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Regional innovation policy and public–private partnership: The case of Triple Helix Arenas in Western Sweden

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Policies for regional innovation in Sweden rely on the view that different groups of actors enter into collaboration on the basis of a mutual interest. One recent organisational expression of this view is the development of innovation policy and development organisations known as 'Arenas'. These organisations were modelled on the Triple Helix innovation theory, which is known for promoting innovation as collaboration between industry, university and policy. This paper analyses the historical development of two such Arenas, which were created by public and private actors in two Swedish cities. The study used a historical case-study approach, combined with interviews with project management and project workers, to highlight the difficulties in stabilising broad collaboration patterns. The paper concludes that diverging interests may result in unresolved tensions within Triple Helix Arenas.

Keywords: regional innovation; triple helix; Sweden.

1. Introduction

Since the early formulation of a new research area at the first biennial international Triple Helix conference in 1996, the theory of Triple Helix innovation (Etzkowitz and Leydesdorff 1997) has developed, spread and achieved substantial influence in the field of innovation studies. It has become one of the more important and widely discussed conceptualisations for the analysis of regional innovation development (Jacob 2006). One major concern, however, has been that the theory treats the roles of different innovation actors (universities, industry and government) symmetrically, which promotes the impression that innovation is the result of non-hierarchical collaborations around mutual development objectives. This understanding of 'innovation as collaboration' is seen as one reason for its positive reception in policy for regional innovation development. The perceived wisdom, that different actors will work together to achieve important economic and social goals if Triple Helix 'processes' are stimulated, underlines the complex task of regional development actors to mobilise actors that can help create innovation and growth. In this way, theory has been translated from an analytical scheme that describes historical development into a flexible policy device that has aims to motivate, create and manage innovation processes (cf. Miettinen 2002; Shinn 2002). This step is also actively promoted in the Triple Helix theory discourse (cf. Etzkowitz and Klofsten 2005). One result of this is that 'Triple Helix' has become a form of managerial practice and new organisations have emerged that claim to be Triple Helix organisations. This development deserves further analysis, and the aim of this paper is to examine these specific regional organisational manifestations of the Triple Helix. How do actors within

these organisations relate to and balance the pre-packaged view of collaborative innovation dynamics in Triple Helix with their view of the innovation developments that unfold?

The development of two regional Triple Helix organisations in Western Sweden is used as a case study. A decline in the automotive and telecom industries in this region had created a sense of urgency, and public and private actors initiated discussions about socio-economic development, with renewal being an essential theme. Actors discussed the creation of new products, markets and services at the intersection of the automotive and telecom industries and public utility. Another central theme was joint effort and public–private partnership. The vision of these actors implied a broad development process and the need for many different interests to collaborate around systemic solutions in which risk and benefit could both be distributed among actors. The solution that the actors developed was a new form of development organisation known as an 'Arena'. This paper combines data from two empirical studies of Arenas conducted in 2004 and 2005. The first study, which focused on developments in the Trollhättan area, is based on 13 interviews (Fogelberg 2004). The second study, which focused on developments in the larger city of Gothenburg (Alänge et al. 2005), was based on 23 interviews with managers and project leaders who were involved in the development of Arena infrastructure or participated in specific projects. The paper draws on historical analysis of the formation of Arenas and interviews that focused on the Arenas' activities. The interviewees were categorised according to five broad groups: national state agencies, regional authorities, large industries, university researchers, and small and medium-sized enterprises (SMEs). The interviews each took approximately two hours and were recorded and transcribed. Section 2 of this paper discusses the Triple Helix model as part of an analysis of regional innovation. Section 3 describes the historical development of two regional and interconnected Triple Helix Arenas. Section 4 describes the outcome of this regional innovation policy using examples from interviews with actors who developed or worked at these Arenas. Section 5 discuss the implications of Triple Helix policy for actual development.

