Strategic Navigating through Institutions: An Incumbent’s Journey of Sustainable Innovation

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Abstract
This paper aims to advance our understandings of how incumbents strategically navigate through institutions in the processes of sustainable innovation. To this end, we conduct an in-depth qualitative case study on a Swedish incumbent that re-oriented themselves from traditional manufacturing and on their sustainable innovation journey of developing electric vehicle chargers spanning over a decade. Using a processual analysis approach to capture nuance insights and temporal dynamics, we find that the incumbent navigated through complex institutions originated from different layers in the socio-technical system. Their navigating encompassed strategic actions of conducting various forms of institutional work to change institutions and enacting both active and passive responses to institutional opportunities and challenges. These actions were contingent upon the incumbent’s perceptions of their own power position and latitude of maneuvering in the socio-technical regime and on their stake in the particular institutions encountered. Despite of the purpose being creating favorable institutional conditions and grappling with unfavorable ones for their innovation endeavors, the incumbent’s strategic actions could trigger changes beyond their own development trajectory. Although we focus on sustainable innovation, we believe our theoretical insights could also apply to other contexts pertaining to innovation in nascent socio-technical systems. Additionally, we contribute to recent debate in sustainability transition studies on the role of incumbents, by challenging the traditional assumption on the inert nature of incumbents and by showing under what specific conditions incumbents re-orient themselves and pursue sustainable innovation.
1. Introduction

Scholars as well as industry practitioners and government officials consider innovation an important driver for sustainable development (Silvestre & Ticca, 2019). It is widely acknowledged that firms’ innovative behaviors and innovation processes are influenced not only by firm-internal factors such as resources and capabilities, but also by the institutional framework in which the firm is embedded (Hollingsworth, 2000; Kline & Rosenberg, 1986; Van de Ven, Polley, Garud, & Venkataraman, 1999). Some institutions enable and facilitate efforts to change, while other hinder the same innovation endeavors (Berkhout, 2014; Geels, 2004). In the process of pursuing innovation, firms therefore need to navigate through institutions relevant to their innovation projects (Garud, Jain, & Kumaraswamy, 2002; Moodysson & Sack, 2016). Transition studies typically portray incumbent firms as inert and locked-in, protecting status quo and sometimes even blocking innovation, whereas new entrants are seen as more inclined to act as change agents, bringing about innovation and sustainability transition (Smink, Hekkert, & Negro, 2015; van Mossel, van Rijnsoever, & Hekkert, 2017; Zietsma, Ruebottom, & Slade Shantz, 2018). While this view makes intuitive sense based on assumptions of vested interests and sunk investments, it is increasingly questioned by observations. Transition scholars recognize the heterogeneity of incumbents and argue that incumbents also re-orient themselves in face of the changing environment, and thus pursue sustainable innovation (Köhler et al., 2019). Based on the above propositions, this paper aims to advance our insights into how incumbents navigate through institutions in the process of sustainable innovation by addressing the following research questions: 1) how do incumbents encounter and respond to institutional enablers and barriers to sustainable innovation in an economy characterized by change? 2) why do they act in particular ways?

The study draws on a case of a Swedish incumbent that re-oriented themselves from traditional manufacturing towards becoming a leading actor in the emerging electric vehicle (EV) sector in the late 2000’s. Particular attention is devoted to the firm’s innovation journey developing a set of products related to EV chargers. Our dataset is comprised of longitudinal observations collected from first hand as well as secondary sources. To understand how the incumbent’s innovation process unfolded and how they navigated through institutional enablers and barriers along the way, we use a processual approach to analyze data. Our findings reveal that incumbents are prone to re-orient themselves and pursue sustainable innovation under the condition in which institutional change in the landscape and regime layers coincide with the incumbents’ aspiration to embark on a sustainable development trajectory. Their re-orientation can be catalyzed by them finding and utilizing a linkage with knowledge and competence they have already accumulated. As incumbents go through different episodes constituting the innovation process, they encounter enablers and barriers characterized by different institutional elements (i.e. regulative, normative and cognitive), originating from different layers in the socio-technical system (Geels, 2002). They navigate through such institutional enablers and barriers by enacting both active and passive responses, as well as by engaging in various forms of institutional work. Their actions are largely based on their own perceptions of power position and latitude of maneuvering, and on their stakes in maintaining or challenging a specific institution.
The remainder of this paper is structured as follows: first, we outline the theoretical background to our approach and the basic definitions of our core concepts. Then we describe the research design and methods, before presenting our findings and theoretically informed discussion, which constitutes the analysis of the case. We end with summary and conclusions, highlighting our theoretical insights and contributions.

2. Definitions and theory

Sustainable innovation

Sustainable innovation is defined here as “innovation for sustainable development, i.e. innovation with the potential to contribute towards more sustainable systems of production and consumption” (Smith, Kern, Raven, & Verhees, 2014, p. 116). It is sometimes argued that firms are generally less incentivized to engage in sustainable innovation because they have difficulties in charging a product price that reflects the long-term benefits from sustainability. Thus, while sustainable innovation may have many positive externalities that members in the society can benefit from (e.g. clean air, safe water, energy savings), firms may be unable to charge all those individuals for their gains (Sierzchula, Bakker, Maat, & Van Wee, 2014). Especially when sustainable products are more expensive than non-sustainable alternatives, this becomes a challenge. Low market acceptance also creates barriers for firms to scale up their sustainable innovation, which makes it difficult to achieve economies of scale and consequently to lower the price of the sustainable product. In sustainability transition studies, these economic factors are often conceptualized as “selection pressure” from the dominant socio-technical regime, which works against the emergence of sustainable innovation (Kemp, Schot, & Hoogma, 1998; Smith & Raven, 2012). Selection pressures constitute a type of market failure (Arrow, 1962), that governments need to address. Examples of government interventions are various types of regulations (Sierzchula et al., 2014).

It is however also argued that firms have become more active in sustainable innovation as they are increasingly aware of the environmental and social impact of their products and services, and consumers have become increasingly concerned about sustainable consumption (Berkhout, 2014). As firms gradually develop such awareness, strategies and competence towards sustainability, they may be able to combine their sustainable innovative efforts with new business opportunities. When this awareness is matched with consumer preferences on the demand side, it is likely to induce more innovations contributing to sustainability transition.

