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How student involvement develops triple helix collaborations towards innovation

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In developing transformative solutions for a sustainable society, an open innovation approach to collaboration is needed. No actor in society has the capacity to create such change on its own, why triple helix stakeholders needs to find deeper form of collaboration. How can universities strengthen the triple helix innovation capacity by developing its own role in triple helix collaborations, by adding student involvement to the traditional view contributing with research? The dimension of adding student involvement will open up for new collaborative platforms that will reduce barriers for deeper collaboration between the triple helix actors, due to the neutral positions students possess. In contributing to such development Chalmers University of Technology has invited triple helix stakeholders to collaborate around the development of such a platform, the Challenge Lab - an arena and platform for triple helix collaboration in developing transformative perspectives and solutions or a more sustainable society. This is a paper that is work in progress

Keywords: Innovation, Collaboration, Co-creation, Triple Helix

1 Introduction

To instigate innovation and development for transformative solutions for a sustainable society, triple helix actors needs to develop practices that enhance multi-stakeholder co-creation. Often universities are expected and also view its role in such collaborations to mainly contribute with researchers and knowledge in collaborating with industry and government. A different perspective on roles as well as what universities can contribute with in such collaborations, is needed if we want triple helix collaborations to instigate innovation and co-creation, for transformative solutions in areas such as sustainability.

In taking on the challenge of coming about to develop such collaborative efforts that leads to innovation, universities can take a leading role in using triple helix constellations and its capabilities to develop the collaboration further, towards innovation. In the case of Challenge Lab, academia has here redefined itself to also include the educational aspect

by involving students on master level, and not only research and researchers' as is normally the case. The role the students play in participating with their master thesis projects, are to facilitate the developing of stakeholders' understanding of each others logic and how that may contribute to a system perspective in bringing forward innovations in the area of sustainability. In return the students get the experience and understanding of triple helix collaborations.

In developing transformative solutions for a sustainable society, collaboration across industry, government and academy is needed. No actor in society has the capacity to create and bring forward solutions that are of the transformative nature and on the multiple levels it needs to be, why triple helix stakeholders needs to find new forms or deeper form of collaboration.

In the establishment of Challenge Lab, Chalmers want to explore new forms or organizing to develop a triple helix innovation capacity but also developing its own role in triple helix collaborations, by adding student involvement rather than the more traditional way of contributing with research.

In contributing to such development Chalmers University of Technology has invited triple helix stakeholders to collaborate around the development of such a platform, the Challenge Lab – an arena and platform for triple helix collaboration in developing transformative perspectives and solutions or a more sustainable society. In Challenge Lab student involvement is an important ingredient, where master students are involved in multi-stakeholder collaborations. Another important aspect has been that the Challenge Lab has been located outside the traditional campus area and into the university area in a science park. This has been made to see what effect it has on the different stakeholders as well on the faculty involved and students.

How can universities strengthen the triple helix innovation capacity by developing its own role in triple helix collaborations, by adding student involvement to the traditional view contributing with research?

This is a paper that is work in progress.

2 Theoretical background

Universities contribute to innovation in many aspects, such as research, education, transferring knowledge in terms of IP and licensing (Cohen 2002, Thursby 2001, Mansfield 1991), and academic entrepreneurship (Shane 2005, Jacob 2003). Universities are also in engaged in more relationship intensive and collaborative efforts such as networks and collaborations with firms and other organizations, in industrial alliances, science parks and research institutes (Siegel 2003, Perkman 2007), which can be related to open innovation settings. The development of universities engagement in such settings can be seen in relation to the development of how processes for innovation and product development has been developed to engage more and more external parties and towards more of open innovation (Chesbrough 2006, Coombs 2003). Open innovation is here referred to as the process of instigating innovation through creating and transforming knowledge with others and inviting others to participate, as Chesbrough and others has expanded the definition of open innovation to. Open innovation can further be seen as a way to organize for collective knowledge creation and innovation (Huff 2013), in

particular the early stages (Yström 2013), and as innovation management studies stress the importance of interfacing and interacting with a diverse range of stakeholders to pool different knowledge and skills bases that foster innovation (Tushman 1977, Cohen 1990, Pittaway 2004).

