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STRATEGIES OF INCUMBENT FIRMS IN DE NOVO ECOSYSTEMS: EXPLORING THE ELECTRO MOBILITY SECTOR

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Research in Progress

Abstract

Current research has highlighted multiple facets of established ecosystem formations. We intend to add to the body of ecosystem literature by raising the question of how incumbent firms navigate in emerging de novo ecosystems. Using a grounded theory approach, we analyze incumbent firms in the nascent German electro mobility industry. The electro mobility sector is a particularly relevant field since different incumbents with different capabilities need to collaborate closely and build integrated solutions to realize electronic enabled mobility. Furthermore, several actors, previously operating in separated industries such as automotive, energy and infrastructure, converge in the electro mobility ecosystem and cooperatively pursue new strategies for value creation and capture. Our aim is to understand how the incumbents' capabilities influence the navigation in the de novo electro mobility ecosystem.

Keywords: Ecosystem, De novo ecosystem, Strategy, Incumbent firms

1 Introduction

Traditionally, companies' value creation took place in supply chains with established supplier-buyer relationship and business transactions remained within their respective industry's borders. However, advances made in information and communication technology led to the increased blurring of these clearly defined boundaries and gave rise to business models linking companies that have been operating in different industries so far (Yoo *et al.*, 2010). This shift towards a value creation, where companies join forces in order to co-create a product or service is coined under the term business ecosystems (El Sawy *et al.*, 2010). However, the general reasoning behind ecosystems is not a new topic in scholarly discussion and there is an increasing amount of research on the distinct governance and orchestration challenges presented by mature ecosystems (e.g., Dhanaraj and Parkhe, 2006; Nambisan and Sawhney, 2011); much less work has addressed how actors navigate in de novo ecosystems (Dattée *et al.*, 2018). The de novo ecosystems are those that are in an early state of formation or reformation (Hannah and Eisenhardt, 2017).

We aim to look at the German electro mobility ecosystem as it fulfills three important characteristics of a de novo ecosystem (Hannah and Eisenhardt, 2017). First, de novo ecosystems often exhibit undefined industry structures, with unclear product or component definitions, rapidly changing innovation in one or more components, and uncertainty about potential rivals (Navis and Glynn, 2010; Santos and Eisenhardt, 2009). These particularly applies to the electro mobility ecosystem where energy, automotive, infrastructure, software and diverse service providers stay in a coopetition in order to provide transport through electricity, even though the roles and respective strategic values are not determined (Kley *et al.*, 2011). Second, within de novo ecosystems, the availability of the components required to create value cannot be taken for granted (Hannah, 2013). Given the manifold dependencies of electro mobility, companies that, for instance, manufacture electric cars, cannot guarantee that both energy suppliers and providers of charging infrastructure will cover the public space with energy and charging stations, hence hindering the value creation of the produced electric vehicles. Therefore, a firm's ability to successfully produce its own component in the electro mobility ecosystem may be insufficient to guarantee its overall success. Third, de novo ecosystems are dynamic. That is to say, the location of technological challenges and the relationship between components is likely to change over time due to unanticipated firm actions and unexpected innovation (Staudenmayer *et al.*, 2005; Ferraro and Gurses, 2009; Adner, 2016). In the case of electro mobility, the establishment of the vehicle to grid communication interface ISO 15118 through the car manufactures enabled electronic vehicles to charge on public stations without handling cards and apps for authentication. Hence, the value of different capabilities (e.g., mobile charging application providers) is affected, or has changed the location to a different position (in this case towards the vehicle manufacturer, as all necessary authentication information is provided by the vehicle). Besides the academic comprehension on de novo ecosystem, there are also some factual factors that mark the electro mobility nascent: (i) In 2017, only 1% of all sold cars were powered electrically. (ii) With currently approx. 100,000 registered electric cars in Germany, the government's target of one million cars by 2020 will most probably not be reached (German National Platform for Electric Mobility, 2018). Although the electro mobility ecosystem is currently nascent, it is projected that by 2030 30% of all cars will be electrically powered (Chemnitz Automotive Institute, 2019). The de novo phase of ecosystems is therefore crucial, as it is associated with rapidly achieving critical mass while simultaneously establishing governance structures that steer the growth (Evans and Schmalensee, 2010).

Given the early state of electro mobility, incumbents from related sectors such as automotive, energy and infrastructure are moving into the de novo electro mobility ecosystem to take advantage of novel opportunities. For example, energy suppliers, with their core business in energy generation and sales, now are also offering the possibility to purchase energy for the public charging of electric cars directly via a mobile application, thus creating access to the mobility space and respective data (who charges where, how long and how much). Given this crucial role of incumbent firms in the electro mobility ecosystem, we seek to answer the research question of how incumbents' organizational capabilities affect the successful navigation in de novo ecosystems. We assume that particularly dynamic capabilities of incumbents play a major role in navigation of emerging ecosystems.

