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Open Innovation Session as a Tool Supporting Innovativeness in Strategies for High-Tech Companies in the Czech Republic

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Abstract: Open innovation has developed over several decades from a small pool of innovation pioneers, mostly active in high-tech industries, to be widely discussed and implemented in innovation strategy. The primary objective of the Open Innovation Session (OIS) is to create a platform where firms are able to facilitate knowledge transfer. This paper focuses on the contribution of OIS, implemented by regional government, in formulating companies' strategic management and to overcome barriers to innovation for high-tech companies in the South Moravian region of the Czech Republic. The methodology adopted for this paper includes monitoring and analysing the activities of this programme over seven years, followed by a quantitative study using both primary and secondary data. The primary data for the research were gathered through questionnaires, where the respondents were general managers of companies that had at least some experience of an innovation process. Secondary data were taken from the Czech Statistical Office. This paper has found that the association between an aspiration for innovation leadership and expenditure for research and development is high, further that participation in OIS led to a shift in the perception of the objectives, needs and conditions of the business and finally the major barriers to the innovation process are a lack of highly motivated people with the necessary technical and business experience.

Keywords: strategic management for Industry 4.0; Open Innovation Session; regional innovation strategy; South Moravian region; innovation barriers; innovation strategy

JEL Classification: O31

1. Introduction

Industry 4.0 is current challenge for most industries (Maresova et al. 2018). It is enabled by the internet of things allows for the integration of people, environment and process within a company. It also fosters the integration of a company with its environment, potentially consisting of subcontractors, customers, suppliers and R&D partners. Major trends within Industry 4.0 are shorter lifecycles and therefore the need to speed up time to market. This will increase the need for innovation. Open Innovation is an approach to master the innovation game and to stay competitive in fast-changing markets (Industry 4.0 and Open Innovation 2018).

Innovation encompasses not only new or improved products and processes but also new services, marketing, branding and design methods and new forms of business organization and collaborative arrangements. As previous authors (Cooke 2011; Hagedoorn et al. 2000) have pointed out, the importance of regional–national interactions, especially regarding each region's eco-innovation

system, its regional and national regulation, subsidy and incentive structures and eco-innovation outcomes in the sense of new products, processes and organizational changes implemented in the markets for eco-innovations. It is particularly important to identify the factors affecting national development through regional technology innovation. Furthermore, strengthening R&D in universities and research organizations, community associations and the business community, innovation and energy agencies, regional and national government can increase the capacity to effectively address both innovation and sustainability challenges and create capacities to act and find specific innovative solutions as and when needed. As previous studies (Hagedoorn et al. 2000; Gallié and Roux 2010) have pointed out that collaboration for open innovation can occur between private firms and between private firms and government research organizations. It is confirmed by study of Hossain et al. (2016) where the findings of significant studies are highlighted and a detailed picture of the progress of open innovation literature is described. Furthermore, West and Bogers (2017) summarized opportunities, which include more research on outbound open innovation, the role of open innovation in services and network forms of collaboration such as consortia, communities, ecosystems and platforms. The open innovation networks exhibited many of the same tensions discussed in innovation initiatives within organizations (Jarvenpaa and Wernick 2011). Cheng and Huizingh (2014) studied the relationship between open innovation and innovation performance. The results indicate that performing open innovation activities is significantly and positively related to new product/service innovativeness, new product/service success, customer performance and financial performance. Chaston and Scott (2012) findings may suggest that firms operating in emerging economies need not necessarily rely on entrepreneurial behaviour to sustain business growth, although involvement in open innovation may enhance business performance.