Therefor, universities need to understand the context of open innovation and what relevance academia and universities may have in collaborations with industry (Perkman 2007) and other external stakeholders, and further how triple helix constellations with multiple stakeholders can be designed from an open innovation perspective to contribute stronger in developing knowledge solutions collaboratively, in particular in complex settings on complex issues, such as the area of sustainability (Sarkis 2010). The triple helix approach to innovation is based on the understanding of the importance of interaction between the spheres of academia, industry and government in general (Etzkowitz and Leydesdorff 2000), and more specific in the field of sustainability (Etzkowitz and Zhou, 2006). However, as suggested by others (Lundberg, 2013), there is a gap and need for a deeper understanding on how triple helix collaboration can be established, managed and facilitated to contribute stronger to innovation, and a need also stressed in the open innovation literature (Giannopoulou 2011).

Based on the broad understanding of the importance of the links between industry and academia to spur innovation (Salter 2001, Agrawal 2001, Cohen 2002), different dimensions of the links has been distinguished, such as links where patents and licenses are transferred and different level of relationships (Howells 1998) or type of relationship (Scharinger 2002, Salter 2001). In distinguishing between relational involvement, there is a division into high, medium and low relational involvement, where high relational involvement results in co-creation and close collaborations that to a greater extent results in innovation (Perkman 2007). One here needs to distinguish between cooperation, collaboration, and co-creation. Cooperation can here be defined as a way to interact to exchange information and communicate directions and decisions. Collaboration is a deeper form where a common goal and result is to be achieved (Kahn 1996, Kohn 2006), and as the base for the deeper co-creation that open innovation can create. In looking into how universities collaborate for innovation, the context of open innovation becomes relevant.

In developing triple helix collaboration towards innovation and to have each of the helices to some extent "assume the role of the others" (Etzkowitz 2005, Lundberg 2013) it is here suggested to involve students as intermediaries (Howells 2006) and boundary spanning actors (Lundberg 2013), to craft and nurture collaboration and open up for a deeper understanding of the different logics the multiple stakeholders have in triple helix collaborations (Thune 2010).

3 Method

The aim of this study has been to achieve a deeper understanding of how student involvement in triple helix collaborations can strengthen the collaboration between stakeholders, collaboration that drives innovation and how that may develop the view of the role of the universities in boundary spanning open innovation. In studying the case of Challenge Lab at Chalmers University of Technology a deeper understanding of different stakeholders perspectives are offered, and how students can be involved in triple helix collaborations to drive innovation of transformative solutions for a sustainable society.

The study is based on an explorative and qualitative (Denzin, 2000; Silverman, 2000) case study approach (Eisenhardt 1989; Yin 2014), based on action research methodology (Cunningham 1993) to gain a deeper insight and understanding. Action research methodology is chosen, as this study aims to contribute not only to theory, but also to practice in terms of deliberate involvement of the researcher. With the dual focus on both theory and practice, and the closeness of the researcher to the object of study, action research offer to gain understanding not only of specific events and activities, but also in the overall context and thereby gaining a deeper understanding of the subject, which is a strength of this methodology. However, in applying an action research approach it is also crucial that efforts are made in clarifying and resolving any biases in perception, pre-understandings and interpretation of the empirical material (Alvesson 1999). The empirical material and analyses has therefore been validated with an outsider researcher. Further, validation of the analysis has been carried out by means of reviews and discussions with respondents and participants, as well as in the community of researchers in order to achieve consistent interpretations.

Case studies include a number of various applicable methodologies that complement one another. In this study, a combination of participant observations (Atkinson 1994) and interviews (Kvale 1996) has been used. The collection of data has been through workshops designed as multi-stakeholder dialogues as well as observations (Atkinson 1994) as the main source of data, and complemented with individual semi-structured interviews (Fontana 2000, Kvale 1996), to achieve a deeper understanding of the underlying forces for collaboration. The observations have been both participatory and non-participatory. The non-participatory observations have been based on an ethnographic approach, where the observer makes a great effort to remain an outsider vis-à-vis the group and not intervene (Alvesson 1999).

