



IS THERE AN ARCTIC ECOSYSTEM EMERGING? OULU REGION'S PERSPECTIVE

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Abstract

Interest toward Arctic issues has been growing during the past years. This growing interest has not been followed by commonly shared definitions of the Arctic key concepts. This has led to a coexistence of a variety of definitions which sometimes are almost contradictory. The essence of the Arctic in the operational agendas is hard to find considering the high frequency of the term Arctic appearing in publicly expressed strategies. In this paper, the Arctic dimension and its relevance to key actors are investigated by applying an ecosystem approach. The studied case is from the Oulu region of Finland where there has been two consecutive projects aiming at the clarification of the role of the Arctic in the region. In addition to completed projects and their reports, the researched material in this paper consists of the preparation materials of the renewal process of the Oulu Innovation Alliance. This ecosystem approach offers an interesting alternative to deepening the understanding of the Arctic positioning of participating actors. Instead of analyzing separate strategic documents of individual actors, it is reasonable to study collaborative products of the members of the innovation ecosystem. However, an additional research step is introduced by this ecosystem approach – that is, that the existence of the ecosystem needs to be verified. As easily as organizations name the Arctic as their area of interest without explicating their interpretation of the Arctic, various collaborative forms of development are labeled as an ecosystem without validating the true nature of the co-operation. Therefore, in this paper the Oulu Innovation Alliance is first analyzed from the ecosystem perspective and after that the Arctic dimension is examined. According to this brief study, the Oulu Innovation Alliance fulfills the criteria of an innovation ecosystem – the key characteristics can be found in the preparatory documentation of the renewal process. Moreover, the plans for execution and operationalization of the Oulu Innovation Alliance seem to be sufficient to ensure the realization of the planned innovation ecosystem. Finally, the planned new Oulu Innovation Alliance cannot be interpreted as an Arctic innovation ecosystem – the Arctic dimension is addressed directly or indirectly in some of the sub-ecosystems, but it is not defined as a major factor. Compared to previous attempts to specify the true valuation of the Arctic dimension from the key actors' perspective, the ecosystem approach offers a richer, deeper and more versatile view of the importance and weight of the Arctic issues. Hence, whenever it is suitable the ecosystem approach seems to be a justified research strategy when addressing these rather challenging issues.

Keywords: Innovation ecosystem, Arctic context, Regional strategy



1. INTRODCUTION

During the past decades, there has been an increasing interest towards the Arctic. However, in the wide arena of the Arctic actors commonly shared definitions of the Arctic key concepts have not yet risen. Conceptualization of the Arctic as a context and as well as a phenomenon is undoubtedly required in processing versatile Arctic themes and topics. Because of this lack of a jointly defined framework, different analyses related to the Arctic have been quite limited and incoherent considering the magnitude of the economic potential embedded in the Arctic.

From Oulu region of Finland perspective there is some interest towards the arctic. It is especially seen in strategies of the regional organizations. However, at the operational level this has not been acknowledged at the same level of attention. So far, companies from the Oulu region have not been very active in various major investment projects in the Arctic. Also in the region a shared concrete vision of the future Arctic business opportunities and coordination related to these issues are lacking.

Innovation ecosystem refers to a dynamic and interactive network that promotes innovation and consists of a group of local actors and dynamic processes, which together produce solutions to different challenges.

The Oulu Innovation Alliance (OIA) is co-operation based on a strategic innovation alliance agreement made by education and research institutes, companies and the public sector in 2009. The purpose of the alliance is to focus on the activities in jointly agreed specific innovation areas (e.g. internet research, energy), invest in development of agreed infrastructures and create and develop mechanisms for mutual use. In the year 2015 a new agreement is defined and signed for the years 2016-2020.

In this article, there are two dimensions in the theoretical framework. First dimension is the concept of the innovation ecosystem and the second is the Arctic. These two defined dimensions are helping in the assessment of Oulu Innovation Alliance (OIA) as an Arctic innovation ecosystem, which is performed in three steps. The first step is to consider whether OIA displays the general characteristics of an ecosystem. The second is to evaluate the recognition and definition of the Arctic dimension in documentation describing the essence of the alliance.

And finally considering operationalization of these key concepts.