The concept of open innovation is widely used in mostly high-tech industries (Matulova et al. 2015a, 2015b, 2016). Different regions have competitive advantages in different industries depending on the geographical location and the size and nature of the firms operating within that area. Access to capital, labour and/or technology can be a major source of advantages for different firms. To foster the growth of the firm, the management has to be strategic in choosing its partners for collaboration. One of the three strategic themes of the Regional Programme of Innovative Actions initiative of the 2000–2006 cohesion policy (Introducing the RIS of South Moravia | RIS JMK 2018) This is a government policy call Czech regional innovation strategy 2000–2006 was 'regional economies based on knowledge and technological innovation.' Regional development can be achieved through open innovation where knowledge transfer could occur in the form of technology transfer and/or expert assistance. Open innovation involves cooperation with external partners and cooperation with external partners can be an important challenge as both parties need to agree on their mutual benefits. Both parties need to benefit from cost- and risk-sharing opportunities (Hagedoorn et al. 2000; Lopez 2008). Through open innovation and cost- and risk- sharing strategy, the partners can achieve economies of scale as has been argued by (Becker and Dietz 2004; Arvanitis 2012). Although firms can increase value and attain efficiency through open innovation leading to regional development, it is easier said than done. Firms sometimes are concerned about the barriers to open innovation. Although, researchers have discussed the barriers to innovation, they have overlooked the firms' actions to change the strategies within the firms to overcome these barriers and to implement open innovation practices within firms. This paper focuses on the changes in strategies of innovation of the 47 high-tech firms to overcome these barriers.

The most important barrier for open innovation is the concern about the secrecy of technology know-how as well as business policy. Both Kaiser (2002) and Arvanitis (2012) have argued that the extent of cooperation is associated with strategies to internalize knowledge that can leak out to competitors. Yet, companies decide to cooperate if they find it beneficial by upgrading capabilities, foreseeing opportunities to shape the competitive environment, learning to use new technologies, gaining understanding of the complexity of the solution and gaining access to new resources (Caloghirou et al. 2003). While Kaiser (2002) and Arvanitis (2012) focused on the Industrial

Organization's point of view, which seeks to increase company value, as seen from the Management literature. Nonetheless, barriers need to be overcome for the successful implementation of open innovation. One of the best ways to overcome these barriers is through increasing absorptive capacity of the company. The importance of ACAP is well accepted and practised across the fields of strategic management, technology management, international business and organizational economics. Cohen and Levinthal (1989)'s definition of ACAP as the firm's ability to value, assimilate and apply new knowledge is regarded as the widely accepted one. Zahra and George (2002) have drawn a seminal distinction between the firm's potential absorptive capacity and its realized absorptive capacity. Potential capacity comprises knowledge acquisition and assimilation capabilities, whereas the realized capacity centres on knowledge transformation and exploitation. Franco et al. (2014) have analysed the antecedents of the firm's potential absorptive capacity and its impact on the firm's innovation. They have re-examined the role of innovation cooperation in triggering the firm's capacity to scan and assimilate external knowledge, putting a novel focus on the manifold proximity between the firm and its partners. Similarly, (Cohen and Levinthal 1989, 1990; Zahra and George 2002; Franco et al. 2014) also proposed mechanisms that enable companies to exploit externally acquired knowledge. Cooperation strategy largely depends on the firm's ability to manage the trade-off between knowledge generation and gaining knowledge from partners and also depends on the absorptive capacity of the cooperating companies once the type of partner and innovation is agreed on (De Faria et al. 2010).

The knowledge flow can be made effective through the introduction of Open Innovation Sessions (OIS). Putting OIS into practice is the most important aspect of the planning itself (Matulova et al. 2015a, 2015b). These sessions can also have a considerable impact on the strategic management of the companies involved in open innovation. Strategic management involves internal and external communication practices as well as monitoring to ensure that the company can achieve its goals as outlined in its strategic management plan and open innovation is complementary to the toolset for strategic planning. Strategic management helps to increase the efficiency of institutions and plays an effective role in their success (Amoli and Aghashahi 2016). William Darden of Hershey National Track Company admitted the success of the company was a result of proper strategic management. Alfred Thomas Chandler, a professor at Harvard University, conducted a survey of large American corporations and explained their senior executive managers' strategic decision-making processes. He also demonstrated how strategic decisions and planning could lead to success in a competitive environment. As explained in (Amoli and Aghashahi 2016), the use of strategic management increases the efficiency of car companies. For example, Bahman Khodro Company increased the number of cars produced by up to 6000 units in 2013 and the customer satisfaction level also increased to 73%. Dynamic, forward-looking and holistic discipline and strategic management are considered the way to overcome organizational issues (Amoli and Aghashahi 2016). Blending the inflow of external information with the internal capabilities can help to boost the organization's performance. OIS facilitates the exchange of information from stakeholders, rivals, partners, experts and technology owners into the organization and can help the management to formulate a strategic plan to increase efficiency and productivity. This in turn will lead the organization to overcome the barriers to open innovation.