During fall 2013 and spring 2014 observations has been conducted during 10 workshops and meeting with academia, industry and governmental organizations. In addition, interviews has been made with the 12 students, all directly involved stakeholders[1] in Challenge Lab, representing triple helix stakeholders and another 10 persons that has been involved in Challenge Lab, representing the perspective of the stakeholders involved.

4 The case of Chalmers Challenge Lab

Challenge Lab, organized by Chalmers University of Technology in Sweden, is established with the purpose to become an arena for deeper forms of collaboration and innovation between triple helix stakeholders around transformations for a sustainable society. Chalmers is the host, but the content is very much developed by the involved stakeholders from industry, government and academia. Based on its experience of triple helix collaborations, in developing an arena for innovative collaboration on sustainability Chalmers have seen the need for multi stakeholder collaboration taking a multi-level perspective is essential in driving transformation.

In the strategy, Chalmers University of Technology has a strong a focus on contributing to the development of a sustainable future, as well as developing collaboration for

[1] 15 personsons

innovation[1]. The creation of a Challenge Lab where multi stakeholder collaboration is combined with student involvement to drive innovation and transformation for a sustainable society came up as an idea.

"A sustainable society", is a very broadly defined area for Challenge Lab, and the first Lab was therefor decided among stakeholders to be around "sustainable transportation". During the first year 12 students has been engaged, with different educational backgrounds within engineering and where half of the group were international master students from 6 different countries[2].

In Challenge Lab students on master level across disciplines are offered to develop their theoretical knowledge with a strong practical relevance, in participating in taking different and multiple stakeholder challenges one step further. The master students are involved to facilitate the collaboration, while at the same time develop skills on how to work on complex issues, with multiple aspects and stakeholders. The idea of involving students has come from the need of including aspects of sustainability and innovation into the engineering education, as well as the demand from students of having stronger practical relevance in more parts of their education. But it has also its background in experiencing the effect of the role students possess, the role of being neutral and someone all stakeholders care for.

The stakeholders involved in this first Lab, were from governmental agencies, industry and academia. Governmental agencies were mainly on a local and regional level, from different offices related to transportation, representing environment, regional planning infrastructure. The industry involvement has been with a global company within the automotive sector, with involvement from three different areas and disciplines such as R&D, environmental affairs, and product planning. Furthermore, a regional trade organization and two regional science parks[3] has also been involved. From academia, researchers and leaders from different departments, faculties and research projects were involved, covering the area of transportation. The location of Challenge Lab is at Lindholmen Science Park, outside the traditional university campus, to be closer to the stakeholders and to contribute with the Lab to the activities in the science park, to see if that would add to the collaboration further.

The process in the Lab is based on three major phases; the preparational phase, the Lab-phase, and the follow up and evaluation phase.

In the preparational phase stakeholders meet in a set of workshops, developing issues to be researched and investigated, based on the stakeholders interest and need. Current research or development projects are related to, while at the same time the discussions are related to system change and "what needs to be done to meet the system requirement for sustainability", to find areas and avenues of interest that the students can be guided to. The students also go through a preparational phase, where they are introduced to the theories related to sustainability, multilevel perspective thinking and different methods. Back casting is one major tool used in the Lab. The students also meet up with stakeholders and professionals in this phase to discuss the theoretical backgrounds in

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[1] Chalmers has been ranked 2nd on the Leiden ranking for co-publishing with industry. Chalmers School of Entrepreneurship is ranked 8th globally in UBI ranking 2014, http://ubiindex.com/rankings/

[2] Mexico, Brasil, Turkey, India, Germany, Finland.

[3] Lindholmen Scnece Park and Johanneberg Science Park, Gothenburg, Sweden

order to get a holistic understanding, but also practical relevance to theory. In addition the students are also introduced to methods and tools on how to drive and lead change in the area of sustainability and with multiple stakeholders.