Disruptive innovations are typically not very competitive initially (Kemp et al., 1998). They may however eventually outcompete old alternatives and gain market acceptance if shielded, nurtured and empowered over time (Smith & Raven, 2012). Studies have revealed that disruptive sustainable innovations are forged by new entrants, while incumbents are locked-in and tend to dampen the innovations so as to defend their power position and interests in the extant regime (e.g. Smink et al., 2015; Zietsma et al., 2018). Recently, transition scholars started to question this view by pointing out that incumbents are heterogeneous and some may also re-orient themselves and (fore)see business opportunities in engaging in sustainable innovation (Köhler et al., 2019; van Mossel et al., 2017). The so called multi-level perspective (MLP) posits that actors, including incumbents, are embedded in a socio-technical system in which institutions exert influences from three different layers (Geels, 2002). The ‘niche’ layer represents ‘protective spaces’ in which sustainable innovations are shielded from adverse
selection pressures; the ‘regime’ layer is referred to as institutional structuring of the current system resulting in path dependence and incremental change, and is usually the locus of adverse selection pressure against sustainable innovation; the ‘landscape’ layer represents the broader societal development which is exogenous to the regime and niche, and where institutions are more overarching and most stable (Fuenfschilling & Truffer, 2014; Geels, 2004).

In this paper, we focus on incumbents and on the selection pressures that are institutional in nature and relevant for incumbents in their processes of pursuing sustainable innovation.

**Institutions**

Institutional theory posits that organizations are embedded in an institutional environment where legitimacy is crucial to survival (DiMaggio & Powell, 1983; Suchman, 1995). Institutions, broadly understood as “the rules of the game” (North, 1990), are elusive in terms of definition. Different disciplines stress different elements of the concept. In this paper, we adopt Scott’s (2014, p. 56; also see Scott, 1995) definition of institutions, which states that “institutions comprise regulative, normative, and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life”.

The *regulative* elements of institutions refer to explicit and formal rules that influence behaviours via coercive mechanisms (e.g. rewards and sanctions). Some typical examples of regulative institutions include laws, regulations, government policy and funding programs. The *normative* elements of institutions refer to norms, values, role expectations, responsibilities, generalized procedures and the like that are morally governed and sustained by everyday practice. *Normative* institutions influence behaviours through indicating what is appropriate and socially acceptable. The *cognitive* element of institutions refers to rules that constitute our understandings of the nature of reality and provides frames and templates through which we assign meanings and make sense of things. Cognitive institutions are the most deep-grained elements and often characterized by taken-for-grantedness. As such, deviating ideas and behaviours are generally unthinkable. Typical examples of cognitive institutions could be heuristics, knowledge templates, belief systems, and shared identities. Cognitive institutions are sustained and reproduced by culture and mimetic behaviour. These three elements constitute three pillars of institutions. While analytically distinct, they operate together in affecting actors’ perceptions and behaviours (Scott, 1995). Thus, institutions that influence actors’ behaviour are complex and not always easy to entangle. Although institutions tend to be described as factors constraining behaviour, they may also contain affordances that enable strategic actions (Scott, 2014; van Dijk, Berends, Jelinek, Romme, & Weggeman, 2011).

Drawing on institutional theory in explicating MLP, Geels and Schot (2007) accentuate that socio-technical systems with a special focus on technology can be understood as synonymous to organization fields (as conceptualized by DiMaggio & Powell, 1983) in terms of the scope of the structural environment (Fuenfschilling & Truffer, 2014). Leveraging on this idea, Fuenfschilling and Truffer (2014, p. 776) argue that a socio-technical regime can be “interpreted as denoting the most highly institutionalized core of a socio-technical system or organizational field”. They contend that the strength (in terms of degree of institutionalization of the different elements) of the regime may vary. In a mature organizational field (where the strength of regime is strong), actors generally share a common
meaning system, and frequently interact with each other, contributing to the same institutional arena (Scott, 1995). Whereas in an emerging field (the strength of the regime is weak), actors involve in negotiations and struggles over various meanings and practices as the different institutional elements are still in formation (Garud, 2008). Hence, the maturity and stability of the socio-technical system (and the regime within it) are signified by the degree of institutionalization and alignments of the various structural elements within the system. In other words, if a regime is in transition or emergence, we can expect institutional contradictions or institutional voids to arise. As individual and organizational actors are embedded in their socio-technical system, their interaction and institutional activities contribute to the (dis)alignment or realignment of the different institutional and material elements within the system and result in the structuration and change of the system as a whole. In other words, they act and interact upon their own interests, and in the meantime, wittingly or not, (de)constructing or reconstructing the ‘institutional infrastructure’ (i.e. a set of prevailing institutions) in the socio-technical system (Hinings, Logue, & Zietsma, 2017; Oliver, 1992; Schot & Geels, 2008). This directs us to actors’ agency towards institutions within the context of sustainable innovation.

**Strategic navigating through institutions**

While neo-institutional theory traditionally emphasizes isomorphic pressure leading to conformance and homogeneity of actor’s behaviours, a more agentic view posits that institutions can influence but not determine actors’ perceptions and behaviours (DiMaggio & Powell, 1991), as actors who are reflexive and capable may exercise agency and strategically respond to institutions (Battilana & D'Aunno, 2009; Oliver, 1991). On the other hand, this does not mean that actors’ agency is without constraints, because actors’ freedom and latitude to act are bounded by their institutional environment (Lawrence, 1999). In other words, actors enjoy partial autonomy to act in line with their interests and purposes (Battilana & D'Aunno, 2009; Farla, Markard, Raven, & Coenen, 2012; Gertler, 2010). Actions by actors to deliberately affect their institutional environment is conceptualized as ‘institutional work’ (Lawrence & Suddaby, 2006). Hinings et al. (2017, p. 183) argue that institutional infrastructure is an integral part of institutional work, as “when creating, maintaining and transforming a field, the kinds of institutional work being done are critically about institutional infrastructure, the institutions of governance, power, legitimacy and control.” In an emerging field, there is usually a lack of reinforcing institutional infrastructure, which on the one hand provides considerable opportunities for experiment and change, and on the other hand sets limits to field members’ ability to define and acquire legitimacy, resulting in ambiguity (Hinings et al., 2017). When incumbents orient themselves and pursue sustainable innovations in a niche or an emerging nascent regime, it is important for them to engage in institutional work targeting the relevant institutions and institutional infrastructure in the socio-technical system.

Furthermore, actors may enact responses due to institutional stimuli without necessarily working on institutions and institutional infrastructure. In other words, the stimuli of actions may be institutional in nature while the target of the actions may not (Smets, Aristidou, & Whittington, 2017). For example, firms may explore or enter a new sustainable product area to capture opportunities brought by institutional change (e.g., regulatory change), without devoting efforts to the institutions (e.g., the regulations) per se. In response to institutional stimuli, actors may act in an active or passive way (Oliver, 1991). Regardless of whether actors’ actions are institutional work or sheer response to institutional stimuli, these actions
embodies actors’ agency in attempting to achieve their purposes and interests (Smets et al., 2017).