Although the impact of open innovation and strategic management on firm performance has been discussed by many researchers, none has focused on the effect of the Open Innovation Session as a tool for the strategic management of high-tech firms. There are clear incentives in cooperating with potential partners for gains in terms of learning and knowledge spillovers, rather than searching for opportunities to minimize a loss or cope with a problem. This paper also considers how these open innovation sessions can be a way of overcoming the barriers to open innovation. The literature on the barriers to innovation has missed the opportunity to investigate whether and how firms can change their strategy in response to their perception of obstacles. While the literature on barriers has focused on the direct effect of these barriers on firms' innovation engagement and performance, they have not explored the indirect effect that barriers might induce on performance through a change in the

firm's strategy. This paper focuses on the contribution of OIS, implemented by regional government, in formulating companies' strategic management and to overcome barriers to innovation for high-tech companies in the South Moravian region of the Czech Republic.

2. Methodology

The Regional Innovation Strategy of the Moravian region in the Czech Republic included the design and implementation of a set of measures and tools called the 'Open Innovation Session' to foster innovations. After 7 years of implementing the OIS by the government, it is a suitable time to analyse the impact of these sessions and of governmental assistance in the regional economies through the changes in strategic management of the firms. The methodology adopted for this paper includes monitoring and analysing the activities of this programme over seven years, followed by a quantitative study using both primary and secondary data. This paper applied a combination of quantitative and qualitative research and the combination of these two methods, joint research plans.

2.1. Data Collection

The primary data for the research were gathered through questionnaires. These questionnaires were distributed in paper form to the individuals who are directly related to innovation strategy planning. The respondents for this study were the general managers of companies that had at least some experience of an innovation process. Fifty companies received the questionnaire and were personally interviewed to the survey and the collected data were sorted, tabulated, classified and analysed. This initial classification found that only 47 questionnaires were complete and so were subsequently used in the analysis.

2.2. Design of Concept

This study examines the impact of Open Innovation Sessions (OIS) on the strategic management process of high-tech companies in the South Moravian region of the Czech Republic. The design concept—called the Open Innovation Session (OIS)—was basically a tailor-made one-day meeting with potential high-technology partners focusing on the specific demands of both Czech SMEs and international corporations and large companies (Coca-Cola, Konica Minolta, GE Electronic, Meopta and many others). The aim of the OIS meeting was to effectively and quickly reach solutions to challenges and/or technological problems defined by the client corporation. One of the aims of the session was to connect the company with as well potential suppliers of solutions as suitable business partners. Companies were able to identify a partner from a long list of potential suppliers of solutions, make contact with them and organize the logistics of a meeting, including the location. Once the technological areas are matched, the firms identify the specific technological problems during the session and then discuss the possibility of cooperating to resolve them.

The primary objective of the OIS is to create a platform where the firms are able to facilitate knowledge transfer. The typical users of OIS were mostly hi-tech companies. Firstly, the potential partners are selected from the list of potential companies/firms. The SMEs are, then, connected with the innovation centres of the external partners. At a later date, a joint meeting is organized where experts from the selected research organizations or companies present their technological solutions. At the OIS, the participants from each potential party, in turn, present their respective solution or technology, followed by a discussion. This allows the SME to compare the quality and acceptability of different parties and their technical solutions and their offerings, which allows them to plan for their future cooperation. Thus, the OIS not only leads to partnerships but opens up opportunities for creative problem-solving. The objectives of this study are:

O 1: To find industries that use the Open Innovation Session model as a tool of strategic management in the Czech Republic.

O 2: To identify the major barriers to the innovation process among the companies in the South Moravian region of the Czech Republic.
O 3: To find the factors that largely affect the implementation of innovation strategies within these companies.

