Chapter 3, Exercise 1c

Use the framework by Bergek et al., 2015, to analyse the Lochem and the Aardwarmte Den Haag case as described and analysed in Werker et al., 2017, do not forget to define the term technological innovation system to start with.

Aardwarmte Den Haag

Definition of technological innovation system:

With the aim of a more sustainable and profitable society, "Aardwarmte Den Haag" (ADH – Geothermal Heat The Hague) is aimed to use heat from geothermal layers for district heating in the city of The Hague. – see page 12 of Werker et al., 2017. The complexity within the technological innovation system (TIS) is the result of intertwined relationships between a wide variety of agents and stakeholders from the public and private sectors. The initiator – and therefore the leading agent – is the municipality of The Hague, whereas the principal investor is the Dutch Ministry of Economic Affairs (agent). The Dutch research institute TNO and electricity and gas distributor ENECO are agents as well and responsible for the feasibility, infrastructure, safety, and distribution of the TIS. The only stakeholder is the 4000 – 6000 households within The Hague.

Interaction and collaboration are essential parts of ADH. Therefore it is possible to analyze the TIS of ADH with the framework of Bergek et al., 2015 to place it in a broader context structure. The framework consists of interaction between focal TIS and four context structures (Bergek et al., 2015). Two of these context structures are applicable for ADH and are described underneath in more detail.

Relevant sectors context:

The case Aardwarmte Den Haag fits the property of creating interdependent dynamics between focal TIS and various context structures - structural coupling. This is embodied in the interaction between the focal TIS and relevant sectors, as mentioned by Bergek et al., 2015. The municipality of The Hague aims with ADH for a more sustainable and profitable manner of heating the households, i.e., its products primarily contribute to serving the overall function of the sector. In addition, such a system can be connected to sector-level structures in multiple ways. For example, research by TNO and installation of the infrastructure by ENECO were required. During the whole process, there was limited interaction and collaboration between the agents and the households (stakeholders). According to Bergek et al., 2015: "previous literature has primarily emphasized incumbents' (active) resistance to change." As a result, it can be concluded that the interaction between stakeholders and agents was insufficient.

Political context:

In the case of Aardwarmte Den Haag, the municipality dominance involves how TIS actors can build political networks or coalitions to achieve policy changes in favor of the technology in focus. This factor fits with the context structure of the interaction between the focal TIS and the political context. "Availability of public financial resources for research and development and the formation of markets" (Bergek et al., 2015) give

expression to the interaction between governmental institutes, The Hague municipality, and the Ministry of Economic Affairs were essential for the TIS. Therefore the political context of the framework is also applicable.

LochemEnergy

A technological innovation system is defined as a set of elements, including technologies, actors, networks, and institutions, which actively contribute to the development of a particular technology field (Bergek et al., 2015). The LochemEnergy TIS is based around the development of locally placed, renewable energy production. LochemEnergy is a collaboration between; the municipality Lochem, the Housing Corporation, Energy companies Alliander and Eneco, the province Gelderland and the Universities of Twente and Nijmegen.

Geographical context and sectoral context have a strong presence in the Lochem TIF.

Sectoral context;

Sectors are defined in terms of the production, distribution, and use of technologies and products needed to serve a certain function for prospective users, e.g., supply of medicines (Malerba, 2002), energy, or food (cf. Geels, 2004) (Bergek et al., 2015). LochemEnergy is a TIS that is clearly focused on one main sector, the Energy sector. LochemEnergy mainly contributes to serving the energy sector's overall function. Bergek et al., 2015 give the following example about a TIS focusing on one main sector; "For example, the wind turbine TIS develops products that are used to generate electricity and can, thus, be considered to be part of the energy sector." As for LochemEnergy, it develops local renewable energy production which contributes to the energy sector by producing renewable energy as well as being an example for other local projects within the energy sector.

Geographical context;

Geographical context may be seen as links and relationships outside the system influencing the TIS. So, for example, a firm that proactively develops new technology and educates the regional labor force (Bergek et al. 2015 page 58). In the case of LochemEnergie, the national energy company Eneco interacts with the local energy company Alliander. The boundaries of the TIS are regional, but there is interest from Eneco. To help Alliander and the project, Eneco serves as a backup system to the local energy system for periods in which the local energy production does not suffice. Eneco Green Energy Service is the part of Eneco that is interested in the results of this project, so they serve as a backup system to diminish time.