Electric mobility analysis: contributions from sociology

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Abstract: This paper discusses ways that the question of social acceptability of eco-innovation can usefully be addressed with sociological methodologies and theoretical frameworks contributions, both in the study and the management of innovation processes. It will first discuss the types of contributions that sociology can provide into innovation management, through a specific conception of users. The particularity of sociological contribution reposes on the vision of the users. It will secondly show how the sociological approach allows to observe and build up a picture of the interactions between the different types of economic actors involved in the innovation process. Our examples are drawn from a program implementing intelligent charging infrastructures for electric vehicles. We show how economic sociology of uses and consumption permits to define user positionality in the innovation network. The understanding of the interactional processes inside our socio-technical space permits us to identify institutional impediments that slow down social acceptability of an eco-innovation such as the electric vehicle.

Keywords: eco-innovation; sociology; electric mobility; users; consumption; trust; attachment.


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1 Introduction

Benefiting from strong support from political spheres and state agencies, sustainable development and eco-innovations have become central objects for public policies and then for social sciences researchers’ studies. Moreover, the sustainable development sector and its economic actors want to use researchers’ works to guide their innovation strategies. It helps them to integrate users, in a perspective close to open-innovation (Akrich, 1998; Chesbrough et al., 2006). This paper examines ways that the question of social acceptability of eco-innovation can usefully be addressed with sociological methodologies and theoretical frameworks contributions, in both the study and the management of innovation processes.

2 Context and objectives

This paper will present and articulate two main questions, which it will answer through the case study of an innovative consortium creating technological supports to eco-mobility.

First of all, we will consider what kind of contributions sociology can generate into innovation management, through a specific conception of users. What can be its contributions in the implementation of an experimental innovative infrastructure for electro-mobility?

Secondly, we will show how the sociological approach allows to observe and build up a picture of the interactions between the different types of economic actors involved in the innovative process. How can sociological theories and concepts and participative observation contribute to the study of eco-innovation management?

Our paper draws on results from a project called Eco2Charge (E2C), which aims at implementing and testing an innovative communicative charging stations system. It involves a consortium of many actors. So this consortium acts in an innovation management policy, supporting electric vehicle (EV) diffusion by the creation of some infrastructures for charging EVs. The program has to develop a global and intelligent technical solution, which means a connected solution. This solution is to be implemented in tertiary buildings hosting EV users, and must be able both to favour EV charging at workplaces and to smooth buildings consumption. The main objective of this project is to avoid overconsumption and costs increases due to electrical grid connection made by charging stations. The technical solution developed aims to integrate circular economy principles, by regarding these EV charging problems as a system or even as an ecosystem.
That means it is necessary to develop local energy production, energy efficiency, storage and components reprocessing (Caumon, 2011). The sociological researchers are in charge of integrating users’ needs. To do so, they collect and analyse discourses about users’ practices, needs and visions about EV charging and more specifically about the implementation of E2C. Our role, as researchers, is to engage users as far as possible into the innovation process. Thanks to this truly specific aspect, sociology allows to answer new questions, which innovation management raises.

3 Conceptual and theoretical frameworks

Our main conceptual frameworks come from several disciplines and theoretical approaches.

Firstly, we use actor-network theory (ANT) (Callon, 1999; Latour, 1999) to explain the links between innovative process actors. Thanks to its horizontal conception of these links, we can integrate users as actors of the innovation process (Callon, 1986). Secondly, we will use social geography and the concept of scale (Brenner, 1999; Marston, 2000) to underline actors’ territoriality in specific spaces, which defines their position in the network. This is close to the notion of ‘innovative cluster’ which underpins our subject (Cooke, 2001). We will articulate both these theoretical frameworks in order to formalise the notion of socio-technical space. They are social spaces (Di Méo and Buléon, 2005) where actors and technical systems interact (Latour, 1994) positioning them in a special relation to innovation and its infrastructures. This notion of position is related to the concept of positionality (Sheppard, 2002), which is the second major concept we will use. It allows to define a link between an actor’s position inside a specific space and his action’s influence in the network, through the relational proximity between actors. This paper will present two of these socio-technical spaces, based on the relation they induce to innovation. First is space of innovation’s supportive infrastructures conception (the space of diffusion). The second socio-technical space is the space of innovation use.