While institutions are generally stable, they do change over time (Leblebici, Salancik, Copay, & King, 1991; Mahoney & Thelen, 2010; Van de Ven & Hargrave, 2004), and there are times when institutional void presents both constraint and affordance to actor’s agency (Hensmans, 2003; Oliver, 1992). As such, we should not ignore the complexity and temporal dynamics of institutions and actors’ agency (Garud, Gehman, & Kumaraswamy, 2011). Within the context of sustainable innovation process, incumbents need to apply and adjust various kinds of institutional strategies (Lawrence, 1999) and enact responses to create favourable institutional conditions and grapple with unfavourable ones for the sake of their innovation endeavours. We define this phenomenon as ‘strategic navigating through institutions’.

Since institutional change and transformation generally take a long time, we may not be able to observe the institutional outcome of actors’ institutional work within the time span of an innovation process which is comparatively shorter. Nevertheless, this is not a problem when the research concern is how innovative actors navigate their institutional environment as they pursue sustainable innovations. In other words, the focus of analysis in this paper is primarily on the incumbents’ strategic actions in navigating their institutional environment during the processes of sustainable innovation.

3. Research design and methods

The paper is based on a longitudinal study of an empirical case spanning the years of 2007-2018. This case is selected because it meets all of our case selection criteria: a) an incumbent firm engaging in innovation that entails re-orientation and some extent of deviation from its own development trajectory, b) such innovation is a sustainable innovation, c) clear indications of institutional influence and the incumbent’s responses, and d) accessibility of rich process data. The selected case reveals an incumbent’s efforts in reorienting themselves towards sustainability development through an innovation process in which they strategically navigate through institutions encountered along the way. The incumbent is a Swedish firm operating in the electrical product manufacturing industry. In the 1990’s, the firm developed a product for heating combusted engines in vehicles in cold winter conditions (hereafter, ‘car engine heating unit’) and subsequently became a market leader of that product for more than two decades. Their success in this product range indicates that they had a stake in the transport regime dominated by combusted engine vehicles fueled largely by non-renewable energies. Rather than getting their interest and innovation trajectory locked into that regime, they started to look at a long-time horizon and explore new areas for sustainable innovation, because they considered sustainable development the only viable future in the long run. The technology and business competence they had developed in car-engine heating units served as a leverage for them to enter into developing EV charger technology in 2008. Today, they have become one of the market leaders in EV charger on the European market. Despite their success, their innovation journey was filled with propelling and deterring moments brought by the institutional enablers and barriers they came across. They display different kinds of strategic actions in face of those institutional influences, depending on their perceptions and their stake in maintaining or challenging specific institutions. As such, this firm’s strategic navigating through institutions during their sustainable innovation process offers a compelling empirical context in which we can examine our research questions.
Data Collection

The data collection is based on semi-structured interviews with managers and industry experts, and on on-site observations, field notes, as well as on a range of secondary data sources like company brochures, industry reports, newspapers and other media articles, government reports and documents. This allows us to triangulate across different data sources in the analysis. Appendix 1 gives an overview of the interviews and observations included in our dataset. The case firm and all interviewees are anonymized.

Data Analysis

Our analysis follows a processual approach (Langley, Smallman, Tsoukas, & Van de Ven, 2013; Pettigrew, 1997; Van de Ven, 2007), which allows us to understand how the incumbent’s sustainable innovation process unfolded, what kind of institutional influence occurred at different points in time that triggered their strategic actions. We consider it important to take ‘time’ into consideration in our analysis, as it allows us to see more dynamics of the process, such as institutional changes and changes of the incumbent’s behaviors over time during the process. As such, this increases our chance of generating nuance insights of the incumbent’s strategic navigating through institutions and the explanations underpinning their actions.

Guided by the processual approach, we analyze the data in an iterative and systematic manner. It is iterative as we started analyzing the data when it was collected, rather than when the data collection was complete. This allowed us to build and refine our understandings of the incumbent’s innovation process as the project evolved. It is systematic as we follow the procedure of 1) identifying key incidents and events to visually map out the innovation process timeline (i.e. ‘visual mapping’ as suggested by Langley, 1999), based on which we construct a chronology (see Appendix 2) and write a narrative elaborating the chronology, which lead us to 2) identifying five temporal episodes constituting the innovation process (i.e. ‘temporal bracketing’ as suggested by Langley, 1999); 3) we subsequently zoom into each episode, and analyse the incidents and events by coding a) institutional influences and b) the incumbent’s actions.

As one of our research questions concerns the nature of institutions (i.e. enabling or hindering), we also code the institutions as ‘institutional enabler’ and/or ‘institutional barrier’. In addition, we code the institutional elements based on Scott’s (1995) analytical distinction (i.e. regulative, normative and cognitive institutions). This third step of analysis has led us to realize the origins of institutional influences and the targets of the incumbent’s actions are at different levels. As such, we draw on Geel’s (2002) three layers in the MLP and assign the institutions and action targets into the layers of landscape, regime and niche. Moreover, we realize the important connections between the international, the EU and the Swedish national levels regarding institutional origin and the incumbent’s action target. Therefore, we code the data into those three administrative levels. In tandem with step 3), we seek explanations to the incumbent’s strategic actions within each episode.

As we develop our understandings about the case along the analysis process, we return to the chronology and narrative to make refinements. We believe this analysis procedure is useful for dissecting the complexity and dynamics of the innovation process and therefore conducive to generating nuanced insights.
4. Findings

Our analysis leads us to the identification of five temporal episodes constituting the incumbent’s sustainable innovation process, which we label as: (1) ideation; (2) prototyping and prototype launch; (3) initial commercialization; (4) long deterrence by institutional void; (5) scaling-up and wide diffusion. In each episode, the incumbent takes different actions to strategically navigate through institutional enablers and barriers that they encounter. In this section, we present a condensed version of the case (for more details, please refer to Appendix 2).

In 2007, the incumbent started to seek new product areas to enter, kicking off the ideation episode. They focused on long-time horizon opportunities and considered sustainable future of the natural environment of high importance. Meanwhile, the EU climate policy landscape developed to place higher pressure on the energy and automotive industries regarding reorientation, coupled with perception change positively in the transport regime regarding the technological and economic feasibility of EV bought by the advent of lithium battery technology and the launch of economical EV models (e.g. Nissan Leaf). This triggered the incumbent to spot on the EV area. Linking with accumulated knowledge and competence in car engine heating units, the incumbent landed on the idea of developing EV charger.