Furthermore, based on the research objectives, we have developed the following research questions:

RQ 1: What are the industries that use the open innovation session model as a tool of strategic management in the Czech Republic?
RQ 2: What are the major barriers to the innovation process among the companies in the South Moravian region of the Czech Republic?
RQ 3: What are the factor(s) that largely affect the implementation of the innovation strategies within these companies?

2.3. Data Calculation

The prediction function from the SPSS Statistical Software provides advanced statistical analysis that can be used to answer the research questions. The SPSS Expert Modeler method is also employed for the analysis.

3. Results

3.1. Participants of Open Innovation Sessions

In the Czech Republic, the number of registered trading companies in 2014 was approximately 420,000. There were 2391 companies with their own R&D departments; 629 of them invested more than CZK 10 million in R&D in 2015. Expenditure on R&D exceeded CZK together 100 million from 82 in-house R&D departments ((TAČR—Technologická Agentura ČR 2018) The Technology Agency of the Czech Republic is an organizational unit of the state that was founded in 2009 by the Act No. 130/2002 Coll. on the support of research, experimental development and innovation.). The reason for emphasizing the knowledge intensity of firms is the fact that the innovative capacity of the company in the higher order of innovation (innovations cause products, production systems and their layouts to be deferred from their original state to varying developmental stages. We call this development and stage of innovation a "order of innovation). The main criterion here is the stage development that the new product differs from the original one. There are a total of eleven orders, including negative innovation and zero-order innovation. The most radical innovation is therefore the ninth order innovation, this innovation is very exceptional and it is a fundamental technological breakthrough, the creation of a new tribe. This fact determines, to a large extent, the critical size of financial, technical and other capacities directed towards R&D. However, this does not mean that less attention is paid to innovations that do not require internal R&D activities. The following selection criteria were applied:

- the company's *knowledge intensity*, measured by the minimum volume of investments in its own research or development activities,
- the *company's performance*, emphasis was placed on rapidly growing technological SMEs,
- *active involvement in R&D* projects over the last 3 years,
- *category* according to the Classification of Economic Activities (NACE); the key sectors for the Czech economy according to the NACE classification were selected (Figure 1).

3.2. Open Innovation as a Tool for Strategic Management in Czech Companies

Research question 1 analyses the relationship between the type of industry and open innovation usage. The largest number of companies using the open innovation session model as a tool of strategic management was made up of machinery SMEs that implemented Industry 4.0. These companies are mostly focused on the machinery and ICT field and consider open innovation as a suitable tool for

developing their strategic tools to meet the Industry 4.0 content. More than half of all applicants were firms with 51 to 250 employees. More than half of applicants had never worked on a project with a university before. Here we can see the main impact of the Open innovation session model. In 68% of cases, the main reason for cooperation on the part of the company was knowledge of the specific researcher´s team.

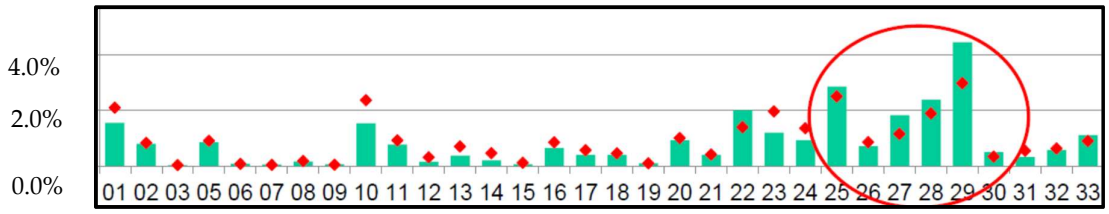

Figure 1. Structure of GDP added-value creation. 28: mechanical engineering, 26: electronics, 29: automotive, 25: metalworking, 62: IT., source: own based on data from Czech Statistical Office.

The research is focused on the association between the size of the company and the frequency of participation in the Open innovation session. Companies were divided into three groups according to the number of employees: 1–10, 11–50 and 50–250 employees. Companies with 1–10 employees most frequently used the open innovation model, in the role of presenters of solutions to larger companies. Companies with 50–250 employees were most often the beneficiaries. Figure 2 shows how often companies used open innovation in correlation to the number of employees.