Lastly, the notion of social acceptability (Labeye et al., 2011), that is to say an innovation’s capability to be overwhelmingly adopted by users, will structure the second part of our theoretical discussion. Indeed, we chose, for our demonstration, to use the conceptual tools of economic sociology, and especially those originating from its latest market analysis (Steiner, 2005). The New Economic Sociology (NES) is founded on the ambition to criticise and complete standard economic analysis to rethink the relations between markets and society (Polanyi et al., 1983). It singles itself out through its will to exceed the classical determinants of economic action by describing them as embedded into social, cultural or institutional relations (Granovetter, 1990). By considering users as involved actors of innovation, which is now understood as a relational process (Akrich, 1998), economic sociology permits us to consider the interactional process of an innovative product attachment, which defines consumption (Callon and Muniesa, 2003). Such an approach enlightens user’s alternative characteristics and motives in its consumer dimension, which completes its economic portrait (Kessous et al., 2005; Sayer, 2002).

We used several methods that we organised through two main frameworks. First is an operational one: in E2C project, we have to harvest users’ discourses about their practices, uses and needs concerning EV charging. To achieve it, we used a mix of qualitative methods, such as semi-structured interviews, observations and photographs,
combined with quantitative methods, such as surveys spread to a national sample of users. These data and their analysis make us the users’ ‘spokesmen’ (Akrich et al., 1988) inside the E2C actor-network.

Secondly, from an institutional point of view: as an actor representing one of the founding entities of E2C actor-network, we can directly observe interactions between economic actors involved in this innovative cluster (Suire and Vicente, 2008). So we used an ethnographical method, through participating observations of actors’ relationships, negotiations about the project but also translations that had to be done. Such translations were necessary to co-construct operations modalities and a common vocabulary for organisations with initially very different epistemic references (Audoux and Gillet, 2011). This approach is thus founded on a daily observation of the project, and through a detailed description of such a research experience.

4 The figure of the user: contributions from sociological theories about consumption

First of all, we will focus here on what we called the socio-technical space of use. It is the social space where all interactions between users, professionals and technical systems are at play, from innovation attachment to innovation use.

4.1 Sociological factors of economic action and the NES

NES thus considers the user as an actor in the innovation process. Sociology of consumption allows to understand the time of an innovative product adoption. That is to say the time when users become actors of the attachment process, through the market-related interaction, in which they acts as consumers (DiMaggio and Louch, 1998; Jeppesen, 2005). Such economic sociology, which favours an entry through consumption, supplies us with several significant contributions, amongst which we will focus on three factors influencing social acceptability: trust, dispositions and interactions.

4.2 Trust

Socio-economic market analysis shows that one cannot only take account of individual interest when describing markets calculating systems (Callon and Muniesa, 2003). Many other elements than strict utilitarianism influence the calculations of economic actors, and particularly consumers. For instance, the notion of quality founds a ‘judgment-based market’, which is structured around trust in its equipment (Karpik, 1989). Logos, brands or guarantees, for example, are socio-technical devices, which aim at favouring consumer trust in the product or service quality (Cochoy, 2008). In other words, such devices represent equipment for consumers to guide their choices.

This notion clearly appears in our data, within both interviews and surveys. For instance, users’ focus on autonomy and reliability of charging stations evidently states the role of trust in EV adoption:

“We are demanding even more reliability. Because, it is true that, every time I arrive at the station, I have the doubt: would the plugs work?” User Interview, April 2014.
Trust is E2C consortium’s foremost concern for its innovation policy in terms of infrastructures. It is the main work area to favour EV diffusion. Indeed, communicative infrastructures’ goal being, at the end of the day, to establish trust in the eco-mobility potential.

4.3 Dispositions

Sociological theories are linked with consumption use concepts like habitus and dispositions stated by Bourdieu (1980, 1979) to describe a product’s attachment process. Dispositions can be a set of resources that the user employs to make the choice to adopt or not an innovative product (Cochoy, 2004). Dispositions guide actors’ choices (Cochoy, 1999), whether it is by capitalising on previous successful actions (Dubuisson-Quellier, 2006), or by referring to ideological or moral principles (Chessel and Cochoy, 2004; Soron, 2010), or even to representations and beliefs (Ferrières, 2006). Our data from interviews confirm these elements. Lead users, indeed, have shown strong dispositions towards new technologies, which they declare to follow and adopt enthusiastically:

“EV was being launched at the time and I was wondering when it would really be a 100% electric. Then, I tried it once and I was blown away: I was convinced. Also because it was so new. I hesitated for quite a time, but I felt I was going to regret not to take part in such a new product. I knew I was going to beta-test, but I wanted to do it anyway.” User Interview, February 2014.