Subsequently, the incumbent tested out their idea by prototyping in 2008. However, the Swedish energy policy debate on energy production agitated the incumbent because it put at stake EV charger as a sustainable consumption category. The incumbent’s CEO responded with contention in a national newspaper article and called for clarity, directionality and long-term orientation in Swedish energy policy. Meanwhile, the incumbent found their first customer (i.e. a large Swedish utility firm named Fortum) who then partnered and invested in the incumbent’s innovation project. In response to Fortum’s high requirements on ‘aesthetic design’, the incumbent brought forth a design resembling a green plant springing from the ground, to stimulate association with environmental friendliness. This led to the incumbent winning a prize at a design competition. In 2009, the incumbent launched their prototype at a large industry exhibition, signalling to other actors in the regime that they were the forerunner in EV charging.

In the meantime, the incumbent’s first customer Fortum collaborated with local city governments and some private actors in large cities in Sweden to build public charging infrastructure for EVs and increase public knowledge about EV and EV charging. These are done via programs such as ‘Stockholm Elbilsstad 2030’ (‘Stockholm EV City 2030’) and ‘BilEl’ (‘Car Electricity’). Some of these programs were even backed by the Swedish energy authority. For Fortum as a large utility firm, aspiring to and accelerating transition to EV may relate to sustainability development on the one hand, and it may also be underpinned by a strong economic incentive on the other hand since transition to EV and EV charging entails being able to sell more energy. With Fortum as their first customer, the incumbent was then able to initially commercialize their EV chargers quite early on.

Despite the incumbents’ eagerness to further develop their EV charger and its production, they encountered a long deterrence by institutional void (i.e. no common EU standard on EV charging plug). Since the electrical product manufacturing industry is highly regulated, no standard of EV charging plug rendered high uncertainty. Hence, the incumbent hesitated from
large-step improvements, fearing further sunk investment would possibly get wasted. Not thinking of any standardization strategy, the incumbent was surprised by their German competitor who proposed their design as the EU standard. With scepticism initially, the incumbent chose to ‘wait and see’. They observed that the German proposal was gaining support from powerful actors in the automotive industry. However, an opposing petition and alternative standard proposal was raised by a French-Italian alliance, backed by utility firms in some European countries, and hence the void of no standard became prolonged.

Hassled by the deterrence, the incumbent joined other Swedish actors in a test project and concluded that the German design was probably the best solution when taking safety and cost into consideration. Since the German design was backed by many powerful actors in the EV regime and with the test result, the incumbent changed their attitude and supported the German design at EU standardization committee meetings, in hopes of a quick end to the institutional void so as to speed up their own innovation. In 2013, the European commission finally announced the German design as the single EU standard. Nevertheless, the incumbent as well as many other actors in the growing EV regime had already informally adopted the German design. The incumbent launched several incremental upgrades to their EV charger, with a more radical version (with built-in IT communication system, and completely new design) launched in 2016.

Although the EV regime grew over the years, general consumers’ lack of knowledge in and preference for EV and EV charging were two of the main barriers to EV regime evolvement. This is understandable because of the hitherto relatively higher price of EV in comparison with combusted engine vehicles, insufficient public charging infrastructure catering to charging needs, and changes required in drivers’ routines and habits. This in turn impeded the scaling-up and wide diffusion of the incumbent’s sustainable innovation. In 2015, the Swedish environmental authority launched a large-scaled subsidy program named ‘Klimatklivet’ (“The Climare Step”) to encourage building infrastructure and purchase of products related to sustainable energy production and consumption. In response, the incumbent offered regular workshops and provided printed and digital materials to educate consumers in EV charging and the related economic and environmental benefits. When doing so, the incumbent actively promoted ‘Klimatklivet’ as a tool assisting consumers to reap the benefits from EV and EV charging.

In parallel, on the EU level, some German actors have initiated standardization work regarding public EV charger installation. They proposed a high degree of mechanical protection requirement to be encoded into the EU standard which was linked with CE marking (i.e. permission to be on any EU markets). This implied that if these actors succeeded, a large trade barrier would arise, hindering the incumbent from selling their EV charger across Europe without significant and costly re-design of their chargers. In response to this threat, the incumbent, together with their Swedish competitor, actively engaged in the standardization work, arguing that such a requirement is not necessary in all EU countries, and instead proposed permission for different degrees of protection encoded into the standard. In 2018, both proposals from the German and Swedish sides were put into the EU installation standard. As such, the incumbent could still have their EV chargers CE-marked and sell across Europe.

5. Discussion
Our findings reveal the followings. First, stimulated by the window of opportunities afforded by landscape-level institutional change towards sustainability and regime-level institutional shift towards the feasibility of EV, the innovative incumbent responded by reorienting themselves and by drawing on accumulated knowledge and competence to embark on a sustainable innovation journey. Second, just like any actors embedded in an institutional environment which is complex and of multi-levels containing both enabling and hindering elements to innovation endeavors, it is important for the incumbent to strategically navigate through those institutions by creating favorable institutional conditions and grappling with unfavourable ones for their innovation in the making. To do so, the incumbent enacted both active and passive responses, as well as engaged in different forms of institutional work (Lawrence & Suddaby, 2006). In this section, we theorize and discuss the incumbent’s strategic actions in navigating through institutions in their innovation process. As we do so, we offer explanations to the incumbent’s strategic actions. Quotes are used for illustration purposes.

**Active response to windows of opportunities**

Our findings show that regulative institutional change at the landscape level (i.e. strengthened EU climate policy) and cognitive institutional change at the transport regime level (i.e. changes in perception of technological and economic feasibility of EV) created a window of opportunity for the firm’s EV niche in the mid 2000’s. As the firm awakened to the importance of sustainability, they actively responded to this window of opportunity by taking the risk to enter the EV niche despite the technology’s immaturity and uncertainty. As the R&D manager reported:

“At that time, we did not know if this (EV) will happen in the future, but if it does, then we should be a part of this area.”

Rather than taking a competence-destroying route (Henderson & Clark, 1990), they sought to exploit the linkage between their accumulated competence and the innovation at hand:

“We were a market leader in making car engine heating units since the 90’s. So, we already had knowledge on how to make a pole that is installed on the ground and had electrical components inside. This was helpful for us to make an EV charging pole.”