In order to address these questions, first, we want to provide the theoretical background on ecosystems. Second, we explain our research methodology, whereby we use grounded theory methods to collect and analyse data. Third, we present initial results and our expected contributions.

2 Theoretical Background on Ecosystems

Value creation is undergoing a structural change where one can observe an increasing shift from value chains to ecosystems (Adner, 2016; Jacobides *et al.*, 2018). This trend is reflected by a rising number of publications to digital ecosystems in management and information systems research (e.g., Ceccagnoli *et al.*, 2012; Gawer and Cusumano, 2014; Tan *et al.*, 2009; Tanriverdi and Lim, 2017). The term "ecosystem" has its origin in biology, where all species of an ecosystem are linked together and share the same fate (Iansiti and Levien, 2004). This understanding can be transferred and applied to the business context, where the performance of each member in the business ecosystem is tied "to the overall performance of the ecosystem" (Jacobides *et al.*, 2018).

In prior literature, there evolved various types of ecosystem definitions and conceptualizations, which include digital ecosystem (Ghazawneh and Henfridsson, 2013; Um and Yoo, 2016), digital business ecosystem (El Sawy and Pereira, 2013), mobile ecosystem (Basole, 2009), innovation ecosystem (Adner and Kapoor, 2010; Adner, 2006; Adner and Kapoor, 2010), technology ecosystem (Adomavicius *et al.*, 2008; Wareham *et al.*, 2014), platform-based software ecosystem (Tiwana *et al.*, 2010) or service ecosystem (Barrett *et al.*, 2015). Table 1 illustrates different perspectives on ecosystems to provide a conceptual overview.

The extensive ecosystem literature encompasses various research streams. For example, Jacobides *et al.* (2018) makes a distinction into three categories: First, business ecosystem focuses on the individual firm and its environment. Second, the innovation ecosystem focuses on innovations, value proposition and the involved actors within its parameters. Third, the platform ecosystem focuses on the actors who are organized around an accompanying technological platform. Another classification is provided by Adner (2016) who differentiate ecosystems into ecosystem-as-affiliation, which regard ecosystems as communities consisting of connected actors defined by their networks and platform affiliations, as well as ecosystem-as-structure, which subsequently views “ecosystems as configurations of activity defined by a value proposition”. Besides the terminological consideration, various different aspects of ecosystems are subject to current research, depending on the unit of analysis. Characteristics such as openness (Benlian *et al.*, 2015), development stages (Tan *et al.*, 2009), structure and dynamics (Um and Yoo, 2016), but also business models (El Sawy and Pereira, 2013) and value co-creation in ecosystems (Ceccagnoli *et al.*, 2012) are discussed. All of these contributions are valuable , but are more suitable for mature ecosystem structures, where: (i) Firms are aware of each other and agree on the ecosystem roles (keystone, complementors or suppliers) (Dattée *et al.*, 2018). (ii) The relationship among the ecosystem firms is symbiotic (Tan *et al.*, 2009). (iii) Firms know exactly which assets they can create in an ecosystem and how they select the right partners to do so (Adner and Kapoor, 2010; Kapoor and Lee, 2013). Finally, (iv) companies know where to invest if they aim to achieve control in the ecosystem (Teece, 1986, Dattée *et al.*, 2018).

Term	Definitions	Source
Digital ecosystem	“A digital ecosystem consists of a focal platform, a large number of heterogeneous complementary add-on products, and a host of boundary resources that are used to connect the focal platform and the complementary products.”	(Ghazawneh and Henfridsson, 2013)
Innovation ecosystem	“A given innovation, however, often does not stand alone; rather, it depends on accompanying changes in the firm’s environment for its own success. These external changes, which require innovation on the part of other actors, embed the focal firm within an ecosystem of interdependent innovations.”	(Adner, 2006; Adner and Kapoor, 2010)
Platform ecosystem	“We define a software-based platform as the extensible codebase of a software-based system that provides core functionality shared by the modules that interoperate with it and the interfaces through which they interoperate. […] We refer to the collection of the platform and the modules specific to that platform as that platform’s ecosystem.”	(Tiwana et al., 2010)
Service ecosystem	“A service ecosystem is a relatively self-contained, self-adjusting system of resource-integrating actors that are connected by shared institutional logics and mutual value creation through service exchange.”	(Lusch and Vargo, 2014)
Technology ecosystem	“Technology ecosystems are often described as product platforms defined by core components made by the platform owner and complements made by autonomous companies in the periphery.”	(Wareham et al., 2014)