They also often describe themselves as caring or even campaigning for environmental matters, which they wish to integrate into their consumption acts (Dunn, 2008). In other words, the sustainability of an eco-innovation, such as EVs or E2C charging stations which are their diffusion infrastructures, is integrated into an identity claim, which founds its social acceptability (Pierre et al., 2011). However, such claims are not fundamentally associated with ideological perspectives but rather with biographic elements:

“Maybe I was… I never liked diesels, never had any. I always made the maximum to have the cleanest cars as possible, so maybe I have an ecological fibre, maybe. (…) I have two thermal vehicle I drive on ethanol, so maybe… I am no ecologist nut, but I try to use as much as I can the means which help reduce pollution for our children later.” User Interview, April 2014.

“Before, I worked on eco-driving and I learned a little how, and how much cars were polluting. It kind of disgusted me, I was pissed off with car industry, and for that matter, and EV was actually a vehicle which could reconcile me with cars.” User Interview, January 2014.

4.4 Interactions

NES analyses mercantile relationship, which it defines as an interactional process (Weber, 2000), meaning that it is embedded into a social relation where individuals interact together and with technical and socio-technical devices. These interactions occur when a product is attached to a consumer (Goulet and Le Velly, 2013). Without falling into the critique of consumer manipulation by ‘market professionals’ (Barrey, 2000), they can be based on strong interpersonal relationships (Chantelat, 2002), on emotions, which
go beyond the economic standard conception of rationality (Elster, 1996), or on ergonomic aspects of innovation (Bélis-Bergouignan et al., 2012). In our case, we saw how lead users made attachment: they often point to the impact of informal exchanges as well as the try-outs they made through a relative. Such an interactional process appears very distinctive when users explain how they come to adopt EV as well as when they explain how they try to convince their relatives to do so.

“I am so convinced that I promote it myself: when I get in a supermarket’s parking and then someone comes and asks me questions: want to try it? And I take them for a ride. The same when I have friends at home. They all are much surprized. When you taste it…” User Interview, May 2014.

Moreover, when they describe the decisive factors which convinced them, they often mention driving sensations, EV comfort and driving pleasure. Doing so, they describe the quality of interaction with EV with a wording of sensations and emotions.

“The feeling… I am a quite nervous person, an action-type of guy, always running. And when I get in my EV, it’s relaxing. No vibrations, nothing, at peace. It’s weird how it relaxes me.” User interview, April 2014.

It seemed quite clear for the E2C consortium, that EVs’ social acceptability demanded infrastructures such as the clusters of communicating charging stations which are implemented. At the time of such diffusion, infrastructure design, economic sociology, with its conceptual tools and methods, helps to analyse more precisely some elements leading to an innovation adoption, to which the standard economic model sometimes remains blind. By this way, sociological approach shows how its contribution to innovation management is essential for an innovation to succeed (Terrade et al., 2010).

5 Interactions within actor-network: ethnographic description of an innovative cluster

Having demonstrated the sociological contributions to the direction of innovation management, we now focus on the study of innovation management itself. We analyse interactions in what we called the socio-technical space of EV diffusion infrastructures conception. In our concern, such a space is institutionalised through the E2C consortium. Indeed, it gathers all project actors in charge of designing infrastructures for EV, taking its technical dimension as well in the technical work of design, as in its network formal organisation, which implies the intervention of several technical devices, such as steering committees, shared calendars, etc.

5.1 Users’ spokesmen inside a socio-technical space of EV diffusion

Beforehand, we were acting as external observers of the socio-technical space of use. Here, we are actors in the space of diffusion infrastructures, since we belong to one of E2C actor-network’s entities. And we are users’ spokesmen (Akrich et al., 1988) because users cannot have direct access to E2C consortium and its steering committee meetings. So we act in a double dimension inside the network: an operational dimension, which makes us observers of the socio-technical space of use; and an institutional dimension making us users’ spokesmen inside the space of diffusion. Being spokesmen, we try to reinforce the positionality of the socio-technical space of use within the innovative
actor-network. In other words, we try to maximise users’ feedback influence on E2C consortium actors. So we could observe conflicts, struggles for legitimacy and translations which exist in that kind of collaboration. As a matter of fact, we conducted participative observations of the economic actors’ interactions in the socio-technical space of diffusion: collecting elements from our interactions with each and every other partner, documenting actors’ strategies to keep operational margins or, in our case, to conform to scientific ethics. From the precise description of these interactions and the co-constructions they led to, we will present our analysis of an innovative cluster’s operations.