2. Triple Helix innovation and studies of regional Triple Helix policy

The Triple Helix theory was originally developed to analyse innovation at the societal level and as a historical outcome. Triple Helix theory emphasises that development occurs collaboratively in a mutual three-party process that involve actors (institutions) from government, industry and academia. One historical trend that the theory aims to describe is the increasing role of knowledge for innovation, and in particular the role of the university in an increasingly knowledge-based society. Where academia had earlier been seen primarily as an up-stream activity or as part of a knowledge context to innovation, the Triple Helix positioned the university closer to the actual innovation process. Another trend that the theory aims to describe is the increasing role of a collaborative mode of innovation. The three institutional spheres (helices) interact and communicate at different levels in Triple Helix processes that not only drive change but also lead to internal transformations of the respective institutional sphere (Etzkowitz and Leydesdorff 1995, 1997, 2000). The latter can be expected to lead to self-organising and non-linear system development (Leydesdorff 2001). The transformation of the institutional spheres occurs through hybridisation between spheres where elements from university, industry and government are recombined into new forms:

> The common objective is to realize an innovative environment consisting of university spin-off firms, tri-lateral initiatives for knowledge-based economic development, and strategic alliances among firms ..., government laboratories, and academic research groups. (Etzkowitz and Leydesdorff 2000: 112).

The model has also been promoted in the context of innovation management, as a framework for public policy, for a related but specific reason. In that form, as a policy model for innovation:

> ... triple helix provides a flexible framework to guide efforts, from different starting points, to achieve the common goal of knowledge-based economic and social development. (Etzkowitz and Klofsten 2005: 255)

The Triple Helix formulation started to make sense to different actors in the policy. National governments, regional innovation actors and even small projects and individuals were able to describe or frame their work using a Triple Helix framework. The model turned out to be particularly attractive to policy traditions that emphasised 'democratic corporatism' (Etzkowitz 1997), in which public and private actors are expected to collaborate for the mutual benefit of social development. Sweden is a case in point. Innovation policy in the Swedish welfare model relies on the explicit or implicit assumption that stakeholders will collaborate in order to strengthen national competitiveness. Under this assumption the state allowed large organisations influence or control of public funding for research and innovation. In a Swedish context, 'public–private–partnership' is merely a new formulation of a longer tradition and working mode of the Swedish welfare model. This also frames the expectation of the new role of the university for innovation. When academia is positioned closer to innovation it becomes seen as an actor with 'interest' who should participate in partnership and drive innovation. The focus has been the new developmental role and capacity of academia to drive technology transfer processes (Etzkowitz 1983, 2003; Cooke and Leydesdorff 2006; Tiffin and Kunc 2011). Sweden has in recent years tried to copy technology transfer models used by

universities in the USA, while largely neglecting the parallel and ongoing discussion that, based on historical analysis, show the limitation of the expected capacity of the university for this role. The trend has been to regard 'transfer' only in terms of equity arrangements, but commercial roles may be less rewarding and more problematic for the university than is expected (Feller 1990). Ernø-Kjølhede et al. (2001) propose that university technology transfer has to be designed paying due respect to the balance between the individual academic autonomy and the managerial ambition to enhance the economic outcome of research.

There had been several earlier and related studies of the impact of Triple Helix theory in the Swedish system. Jacob (2006) showed that close contact between the major Swedish innovation agency (VINNOVA) and academic researchers gave rise to theoretical narratives inside VINNOVA that became visible in policy documents and programme calls for regional innovation. The narrative of Triple Helix collaboration was particularly suitable for the agency's regional innovation policy since it was in accordance with the long-standing political culture in Sweden of relying on a shared public–private responsibility for economic development. This rhetoric developed into institutional form in subsequent regional policy, especially through the VINNVÄXT regional development programme, which was implemented by the VINNOVA in 2003. Laestadius et al. (2007) reported results from interactive innovation research that was a required component in order for regional developers to obtain funding from the VINNVÄXT programme. The aim of this interactive research was to both analyse the activities within the programme and to enhance the efficiency and quality of these activities by providing a reflexive feedback loop to the regional development projects. Several of these studies are also relevant to this paper. Johansson et al. (2007) reported on the ProcessIT project, which aimed to develop synergies between local manufacturing industry and information and communications technology (ICT) firms. Large manufacturing companies collaborated with small information technology (IT) companies and, in cases where development included advanced knowledge-based innovations, this led to collaboration with IT researchers from the local university. The main role of public actors was to set up the collaboration and safeguard funding. The idealised view that Triple Helix actors collaborate in harmony found little support in the study of the ProcessIT project. A similar conclusion was drawn in analysis of the Triple Steelex project (Laestadius and Nuur 2007), which found that the large companies promoted their own agenda and conducted research and collaborated with the academic institutions as they saw fit. In the case of the steel industry and regional development, most of these collaborators were not found locally or in the region but outside the context of members of the Triple Steelex project.