Entering into the Lab-phase, a process of matching the interest of the students, based on personal interest and their educational backgrounds, and subject areas of stakeholders takes place. The stakeholders as a group and as individuals try to match up to the interest of the students. The results are that the students chose the area and focus, but related to what challenges stakeholders are confronting. This is an important difference to other master thesis works, where a single stakeholder offers a defined project that the students take on and work on. In Challenge Lab the students are partly working as a large group, partly in pairs with their different projects and research questions they have defined, in collaboration with stakeholders. In allowing the students to suggest and drive the development of the research question or issue to be focused on, the process opens up for stronger student involvement adding new perspective to the subject as well as the stakeholder collaboration. The idea with involving students is that students are believed to be boundary spanners and contribute to the collaboration between stakeholders. The different logics and perspectives the different triple helix stakeholders have, are difficult to bridge and become barriers for system wide innovations. The students also gain, gain understanding on how to drive complex multi stakeholder projects, a competence that often is important in real working life but not focused on in the educational curriculum.

In preparing and starting up Challenge Lab, efforts were made on how to design for an arena where triple helix stakeholders are engaged in collaboration in a way that spur innovation and transformational sustainability solutions. Experiences from previous collaborative efforts were analyzed, where multiple stakeholder has participated and within the area of sustainability. In addition an experimental dimension was added, based on the idea of how a university can use its capabilities form not only research, but education and innovation as well. In doing this reflections and follow up discussions were held during the full year, with stakeholders involved but also internally within Chalmers.

4.1 The importance of boundary spanning in striving for innovation in triple helix collaborations

Early on the meetings and workshops that took place was mainly related to the progress of the student projects in the Lab, but soon those developed to also add dimensions of deeper collaboration and how that could be taken further in the next steps of Challenge Lab. In these meetings, workshops, and interviews, stakeholders expressed their view on their participation in the Lab and how it has evolved.

The early discussions were also focused on results. However, after the initial meetings the stakeholders came to the conclusion that this would be an evolving process and that they wanted to experience being part of the Lab and then see what possible results there could be. A representative from industry expressed;

> *"Often collaborations between different organizations mean that you will have diverse interests and aims for the collaboration. Even if we think we have discussed what to collaborate on and for, we often miss out creating the deeper understanding of our diverse interests and the underlying reason for that. If we could have a process securing such deeper understanding as a start, collaborations would certainly give much more." (Industry representative 5)*

After some meetings when the stakeholder had tried to come up with a set of issues they thought were critical to have the students to investigate more, issues that they jointly defined, they realized what that had meant to the common discussions;

> *"Meeting around the students makes the discussions easier, as it is not only our interest we are there to protect in defining or developing aspects around specific issues to work on in Challenge Lab." (Industry representative 3)*

And in more particular how the student participation has contributed to the understanding, positioning and collaboration between the stakeholders:

> *"We first thought that the collaborative parties were focused on the results the students brought forward, but we realized soon that the preparational discussions and other discussions we had as stakeholders were as interesting and important". (Faculty staff 2)*

> *"Of course we are interested in what the students are doing and reporting on, but as important are the discussions it creates among us and how we suddenly seem to discuss specific issues on a system level. The different triple helix stakeholders perspectives are crucial in understanding what different problems on a system level an solution need to solve." (Governmental agency representative 4)*

> *When the students made interviews, in their effort to understand what our problems where and the logic behind, I heard myself and others explain in a more neutral and open way, bringing forward underlying logics and reasons for our way of acting. That also gave me a better understanding of underlying logics and reasons of others, that I have never understood before. (Governmental agency representative 2)*

This can be seen as a contribution the students bring in by being the neutral boundary spanner and intermediary in analyzing and describing in a different way, but also taking the system perspective rather than the perspective of one single stakeholder.

Among the projects and issues the students undertook, some actually developed prototypes that were tested and where stakeholders participated or were involved. Reflections from stakeholders on one such initiative were:

> *"We have been working in this area for a long time, but we have never thought of the aspects the students included in their solution. Even if their solution is only a prototype, they have brought us other perspectives and us as stakeholders together, that may help us to open up for new ideas and processes." (Governmental agency representative 4)*

After about half a year the stakeholders wanted to plan for the students to continue after their project work were finished, or develop a process for how the work could continue. And as expressed by another stakeholder from industry:

> "*We need to participate in more of this explorative discussions and activities on sustainability among us stakeholders. It adds dimensions that we otherwise don't get in our ordinary way of working." (Industrial representative 1)*

The students that has been involved has all expressed the appreciation of being in contact with stakeholders and multiple stakeholders, which has made them understand the complexities and difficulties of collaborations and leading change.