This can be seen as a form of ‘mindful deviation’ without negating the past (Garud, Kumaraswamy, & Karnøe, 2010). Consequently, less friction was created against their re-orientation.

Moreover, enabling institutions (i.e. government programs in building charging infrastructure) opened a window of opportunity for initial commercialization of the sustainable innovation that the incumbent could not access directly. Hence, the incumbent actively sought collaboration with powerful actors rich in financial and social capitals. Eventually, through collaboration, they managed to indirectly tap into the commercialization opportunity afforded by government infrastructure programs. Collaboration with the powerful actor and supplying innovation to government programs rendered credibility and reputation to the incumbent, which was important for their legitimacy. Furthermore, during prototyping, the collaboration with their initial customer also served as shielding and nurturing mechanisms to protect the incumbent’s sustainable innovation from adverse selection pressure from the regime (Smith & Raven, 2012).
During the scaling up and wide diffusion episode, the firm also actively promoted the policy support program as they saw in it the opportunity to accelerate change in consumers’ mindset towards embracing EV and EV charging.

**Political work on endangering policy**

During prototyping, the Swedish energy policy debate at the time endangered the legitimacy of the incumbent’s innovation. More specifically, the policy debate could potentially result in unsustainable energy production (at least partially), which would consequently put EV charging as an unsustainable category. To prevent this, the incumbent engaged in what we conceptualize here as *political work* by openly raising concerns about the policy and by calling for clarity, directionality and long-term orientation in the Swedish energy policy. The CEO commented:

“The politicians talked a lot about taking away this and that, but not much about how to replace them... If we take away the nuclear-power plants and small hydro-power mills which supplied about 40% of the electricity in Sweden, yet do not have a clear substitution plan, then we probably had to import energy made from coal in for example Poland...We are consuming more and more energy nowadays, and EV charging is also about energy consumption. If energy production is not sustainable, then it is not sustainable to charge your car either...So I said, I want to see a plan, a concrete long-term plan! How we should produce energy in the future?!”

In other words, the incumbent attempted to quench the emergence of an unfavourable institutional condition that could de-legitimize their innovation.

**Symbolic work to forge cognitive legitimacy**

When an innovation is unfamiliar to and has not yet gained acceptance from consumers, it is likely to be seen as odd if it is put in public spaces. This explains why the incumbent’s first customer was concerned about the appearance of EV charger in different public places, and hence raised high requirements on design. For the general public to confer acceptance and legitimacy to the innovation, it is important to work on their perception (i.e. a cognitive institution). Symbols can be utilized to persuade others to change their attitudes, beliefs, values and perceptions (Cheney, Christensen, Conrad, & Lair, 2004), as meanings can be constructed via and incorporated into symbols, and symbols can be mediums through which institutions are transmitted (Lawrence & Suddaby, 2006). Moreover, “symbols that comprise rational myth are connotatively related to broader social and cultural myths” (Lawrence & Suddaby, 2006, p. 245). Product design is one kind of symbols that actors can use when engaging in institutional work to affect perceptions (Lawrence & Suddaby, 2006). This accounts for the incumbent’s efforts to target public perception of their innovation by utilizing symbols in their product design. As explained by the CEO:

“Our first customer placed very high requirements on design. Design! The chargers have to look nice in different public places, so that people won’t say ‘oh, this thing is awful standing there’... So, we worked on the design. Eventually, we came up with a design that looked like a green plant coming up from the ground, because the association should be ‘this is good for the nature, it is environmentally friendly. It looks even like a plant’.”
We conceptualize the incumbent’s action of utilizing symbols in product design to affect perception of their innovation as *symbolic work*. More specifically, they drew on normative institutions (i.e. value on sustainability and expectation of aesthetics) from the landscape layer and incorporated them into a symbol of a green plant, aiming to stimulate association of their innovation with the meaning of environmental-friendliness and to appear to general expectation of a pleasant appearance of public infrastructure. In doing so, they worked on creating a positive public perception of their innovation. In other words, they exercised symbolic work via design to render cognitive legitimacy for their innovation. The reward as the winner in the design competition indicates a confirmation to their symbolic work.

**Pre-emptive status work at field-configuring event**

Exhibitions and conferences are important field configuring events when the field is emerging (Garud, 2008), which means that they are important venues where institutional infrastructure of the emerging regime is in formation (Hinings et al., 2017). At a field configuring event of an emerging regime, actors gather to exchange information, create discourse, negotiate membership and field boundary, as well as to ‘theorize’ (Greenwood, Suddaby, & Hinings, 2002) their idiosyncratic practices (i.e. ‘proto-institutions’ as coined by Lawrence et al., 2002) to generate wider recognition and legitimacy (Garud, 2008). As such, targeting institutional infrastructure is an integral part of institutional work (Hinings et al., 2017). The incumbent participated in a large exhibition, where they launched their prototype, to enact membership in the emerging EV regime, and more importantly to pre-emptively build status over other actors who would join the regime later on. As the R&D manager noted:

> “We wanted to show that we take the front position, we showed the (prototype) charging station, despite there were no (EV) cars. So, we marked our position and showed that we would be a part of this development.”

Since status differentiator is also an important component of institutional infrastructure (Hinings et al., 2017), the incumbent considered it crucial to engage in what we label *pre-emptive status work*. In hindsight, this strategic move seemed to render normative legitimacy and advantage for the incumbent regarding their innovation. The R&D manager noted:

> “It was signal to the market. And that of course helped us a lot when the market later became huge, because lots of people that were on the exhibition in 2009 think, ‘oh, they have already been working on EV business in 2008, so probably they are the best.”

**Passive response to institutional void**

Institutional void refers to spaces of legitimation unarticulated by actors in an institutional field (Hensmans, 2003). In our empirical case, the lack of EV charging plug standard in the EU can be understood as institutional void. This institutional void arose due to the novelty of the EV niche where many institutions were not in place or still in formation. Since standards as a rule reflect acceptable ways of doing things (Salter, 2002), it becomes problematic for actors accustomed to operating in a highly regulated field and following rules to orientate at times of institutional void. Therefore, the incumbent was troubled and their innovation development was deterred when there was no EV charging plug standard in the EU. Although institutional void may present both constraints and affordances to strategic action, actors are not always able or willing to react immediately (Hensmans, 2003; Oliver, 1992). When asked whether they felt they could do anything about the lack of standard, the incumbent’s R&D manager noted that they did not even think about it at that time.
This indicates that the habit of rule-obedience made it unthinkable for the incumbent to take strategic actions in face of institutional void to begin with. In other words, the strategic action to intervene in institutional void was blocked by a taken-for-granted cognitive institution. While actors from Germany, France and Italy proactively engaged in standardization work, the incumbent decided to ‘wait-and-see’. As the R&D manager explains:

“In the beginning, we were very sceptical about our German competitor’s proposed design... But we didn’t see any point to fight with them in the standardization. If we had done that, we would have spent way too much money... Some French and Italian actors tried, but at some point their design was deleted (from the standardization discussion)...We thought it would be much better to let them do the work in central Europe, and we closely followed the standardization development in Europe, and tried to establish a good position in Sweden instead.”