Other researchers have studied bottom-up policy initiatives that build on Triple Helix. For example, Viale and Camodall'Orto (2002) proposed a distinction between state-governed and evolutionary Triple Helix developments to stress the difference between top-down and bottom-up initiatives. This division was used by Viale and Pozzali (2010), who described the mode of Triple Helix that arose in the Gothenburg region as 'evolutionary' and bottom-up by referring to the development of university-based outreach centres, science parks, and new functions for intellectual property rights. The view that these particular and fairly recent internal developments of the university are the main engine for its role for economy and regional development is exaggerated. The historical working mode of Chalmers University of Technology is that it has been highly embedded within the economy and society. The university has provided general competence to the region and has been a site for industrial research that, in most cases, has been funded by public funds. These funds are primarily found in applied areas that have been put in place as a result of negotiations between the state and the large industry. The transformation of Chalmers to a foundation in the mid-1990s did not lead to a significant change in its mode of research, role for innovation, or reliance of research on public funds.

However, the university can be seen as an engine of development if one broadens the perspective and consider this embedded role in the innovation system. It has been emphasised that the generative role of universities for providing new knowledge and direct commercialisation from academic knowledge must be complemented with a view of the important broader and historical role of universities as regional development actors, where the university represents a multitude of roles and functions (Gunasekara 2006; Benneworth et al. 2009). With respect to roles, it has been acknowledged that structural differences and power relations between innovation actors may be reproduced in Triple Helix collaborations (Gunasekara 2006; cf. Thorpenberg 2005). A similar theme was developed by Eriksson (2005), who analysed the development of state- and EU-funded regional 'industrial development centres', which were created in other parts of Sweden in the period 1997–2000. Local initiative and collaboration between actors were a central aspect of this development. However, the industrial development centre differs from the Arena organisation, as developed below. The primary aim of industrial development centres was to assist innovation in existing industrial paths and, to a lesser extent, they explored industry renewal. Rather than being the actual innovation agent, centres were intended to organise projects that were carried out by participating industry actors. Industrial development centres were created in small rather than large industrial regions. Furthermore, centres were set up to convey a culture and function using the private firm as a model,

not to explore or develop a new culture and model at the intersection between public and private organisations. Nevertheless, one outcome of the industrial centre informs the present case: where large firms were initiators or participants, this usually prevented the creation of a symmetrical relationship between participating members.

A theme in earlier studies has been the discussion of the Triple Helix rhetoric of mutual development and the realisation of this mutual development in a local innovation context. However, Jacob's (2006) conclusions still hold true. There is a lack of studies that investigate the links between a Swedish corporatist welfare state model that has traditionally relied on mutual development, and the more recent expression of this tradition in innovation policy practice. The creation and governance of innovation through a new and separate institution—Arenas—is a novel expression of the Swedish model of innovation governance that has not previously been studied.

3. Historical development of two regional development 'Arenas'

The region in question has a history in technology industry sectors such as shipbuilding, vehicle technology, manufacturing and, more recently, ICT and biomedicine. The region hosts the majority of the Swedish innovation system for vehicle technology and much of the strength of the 'vehicle zone' that stretches from Gothenburg and Trollhättan in the west to Södertalje and Stockholm in the east. This zone is claimed to have approximately 150,000 people working in the vehicle industry, 40,000 in manufacturing, 100,000 in the supplier industry, and about 11,000 people working with R&D (Holmelius and Persson 2004). The decline of the vehicle and telecom industries affected society in various ways. Public and private actors started to discuss new forms of collaboration that could save existing industry and guide development towards new and future industrial paths for the region. Two broad public–private collaborations were created and termed 'Arenas' to distinguish them from mere incubators and science parks.