The material of this article consists of two separate, yet strongly connected projects: The Finnish Funding Agency for Innovation's (Tekes) strategic opening *Roadmap to a smart Arctic specialization SMARCTIC* [23] and The Council of Oulu Region's funded project *Arctic business and RDI-activity in the Northern Ostrobothnia* [10]. Additional material is gathered from the Oulu Innovation Alliance and its preparation process material on the new strategic agreement 2015.

2. INNOVATION ECOSYSTEM

One essential concept in this article is ecosystem. It originates from evolution biology meaning a community of living organisms and conditions of the environment. In the ecosystem there is co-evolution as a process in which interdependent species evolve in an endless reciprocal cycle. Another view of the natural ecosystem is that if environmental conditions change too radically they can collapse and a new ecosystem is established with the previously marginal species at the center [14]. Systematic principles of ecosystem are [9]:

- ecosystem's adaptability to the changes in the environment
- actors' competence to self-direction
- autonomy of the elements and at the same time mutual dependency – rivalry and co-operation
- constant process of rebirth, adaptation and disappearance – “natural selection”

When considering a business ecosystem, according to Moore [14] it gradually moves from a random collection of elements to a more structured community. Development happens in four distinct stages: birth, expansion, leadership, and self-renewal – or, if not self-renewal, death.

Hautamäki and Oksanen [9] are defining the methodology and functions of an innovation ecosystem through four different concepts and processes, which are the method of authentic dialogue [11], the Triple Helix cooperation [6], the concept of a core organization and foresight and futures studies.

Innes and Booher [11] have defined a concept of collaborative rationality. For the process to be collaboratively rational, all of the stakeholders must be fully informed and able in portraying one's views and to be listened to, whether they are powerful or



not. To achieve real collaboration, dialogue needs to be authentic. Authentic dialogue among diverse and interdependent stakeholders can produce reciprocity, relationships, learning and creativity. Adaptations of these systems lead to shared identities and meanings, new heuristics and innovations.

Triple-helix model cooperation is a term used in defining collaborating actors and institutions in innovation. Etzkowitz and Leydesdorff [7] argue that new knowledge is mostly generated in a triple structure between universities, companies and public authorities. Interface of these actors' knowledge production, networks and co-operation organizations are being formed.

The concept of a core organization means that there is a named partner responsible in the system who's planning and implementing activities promoting dialogue and coordinating projects. Launonen and Viitanen [12] argue that most of the ecosystems need this separate core organization ("smart handover"), which has the responsibility e.g. on the building partnerships and brands and coordinating and channeling different capitals to the region. The core organization needs to be constantly and fluently feeding new ideas to the system and bringing different actors and expertise together.

To formulate investments to the innovation ecosystem, there needs to be foresight work meaning defining future changes and markets related to own strengths, defining goals and making strategic decisions [9].

One defining factor of innovation hubs is that they are local and creative centers in the global economy [9]. The key elements of innovation hubs are that they act as nodes in the global economy and are linked to a local innovation and business environment [15]. An innovation hub has to produce some special value to the global network. This value can be special expertise, new technology and knowledge based globally interesting business. Innovation hubs are well-know and they attract experts, firms and investments [9].

Clustered know-how in the innovation hub can be called a competence profile [9] or knowledge space [6]. This can be based on a special technological platform (e.g. Seattle, San Diego), specialized production expertise (e.g. Milan), service sector (e.g. London) or creative economy (e.g. Hollywood). When defining the success-factors of innovative regions, versatility is crucial. Strict specialization can

bring trouble if demand and market changes affect to it. The best known example of this is Detroit [9].

Other success factors in making a dynamic ecosystem are e.g. entrepreneurial culture in which risks and creativity are acceptable and constant movement or circulation of ideas and people in the system. The core of a dynamic ecosystem is dynamic and interactive business life [9].

Innovation hubs are usually located at close range of universities. University's role can vary, but in principle this role is diverse. Previously university's role in the system was seen more as transferring knowledge, expertise and technology to companies. However, this perception has been more or less abandoned and recent views highlight co-creation between actors [19].

Launonen and Viitanen [12] have developed the Hubconcept framework as a concrete tool for combining infrastructure development and innovation processes into one package. Framework involves company and forum driven activities (start-ups, SMEs, Anchors), public-private partnerships (Living labs, Cluster programs) and public policy driven activities (education, services, Innovation policy).

The Quadruple Helix brings an additional helix to the Triple Helix model, the civil society. It can be argued that the Triple helix model places emphasis on the knowledge production and innovation in the economy (knowledge economy), while the emphasis of the Quadruple Helix can be seen as encouraging the perspective of knowledge society/democracy [2].