Garud et al. (2002) points out a paradoxical property of technological standards: the creation of standards involves cooperation (and compromise) between competitors, which challenges actors with self-interests to come to an agreement. In consideration of their own interests and powers, actors tend to make careful assessment of the others’ intentions and prospects before deciding whether to join, to support or to counter the efforts of standard sponsors (Garud et al., 2002; Salter, 2002). This is in line with our findings. The incumbent made self-assessment and concluded that they were in a disadvantageous power position in the regime, and therefore they refrained from active response to the standardization work of EV charging plug. Instead, they closely followed the standardization process, and assessed the moves of powerful actors and the prospect of different proposals by different standard sponsors. When they realized the German plug design increasingly gained support from powerful actors in the regime, they switched from sceptically ‘wait-and-see’ to voicing support for the German design in the standardization meetings they participated in. As the CEO commented:

“Our German competitor did a prototype, they had a good initiative, they were also supported from the rest of the industry – ok, good, good idea, why not...”

In short, in face of deterrence by institutional void, the incumbent was hindered by the taken-for-granted habit of rule-obedience and was therefore unable to initiate a standardization strategy from the start. They kept their eyes closely on others’ moves and made assessments on themselves and others in order to decide on their own tactics. Perception of power position and latitude of maneuvering seemed to steer the incumbent’s response to a large extent. As they had a stake in ending the prolonged institutional void, the incumbent made a compromise to support their competitor’s standardization strategy. The incumbent thus enacted passive response to institutional void.

**Flexibility work combating institutional pressure**

van Dijk et al. (2011) argues that some properties of institutions can provide affordances to actors’ strategic actions in achieving self-interests and goals despite of adverse institutional pressure. However, it requires reflexivity from actors’ to recognize and take advantage of institutional affordances (van Dijk et al., 2011). One such affordance is the plasticity of institutions through which actors could make elastic stretching on institutions and create interpretive flexibility to their own advantages (Strambach, 2010). We conceptualize actors’ actions in stretching and creating interpretive flexibility of institutions to suit their own purpose and advantage as flexibility work.
Such flexibility work is exemplified in our findings. When encountering institutional pressure (via standardization) from some German actors to comply with the high mechanical protection requirement, the incumbent understood that compliance entailed costly re-design of their innovation whereas non-compliance may lead to halt in diffusing their innovation across the EU if the high requirement should be formalized into the EU standard. In response, they collaborated with their Swedish competitor to enhance the collective power position, and together they stretched the requirement by contending that there should be different levels of mechanical protection allowed in the standard.

They drew on their experience and expertise in car engine heating units in Sweden to construct ‘evidence’ in arguing that the high requirement was not necessary in all countries, and that it should be up to the manufacturers to legitimately choose among different degree of compliance based on the specific conditions of the places where the EV chargers are installed. In other words, the incumbent exercised flexibility work to combat adverse institutional pressure. Later on, the high requirement from the German side has been formalized into the EU installation standard which also allows the Swedish advocacy of different degree of compliance. This evidence indicates that the incumbent has succeeded in having their own non-compliance legitimized formally. As such, the incumbent was able to, at least temporally), quell the threat against the scaling up and wide diffusion of their innovation.

6. Summary and conclusions

The paper set out to deal with the following research questions: 1) how do incumbents encounter and respond to institutional enablers and barriers to sustainable innovation in an economy characterized by change? and 2) why do they act in particular ways? When addressing these questions on a longitudinal study of an innovation process by a Swedish incumbent, we identified five critical episodes: (1) ideation; (2) prototyping and prototype launch; (3) initial commercialization; (4) deterrence by institutional void; (5) scaling-up and diffusion. Below is a condensed summary of the innovation process, with explicit references to how the firm navigated through institutions in each of the five episodes.

Triggered by institutional change in the regime and landscape layers, the incumbent identified a window of opportunities during ideation and actively responded to this opportunity by initiating development of an EV charger. During prototyping, they strategically collaborated with a powerful utility actor to access initial commercialization opportunities offered by government-backed programs in building EV charging infrastructure. The incumbent drew on increased focus on sustainability and value on aesthetics from the landscape layer to conduct symbolic work via design to render cognitive legitimacy in the regime layer. They also engaged in political work to prevent Swedish energy policy development from delegitimizing their innovation. By launching their prototype at a field-configuring event, they exercised pre-emptive status work to position themselves as a forerunner in EV charger technology. In face of a long deterrence of institutional void (i.e. no common EV charging plug standard in the EU), they passively responded by choosing to ‘wait-and-see’ due to cognitive institutional blockage of rule-obedience habit and perception of their own disadvantageous power position in the regime. As they assessed the prospect of different standard sponsors, they changed from a sceptical and resistant attitude to supportive behaviour towards their German competitor’s standardization strategy. The change of attitude and behaviour indicates their attempt to end institutional void so as to speed up their
innovation process. To scale up and diffuse their EV charger, the incumbent promoted government support programs and engaged in educating general consumers to create consumer preference. However, they encountered a threat from installation standardization pressure from some German actors, and they applied ‘interpretive flexibility’ in the standardization work to quell the threat against diffusion of their own EV charger.

On conclusive notes, our findings reveal various institutional challenges and opportunities faced by the investigated incumbent during the course of an innovation process spanning more than a decade, and generate conclusions on the forms of strategic navigating through those institutional challenges and opportunities. While most aspects influencing preconditions for innovation are beyond direct reach of individual actors due to embeddedness in the collective structure of the regime and landscape layers, this case shows that some aspects actually can be influenced by strategic actions under certain conditions. When institutional changes in the landscape and regime layers coincide with the incumbent’s aspiration to embark on a specific trajectory, catalysed by them finding and utilizing a linkage with their already accumulated knowledge and competence, the incumbent can use these changed preconditions to their advantage, and sometimes also trigger changes that go beyond their own trajectory. Concrete examples are political priorities and standards, especially on a national scale and within sector specific interest groups on an international scale. Being a first mover or early adopter holding certain key competence – and/or being recognized for holding such key competence – can compensate for a somewhat weaker power position in the industry hierarchy. Furthermore, decisions made by dominant actors such as industry leaders can be influenced by efficient and proactive symbolic work and legitimacy building, and through alliances with such core partners. While this study confirms that actors can utilize ‘partial autonomy’ and actively conduct institutional work to change institutions for the advantage of their innovation endeavors, it also illustrates the potential of a passive response and adaption as development strategy forward.

