

THE ROLE OF NETWORKS IN THE INNOVATION PROCESSES OF SMEs

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Abstract:

The main challenge in innovation seems to be not a lack of ideas, but a deficit in the evaluation and transformation of ideas into new processes or products. Due to their specific characteristics and the fact that innovations of SMEs are application-oriented, SMEs depend on external know-how for fundamental research. They therefore need a support network that translates the knowledge necessary for successful innovation into their language. Technical feasibility studies provided by research and technology organizations (RTOs) are designed to promote this knowledge transformation and transfer to SMEs. In this paper, the authors examine how to facilitate knowledge transfer between SMEs and RTOs. The results of a literature review and data from a previous study about the effects of a Feasibility Studies Program of the Austrian Industrial Research Promotion Fund reveal evidence of a stimulating effect of technical feasibility studies on SMEs' innovative activities. They also identify prerequisites for SMEs to tap the full potential of their interaction with RTOs. First, there has to be a developed research scene that is willing and able to meet the needs of SMEs. Second, SMEs have to recognize the potential advantages of working together with RTOs in the innovation process and to overcome their common fear of contact with RTOs.

Keywords: network, innovation, RTOs, SMEs

1. INTRODUCTION

Innovation is traditionally viewed as mostly taking place within a single firm (Lee et al., 2010). Nevertheless, the increasing flexibility of knowledge workers, the continuing expansion of the internet and accessible venture capital markets have led to the questioning of the effectiveness of the traditional innovation system (Chesbrough, 2003; Lee et al., 2010). In light of these changes, the role of networks, communities and external linkages has come to the fore in investigating innovation processes. The Schumpeterian view of the lone entrepreneur single handedly bringing innovations to market has now been superseded by a much richer network of actors (Laursen & Salter, 2006).

Within this emerging picture, it has been shown that SMEs certainly do not lag behind their larger counterparts. The benefits of opening up the innovation process have been illustrated in numerous studies (Lee et al., 2010). Crossing the boundaries of the firm and cooperating with external actors is an opportunity to multiply the number of learning opportunities and to assimilate specialised and complementary knowledge (Coombs & Metcalfe, 2002). Whilst these benefits have been recognised, additional focus has been put on the particular challenges of employing a more networked approach to innovation in SMEs (Van de Vrande et al., 2009).

In this paper, we argue that in order to overcome these barriers, SMEs require a support network that is able to translate this often domain-specific, basic knowledge necessary for successful innovation, into a language that is more easily understood and therefore more implementable. In particular, we focus on one prominent way for SMEs to tap into such resources that is the Research and Technology Organisation (RTO). We explore how this knowledge transfer can best be facilitated and specifically, we discuss the state-funded technical feasibility studies conducted by Research and Technology Organisations such as universities, non-university and public research and development institutions, as well as institutions funded by the industry, technology-oriented consultants and engineering offices (Roessl et al., 2010).

Through the means of a literature review coupled with data from a previous study (Roessl et al., 2010) surrounding the effects of the non-state funded Feasibility Studies Program of the Austrian Industrial Research Promotion Fund reveal evidence of a stimulating effect of technical feasibility studies on SMEs' innovative activities. In addition, the authors also identify further prerequisites for SMEs to tap the full potential of their interaction with RTOs. First, there has to be a developed research scene that is both willing and able to meet the needs of SMEs. Second, SMEs have to actively recognise the advantages of working together with RTOs throughout their innovation process and take purposive steps towards overcoming their common apprehensions of collaboration with RTOs. Finally, we put forward that a move towards a more open approach to innovation can help SMEs foster and ensure the fruitfulness of these external interactions

2. BARRIERS TO KNOWLEDGE ACCESS

With the exception of examples predominantly found within high-tech branches, SMEs display a lower propensity towards generating their own fundamental research, but are more involved within the subsequent steps of the process in technology development and in the development of near-to-market application solutions (Muscio, 2007). As a consequence, they are dependent on a network of customers, suppliers and public or private research institutions' (Enkel et al., 2009). While SMEs call for this external knowledge to support the internal development of innovative solutions and to progress their knowledge base further, they often face a complex set of barriers in gaining access to this knowledge (Goduscheit & Knudsen, 2015). Within this context, the following decisive challenges can be listed (Roessl et al., 2010): SMEs are often not able to effectively articulate their information requirements, or to clearly express their needs in the language of the information providers when searching sources of information for particular information (Landry et al., 2013).

