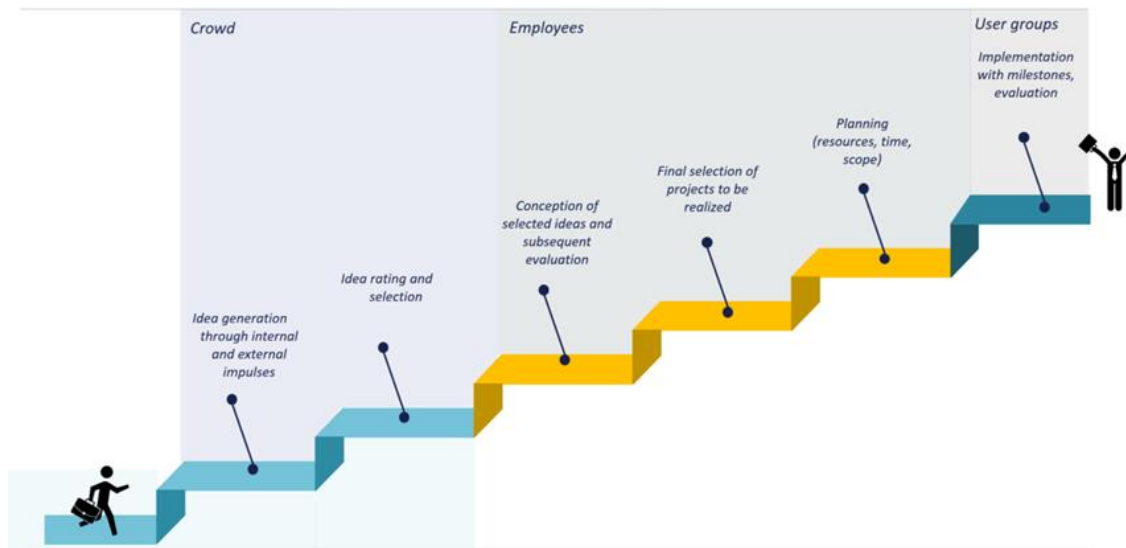


Figure 23 Identification of innovation processes in companies involving external and internal skills
 Source Adapted from Steinbeis 2i GmbH¹¹⁴

As explained in Paragraph 3, innovations are not only granted for the high-tech technologies and for big players on the market. Innovations can also be applied in low- or medium-tech sectors, even in “low tech” companies. Innovation and Open innovation in these industries is not about inventing new technologies or pushing forward technology frontiers, but rather a matter of finding relevant, novel, applications of existing technologies. Nevertheless, it also can be bifacial to consider, not only the existing products and services, but also those that are waiting to be launched in the company's pipeline. These can be elected according to their technology degree of qualification “Technology Readiness Level” (TRL), where the technologies are scaled from the performance of basic reach to the launch on the market.

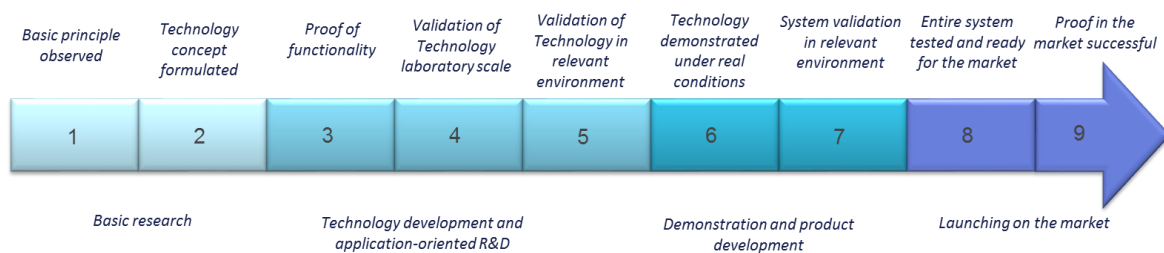


Figure 24 Technology Readiness Level
 Source Adapted from Steinbeis 2i GmbH¹¹⁵

Environmental analysis of existing markets and trends

The aim of an environmental analysis is to identify external drivers of innovation that have an impact on the company's business to. According to Michael E. Porter's “Five Forces Mode” (1980)¹¹⁶, five external forces in particular influence the company and its products: market, competitors, suppliers, substitute products and customers can be potential drivers of innovation.