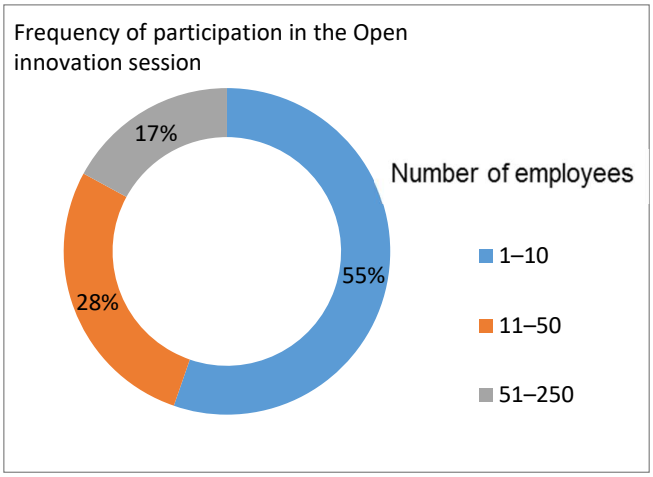

Figure 2. Size of applicants of Open innovation session model (by number of employees). Source: own.

Research question 2 focuses on identifying the major barriers to the implementation of the innovation process. Although technology management was thought to be the major barrier in implementing the innovation process in Industry 4.0, this assumption is found to be a myth. *The lack of highly motivated people with the necessary technical and business experience* was found to be the main factor hindering the implementation of the innovation process. Secondly, the *educational system* is inadequately responsive to long-term societal and technological changes and thereby the new needs of companies. The *market competencies* of most of the companies were found to be less developed in technical competency to foster the adaptation of knowledge transfer. Smaller companies with a critical size were required to achieve a critical size to be capable of being global leaders in the development of new generic technologies. Few companies were able to invest in large innovative projects with global impact and scope. These companies are at the forefront of the development of generic technologies. It is not possible for other companies to enter this innovation. Lastly, the need for a stable, predictable and motivating business environment is also found to be a barrier to the implementation of the innovation

process. All these information is based on own obtain data, we tried to map out the most significant barriers in the innovation process in companies.

Research question 3 examines the factor(s) that largely affect the implementation of the innovation strategies within these companies. *Aspiration of innovation leadership* is the major factor that affects the implementation of the innovation strategies, the correlation between these is very high. The goal of the innovation is to gain a strategic advantage and the strategic benefits.

This captured the correlation between R & D investment rate and the aspirations to lead the market. Several major categories according to the attitude to innovation strategic tools were found to be determinate. There can be described by these main groups: the group of companies, which offer something that no one else can (product uniqueness)—focused on radical innovation and changing parameters in the market, listed in the Table 1 as A; a second group of companies are focused on offering in a way that no one else can provide: unique delivery; listed in the Table 1 as B, another group claim that their strategic tool is a technical complexity/uniqueness; listed in the Table 1 as C the next group, listed in the Table 1 as D, is focused mainly on gaining an advantage by being the first on the market or focused on the right timing. An interesting mind set was observed in the so-called "smart follower" group, (see Table 1 letter E). This group observes innovation by their competitors and smartly implements these innovations in their market/technology. The remaining companies were divided into groups that focused on differentiating (G in the Table 1) a new factor of competition and on diversification (taking advantage of existing know-how in a different market). A very interesting result—was that the perspective based on strategy gained the most interesting competitive advantage, the so-called smart follower. These companies invest 4× to 5× more in R&D and use open innovation in a very smart way. The results indicate the association between the aspiration for innovation leadership and expenditure on research and development. There is a significant correlation between expenditure on open innovation and aspiration, which could be described as the aspiration of using existing know-how in another market—diversification (Table 1).

Table 1. Relationship between the R&D investment rate and aspirations to lead the market, source: own.

Aspiration of Innovation Leadership	Mean	N	Std. Deviation
A	5.5000	8	4.62879
B	12.0000	1	
C	3.2857	7	1.49714
D	4.6500	6	4.61031
E	3.0000	6	1.78885
F	4.3250	8	2.86394
G	6.2000	11	6.70298
Total	4.8447	47	4.44061

A—product uniqueness—radical innovation—changing parameters; B—offering in a way that no one else can (unique delivery); C—technical complexity/uniqueness; D—right timing; E—smart follower; F—differentiate (a new factor of competition); G—diversification.