> *"When I joined challenge Lab I was not that interested in sustainability issues and environmental issues. My interest has been in developing business and processes. However, now I see it totally different. I can see myself work in this area in the future, related to transport or energy. The complexity, difficulties and necessities made me think differently. All engineering students ought to go through something like this!" (Student 6)*

This student, as a few others, also indicated the need for a deeper understanding of sustainability and how that subject and issues still is not broadened to the larger group of engineering students, even if the subject is incorporated in all program curriculums.

Another student expressed the following;

> *"This thesis Lab has made me understand how difficult it can be in bridging views but also in understanding that it is not only about views, it is also the different perspectives the stakeholders have, the different logics they base their development on. If we don't find ways to open collaborations across industries and disciplines, I cannot se how transformative solutions are to come about, especially that will transform on system level". (Student 9)*

5 Discussion

The role of Challenge Lab is to illustrate the importance of deepening collaboration and co-creation to instigate innovative ideas between triple helix stakeholders in the area of sustainability, taking a multilevel perspective. Sustainability is an area where innovation is strongly needed, but will demand collaboration between stakeholders if to develop the transformative solutions we need for a sustainable future. Even though some argue that multi stakeholder collaboration is not driving innovation and development of solutions across and on a system level that many others argue for (Fadeeva 2004) in the literature of open innovation and in triple helix collaborations, it is here argued that there are advantages that may spur innovation and development. As shown in other studies, (Lundberg 2013) boundary spanners are important for successful triple helix practices. In this case study, even if it is based only on a recently established initiative, shows how boundary spanning activities and roles, make stakeholders come together and making joint efforts in finding ways to contribute that add value. In involving students the Challenge Lab process shows on the use of students as boundary spanning intermediaries in the process of innovation and collaboration between stakeholders. The students were able to communicate and shed light on different actors perspective while at the same time having all stakeholders support in finding new perspectives or solutions that the stakeholders all could stand behind. The boundary spanning role of students have lowered barriers between the stakeholders, while at the same time built trust. The boundary spanning activities has emphasized the transformation and translation of knowledge, rather than transfer of knowledge. Interesting is the stakeholders view on the value and results. Several of the stakeholders appreciate and value en emerging view on what valuable results are. This emerging view is also pushed for to keep, even though the different stakeholders want actionable results in the end. Representatives stressed the

importance of having the capability to utilize the knowledge created, which than can become valuable results.

As Challenge Lab will be further developed during the coming year, the research will be extended and focus on what results are created due to the collaboration, but also how the involved firms view the value in participating. However, if the stakeholders involved have the capacity to utilize such results, it can still be very valuable. As indicated in by the citations here, there seems to be a demand for knowledge and results that even if they are not directly useful, the value of its indirect use can still be considerable. If collaborative efforts results in that firms and organization are gaining knowledge, perspectives and ideas that when put in the context of their firm develop new innovative solutions, the value must be seen as very high and valuable efforts.

The students involved in Challenge Lab, developed their knowledge in sustainability on a system perspective, but also capabilities for taking on complex challenges in complex settings, when put in the ”driving seat” and contribute to the development of transformational solutions for a sustainable society.

Furthermore, rather than looking on its role to disseminate knowledge and research results to society, universities can also take on the learning perspective and add to its research the dimensions and aspects of other triple helix actors. The dimension of adding student involvement will open up for new collaborative platforms that will reduce barriers for deeper collaboration between the triple helix actors, due to the neutral positions students possess. In this study we have identified student involvement as one key ingredient in developing triple helix collaboration, with multi stakeholders involved.

This case study also contributes to the understanding of the role a university can take in creating platforms and arenas for hosting triple helix collaborations with student involvement and what that can contribute to in terms of new research perspectives and questions. A practice that may contribute to the stakeholders as well as the students.

The practical implications will add aspects to take into consideration on how to organize triple helix collaborations but also aspects on how to act as a participating stakeholder. In this case study the different triple helix stakeholders has shown to have different needs and expectations on the collaboration, but when discussed common grounds are set to be common goals for the development.

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