Trends must also be recognized as drivers since they can influence the business field directly or indirectly. These include legal initiatives as well as social trends. In addition, the EU Commission has named several

¹¹⁴ Püchner, Fischer, Schmidt (2017), *Open Innovation, Strategische Herangehensweisen für kleine und mittlere Unternehmen*

¹¹⁵ Püchner, Fischer, Schmidt (2017), *Open Innovation, Strategische Herangehensweisen für kleine und mittlere Unternehmen*

¹¹⁶ Porter, Michael E. (1980): *Competitive Strategy: Techniques for Analyzing Industries and Competitors*. Free Press: New York

Key Enabling Technologies (KETs), which are essential for the competitiveness of companies and thus for their existence on the market. These include micro and nanoelectronics, nanotechnology, industrial biotechnology, advanced materials, photonics, and advanced manufacturing technologies. As perceived by the Commission, the countries and regions that fully exploit KETs will be at the forefront of creating advanced and sustainable economies. For this reason, it is of high importance to follow the current but also the trends of the future developments as in this way, the right strategies can be timely developed and implemented.

In addition, when comparing to the other organizations, large companies often can afford their own departments for technology observation and deal with diverse future scenarios. SMEs often lack the resources they need and even memberships in clusters does not usually cover all the necessary fields of competence in order to depict the products and services of the future. That is why Open innovation approaches are so important to SMEs.

Objectives and motivation for open innovation

The alignment between the innovation forces acting on the company externally and the competencies and knowledge assets that the company owns reveals innovation strengths and weaknesses. Based on this, the strategy is derived and it allows companies to respond to market changes and external innovation pressures, thus remaining competitive. The goal must be to balance existing innovation weaknesses.

As technology advances rapidly and SMEs today should acquire knowledge from all key technologies, external partners are needed. These bring at best solutions that in the most of the cases can be implemented quickly. This is where the innovation ecosystem comes into the focus: cooperation and exchanges with other companies, research partners, cluster initiatives, technology platforms, business developers and the “crowd” can make the innovation strategy of SMEs meaningful.

Prioritization of potential partners based on the strategic goals allows the delimitation and facilitates the decision-making. The goal of the process is to find out in which innovation ecosystem the company should position itself. From the up-to dated acquaintance usually the own representation of the competences shows first gaps in the innovation processes. Themes that were initially considered strategically important and should be realized without a partner, appear suddenly in a different light or take a back seat. This is requiring the reconsideration and reformulation of the strategic goals.

Open innovation ecosystem

From the analysis of strengths, weaknesses and market-specific conditions, it is possible to derive the framework conditions and perform the weighing of goals and reasons of the journey in which segment of the innovation ecosystem for strategic innovation partners should be sought. The more precise the goal of an innovation partnership is formulated, the clearer and more structured the search on the regional, national and European level can be performed. For example, if specific market knowledge is critical to broadening innovation, the innovation ecosystem will also focus on potential strategic partners in those markets. If specific technology developments are the focus, the ecosystem will also include technological innovation platforms.

In general, the innovation ecosystem consider and should include the following actors as it focuses on the most relevant relations to the Open innovation issue of the company:

- Companies
- Research facilities
- Cluster Initiatives
- Innovation platforms

- User-oriented Organizations /user group
- NGOs, associations
- Investor
- Funding program
- Accelerator / Incubators /Start-ups
- Policy / Administration.

Challenge No. 2: Operational challenges

As previously described, in the process of changing towards the utilisation of the Open innovation models, development and application of the proper innovation strategy plays a vital role. The alteration from a company that is used to produce the innovations “in-house” into a company that openly innovates with third parties, requires a lot of changes on both the structural and operational levels. For these reasons, strategic and operational challenges are inter-related and closely depend on each other.

In order to apply the successful changes, the establishment of the effective processes is the foremost factor which needs to be productively addressed. This process highly depends on the possibility to address the issues related to the lack of aims/goals, unclear internal and external communication, absence of stakeholder support and also the immeasurability and lack of strategy orientation. For these reasons, its very important to start with the strategic challenges and to identify the future course and company’s position in the innovation ecosystem and correspondingly to align the company’s processes.