The first Arena under study is the Open Arena Lindholmen. Its site and nearby shore hosted industrial activities that made Sweden the second-largest shipbuilding nation in the world during the 1960s and early 1970s. This era ended abruptly in the late 1970s due to the rise of low-cost production in Asia and a global restructuring of the shipbuilding industry. The Swedish state attempted to reconstruct the shipbuilding sector and decrease the negative societal effects that the decline had had on the region. Due to significant state involvement, through funds and loans, the state ended up as a major owner of the Swedish shipbuilding industry and, a few years later, as owner of the remaining assets, land and empty buildings. In 1990, a small regional 'high-level' group of public and private interests initiated a long-term strategy for the renewal of the area. New schools and competence enhancement programmes were developed and the city of Gothenburg acquired the old shipyard area from the state in 1996 for SEK1 (including debts). A new joint IT university was established as collaboration between the general university, the University of Gothenburg, and the technical university (Chalmers University of Technology). A new science park was established by the two universities, the City of Gothenburg, Ericsson (telecom company), AB Volvo (heavy vehicle manufacturer), (Volvo Cars) automobile manufacturer, and the major technology consultancies of the Swedish vehicle industry. The vehicle and telecom industries had both started to concentrate important parts of their engineering activities in this area. The interests behind the science park established Open Arena Lindholmen as a form of societal mobilisation and as a way to organise development of public–private collaborations between various industrial and public actors at municipal, regional and national levels.

The second Arena studied, Innovatum Technology, was also developed at a former industrial site, in this case at the historical heritage site of the old Nohab industries in Trollhättan. Nohab, established in 1847 and one of the major metal industry manufacturing firms in Sweden, produced water turbines, locomotives, diesel engines, military airplane engines and later, various other military products, and advanced civil technology such as nuclear industry components. Both of the subsequent major industries of the area, Volvo Aero (highly dependent on military contracts) and Saab Automobile (a spin-off of the military airplane manufacturer SAAB), are industrial spin-offs from Nohab. The Nohab business declined in the late 1970s and was terminated in the late 1980s. When the new industries also started to decline, the economic situation became severe. As in the case of the former Gothenburg shipyards, politicians and industrial patrons in Trollhättan started to discuss how to use the old industrial sites and facilities as a geographical hub for renewal and economic and societal growth processes. The new actor, Innovatum Technology, was created in 1996 by the major stakeholders: the regional government of Västra Götaland, the municipality of Trollhättan, the major local workers union, Volvo Aero Corporation, Saab Automobile, Skanska, and Vattenfall. It was established to partly utilise what was, at the time, a recent shift in Sweden in the power balance in innovation policy from the state towards regional actors. By 1995, the region of Trollhättan was experiencing severe economic stress and, consequently, became eligible for EU Structural Funds (Objective 2 Area Funds). The funds created a new degree of freedom and the opportunity to gain local control of a regional innovation policy that had previously been controlled by national actors. Funds were invested in

material and organisational infrastructure for innovation. This included new use of old facilities, the establishment of an organisation of experienced project leaders from both local SMEs and large industries of the region, the creation of support infrastructure for business incubation of small software companies (for example, in digital special effects for the film industry), and support for larger and manufacturing-oriented projects of interest to Volvo Aero and Saab Automobile. Both firms were already partners in large public national research programmes in the fields of aerospace technology and vehicle technology, which were governed by these industry partners, and they chose to place some of these activities at Innovatum Arena. The focus of the Arena was on developing various new combinations of 'manufacturing' and 'media'. A parallel process of clustering the Swedish film industry in Trollhättan using regional funds utilised the facilities of the Nohab area and the advanced visualisation equipment of Innovatum Technology. Film 'industrialisation projects' were developed around advanced automisation and the production knowledge of Volvo Aero. Saab Automobile expected to run advanced engineering projects at Innovatum instead of conducting all of its projects in-house; an example of this is hybrid electric drive-train technology. Innovatum Technology aimed to play a role for advanced engineering in projects that had previously been undertaken in-house in the Swedish automotive industry. Volvo Aero developed computer simulations of product and production development processes, and also contemplated developing new real-time-based communication technology. The latter was linked to the rise of the 'network-based defence' in Sweden (that is, a military defence system that could rapidly mobilise distributed resources and adjust and take action in relation to unspecified and unknown tasks).