Even if SMEs are in a position to clearly articulate their information requirements for the development of the innovation idea, they often lack knowledge and sufficient time in order to identify the most appropriate sources. Idea generation is often a product of basic research that is carried out either in universities or in research departments of larger companies (Linton & Walsh, 2004). As these new discoveries seldom have an immediately obvious publicity effect and are rarely presented in a way which would make them instantly visible to SMEs, in terms of their relevance for the own innovation

activities, there is an awareness gap amongst smaller enterprises which do not make use of the traditional channels of communication (Pina & Tether, 2016).

3. THE ROLE OF MEDIATION AND AN EXAMPLE OF AN AUSTRIAN PROGRAM

As has already been established, providing SMEs with appropriately communicated external expert knowledge on R&D seems to be an increasingly necessary precondition for their innovation activities (West & Bogers, 2014). The question then becomes how to best facilitate this networked innovation in SMEs, and trying to discover which factors contributed to the success (or failure) of their innovation efforts as searching for and selecting who to collaborate with to create an effective network can be difficult for SMEs, who may have limited information sources, and lack the financial resources to gather vital information (Lee, 2007).

To elevate the challenge of searching for appropriate knowledge, extant studies suggest a collaborative model that emphasises the role of a mediator or promotor in supporting the SMEs' capacity to form an innovation network and in orchestrating this network effectually (Lee et al., 2010).

The principal role of the RTO is to support and mediate knowledge flows by helping to establish a bridge between the SME and their innovation network. It is typically argued that RTOs are translators of the complex scientific knowledge in order that SMEs can better relate to the knowledge. Technological uncertainties can be reduced through interaction with RTOs 'providing information and a number of related services which help to bridge the gap between technological opportunity and user needs' (Bessant and Rush, 1995). The relevance of active interaction with 'knowledge intensive business services' and 'institutions of technological infrastructure' has also been empirically supported by Huighzign (2006). RTOs are able to translate fundamental, scientific findings into the language of SMEs and therefore help them to tap the potential of basic research. They document that companies are generally satisfied with both types of knowledge institutions and that they recognise the influence of these relationships in terms of various technical, economic, investment and intangible impact (Goduscheit & Knudsen, 2015). Although, these prospective benefits of interactions with RTOs have been discussed and empirically verified in the literature (Barge-Gil & Modrego, 2011), there are potential hindrances to collaboration with SMEs that should similarly be discussed. Primarily, RTOs are accustomed to working on research assignments of large enterprises and/or research promoting institutions and are particularly interested in fundamental research, 'rather than on delivering relatively straight-forward problem-solving services associated with application and transfer of technology' (Bessant, 1999). Additionally, RTOs generally favour few but significant connections with larger companies rather than many marginal ones to a large number of SMEs (Cohen et al., 2002).

Appropriate promotion and intermediation programs therefore have to be flexible and should be primarily aimed at supporting the SME with an adequate support network, which is customised and dependent on the individual innovation problem (Goduscheit & Knudsen, 2015). Additionally, such promotion programs should encourage and facilitate contact between SMEs and RTOs to overcome reciprocal uncertainties. One prominent way to grant SMEs access to such resources is state-funded technical feasibility studies conducted by Research and Technology Organisations (RTO) such as universities, non-academic and public research and development institutions, as well as institutions funded by the industry, technology-oriented consultants and engineering offices. A specific example of such a program analysed in detail by Roessler et al. (2010) will be summarised and discussed in the following section.

Within the framework of the 'Feasibility Studies Program' of the Austrian Industrial Research Promotion Fund (RPF), technical feasibility studies for product and/or process innovations are offered. These studies are funded with 70% of total costs (Roessler et al., 2010). The key objectives of the 'Feasibility Studies Program' of the Austrian Research Promotion Fund are twofold: First, they perform a uncertainty reducing function for the SMEs as non-feasible innovation ideas are identified at the very preliminary stages of the innovation process. Conversely, those ideas that demonstrate potential are encouraged and advanced. The innovation management of SMEs is also improved through experience with research institutions, and fear of contact is to be minimised (Roessler et al., 2010). Second, a further objective of the program is the forming of relationships between SMEs and those RTOs which offer the best fit for their particular problem situation.

The evidence gathered by Roessl et al. (2010) illustrate that these forms of Feasibility studies may indeed serve as a support for stop/go-decisions in innovation projects. If the quality and the possibilities of utilisation of the project are rated favourably within the feasibility study, it can be assumed that this will act as positive reinforcement and as stimulation for the SME to take the project further. In turn, negative results from the study can act as an “early warning” system, before the project is too advanced and before abandonment might become complex and costly. On the basis of the overwhelmingly positive experiences that were expressed, it appears as if the participating SMEs were able to reduce possible tensions in their relations with the RTO (Roessl et al., 2010).