5.2 The consortium creation

In 2011, the ADEME has launched a call for expressions of interest supporting eco-mobility’s diffusion. Several major industrial actors of the energy and transportation sectors decided to answer collectively. Both geographic and capitalistic proximity between some of these companies, which we consider as an ‘actor-network’ of eco-innovation, are critical factors in its genesis: the economic and industrial project is embedded within a pre-existent network of institutional relations. Moreover, interpersonal relationships were to play a defining role in the consortium birth. Indeed, it is through a first relational contact between a research designer from UVSQ and a senior manager from RSA on a ‘train station platform’, as it was reported to us through an interview that the founding exchanges will start. One clearly appreciates here the embedment described by the NES authors (Grossetti and Bès, 2001). The first nodal point of this actor-network, around which future entities will be recruited, is probably the Econoving industrial chair department of UVSQ, since it was already associating several of the future partners. The main objective of this structure was to work in very close relationship with several local industrial and economic actors in order to favour fundamental research and its application through eco-innovative industrial policies. The origins of Eco2Charge are therefore embedded into a fabric of social, geographic and institutional relations. This triple proximity has greatly eased both ADEME’s and local actors’ enlistment. Through the whole of 2011, discussions led to design the project in a collaborative manner. In December of 2011, the project and its structuration and roles repartition were finally presented. From that moment, research really became a partnership, especially when the negotiations for researchers’ intervention modalities began to be discussed. Several points indeed were demanding a propositions/counter-propositions exchange between UVSQ and its partners.

5.3 Translation process

Researchers involved progressively make the work subject their own and proposed the first methodological elements during the first semester of 2012. First of all, it immediately struck us how different were the ‘epistemic references’ (Audoux and Gillet, 2011) between researchers and their partners: it led to misunderstandings, problems of vocabulary and different visions of a same project. During summer 2012, several versions of a document with detailed operational proposals from UVSQ were circulated. Researchers needed to clarify some scientific work specificities, and sometimes a climate of legitimacy struggle appeared. This process is interactional, since there must be mutual efforts to put into service a clear vocabulary and so on. Many e-mails illustrate this
translation (Callon, 1999), which is necessary because of divergent organisational cultures (Bertrand, 1991). For instance, some vocabulary elements, which are strongly valued both in corporate and academic contexts, such as ‘expected results’, ‘indicators’ or ‘problematic’, indeed can take different meanings depending on the counterpart. So there was a literal need for translation (Godelier, 2011) to create a common vocabulary. The following extracts show this process:

“Please find attached the revised note […]. Following our previous conversation and to answer to what you wanted, we eliminated some theoretical elements and precised expected results.” E-mail from a researcher, 11th of July 2012

“As I said in my phone message, I still have some comments on the document I sometimes find difficult to understand… I let you see the attached note. I also attach a synthesis document which will help you to understand better what we expect and maybe it will make it easier to understand each other: we may be saying the same things with different words!!” E-mail from an industrial partner, 11th of July 2012

Most of the end of 2012 was dedicated to this task, building a common comprehension through a continual cooperation. The aim was to get to a compromise, in terms of both the fields of study and the concern of the conduct modalities of such a study (Mesny and Mailhot, 2007). For instance, if we had to give up on some of our most advanced theoretical elements, we obtained in return to abandon ‘the development of an algorithmic predictive model’, which we considered to be in opposition with our sociological practices and principles. During this time, ADEME was examining the project, which was deposed in May 2012. This negotiation game went on until the end of 2012. It generated debates and tensions, but allowed a real ‘co-construction of the command’ (Draetta and Labarthe, 2011), involving researchers and industrial partners in the design of the research protocol. At the end of 2012, E2C project was officially validated by the ADEME, and partly funded. On the 8th of January 2013, the detailed project was publicly presented, and especially the responsibilities of each partner. The global budget was approximately 13 million Euros, 4.5 of which were advances from the ADEME, the rest being funded by the industrial partners.