Based on obtaining own data from the questionnaire survey the expenditure and the areas of investment were investigated. Company investment (expenditure) that helped to foster innovation was categorized, such as: product innovation, process innovation and strategic management. It was found that most of the companies invested in R&D—focused on innovation of the technology processes (Table 2). According obtain data most companies were focused on product innovation. The distinction between processes and products innovation was clarified but it may be less clear, if the production, delivery and consumption of services can would be offered at the same time. We could summarize, that innovation, which involves significantly progressed characteristics of the service is a product innovation. And significantly improved skills, methods, formulas for performing the service is a process innovation. In some cases, there are implemented both the characteristics of the service, the methods, skills equipment and companies use combination of process and product innovation. In our research we divided firms into groups according the type of more significant type of innovation. Third

groups were focusing on innovation in strategic innovation. Focusing on this type of innovation requires a certain awareness of the company's management and according to our survey, this type is devoted to the smallest group of companies.

Table 2. Areas of investment within the company to foster innovation, source: own.

Kind of Innovation	Mean	N	Std. Deviation
Product innovation	4.6769	26	3.70722
Process innovation	5.2714	14	5.82586
Strategic management	4.6143	7	4.44613
Total	4.8447	47	4.44061

Based on the strategy, respondents were divided into three main groups. Firstly, those who followed the expansion strategy, second those that focused on stabilization after previous growth. The last group was categorized as a defensive strategy (keeping a position in response to a decreasing market) (Table 3).

Table 3. Types of business strategies, source: own.

Strategy	Mean	N	Std. Deviation
Expansion strategy	5.1700	30	4.07508
Stabilization Strategy	4.2706	17	5.10340
Defensive strategy	0	0	0
Total	4.8447	47	4.44061

The impact of the innovation was also measured. Here we have attempted to capture the correlation between the R&D investment rate and the company's strategy from the point of view of whether the firm is targeting expense or stabilization (for example, after previous growth or generational change) the stabilization strategy has been relatively well represented and defensive strategy (losing market share).

The group with "Expansion Strategy" invested the most in R&D, almost 1% more than the others (Table 4).

Table 4. Relationship between the R&D investment rate and the company's strategy, source: own.

Impact	Mean	N	Std. Deviation
Expansion strategy	4.3882	34	3.77301
Stabilization Strategy	6.0385	13	5.85727
Total	4.8447	47	4.44061

The paper focused on tracking R&D expenditure according to how the companies perceive barriers to innovation, as it was expected companies that do not see significant barriers invest more in their own research (Table 5).

When monitoring the relationship between the export rate of a firm and investment in research and development, a statistically significant correlation was found. This result confirms that exports (in particular to demanding markets such as the USA and Japan and to a large extent to the Czech Republic and Germany), are a significant stimulus for investment in their R&D activities and support global business and innovation ambitions. Factors such as the export rate and the number of collectively employed workers are also related to the degree of innovation introduced by the company into the production process. The analysis shows that companies with foreign capital are trying to invest more than Czech companies. This result could be affected by the fact that research among firms that have a research centre in the Czech Republic (Table 6).

Table 5. Barriers to innovation, source: own.

Barriers	Mean	N	Std. Deviation
No significant barriers to implementation of innovation	3.8875	32	2.92770
Significant barriers to implementation of innovation	7.3889	9	6.97790
Significant barriers to a specific field	6.1333	6	5.55506
Total	4.8447	47	4.44061

Table 6. Correlation of variables, source: own.