Table 1: Definitions on ecosystems in literature

However, what, in comparison, has currently been less considered are de novo ecosystems. Hannah (2013) derived a model to demonstrate that within de novo ecosystems, an absence of available partners in other components may prevent firms from creating value in their own. Moreover, Hannah and Eisenhardt (2017) developed a framework for start-ups in the US solar panel industry, that details that high performing firms are motivated to create value in collaboration with their partners, and enact strategies that allow them to do so, despite the uncertain and dynamic structure of de novo ecosystems. In contrast, Ozcan and Santos (2015) illustrates that firms within the (failed) mobile payments industry were unable to co-create value because of their inability to determine an underlying component ecosystem, regardless of their individual performance. At the same time, other findings suggest that companies in de novo ecosystems may also have a broader strategic portfolio (Ozcan and Eisenhardt, 2009), e.g. in terms of developing novel relationships between existing players (Ozcan and Eisenhardt, 2009; Ferraro and Gurses, 2009), or by changing the boundaries between components (Fixson and Park, 2008). Although this work is valuable, previous research has not addressed the question of how the organizational capabilities of incumbents influence the navigation in de novo ecosystems.

3 Research Methodology

In this study, grounded theory methods (GTM) are utilized in order to collect and to analyse data (Glaser and Strauss, 1967). This method is particularly useful when little research has been conducted on the specific topic so far, and there is a need such for theory building. Against this background, we consider GTM suitable for our purpose, because on the research streams of de novo ecosystems, electro mobility and the strategies of incumbents, little research has been conducted as yet, and particularly on the intersection of the three issues almost no research is available. GTM allowed the researchers to engage in the data analysis directly from the first interview on. This is particularly important in order to develop preliminary categories and steer the selection of interview candidates in the further course of data collection. We use GTM as a method to be included within an interpretative case study (Halaweh *et. al*, 2008) and consider the electro mobility ecosystem as a single case with several logical subunits of analysis, namely incumbent organisations (Yin, 2016).

Wiesche *et al.* (2017) classify the output resulting from grounded theory into three categories: (i) developing a theory, (ii) developing a model and (iii) a rich description of the phenomena. Each of them contributes to research in their own way. Our aim is to contribute to IS research by developing a research model which defines “relevant variables and the relationships among those variables” (Wiesche *et. al*, 2017) for incumbents navigating in the de novo mobility ecosystem.

3.1 Data collection

In order to build a model from data (Birks *et al.*, 2013), data must be generated first. This can be done through various forms e.g., field observations, interviews, online resources and participant observations (Myers, 1997). In this study, semi-structured interviews were conducted to obtain certain information about thebphenomena to be investigated that would otherwise not be available (Kaiser, 2014). The first step involved the creation of an interview questionnaire, translating the research questions into interview questions. This process is called operationalization and signifies that the questions are transferred into the cultural context of the interviewee (Gläser and Laudel, 2009). Therefore, we took into consideration the background of our prospective interviewees who must deal with electro mobility at an incumbent, which therefore will have a background in business, engineering or information systems. In this mode, we ensured that the interviewees fully understood the questions and answered them to the best of their knowledge and belief (Gläser and Laudel, 2009; Kaiser, 2014). According to Kaiser (2014), a questionnaire should fulfil the following criteria: i) provide structure for the interview and ii) offer all information necessary for the investigation. To fulfil the requirements of Kaiser (2014), we anchored our questionnaire on the taxonomic framework of co-creation developed by Zwass (2010) to ensure that all relevant components, of multivalent value co-creation strategies, are covered. To this degree, our questionnaire is guided by the four important categories: tasks, processes, co-creators and value.

In the next step, we decided to go for a semi-structured interview questionnaire with 15 open-end questions. In contrast to the structured interview, the semi-structured interview gave us the possibility to deviate from the initial interview guideline. Throughout the period of data collection, the questions have been adapted continuously in order to receive a holistic view on the topic (Gläser and Laudel, 2009). That means, whenever new aspects have been mentioned recurrently and also when contrasting aspects came up, we developed new in-depth questions and introduced them in the following interviews with the goal to illuminate the phenomenon further (Gläser and Laudel, 2009). Accordingly, unsuitable questions have been adapted, if they did not contribute to the research questions (see appendix 1 for our guiding questions).