In many cases, the management of SMEs overstate internal sources and understate external sources due to the lack of openness to the external environment. This misinterpretation of the reality could provide the management with the wrong input and it could impact on the strategic decision making. Therefore, the objective assessment of the internal resources, especially which the resources strengths and which are the weakness (as explained in the previous chapter) is needed in the process of establishment of the effective internal processes. These are also followed by the exact communication and the engagement of the stakeholders.

When talking about the operational challenges, the conclusion of the strategic partnerships plays a significant role as well. The prioritization of potential partners based on the strategic goals of the company allows the delimitation and facilitates the decision-making. The goal of the process is to find out in which innovation ecosystem the company should position itself. Joining local/regional, nation and international networks can in a significant level enable the collaborations and serve as a mediums for the successful partnerships. The same refers to the cluster memberships, which as a highly supportive settings facilitate the unrestricted knowledge and information.

Challenge No. 3: Legal Challenges

Intellectual property is considered the most problematic and complex issue facing companies introducing Open innovation programs. The results of the performed survey also showed that the majority of the companies have problems with this issue when considering opening their businesses for the externals, but at the same time they are not fully aware that especially on the EU level there are many possibilities to acquire the up-to-date information and support by the Intellectual property (IP) experts.

Due to the nature of collaborative innovation, especially in those where SMEs are working together with Research and Technology Organisations (RTOs), a well-organized Intellectual property management is vital for the success of the project. Sharing knowledge, technology and expertise between partners is perceived as huge benefit, nevertheless it also involves the assets outflow risks in the cases on improper

management. On the other hand, also due to the co-development activities that might be carried out in collaborative projects, the efficient allocation of ownership of results is crucial for their optimal exploitation. Since Open innovation is all about sharing know-how and inventions with third parties, organisations should start managing IP at the very early stage of the innovative process, starting with an accurate allocation of the IP owned by each party.¹¹⁷

In this scope, SMEs are encouraged to further explore the support options which are offered by the intermediary organisations, EEN, European IPR Helpdesks and furthermore to learn more about the EU Projects which are exactly dealing exactly with this topic.

Challenge No. 4: Cultural challenges

Recent European policies in research and innovation highlight the need to develop a new culture closer to the Innovation and Technology Transfer that should be based on more creativity and risk-taking activities. This also refers to the implementation of the Open innovation approach.

The shift in mentality of people requires a relatively long period of time and it is a very complex process. There is usually a quite high level of uncertainty towards the products or services which have not been invented or developed “in house” and therefore lack of trust when concluding new partnerships. For this reason, it is of a high significance to minimise or entirely change the negative outlook towards the Open innovation, as this could further result in higher inflexibility, thus obstructing the innovation processes. Furthermore, lack of commitment and motivation are also two aspects that need to be systematically addressed. As in the previously explained, there are many factors which are influencing these features (e.g. unawareness and non-exploitation of the own capacities). Only the appropriate set of the innovation strategy and clear allocation of the tasks and responsibilities can lead to the positive results.

Beside the cultural alteration that is essential for the business sector, a change in a mind-set towards more innovations is needed for all stakeholders involved in the innovation value chains. This fundamentally relates to those stakeholders that are closer to the education system, universities and research organisations, as well as in firms and companies. This should be done by promoting special programmes to foster innovation culture among entrepreneurs or to undergo vocational training for young students in universities. This could be done by promoting dedicated measures to support changing the mindset to innovation such as updating curricula of universities towards the development of more entrepreneurial skills among students and research staff. Also, the promotion of managerial skills at the leadership of universities should be encouraged through additional courses, dissemination events for enhancing cooperation and for exchanging of best practices.

Last but not the least, following the latest trends of the innovation ecosystems, inclusion of the Social innovations and social responsibilities must take a significant role part in the future developments. Currently, many social challenges (e.g. in health or mobility sector) remain without satisfactory solutions or the available solutions are not (yet) widely used and only few economic players committed themselves to Social innovation. Technology, in especially cross-cutting solutions interfacing digital society and concrete consumer demands, can play a big role in Social innovations and combination of Social innovations with new technological advancements can secure future of a company’s core business’.