Monitored Variables		Expenditure	Export	University Employee	Firms Source	Subsidies	Last 3 Years Increasing
Expenditure	Pearson Correlation	1	0.289 *	0.378 **	0.277	−0.277	0.265
	Sig. (2-tailed)		0.049	0.009	0.059	0.059	0.071
	N	47	47	47	47	47	47
Export	Pearson Correlation	0.289 *	1	0.368 *	0.050	−0.050	−0.234
	Sig. (2-tailed)	0.049		0.011	0.737	0.737	0.113
	N	47	47	47	47	47	47
University Employee	Pearson Correlation	0.378 **	0.368 *	1	−0.117	0.117	0.079
	Sig. (2-tailed)	0.009	0.011		0.432	0.432	0.599
	N	47	47	47	47	47	47
Firms Source RD	Pearson Correlation	0.277	0.050	−0.117	1	−1.000 **	−0.048
	Sig. (2-tailed)	0.059	0.737	0.432		0.000	0.751
	N	47	47	47	47	47	47
Subsidies	Pearson Correlation	−0.277	−0.050	0.117	−1.000 **	1	0.048
	Sig. (2-tailed)	0.059	0.737	0.432	0.000		0.751
	N	47	47	47	47	47	47
Last 3 years Increasing	Pearson Correlation	0.265	−0.234	0.079	−0.048	0.048	1
	Sig. (2-tailed)	0.071	0.113	0.599	0.751	0.751	
	N	47	47	47	47	47	47

* Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

4. Discussion

The analysis of innovation cooperation mechanisms is based on different theoretical perspectives. The literature described that companies decide to cooperate if they see opportunities to create a competitive environment, gain access to new resources, improve their capabilities and learn to use new technologies (Caloghirou et al. 2003). The decision to cooperate is based on how the company 'manages the trade-off between generating and accepting knowledge to and from partners' (De Faria et al. 2010) and depends on the absorption capacities of the cooperating firm, the type of partner and the type of innovation. This paper contributes to the innovation literature by surveying and empirically testing whether experiencing open innovation is supportive to eliminating barriers to innovation and if there is any implementation of innovation connected with the strategy of management. Figure 3 shows the process of Open Innovation Session.

It is found that participation in the Open innovation session led to a shift in the perception of the objectives, needs and conditions of the business; companies became more like partners or an initiator of open innovation. The literature on strategies in conjunction with current trends and changes, such as the concept of Industry 4.0, suggest that incentives to cooperate are linked to knowledge management strategies and competition with competitors (Arvanitis 2012). Studies on the barriers to innovation mostly look at the characteristics affecting the perception of financial and non-financial obstacles to innovation (D'Este et al. 2012, 2013, 2014; Hölzl and Janger 2014, 2013; Pellegrino and Savona 2017); the deterrent effect of obstacles on companies' strategy to engage and invest in innovation activity and the propensity to innovate (Mohnen and Rosa 2002; Galia and Legros 2004; Canepa and Stoneman 2008; Savignac 2008; Iammarino et al. 2009; Mancusi and Vezzulli 2010; Tiwari et al. 2008; Baldwin and Lin 2002); and the direct and indirect impact of barriers on firms' productivity and

performance more generally (Coad et al. 2016; Hall et al. 2013). We have found that the major innovation barriers for implementing Industry 4.0 is *a lack of highly motivated people with the necessary technical and business experience*. Unlike the hypothesis presented by (D'Este et al. 2012, 2014; Hölzl and Janger 2013, 2014; Pellegrino and Savona 2017), where barriers to innovation are mainly seen affecting the perception of the financial aspect. Secondly, the *educational system* is inadequately responsive to long-term societal and technological changes and thereby the new needs of companies. The *market competencies* of most companies are less developed, such as technical competence.