Parallel to the development of the questionnaire, a database with company contacts was set up, following the categories of (Abdelkafi *et al.*, 2013) who identified the five main actors in the field of electric mobility: manufacturers, suppliers, customers/users, service providers and the government. In the assemblage of the database, the researchers agreed on four sample criteria: i) Companies must provide products and services to enable electro mobility ii) Companies must fulfil one of the generic roles according to Abdelkafi *et al.* (2013) iii) Companies must pose an incumbent structure, and iv) Companies need to provide their products or services in Germany. Based on our selection criteria, the first firms were contacted through the authors' personal networks. This gave us the possibility to conduct a pretest and examine the questions in terms of comprehensibility, length and non-overlapping of topics. After that test phase, we entered the main phase of data collection. In turn, we searched for electro mobility firms in business-oriented social networks (e.g., LinkedIn) and contacted the firms that, based on the information given on their professional position and experiences, aligned with our criteria. Table 2 outlines the four generic roles of actors in the electro mobility ecosystem (Abdelkafi *et al.*, 2013) and the respective studied companies. It is important to note that incumbents often fulfil multiple roles at the same time, which is also covered by our interview guideline.

Role	Description	Interviewed Company
Manufacturer	Manufacturers cover the biggest part of the value chain of vehicle production (Abdelkafi *et al.*, 2013) and produce electric vehicles (EV) (Riasanow *et al.*, 2017). The value proposition of manufacturers can include business functions such as R&D, manufacturing, and services (Kang *et al.*, 2009).	Gamma, Zeta, Kappa, Pi
Suppliers	The electro mobility industry can be characterized by one-sided supplier-buyer relationships (Turnbull *et al.*, 1992). Vehicle manufacturers rely heavily on first tier suppliers, which may offer product development, design and technology, with many depending on subcontractors, namely second tier suppliers. These in turn can depend on third tier contractors, which e.g., supply press, cutting, welding, forging or casting work (Riasanow *et al.*, 2017).	Alpha, Beta, Lambda, Theta, My, Rho
Service providers	Service providers such as energy providers and network operators (Abdelkafi *et al.*, 2013) offer electro-mobility services to end customers, which may include charging, search & find and routing (Madina *et al.*, 2016).	Alpha, Beta, Delta, Epsilon, Eta, Theta, Lambda, My, Rho, Sigma, Omega
Substitutes	Substitutes like conventional or hybrid cars, public transport or railways can replace the electric car, but can also be regarded as an extension of the electro mobility concept (Abdelkafi *et al.*, 2013).	Gamma, Zeta, Kappa, Pi, Omega

Table 2: Generic Roles in the Emerging Ecosystem of Electro Mobility following (Abdelkafi et al., 2013)

To date, 22 interviews were conducted in the period from August to November in 2018 (table 3). All of the interviewees could provide sufficient seniority, starting from management level up to head, director and C-level from different business departments, which included technology, business development, innovation, marketing and sales. Sufficient seniority is necessary because much of the ecosystem strategy involves decisions that are usually developed and made by managers in senior positions. We have therefore focused particularly on interview candidates possessing sufficient seniority. The interviews generally lasted around 45-60 minutes and have been conducted via Skype or telephone. The interviews have been recorded in order to transcribe it later. After each interview, we used the snowball technique. Therefore, each interviewee has been asked if they could recommend other potential interview partners who also met the selection criteria, which ultimately led to further interview partners.

	No. of interviews	**Company description**	**Job position of interviewee**
Alpha	4	Software Development	Vice President Business Development, Director E-Mobility, Head of Strategy, Product Manager E-Mobility
Beta	2	Software Development	Vice President Solution Management, Product Manager Mobility
Gamma	1	OEM	Head of Strategy & E-Mobility
Delta	1	Car Rental	Head of Marketing
Epsilon	2	Energy Provider/Mobility services	Director Innovation, Business Development Manager
Zeta	1	OEM	Head of E-Mobility, Head of Mobility Services
Eta	1	Car Rental	Chief Organizational Officer
Theta	1	Charging Infrastructure	Head of Europe
Kappa	1	OEM	Head of Mobility
Lambda	1	Electronics	Director E-Mobility
My	2	Charging Infrastructure	Senior Manager Strategy, Manager Electric Vehicles
Pi	1	OEM	Senior Manager Innovation
Rho	1	Software Development/Mobility Services	Chief Sales Officer
Sigma	1	Mobility Platform	Head of Business Development
Omega	1	Public Sector/Energy Provider	Product Manager E-Mobility

Table 3: Interviewees and respective job positions

3.2 Data analysis

As mentioned before, we use GTM to analyse the data material which consists of interview transcripts and written memos. Besides the interviews, we examine online resources such as company websites and blogs in detail to triangulate the data (Mattarelli *et al.*, 2013). In the following we outline the current state of data analysis regarding our initial 22 interviews.