4. FURTHER PREREQUISITES OF SME/RTO COLLABORATION

It should be recognised that, the promise of this promotion, support and brokerage may only be one of a range of prerequisites that may aid in facilitating the effective collaboration of SMEs and RTOs. Knowledge transfer, in itself, is not a merely a dyadic transfer of knowledge (Liyanage et al., 2009).

One the one hand, there is of course the requirement for a supportive and receptive environment that is willing to share information, and drive forward the innovation success of SMEs. RTOs are being pushed more and more to engage in more application related research projects. Therefore, these state-funded technical feasibility studies can help to act as bridging activities helping RTOs to forge relationships with SMEs. On the other hand, SMEs have to recognise the numerous potential advantages and that gains are to be had by working together with RTOs. They have to be ready to overcome their fear of making contact and their insecurities regarding the sharing of information, in order to establish effective communication. The RTOs have to play a role in this facilitation by making conscious efforts in translating their technical language into a more application-oriented language. SMEs and RTOs are therefore encouraged to strengthen these intermediary links.

From this foundation of common understanding, trust appears likely to be an especially important factor in facilitating SME–RTO links (Bruneel et al., 2010), since SMEs and RTO throughout the course of their interactions will often be required to exchange commercially sensitive information and tacit knowledge.

From this perspective, the authors recommend that in addition to such feasibility studies, that other complementary programs such as ‘idea labs’, along the suggestions made by Perkmann & Salter (2012), should also be considered. This way, short-term and rather applied collaboration forms are proposed to establish first projects for the sake of building mutual trust and understanding and align the objectives of future research. Such approaches would potentially demand relatively limited resources, while allowing the SME to actively progress in their demand for knowledge. However, it is also an approach that is low risk, but with a potentially longer entry period for obtaining real results. Bruneel et al. (2010) find strong support for the fact that trust is the strongest mechanism for lowering barriers to university–industry linkages. The authors pose that these prerequisites may go some way to reducing or, at least, help manage barriers to collaboration and strengthen knowledge flows.

5. CONCLUSION

Innovation is becoming an increasingly distributed process (Coombs and Metcalfe, 2000) that requires the integration of components, skills and knowledge from several organisations (Chesbrough, 2003). Against the backdrop of our discussion, supported by the example from Austria (Roessl et al., 2010), it becomes apparent, that innovation promotion and mediation aimed at the fostering of contacts between SMEs and RTOs, (or at their intensification), can positively contribute towards elevating some of the typical stumbling blocks that have been previously placed in the way of SMEs in their innovation endeavors (Brunswick & Vanhaverbeke, 2011).

Although these programs help to catalyse and facilitate connections between SMEs and RTOs, there are further prerequisites that have to be explored in more depth in the future. In order to continue this debate and to make a further contribution to the open innovation literature, there is a requirement for more longitudinal evidence from these forms of mediation and promotion programs. Leading on from this, it would be interesting to gather the experiences of SMEs as they engage in their early interactions with RTOs and examine how this initial contact influences the future behaviour of the SMEs and uncover if encouraging results of the feasibility studies stimulate SMEs to extend their

innovation activities. Conversely, do negative results emerging from the feasibility studies influence the innovation behaviour of the SMEs in a destructive manner?

These questions concern the sustainability of support programs for SMEs, with regard to learning how to innovate (e.g. Lawson et al., 2006) or their 'absorptive capacity' (Cohen and Levinthal, 1990). By integrating an RTO, SMEs can indirectly enhance their 'absorptive capacity, which would in turn allow them a better starting position for future innovation projects. A similar question in this context, which was correspondingly discussed by Humphreys et al. (2005) is whether the support programs generally result in isolated, radical changes in the SMEs or whether they stimulate more incremental changes. Again this is a questions that can only be answered by long-range studies.

In order to extend this empirical picture further, the authors also suggest that future analysis should take into account that the perception of intermediary and promotion support across different settings. For instance, perceived barriers to communication might be different within and across various countries or across different industries. Studies gathering data from larger samples would lead to the possibility to carry out such comparisons.

Finally, it also has to be stressed that while the authors have largely focused on the effectiveness of the feasibility studies from the perspective of the SME, there is also still a necessity for more investigation into the RTOs' views on their collaborations with SMEs program and the implications for the issue. Although, one can make the assumption that RTOs appreciate the program, as it increases the market volume for their technical feasibility studies, the question of how far the involved RTOs have been satisfied with the bureaucratic execution of the program could be a further step in the evaluation of these programs. Naturally, understanding and encouraging this form of collaboration is of central importance to policy initiatives for stimulating economic development at the local, regional, and even national level.

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