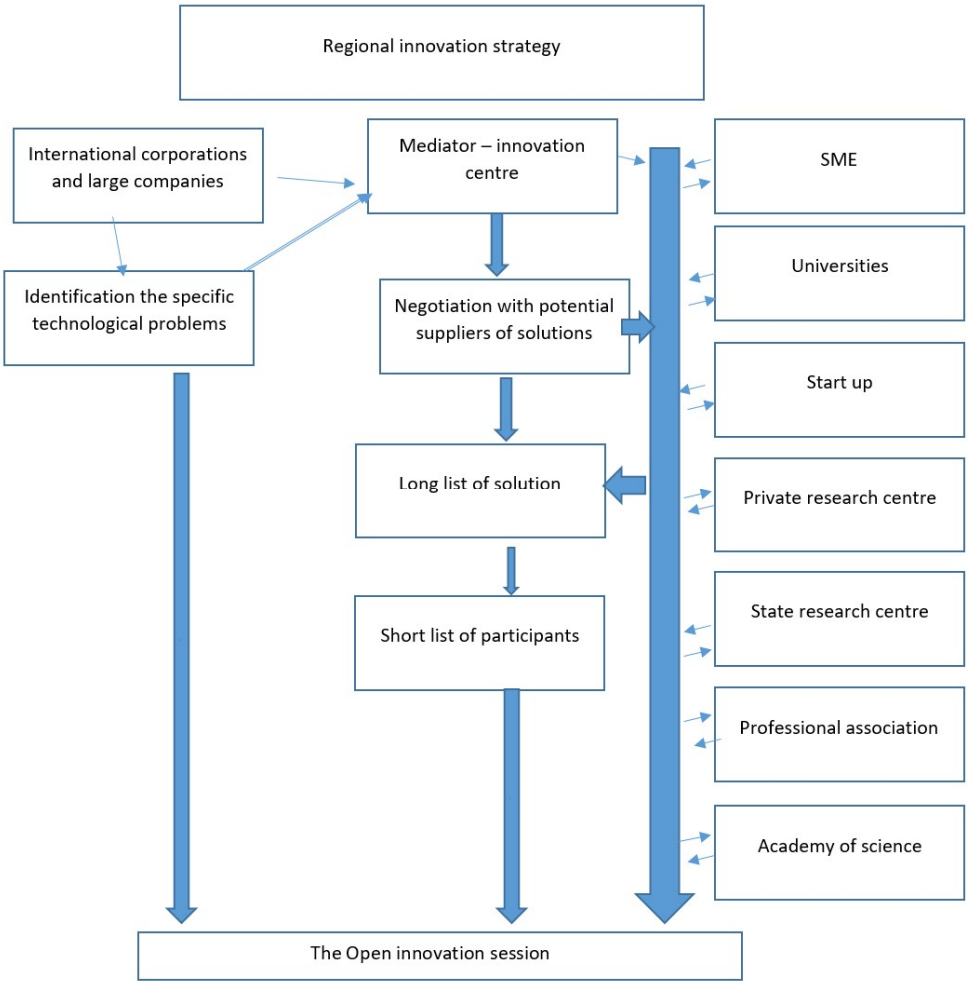

Figure 3. The process of Open Innovation Session.

A very interesting trend in business strategy was indicated; this trend can be referred to as stabilization strategy. This strategy is followed by many Czech companies generating changes that require stabilization. In the Czech Republic, there was a significant number of companies established after the revolution in 1989; the founders of these companies are currently mostly at retirement age and have to solve the problem of the handover of the company. Given that there is no significant experience in corporate and business transfers in the Czech Republic, this process requires considerable knowledge and a stabilization strategy. We can say that it is a phenomenon of post-communist countries that do not have a long-established tradition of private family businesses. It was very interesting to follow the aspect of the aspiration for innovation leadership. This seems to be a very important factor. This paper has found that the connection between aspiration for innovation leadership and expenditure for research and development is high. This result follows the perspectives that leadership tends to emphasize different activities that are essential to different perspectives on innovation. In general, a distinction is made between rational or transactional leadership perspectives. On the one hand,

there is creating stability and transformational leadership perspectives and steering through change processes. Transactional leadership perspectives tend to stress the exchange between leaders and followers and the self-interest connected to these relationships but also monitoring and planning processes that have to be defined (Van Wart 2012).

5. Conclusions

Identifying new knowledge of regional collaboration opportunities, as well as the Czech national ecosystem, allows companies to tap into the pool of expertise and talent of start-ups. Working together towards strategic innovation management to create hundreds of skilled jobs in dozens of new high-tech companies is essential. Support of open innovation initiates the creation of new collaboration, reduces transaction costs, contributes to entrepreneurs' and researchers' understanding of each other and increases demand within research institutes for greater functionality of internal procedures and rules regarding collaboration of researchers and companies. Furthermore, this support improved the image of the companies and researchers, built trust in the local public administration, brought value to foreign investors and demonstrated the interest of the local government to create conditions for the development of knowledge-intensive operations of transnational corporations.

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