These Arenas were linked. The local university of Trollhättan had PhDs working in projects but their institutional affiliation was with the larger universities in Gothenburg. The regional authorities of Västra Götalandsregionen and the large industry incumbents were actively involved in the creation of both Arenas. Industry interests overlapped through the Volvo Group and engineering consultancy firms. In addition, both Arenas were created against the background of regional crisis and as policy experiments/instruments for new ways of building collaboration in society that could create the foundations of the future economy. Open Arena Lindholmen was designed to become:

> . . . the neutral place for collaborative projects between several interests within the Triple Helix . . . [and] . . . the driver for companies, academia and society to have projects on Open Arena Lindholmen is that all actors are needed in order to achieve renewal within service and product development. (internal document from Lindholmen Science Park, translation by present authors)

Similarly, Innovatum Technology Arena was the 'neutral development partner' where SMEs, large industry, regional and municipal government, and the local university could develop broad collaborations to brighten the future of the industrial region. Arenas were seen as playing a brokering role, since they:

> . . . have no vested interest of its own. (Arena manager – 2)

The stabilisation of Arenas relied on the creation of actor networks based on mutual understanding. A unifying common language and development perspective to mobilise the Arena was needed. This is where the theory of Triple Helix innovation entered the picture.

4. Open Arenas and closed discourse: Developmental actors' reflections on regional innovation as Triple Helix development

There are several reasons why Triple Helix became important to Arenas and their interest groups. One reason was that this theory was important to the major national innovation policy actor. Another was that it fitted with the general assumptions that mutual understanding and neutral collaborations were the way to mitigate the region's rising economic crisis. However, as Section 4 aims to show, conflicting interest prevailed and we found little support for the vanishing interest dimension prescribed by Triple Helix theory. Sections 4.1–4.4 provide examples from interviews in four broad categories.

4.1 National agencies

The most relevant national agency in this context is the Swedish Governmental Agency for Innovation Systems (VINNOVA). This agency promoted the Triple Helix model of innovation as being foundational for the agency's conceptual work and strategy during its formation and consolidation in 2000–1 and in the following few years. A central policy document stated that:

> . . . for innovation systems to be effective, science, business and politics [i.e. the Triple Helix] must work together to set priorities and develop new initiatives within Sweden's important growth areas . . . [and that a] . . . central feature of these initiatives will be the development of strong innovation environments . . . characterised by high levels of interaction between the actors involved. (VINNOVA 2002: 3)

At the level of a VINNOVA representative, the Triple Helix model was seen as useful because:

> It underlines the importance of mobilising all sectors. By demanding that companies should be involved, the research will be more useful. By demanding that politicians should be involved, we know there will be a more long-term commitment at the regional level. (National agency representative – 1)

This Triple Helix discourse was sanctioned at the top level of the agency and was part of the rhetoric of a large portion of programme calls from VINNOVA during the period under study. One particular programme linked regional innovation policy and the Triple Helix idea. In the period 2003–5, VINNOVA organised the so-called VINNVÄXT programme, which aimed to strengthen the competitiveness of regions by stimulating collaboration and partnership between university, industry and local/regional political actors. The VINNVÄXT programme was organised as a 'competition' within the discipline of 'regional innovation mobilisation' and is studied in Laestadius et al. (2007). Also, the actors of the present case submitted a joint application, titled AutoComRegion. Open Arena Lindholmen and Innovatum Technology were both examples of more or less stable regional (Triple Helix) mobilisation of actors, and the Gothenburg actors entered the national competition with an attitude that they were in a different league from many of their competitors, as few of the VINNVÄXT applications from smaller cities could compare with Gothenburg in terms of scale and economic importance. The managerial core of AutoComRegion was from industry and regional public actors—obedience to VINNOVA was not a primary objective—and neither university actors nor SMEs had a strong position. This bias also reflects the history and organising of the Triple Helix Arenas studied in Western Sweden. The AutoComRegion application was not funded, which created controversy and distrust between regional actors and VINNOVA.