¹¹⁷ European Commission (2015) *European IPR Helpdesks: Fact Sheet Intellectual property management in Open innovation*

7. Recommendations and lessons learned

Based on the collected data, preformed analysis and best practice and experiences exchange, the following recommendation for boosting the innovativeness of SMEs and related application of the Open innovation models are reflected:

- Introduction of the clear and structural Innovation strategies are backbone for innovation and introduction of the new business models in SMEs. Innovation strategies plays a vital role in a company's competitiveness. Strategically opening innovation processes in companies in order to integrate and make use of external knowledge and information requires relevant internal and external structures, and most importantly a structure for managing innovation. The systemic combination of internal and external knowledge is still not a practice widely adopted by SMEs, therefore, the systematic approach to boost the innovative of SMEs and thus the application of the Open innovation models is highly recommended.
- For the sustainable and long-term collaborations, the actors involved in the Open innovation processes should include the Quadruple Helix approach: regional and national governments and administration authorities, research community, industry & business sector and civil society, need to work together to co-create the future and drive structural changes. The establishment and cross-sectorial linking of the different innovation ecosystems can be useful for the future developments and new idea generations.
- Protecting Intellectual property in cooperation and collaborative projects is an important aspect that should be based on clear rules and procedures to be applied. Confidentially agreements and definition of the IP must be signed with cooperation contracts and with clear a guidelines. This aspect should especially considers at the beginning of the partnerships in order to avoid the future possible complications and guaranty each party the undisturbed collaboration under the agreed conditions.
- Identification of the suitable and reliable collaboration partners can be done by using the assistance of intermediary organizations, participation in the different networks and clusters and by screening the available web platforms. Open innovation can only be successful if the approach has been fundamentally well set and rooted within the company.
- There is a large space that could be used by intermediary organizations in terms of organizing education for SMEs, in order to get the companies to know this process. Therefore, intermediary organizations can expand their network on the European or worldwide level. They can match supply and demand and help to create new successful Open innovation story.
- More capacity building, competent promotion and transfer from more advanced EU to less advanced and EU pre-associated countries is needed. The existing EU financing instruments can be used for this kind of activities, nevertheless, the greater involvement, motivation and inducements by the National /Regional public authorities is needed in this segment.
- National /Regional public authorities are vital part of the innovation ecosystems as they are designing and facilitate the implementation of the innovation support programmes for the business sector (SMEs). They also play a significant role in the Open innovation as they can facilitate and enable better under understanding between the different stockholders. Bridging the gap between the research and innovation is only possible if the incentives for this activities are promoted and executed from the highest levels.
- Due to the fast changing trends and diverse market developments, especially thanks to the digitalisation, the further investigation of Open innovation models and its applicability in the SMEs can be advantageous.

Furthermore, the by the implementation of the InnTense project, the partners learned the following lessons and came to subsequent conclusions:

- The applied Twinning advanced methodology and Peer-to-Peer action was a effective exercise to arouse mutual learning among the project Partners and it can be considered more productive of the typical best practice sharing, study visits or traditional Twinning methodology. This is due to the fact that the Partners share the common experiences and are involved in the same business activities, therefore it was positive collaboration constellation.
- It is of high importance to motivate and promote the collaborations between the intermediary organisation and SMEs, but directly involving the other Quadruple Helix stakeholders in this process.
- Majority of the interviewed SMEs are facing the same challenges in their innovation processes – lack of resources, lack financial support/ignorance of the existing financing mechanisms and incentives and access to the right collaboration partners. The role of the intermediary organisations and the service portfolio which they are providing should be more disseminated and promoted.
- In general, it has been perceived that difficulties in addressing/influencing the policymakers is a common practice in each of the three participating regions. Those difficulties can be due to the national model that doesn't foresee a decentralized activity by the development agency (everything is centralized in the Capital) and due to the lack of official discussion tables at regional/central level, that could allow the development agency to bring on, in a transparent way certain instances at regional level. In order to unlock this situation a stronger support by the EU could be opportune.
- There is an added value in clustering different projects active in the same call. The clustering of initiatives is an influential instrument that allows the mutual learning and the exchange of experience.

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