Finally, this paper contributes to the recent discussion in transition studies that challenges the assumption on the inherent nature of incumbents as inert and locked-in. We argue for the need to reflect on under what specific conditions incumbents re-orient themselves and pursue sustainable innovation. While we have shown one such condition in our single case study, we invite future research to explore and advance our understandings on those conditions. As such, this paper has both research and policy implications regarding the potential role of incumbents as change agent and driver of sustainability transition. Failure to recognize this may result in one-sided understanding of who are change agents accelerating transistion as well as in ineffective policies to create supporting conditions for incumbents to re-orientate in the course of sustainability transition. Furthermore, although we focus on sustainable innovation, we believe our theoretical insights into actors’ strategic navigating through institutions could also be applicable to other contexts pertaining to innovations in emerging and nascent socio-technical systems in general. More specifically, it is reasonable to expect innovating actors in other nascent socio-technical systems 1) to encounter institutional enablers and barriers with nature similar to those in our case and 2) to engaged in strategic navigating through institutions during their innovation journeys. Whether, how and why their strategic navigating may vary are interesting questions to be explored in future research.
References:


Appendices:

Appendix 1: An Overview of Interviews and Observations in the Dataset

<table>
<thead>
<tr>
<th>Interview Number</th>
<th>Date</th>
<th>Company/Organization</th>
<th>Interviewee's Position</th>
<th>Interview Format</th>
<th>Purpose</th>
<th>Time Length (in minutes)</th>
<th>Recorded?</th>
<th>Notes Taken?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2017-03-13</td>
<td>Local municipality</td>
<td>Business Developer</td>
<td>Semi-structured</td>
<td>To identify potential companies to approach for the research project, which resulted in the identification of the incumbent firm.</td>
<td>90</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>2017-03-20</td>
<td>The incumbent firm</td>
<td>CEO and Export manager</td>
<td>Semi-structured</td>
<td>To gain general understandings about the firm and the industries they operate in and work with along the value chain.</td>
<td>60</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>2017-03-20</td>
<td>The incumbent firm</td>
<td>Export Manager</td>
<td>Unstructured</td>
<td>To understand the firm's product portfolio and development trajectory</td>
<td>30</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>2017-06-15</td>
<td>The incumbent firm</td>
<td>CEO</td>
<td>Semi-structured</td>
<td>To understand the firm's internal organizing for innovation and general barriers and enablers they encounter in their innovation processes</td>
<td>60</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>2017-10-12</td>
<td>The incumbent firm</td>
<td>R&amp;D manager</td>
<td>Semi-structured</td>
<td>To understand the firm's product development trajectory, to obtain stories about their innovation journey of EV charger, and enablers and barriers along the journey.</td>
<td>150</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>6</td>
<td>2017-10-12</td>
<td>The incumbent firm</td>
<td>CEO</td>
<td>Semi-structured</td>
<td>To understand the firm's product development trajectory, to obtain stories about their innovation journey of EV charger, and enablers and barriers along the journey.</td>
<td>30</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>7</td>
<td>2018-12-19</td>
<td>The incumbent firm</td>
<td>CEO</td>
<td>Semi-structured</td>
<td>To understand the role of policy in the incumbent's product development journey (e.g., regarding EV charger development) and the incumbent's response to policy influence.</td>
<td>75</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

(to continue)
### Interviews:

<table>
<thead>
<tr>
<th>Interview Number</th>
<th>Date</th>
<th>Company/Organization</th>
<th>Interviewee's Position</th>
<th>Interview Format</th>
<th>Purpose</th>
<th>Time Length (in minutes)</th>
<th>Recorded?</th>
<th>Notes Taken?</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>2018-12-20</td>
<td>The incumbent firm</td>
<td>R&amp;D manager</td>
<td>Semi-structured</td>
<td>To follow up and gain deeper understandings of the different institutional enablers and barriers the firm encountered during their innovation process of EV Charging.</td>
<td>45</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>9</td>
<td>2018-12-18</td>
<td>Energimyndigheten (the energy authority in Sweden)</td>
<td>Expert - in EV technology and senior advisor</td>
<td>Semi-structured</td>
<td>To understand the historical development of EV, EV charger and the role of policy in Sweden.</td>
<td>45</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>10</td>
<td>2018-12-20</td>
<td>Energi Företagen (an NGO, interest organization on energy issues)</td>
<td>Expert in regulations and historical development of EV charging and energy issues</td>
<td>Semi-structured</td>
<td>To understand the historical development of EV charging infrastructure in Sweden and the role of policy.</td>
<td>35</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>11</td>
<td>2018-01-15</td>
<td>Vattenfall (a large utility firm owned by the Swedish government)</td>
<td>Expert in EV charging and energy, and standardization work</td>
<td>Semi-structured</td>
<td>To understand standardization process related to EV plug, and other enablers and barriers for EV charger development in Sweden.</td>
<td>45</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>12</td>
<td>2018-01-22</td>
<td>SIEK (Svensk Elstandard - the Swedish standardization organization in the field of electricity and electrical products)</td>
<td>Expert in standardization work and procedure in national, EU and international levels</td>
<td>Semi-structured</td>
<td>To understand the EU standardization process of Type 2 plug - what did the German actors did to influence the standard, why did Swedish actors played a supporting role instead of leading role in this process.</td>
<td>45</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>13</td>
<td>2018-01-28</td>
<td>Technical consultant and service partner to the incumbent firm</td>
<td>Founder and CEO</td>
<td>Semi-structured</td>
<td>To understand this actor's role in the incumbent's EV charger development process, and what (institutional) enablers and hinders affect the development and diffusion of the incumbent's EV charger.</td>
<td>60</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Interview Total: 13 interviews (770 minutes)