At the policy level, EU's Smart specialization strategies highlights the interactive and innovative process, in which market forces and the private sector together with universities generate information about new activities and the government assesses the outcomes and empowers the actors most capable of realizing the potential [17].

3. DEFINING ARCTIC AS A CONTEXT

Arctic can be interpreted through special conditions as was the methodological path chosen in the *Arctic business and RDI-activity in the Northern Ostrobothnia* –project [10]. Special conditions were divided to four categories: opticality (e.g. light, fog), variation of temperatures (e.g. cold, ice, and sensitive nature), natural resources (e.g. forest, minerals, water) and activity and culture (e.g. long distances, arctic



cooperation). The special factors can be seen as the core of business activities (e.g. natural resources) or they can be interpreted as factors of nature which require adaptation and sometimes specialization (e.g. darkness). Myllylä [16] is highlighting how these concrete challenges of the Arctic environment should be linked to new business ideas and business model potentials.

On the other hand, the Arctic can be interpreted as a location of various economic activities related to aforementioned special conditions. This perspective can be strongly highlighted from the Finnish perspective, as, depending on different definitions, the whole of Finland [18] or the most northern parts [8] can be seen as part of the Arctic. This problem can be distinguished in the European decision making level as well, since, depending on the actor, the Arctic is perceived as circumpolar Arctic or European Arctic [21]. Paavo Lipponen, a former prime minister of Finland, has made a memorandum to European commission's president for an ambitious EU Arctic and Northern Policy. The memorandum highlights that EU has to strengthen its presence and influence in the region, play a role in combating climate change and optimize opportunities of Northern economic activity [13].

From the Arctic economic perspective, the Barents region is often regarded as a highly potential location for Finnish companies since it has been estimated that the total budgets of the investment projects starting before 2020 in the Barents region are 58-81 billion euros [20].

For operational purposes the shared definition of the Arctic is even more strikingly omitted. In the strategic level, the environmental and sustainability aspects are typically highlighted, whereas in more practical discourses about the Arctic as a business context the utilization of the Arctic resources seems to be a dominant factor. This commonly emerging idea of the Arctic as a resource reserve especially for fading fossil energy sources leads the interest towards the Arctic depending heavily on the fluctuation of the energy prices in the markets [1]. Considering the struggle against climate change, the Arctic offers a context to develop new technologies and innovations but as long as the incentives for developing Arctic innovations are depending mainly on the e.g. market price of the oil this possibility is not utilized properly.

Public Private Partnership (PPP) model can be seen as very relevant related to Arctic context. By collaborative actions, international investments can be

enhanced and research results can be more efficiently applied to solving Arctic challenges [22]. However, as Coates and Poelzer [5] argue, these so-called north-centered innovations are yet to be seized. There is only a little activity related to capitalizing new technologies in Arctic conditions as the quite a limited population and hence diminutive size of the Arctic markets are not attractive to the private actors *per se*.

4. OULU INNOVATION ALLIANCE AS AN ARCTIC INNOVATION ECOSYSTEM

4.1. Oulu and innovation ecosystem

In Finland, Northern Ostrobothnia (used in some contexts as a synonym for Oulu region) extends across the country from the Gulf of Bothnia coast to the Russian border. It is a growing and developing region that has a population of more than 400 000 persons. The principal city is Oulu with a population of 200 000. The population of the region is well-educated as third of the working population have a higher education and there are about 30 000 students in the city. Population structure is very young as the average age is 36 years. Oulu is known for its high-tech expertise and electronics companies [4].

The Oulu Innovation Alliance is co-operation based on a strategic innovation alliance agreement made by education and research institutes, companies and the public sector in 2009. It is highly based on the long-lasting tradition of "triple helix" co-operation and hi-tech. The purpose of the Alliance is to focus on activities in specific agreed innovation areas, invest in the development of agreed infrastructures and create and develop mechanisms for mutual use. In the year 2015 a new agreement is defined for the years 2016-2020. Agreed innovation areas have been formulated through innovation centers focusing on following topics: internet research, printed electronics, international business, environment and energy and health technology.