However, the strong commitment to Triple Helix in VINNOVA had also started to create tensions within that agency. Representatives working with the development of new innovation programmes were unhappy about being locked into to a certain policy theory discourse. One of the more elaborate discussions by informants explains the problem:

> It's typical for Sweden that all the strong interest groups should be gathered to create innovations. However, if one wants to create an environment that stimulates new thinking, and that's my hypothesis, it will not grow in the centre of the old, but in the periphery. ... There is a conservative element. Not that the people are conservative, but the institutional context is conservative. That's my impression ...
>
> Triple Helix has had an impact in Sweden because it fits our political tradition. It's a new version of the Mutual Understanding in politics. But new technology occurs without politicians and the universities, in many cases, so it's a heavily conventionalised picture. It is somewhat perverse sometimes at VINNOVA that the criteria for funding are that the project must involve all the elements in a 'Triple Helix'. (National agency representative – 2)

Another interviewee from the national agency pointed out that using the Triple Helix model as a framework for policy created peculiar effects:

> While VINNOVA used the model for governance and as 'a way to describe control' in its R&D programme structures, the model 'in practice exempts you from analysing interests' in the created R&D collaborations. (National agency representative – 3)

4.2 Regional authorities and regional project management

Regional authorities funded parts of the Arena activities through their unit for regional development and also tried to assist Arenas and use them as vehicles for social and economic development of the region. However, insufficient funds were available at the regional level and those that were available were aimed more at development rather than research. The part of the R&D system that could potentially link universities was funded by the state, largely through VINNOVA, and regional authorities needed the state to play this role. From the position of regional actors, the state R&D agencies were 'actors' to be mobilised in a regional puzzle. However, Arenas were a mechanism that VINNOVA wanted to control as part of a national innovation puzzle. VINNOVA had invested in establishing an organisational worldview that built on Triple Helix (in which one of the helices was the political sphere) and was dissatisfied with what it considered to be fragmentation and unclear political leadership in the region. VINNOVA demanded that politicians should be involved, in order to anchor the development process. The regional authority and regional industry incumbents claimed that VINNOVA had a mistaken picture of how a big city functions in development processes, and that it was high-ranking administrative officials, not politicians, who were directly involved in negotiating regional development issues. Problems also arose at the level of the regional project managers. On the one hand, they were generally positive about new collaborative platforms such as Arenas, as exemplified by one project manager:

> The arena could become a resource for the region and, later, for the whole nation by reducing the time taken from research to business. However, it must be a pleasant Arena, well adapted for its purpose, and neutral. (Regional project manager – 1)

On the other hand, when project managers discussed actual developments on Arenas, a more complex picture emerges. One difference was related to the expected outcome of collaborations. While both VINNOVA and regional authorities had envisioned primarily private markets, public actors and parts of industry also saw also the public sphere as a potential new market, especially for products that draw on the intersection between ICT and mobility such as vehicle IT and intelligent transportation systems (Regional project manager – 2). Another theme was the view that Arenas reified existing power

structure by the role played in Arenas by industry managers. This created a form of *ad hoc* regional policy activity:

> It cannot be said that we have a structured official method. It's more lobbying and in-kind resources. (Regional manager – 3)

The role of regional authorities did not stabilise. The public actor was almost hyper-reactive to signals from senior management of the large industries of the region since industrial support was a prerequisite for political support, and industrial and political support were both prerequisites for state agency support. The resources for regional innovation governance that was linked to Arenas tended to be small and uncertain, and did not allow public actors a position that could balance that of the large industry. National funding therefore remained crucial.

4.3 Large regional industry incumbents

Most of the regional industries that participated in Arena development were from the automotive and telecom industries. These actors were not focused on mutual collaboration. The example below is from a manager of a major R&D organisation within the Swedish vehicle industry:

> We, that is, industry, take all the initiatives and we then collaborate with the university. And that is right since it is easier to connect all resources that need to have interaction with the university. If the university comes with proposals, there is no one here who can review it. There are no resources for that. (Industry manager – 1)

This throws into question the view of a Triple Helix process in which three social actors collaborate on an equal basis. Instead, initiatives were seen as coming from industry. A similar view was supported by another interviewee from industry, who was also sceptical towards the interest of university researchers:

> With our network, we see what the competitors are doing and what the demands are . . . We define projects and then we ask the university if they have any PhD students. If the head of the university department says yes, then we start. That is, we do not hold any beauty contests . . . If one does not start from the strategic needs for Sweden and the companies, but from the personal agenda of professors, if one lets their career plans steer all research, then we are really in trouble. (Industry manager – 2)

The 'beauty contest' is the traditional open-call system for research applications familiar to public research and universities. Industry wanted to gain control over public resources for R&D funding and did not want to participate in research calls. The way the national public R&D system worked was generally seen as problematic from a corporate perspective. University professors were seen as acting according to 'personal agendas' and as being generally incapable of incorporating 'the strategic needs of Sweden' in their decisions, in the way that industry does. By this line of reasoning, societal benefit emerges from industry leadership: the academic and political actors were not seen as being capable of making the right strategic decision for nationally relevant regional development.

For innovations that were considered high-risk ventures, however, the interviewees from industry were prepared to discuss collaboration. In those cases:

> Triple Helix is probably what we shall do here: academia, industry and the regional administration in the same projects, in one arena. (Industry manager – 1)

Another industry representative shared a similar view on innovation in novel areas with uncertain gains for each participating actor:

> An innovation system can't be a few people sitting in a corner somewhere. It ought to be stronger with a Triple Helix, compared to if the various actors run on their own path. (Industry manager – 2)

The Triple Helix model was also seen as potentially problematic in case one has to establish actual development:

> At the same time, it will be more difficult for the process to start, there are more different wills, and there are different timescales between academia, industry and the authorities. (Industry manager – 2)

The same interviewee pointed out that another reason why industry actors link collaborative projects with Triple Helix innovation at Arenas was that research applications addressed to VINNOVA in particular, required this rhetorical link:

> We try to write it in our applications, probably, that it is a 'Triple Helix' or a 'cluster'. (Industry manager – 2)

4.4 University researchers

Close collaboration with industry has long been part of the practice of Swedish technical universities. On a general level, this role provides a kind of rationale for university researchers to portray themselves as a responsive group. When discussing the role of universities and industry in general terms, university researchers sometimes accepted that the collaboration climate was driven mainly by industrial interests, because it allowed an applied researcher to respond to the focus areas and needs of industry:

> It is important that we are driven by the companies and that they set up the demands. There must certainly be basic research with depth in special areas, but that is different. (University project manager – 1)

However, when discussing arrangements in actual development projects, university researchers also raised certain criticisms and described the difficulties in sustaining

a more proactive role for university research that balanced the impact of industry in such collaborations:

> One problem is that industry pushes its goals so hard . . . the collaboration with university is not always as important for them, and they are not broad-minded and open enough. (University project manager – 2)

The same university researcher also presented an image of the innovation process that contrasted with the one given by industry managers. Academia was not seen merely as a passive knowledge infrastructure whose only role was to assist industry, but as an active agent in the innovation process:

> It is always us here at the university department who take the contacts . . . It is difficult to find receivers for this in industry, which I guess is because they have so few research-educated persons. So I find it rather difficult to start industry collaborations, even if there is money at the state agency for innovation to apply for. (University project manager – 2)

The university researchers who were interviewed were not negative towards a Triple Helix mode of collaboration. Instead, they saw their role as an answer to Swedish research policy, where there was strong demand for collaboration across disciplinary and social borders:

> The Triple Helix model is here since it is the state that supplies the universities with money for research. (University project manager – 2)

4.5 SMEs

An important discussion was held among Arena actors regarding the role of SMEs in the supplier chain to large industry. Nonetheless, this group was notably absent in actual Arena collaborations due to limited resources for other activities and a lack of ability to handle knowledge-based innovation development. A limited number of start-up SMEs were identified, however, which were part of the incubator function of one Arena. These very small firms did not collaborate with other actors but worked more or less in isolation, maturing as a firm in a specific narrow niche. One probable reason for their low degree of interaction was that they were economically weak compared to other actors at Arenas:

> We have many ideas and can create many new jobs, but we do not even have money to live from. (SME manager – 1)

Another reason was that the development was not seen as requiring any substantial collaboration. For example, the question of the role of academia met with surprise in most cases. Research and explorative collaboration with other firms or actors was not part of how SMEs conceptualised and developed their innovation process.