Note: interviews were only recorded after gaining informed consent from the interviewees. All recorded interviews were transcribed.
<table>
<thead>
<tr>
<th>Observation Number</th>
<th>Date</th>
<th>Event Organizer</th>
<th>Observation Site</th>
<th>Purpose</th>
<th>Time Length (in minutes)</th>
<th>Notes Taken?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2017-03-20</td>
<td>The incumbent firm</td>
<td>Product showroom</td>
<td>To understand the development history of EV charger and the incumbent's product profile in general.</td>
<td>30</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>2017-04-04</td>
<td>StyrelseAkademi (the national association of board of director academy)</td>
<td>Incumbent's CEO presentation and social gathering of interest actors</td>
<td>To understand the incumbent firm's development history, culture, and their current state of EV charger development and sales.</td>
<td>120</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>2017-05-24</td>
<td>The incumbent firm</td>
<td>Education workshop 1</td>
<td>To understand the purpose of the workshop and to observe interaction between the participants.</td>
<td>120</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>2017-05-24</td>
<td>The incumbent firm</td>
<td>Factory visit</td>
<td>To understand the incumbent's manufacturing routines and procedures of EV charger, and company culture.</td>
<td>60</td>
<td>Yes</td>
</tr>
<tr>
<td>5</td>
<td>2017-05-24</td>
<td>The incumbent firm</td>
<td>Education workshop 2</td>
<td>To understand the purpose of the workshop and to observe interaction between the participants.</td>
<td>120</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Observation Total: 450 minutes
### Appendix 2. EV Charger Development by the Incumbent: a Chronology

<table>
<thead>
<tr>
<th>Year</th>
<th>Major Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>The board of directors in the incumbent firm held a series of meetings to discuss long-term horizon and explore new product area to innovate in. A combination of institutional changes (i.e. landscape change towards the value of sustainability and perception changes in the technological and economic feasibility of EV in the regime) and the incumbent’s aspiration to sustainable future development sparked the idea of entering into the EV business area. Previous technological and business knowledge and competence led the incumbent to innovate by developing EV charger.</td>
</tr>
<tr>
<td>2008</td>
<td>The R&amp;D department in the incumbent firm developed a prototype of EV charger. The Swedish energy policy and policy discussion agitated the incumbent and the incumbent’s CEO then voiced his concern and called for clarity, directionality and long-term orientation in policy development. This political work aimed to prevent energy policy from resulting in delegitimizing EV and EV charging as sustainable solution in the transport sector. The incumbent sought the first customer and partner for their EV charger under development, which resulted in a partnership with their first customer – a large Swedish utility firm Fortum that saw the business potentials and future prospect of EV and EV charging. Fortum placed high requirements on product design, and the incumbent creatively drew on landscape value on sustainability to conduct symbolic work via design in order to render normative and cognitive legitimacy in the regime.</td>
</tr>
<tr>
<td>2009</td>
<td>The incumbent launched the EV charger prototype at a large industry exhibition ‘El-Fack’ in Gothenburg. At this field configuring event, the incumbent engaged in status work to pre-emptively establish a forerunner position in the EV charging area. The incumbent participated in a design competition with their prototype design and was awarded as the winner, which formally conferred legitimacy to their symbolic work via design. Further development of EV Charger was deterred by the lack of EV plug standard (i.e. institutional void). Meanwhile, the incumbent observed that their German competitor Mennekes took first mover actions by designing a plug and proposing it as the future EU standard. At this point, the incumbent held a sceptical attitude towards their competitor’s move and proposal. The incumbent decided not to buy EV plugs designed and sold by their German competitor (later known as ‘Type 2’ plug), nor to come up with a competing design. Instead, the incumbent decided to wait and see how the standardization development would go, while focusing on</td>
</tr>
</tbody>
</table>
establishing a competitive position in Sweden. Meanwhile, the incumbent used normal ‘shucko’ plug in their EV chargers.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010-2012</td>
<td>As Fortum collaborated with other public and private actors, the incumbent was able to indirectly access the opportunities offered by several ambitious policy programs supporting early establishment of EV charging infrastructure. Hence, the incumbent delivered EV chargers to those programs and achieved initial commercialization and diffusion of their EV chargers among large cities in Sweden. The incumbent continued to improve their EV charger in terms of both design and functionality. However, their breakthrough was largely deterred by the institutional void of no EV plug standard in the EU. The standardization discussion was prolonged due to competing standardization strategies from different actors, complicated further by the decision of the standardization committee at the international level, resulting in no consensus reached within the European standardization committee. The incumbent started to realize the technological merits of the plug design proposed by the German competitor, and they also observed that this design was increasingly supported by powerful actors in the standardization committee. Therefore, they also became supportive of this design. In face of prolonged institutional void of no EV plug standard in the EU, the incumbent joined a test project in which a network of Swedish actors participated to test plug safety and figure out how they themselves should proceed with the way forward. The incumbent gained second-order learning in this project, and became even more certain about the German-designed Type 2 plug’s merits. The incumbent found other suppliers (i.e. not German competitor Mennekes) of Type 2 plug, and started to incorporate Type 2 plug in upgrading their EV charger.</td>
</tr>
<tr>
<td>2013</td>
<td>As the European Commission announced ‘Type 2’ plug as the single EU standard, the incumbent (and many other actors in the EV regime) had already adopted ‘Type 2’. However, the official announcement ended the uncertainty of EV charging plug standard in the regime in Europe.</td>
</tr>
<tr>
<td>2014-2015</td>
<td>The incumbent continued to upgrade their EV charger by for example incorporating digital contents for communication and refreshing the charger’s outer appearance with a modern and industrial design. As the national policy program ‘Klimatklivet’ was launched in 2015 to provide subsidies to sustainable initiatives, the incumbent saw this as an enabler to achieve wider diffusion of their EV charger. Therefore, the incumbent started to promote ‘Klimatklivet’.</td>
</tr>
<tr>
<td>2016</td>
<td>The incumbent launched the fourth generation of their EV charger.</td>
</tr>
</tbody>
</table>
A significant increase in sales of EV charger made the board of directors in the incumbent firm realize the EV charger business awaits a large boom in the near future. Hence, they decided to devote heavier investments and attention to scaling up their EV chargers.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>The incumbents offered regular workshops to provide education on EV charging and their EV charger.</td>
</tr>
<tr>
<td>2018</td>
<td>The incumbent’s scaling-up and wide diffusion efforts in Europe were threatened by the standardization strategy (regarding installation) exercised by some German actors. The incumbent joined forces with their Swedish competitor to combat this threat. Although the high requirements were officialised into the EU installation standard, the efforts by the incumbent and their Swedish competitor created ‘interpretive flexibility’ in the requirements standardized. As such, the threat was quelled at least temporarily.</td>
</tr>
</tbody>
</table>