In the new operational model (to be signed early 2016) for 2016-2020 agreed innovation areas are operated through ecosystems. These ecosystems are named [25] *Oulu Health* (health services and technology), *Agile Commercialization* (business development), *Industry 2026* (bioeconomy, cleantech, and metallurgy), *ICT and Digitalization* and *Attractive Northern City* (tourism, creative sector, culture). In the new model, the emphasis has been laid on the increasing intensity



of the involvement of public audience as testers, developers and participants. From theoretical perspective, this can be linked to the concept of Quadruple Helix [2] and this is clearly an indication of ecosystem evolution in the Oulu region.

4.2. Arctic from the Oulu region perspective

In the Oulu region there has been systematic work done in defining arctic trends, analyzing technological needs and evaluating relevant business potential. A large amount of expert knowledge and insight have been collected and analyzed to provide guidelines to utilizing and directing arctic expertise in the future. The Finnish Funding Agency for Innovation's (Tekes) strategic opening *Roadmap to a smart Arctic specialization* [23] and The Council of Oulu Region's funded project *Arctic business and RDI-activity in the Northern Ostrobothnia* [10] have been the most recent activities to contribute in definitions and specifications of the Arctic issues.

The Arctic has been highlighted at the strategic level of different actors [3_4_24] often referring to optimal utilization of the Arctic or Northern possibilities and investment capacity. However, at the operational level this has not been acknowledged at the same level of attention. It has become apparent during the aforementioned projects that the Arctic context can be defined in several ways and there is a lacking shared vision of the future of the Arctic. Also the potential of confusing and misleading concepts can be interpreted as high [26]. The Arctic can be regarded as a general feature that is a pervasive and unavoidable element in all actions carried out in the region, as according to some definitions the Oulu region is a part of the Arctic sphere. On the other hand, the Arctic competence is occasionally interpreted as quite tightly defined special expertise (e.g. cold-related expertise) that does not evolve without determined development actions.

One of the identified challenges is how to raise the awareness of the region's arctic know-how and possibilities related to Arctic topics and also how to bring this theme into the innovation ecosystem so that all of the stakeholders can get involved. This challenge indisputably reflects certain inherent intangibility of the Arctic concept and especially for any single actor in the business context (e.g. an SME) the Arctic seems to be an elusive – and hence

unattractive – element in both strategic and operative decision making.

There is high-level competence and know-how in e.g. ICT in the Oulu region and this advantage could be utilized also in the Arctic cases. There have been application areas identified and to some extent the business models have been created. However, the actual business activities have remained diminutive and companies' ability to interpret the Arctic business opportunities has remained unimproved. This identified phenomenon can be taken into account should the status of the Arctic needs and the potential be improved.

4.3. Arctic innovation ecosystem

The assessment of the Oulu Innovation Alliance (OIA) as an Arctic innovation ecosystem can be performed in three consecutive steps. The first step is to consider whether OIA displays the general characteristics of an ecosystem. The second is to evaluate the recognition and definition of the Arctic dimension in documentation describing the essence of the alliance. And finally, since the OIA is now in transition, it is unavoidable to consider the operationalization of the key concepts – in other words, it is necessary to assess the realism and reasonability of all the actions planned and moreover, reflect these actions from both ecosystem and Arctic perspectives.

First of all, it is rather straightforward to state that the new Oulu Innovation Alliance is an innovation ecosystem when interpreted from the preparation materials and presentations [27]. The five sub-ecosystems constituting the innovation ecosystem entity all convey separately the key elements of the ecosystem – in the heart of each ecosystem is collaboration and coordination, imbedded to triple or quadruple helix structure, whereas the whole renewal process of the OIA displays strong commitment to dynamic assessment of future challenges and possible solutions to them. Finally, it should be noted that two of the sub-ecosystems, *ICT and Digitalization* and *Agile Commercialization*, are planned to act as enablers to all sub-ecosystem and hence creating almost automatic integration of the sub-ecosystems to a one entire innovation ecosystem.

The second step in the assessment of the OIA as an Arctic ecosystem is less unambiguous - the background documentation of the new OIA contains very limited amount of direct references to Arctic issues. In one of the sub-ecosystems (*Industry 2026*)



the arctic is identified as a relevant business context and all the development actions are embedded to it, whereas in another sub-ecosystem (*Attractive Northern City*) the arctic is considered as one important market area as it is pondered that the majority of leisure-time travelers to Oulu do come from the Arctic area. Aforementioned cases are the only ones referring to the Arctic directly. In the rest of the sub-ecosystems references are indirect and somewhat diminutive.