5. Discussion: Triple Helix Arenas, internal tensions and unresolved issues

Triple Helix Arenas can be regarded as a proposal of novel form of organising innovation in the Swedish context. First, they aim to widen the Swedish model of public–private partnership with respect to the variety of actors. The received wisdom was that the mutual development model in Sweden still worked and was required for renewal. Secondly, Triple Helix Arenas aimed to be collaborative policy actors and innovation development actors. They were regional policy actors that regarded the region as 'demonstrators' or 'test sites' for the development of novel solutions that had to be formulated and developed in a collaborative public–private–partnership mode. A wide development network was needed, because the solutions were themselves distributed over several industries and uses. The view was that Arenas represented a win–win situation for all participants, since they allowed mutual development to unfold in areas where broad collaboration was required. If successful, the region and its globally active industries could become leaders in new global markets. Thirdly, Triple Helix Arenas were proposed as a theory-motivated development. Policy managers at the national and regional level aimed to align their agenda to a common theory-laden language that a broad set of actors could understand and sign up to.

The studied Triple Helix collaboration unfolds in ways somewhat different from the above script. The collaboration climate inside Arenas was affected by the strong reliance on one of the helices, i.e. large industry. The industry managers who were interviewed expressed their interests clearly by stating that innovation processes should be controlled by market and customer demands, which are within their sphere of knowledge. Researchers from the university who were interviewed tended to make the opposite point: that most initiatives for collaboration and renewal emerged from within academia, and that industry generally lacked the advanced competence and knowledge to assume this important role. The state, here in the form of VINNOVA, tended to frame regional innovation initiative as Triple Helix collaborations and mutual development process. This was done both through regional programmes and through a more general climate within the agency in which Triple Helix thinking governed the view of innovation and what an agency such as VINNOVA can and should do to promote growth. Arena developers, which were funded partly by VINNOVA, were prone to situating themselves within the mutual interest framework of Triple Helix, and they changed their rhetorical practice to better fit the VINNOVA view. This was not only a strategic response. Local actors shared the norm and evaluation of history that collaboration is indeed an effective recipe for economic growth in Sweden.

The mutual development that Arenas promoted was based on the tradition in the Swedish welfare model, i.e. a two helices industry–government partnership between large organisations, rather than on a Triple Helix process. SMEs and academic researchers were invited primarily when this fitted the agenda of the large industry. Academic research did not become a prevalent aspect of Arenas during the studied period, and the position of university researchers remained weak or absent in the collaborations that were studied. Hence, Arenas failed to utilise the multiple functions and roles that a historically well-rooted academic institution that exist at arms length can provide. Furthermore, renewal may not only grow from the needs and ideas of large organisations. Arenas had also difficulties in including SMEs in regional development, because these organisations were often very small or in the 'incubation' state and thus not really able to participate as collaborators. Thus a broadening of different groups and types of actors was limited, and there was little evidence of an emerging 'mutual' Triple Helix type of innovation landscape between academia, industry and government. This tendency has also been confirmed by other studies of regional development processes in Sweden.

A main problem seems to be how to provide a space for universities and new actors that allow them to take a proactive regional development role in the new organisations for innovation that have been developed in Sweden in recent years. Of course, different actors are part of historically evolved 'innovation systems', in which they already play important roles. However, these new and deliberately built organisational forms for regional innovation have a clear ambition of leadership and management of innovation processes, and hence also represent a potential restructuring of the evolved innovation systems. The tendency to exclude actors in these new organisations may therefore lead to problematic long-term effects, especially if it is academia that is excluded or invited only as a knowledge consultant or knowledge supplier. Triple Helix theory may be correct about the role of the university, but the needed broadening of actors may still not occur if one assumes that all actors are equally capable and strong.

The Triple Helix perspective is one among several perspectives that take seriously the fact that change is the result of complex historical processes, and it attempts to provide a view and understanding of the role of the university in a historical situation where knowledge is seen as a primary driver of these complex processes. However, when the gap becomes too large between the expectation of an ideal-type of Triple Helix process and actors view of the actual development process, this can create an unresolved tension that is counterproductive to the very goal of trying to stimulate innovation through collaboration.

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