5.4 To speak on behalf of the users

The methodology retained is strongly based on relational conception of innovation. Inspired by open-innovation, or ascending innovation works, this vision is largely represented in the sustainable development field (Claval, 2006; Von Hippel, 1976). Our methodology is largely comprehensive and positions us as users’ spokesmen inside the E2C actor-network, just as the situation described by Draetta and Labarthe (2011, p.12), which the sole exception that such a position was at the foundation of the protocol which we defended. We immediately wanted to give prominence to EV users’ discourses. In this goal, if the use of surveys appeared obvious to our partners, we decided to add semi-structured interviews and field observations. Finally and quite surprisingly, the most difficult was the survey’s implementation. Indeed, most of corporate partners have got teams in charge of surveying their customers. It was initially decided to include our questions into such satisfaction surveys. This situation was a strong opposition point between researchers and industrial partners because researchers did not want to lose the upper hand on some essential scientific research aspects, such as sampling or modalities
of surveys’ diffusion, even though these aspects did not seem so central to our industrial partners. Thus, when we transmitted some questions to be integrated in satisfaction surveys, they were sometimes reformulated without verifications by the research team. It was leading, in our eyes, to quite obvious bias, which was out of our control:

“Here is the modified version. I have added some questions as we spoke yesterday, I have taken out or modified some others, and I have modified the order of questions so as to equilibrate questionnaire parts.” E-mail from a researcher, 26th of March 2013.

“The proposed questions were taken into account, but they were modified by the working group to be integrated into the questionnaire”. E-mail from an industrial partner, 10th of April 2013.

Here lies one of the main difficulties of the co-construction process. It is mainly due to the fragmentation, characterising projects which involve many partners. The integration of electric mobility final actors’ ‘voices’ differs according to each partner. So it influences the developing eco-innovation management. Depending on the perspective, questions allow EV users to be actors in the innovation process or simple marketing receptacles.

Furthermore, during the same period, it was redaction time for the consortium agreement, which specifies rights and obligations for each partner and also set the rules of intellectual property. It generated some tensions between legal services of each entity, particularly for data sharing, as we can see below:

“Indeed, agreements generally state that each partner can use all the results of the project, even if they didn’t contribute to all results, for their research needs solely. Some partners are timid about the idea to grant such a right. You will of course have an access to all results you will produce, alone or together with other partners.” E-mail from UVSQ legal service, 11th of May 2013.

Facing these tensions about data use, particularly knowing that we could only use what we would co-produce, questions about surveys’ creation and diffusion became even more of the essence. It was a key point to be sure we could publish the analysis, which we would produce. Moreover, EV users’ integration into the co-construction process could be on the line.

### 5.5 Cross-fertilisation

Despite these difficulties, translation work also made some cross-fertilisation situations. For researchers, it permitted an access to fields for study, which otherwise would have been not accessible. Besides, working with unusual partners was a rewarding experience, in the sense that it stimulated a different work practice than the one which academics are often used to. A stronger collective pressure, as well as an intense production of reports and other progress issues, helped for getting a hold on our data. Our observations here match with what Audoux and Gillet (2011) call epistemic references points’ gaps. Such gaps generate clashes, generally due to communication aspects, but they also are a way of cross-fertilisation, which is close to what management sciences describe when studying cultural management within corporate organisations. Such concepts as organisational culture (Bertrand, 1991) and its management, help to understand how rewarding is this familiarisation with alternative ways of working, in order to achieve cooperation and co-construction of research protocol (Barmeyer and Mayrhofer, 2009). Such a familiarity
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with an exotic organisational culture for academics, once we had exceeded our differences, more often than not provided us with very useful insights from customer relations professionals.

6 Conclusions

The contributions from economic sociology and its methods and concepts, are double. First, at an operational level of management innovation, it allows to get data to illustrate elements of social acceptability inside the socio-technical space of use. Many technical tools and devices are indeed deployed to allow EV attachment, such as E2C infrastructures for instance. Studying more precisely the interactional context inside the socio-technical space of use, we see that economic sociology of uses and consumption permits to define user positionality in the innovation network. In this matter, the specific program of social practices theory (Shove, 2010; Mylan, 2014), which directly stems from both NSE and ANT, seems of the greatest interest for future research on innovation.

Secondly, at an institutional level, we observe interactions inside the socio-technical space of diffusion, in our case represented by the E2C consortium, which permits the study of innovation management modalities within a cluster whose entities have different organisational cultures. There, the understanding of the interactional processes at stake inside such a socio-technical space permits to identify institutional impediments which slow down social acceptability of an eco-innovation such as the EV.

We are still working to identify more precisely how socio-technical space can work in relation to innovation process, as shown by socio-economic works about sustainable development and eco-innovations. Thanks to the critical study of innovations’ conception and diffusion process, this research program could lead to adapt the whole conduct of innovation management.

References