We began the data analysis process similar to Hannah and Eisenhardt (2017) by synthesizing the interview and archival data into a comprehensive case history for each firm. Each interview focuses in particular on the firms' position within the ecosystem; including what components they create internally, relationships (e.g., alliances or contracts) with other firms, and their assessment of the competitive landscape (e.g., technological uncertainty, degree of competition, etc.). We focused on information that could be corroborated from multiple data sources and was emphasized by multiple informants (Jick, 1979). After the first researcher wrote all of the initial cases, the second researcher revisited the original data to ensure accuracy and comprehensiveness. Given the research in progress status we are currently engaging in sequential coding of the transcribed data. After completing this in-case analysis, we conduct a cross-case analysis in order to examine and compare emergent themes and constructs (Eisenhardt and Graebner, 2007). Using tables and charts (Miles and Huberman, 1994), we will list theoretical constructs and compare them across the cases. We are then going to cycle between emergent theory and case data to clarify the key constructs, and strengthen the associated logical arguments.

4 Initial Results and Expected Contributions

Initial analysis of the data collected suggests that the electro mobility ecosystem poses a complex structure which requires a more sophisticated role and component description. We therefore intend to separate these two concepts - role and components - in order to better analyze the activities of incumbents in the emerging ecosystem. We initially elaborated five components that enable the electro mobility: i) Charging apps i.e., software applications to find and book charging stations ii), electronic vehicles iii) infrastructure, such as charging points, iv) energy and transmission infrastructure and v) software platforms that connect charge points and respective charging apps. Each of our incumbents provides one or multiple of these components and henceforth acts in different roles . However, what further emerged is each of these components drew on distinctive capabilities and had little value in isolation, thus making the ecosystem logic particularly salient to the manager, as Theta described: "*That is no use if we work against each other here, but we must work together so that we can solve the issue at all*".

Moreover, we could observe constructs such as "trust" and "uncertainty". For example, the Vice President of Beta noted: "*You can notice that the topic is hot at the moment and that everyone is still looking for it.*" The head of Zeta's mobility services argues along the same lines. "*Now is the time to notice that electro mobility is moving out of its niche into the mainstream. These are classic times when all sorts of players feel called upon to move in the direction of new business models.*" These statements reflect the electro mobility environment in a highly dynamic projection. To respond to these environmental dynamics, incumbents need the ability to dynamically adapt their resources as the director for innovation of Epsilon explained: "*If I'm in a market where I don't even know how it will look like tomorrow. And where I don't know […] how the USPs and the market will look like at the end of the day, I can only come to the conclusion that I must be adaptable.*" Particularly in nascent ecosystem structurers, firms face the challenge to integrate, build, and reconfigure internal and external competences to address rapidly changing environments (Teece, 2007). This can be accomplished by scanning the environment, by identifying changes and opportunities, learning and responding to the observations and reorganizing structures and processes. These sensing, seizing and reconfiguration processes, steers our initial analysis towards dynamic capabilities (Teece, 2007). The importance of dynamic capabilities is significantly reflected in our data, as the product manager of Beta explains with focus to their reconfigured market approach: *"So we have worked very hard on incentives and for the first time created an incentive system for free electric charging at work[...].So we created a first pull and awakened the first market needs"*. Given these importance of dynamic capabilities, we are currently reviewing the literature on the role of dynamic capabilities for navigating ecosystems in general and de novo ecosystems in particular to guide data analysis. Moreover we are also reflecting on what is known about dynamic capabilities of incumbents.

In summation, this paper intends to contribute to the ecosystem literature by enhancing the understanding of how incumbents' dynamic capabilities affect the success in de novo ecosystems. We assume that incumbents with well-defined operational capabilities may pose limited dynamic capabilities in navigating the ecosystem, but they also retain superior resources, which may lead to faster extension of capabilities adaption.

Appendix 1

Guiding Interview Questions	
Task	What role/s does your organization play in the electro mobility ecosystem?
	What competences / technologies does your company have to fulfil this role/s?
	What competences are internally available and what are not?
Process	How do you spot novel innovations / market development in the electro mobility ecosystem?
	How do you adapt your business models and investments to the changing environment?
	How do you adapt or develop your partnership to respond to changing conditions?
Co-Creators	With which organizations are you currently cooperating in the electro mobility ecosystem?
	Why you are cooperating with these organizations, what is the strategical reasoning?
	How is the competitive situation coped within this cooperation?
Value	What is your value of fulfilling your current role/s in the ecosystem?
	How do you capture the value in your current role/s?

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