However, the absence of direct linkage to the Arctic does not imply diminished interest toward the Arctic dimension. For example, in one of the sub-ecosystems (*ICT and Digitalization*) the concerns regarding the remote location of Oulu are expressed explicitly. Altogether, from the Arctic perspective it can be concluded that clearly the Arctic has not been a major guiding factor when preparing the renewal of the OIA. The arctic is referred to as an opportunity twice and as a challenge – although indirectly – once.

To simplify, the Arctic as the context for a new innovation ecosystem appears in three different forms. First, it is a natural (in economic terms) direction of future business activities – the Arctic appears as a business opportunity and Arctic know-how and competence form a competitive advantage to companies. Secondly, the Arctic appears as a hinder or an obstacle to development and business activities – one challenge to the RDI activities from this perspective is to find solutions that fade these disadvantages. Third appearance of the Arctic in the OIA context is almost an invisible one - the Arctic is neither an opportunity nor hinder, it is more or less an insignificant element of the operational context. This third interpretation of the Arctic shows in the OIA background documentation as a generic approach, which does not indicate any specific linkage to the Arctic – neither as a context nor a phenomenon.

The evaluation of the execution of the new OIA is the third and final step of the assessment of the OIA as an Arctic ecosystem. Due to limited availability of the existing decisions and proposals concerning this matter, it is challenging to analyze conclusively the possible future pathways of the OIA. However, it can be maintained that from the resources' point of view the level of commitment to carry out the practical operations according to strategic choices is at least as high as was with the previous OIA era. Moreover, since the coordination responsibilities of the sub-ecosystems are divided more evenly between key organizations when compared to the previous OIA era,

it is safe to assume that as an end result the new OIA will more closely resemble a genuine innovation ecosystem.

To conclude, according to all background information available, the new OIA will form an innovation ecosystem. Moreover, it is likely that strategic choices will materialize into operative actions. However, the role of the Arctic remains ambiguous. It might not be justified to declare Arctic dimension to be completely absent from the strategic considerations, but it is definitely not a key factor affecting decision making.

5. CONCLUSIONS

When applying the most common analytical framework of ecosystems it is rather straightforward to conclude that the Oulu Innovation Alliance resembles a genuine innovation ecosystem. Clearly, the key elements of an ecosystem do exist, yet it is ambiguous to foresee the possible operational pathways since the renewal of the OIA is still in a planning stage. Almost as strongly as the preparatory documentation implicates that the OIA is an innovation ecosystem, the same documentation reveals that the OIA is not a business ecosystem [15] – presumably this setting is what has been intended.

On the other hand, the ecosystem approach does not reveal the true nature of the perception of the Arctic issues. The Arctic is only partially explicated in the background document and to some extent the Arctic appears as an implicitly observed factor. For some of the investigated OIA sub-ecosystems, the Arctic appears as an obstacle or a hinder for future development and for some as an irrelevant element. The lack of joint definition of the Arctic seems to remain as a challenge when igniting the new OIA era. The search for the common positioning toward the Arctic dimension appears at this point as a continuous challenge.

According to this brief investigation of the planning and presentation documentation, establishing the innovation ecosystem seems to overshadow the Arctic dimension – even though when interpreting the Arctic as a location and special conditions, no innovation ecosystem can remove these fundamentals. The Oulu Innovation Alliance will be operating in the Arctic and outputs from the ecosystem will be largely implemented in the Arctic. Therefore, it is indisputable to conclude that one of the major tasks for the revised OIA will be to engage in a collective effort to form a jointly agreed Arctic vision.



Moreover, since innovation ecosystem should produce additional value to the global framework [9] in the case of the OIA the Arctic would serve as an inherent platform to local innovation system to engage in global networks.

To conclude, the Oulu Innovation Alliance fulfills the necessary requirements to become a strong innovation ecosystem. However, at this point it is far too early to conclude the position of the Arctic dimension in the OIA. Obviously, most of the key actors have already adapted to the Arctic context but this adaptation may prevent actors to see the variety of opportunities and competitive advantages that are related to the Arctic competence and business.

6. REFERENCES

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Notes

- [25] Momentarily there are yet no official translations for these sub-ecosystems and terms used here are translated by the authors.
- [26] Dilemma in defining Arctic operations - circumpolar Arctic or European Arctic
- [27] At this moment, these documents are not publicly available. Documents can be received from the authors at the request.