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Moving small crafts and services enterprises towards green mobility practices: The role of change agents

Dr Tom Erik Julsrud[a]

CICERO Centre for International Climate Research, Oslo, Norway

Dr. Jon Martin Denstadli

Norwegian University of Science and Technology, Trondheim, Norway

[a] Corresponding author: tom.julsrud@cicero.oslo.no

1 Introduction

Many of the greatest environmental challenges are found in urban regions where the intensity of traffic from privately owned vehicles is responsible for increasing local pollution and greenhouse gasses (GHGs). Over the years, a huge number of research activities, plans and policies have been elaborated addressing how to manage a shift from an unsustainable mobility system centered around the privately owned fossil-fuel car towards more sustainable forms (Jochem & Rothengatter, 2016; Wegener, 2013). A shift from fossil-fuel to electric vehicles has proven to be one of the most promising pathways for developing a more sustainable urban mobility system (Moradi & Vagnoni, 2018; Nykvist & Whitmarsh, 2008; Schippl, Gudmundsson, & Sørensen, 2016). Although this may not solve problems related to land use and congestion, it represents an efficient way to reduce noise and local CO_2 emissions (Figenbaum & Kolbenstvedt, 2013; Hawkins, Gausen, & Strømman, 2012)[1].

The interest in electric cars in the private market has grown steadily in Europe, Asia and the US, and in some countries where progressive political measures have been introduced to promote e-mobility, half of all new cars bought are now electric (Hardman, Jenn, Tal, & Axsen, 2018). However, the interest in changing mobility habits among professional urban drivers has lagged behind, and even in markets that are considered frontrunners of e-mobility, the use of *electric vans* (EVs) is marginal (Jon M. Denstadli & Julsrud, 2019). The significant number of trips produced by the fleet of craft and service workers in most cities implies that developing greener everyday behavior in this group could have a strong impact on efforts to reduce emissions of CO_2 in urban regions (Figenbaum, 2019). Recent scenario models of urban transport developments also suggest that transport by light commercial vehicles may continue to increase until 2050 (Brand, Anable, & Morton, 2019). Still, although a range of new e-van models has been introduced in the last few years, it has proved difficult to make e-mobility attractive in the professional market. So far, the interest from research communities has also been minimal; there are almost no empirical studies of the use of EVs among professionals, and the factors that currently are obstructing further adoption of e-cars are therefore largely unknown[2].

Studies of technology adoption in enterprises have on the one hand been dominated by theories that address economic benefits/costs and various social psychological processes(Edwards, Delbridge, & Munday, 2005; Hargreaves, 2011; Julsrud & Denstadli, 2014; Legris, Ingham, & Collerette, 2003). More recently a set of innovation studies has turned attention to how multiple technical innovations can provoke a larger systemic transition when aligned with macro- and meso-level factors. These theoretical strands differ radically as they move away from studies of individual adopters towards analyzing large systemic players including actors, institutions, humans and nonhumans.

[1] It should be noted that emissions from electric cars depend on the energy mix available in the cities. As Norway has close to 100 percent clean energy, these vehicles are practically free from emissions.

[2] But see (Jon M. Denstadli & Julsrud, 2019; Figenbaum, 2019)

The starting point for this paper, however, is social practice theory, in which the main focus is on individuals' everyday routinized performances. In contrast to psychologic and economic approaches, it refuses to see adoption as a question of rational choices or attitudes, and in contrast to transition theoretical framework, it highlights the routinized actions of people rather than the complex dynamics of transition theories (Shove, 2010; Watson, 2012). In line with social practice theories, the focus of this paper is on how well the new sustainable innovations are fitting with existing work practices, viewing the enterprises as communities of practice rather than as formal organizational units, following the logic of rational decision makers or the constraining factors of an organizational environment (Brown & Duguid, 2001; Lave & Wenger, 1991; Pantzar & Shove, 2010; Shove, Pantzar, & Watson, 2012). Although we acknowledge the basic premises of practice theories, we suggest a theoretical framework in which the role of actors and agency in initiating and stabilizing change is given more room. Inspired by Strengers' (Strengers, 2012) work on electricity demand managers, we propose a novel theoretical framework where an element-based version practice is enriched with the concept of *change agents*. We offer a definition of change agents as individuals who seek to make reconfigurations in social practices by introducing technologies, negotiating meaning and initiating learning. The question we raise is how uptake of e-vans among small craft and service enterprises challenges the established mobility practices, and how local change agents are initiating processes that help to stabilize emerging practices.

This paper contributes to theories of proenvironmental innovations in enterprises by explicitly connecting the "element-based" social practice approach, as promoted by Shove et al. (Shove et al., 2012), to the concept of change agency. By applying this new framework in a study of 14 craft and service enterprises adopting EVs, we demonstrate how these processes were strongly affected by the activities of engaged actors that took on a leading role in promoting and facilitating change in practices. The benefit that this approach brings is that it allows for a more fine-grained and richer understanding of how changes occur and also of points of resistance and defection.

In the next section (2), we shall give a brief overview of some current theories on adoption and the use of proenvironmental innovations in organizations before we present our suggested framework. In the following section (3), we go through the context for our case studies—14 enterprises in two Norwegian cities—before we explain the methodology and data (4). This provides the background for the results presented in section 5 and the discussion and conclusions in section 6.

2 Theoretical Overview and Analytical Framework

2.1 Traditional Innovation Theories

The body of studies emphasizing the adoption of innovations at the level of the organization is huge and fragmented, and the various theories have their roots in different disciplines and professions (Edwards et

al., 2005; Lam, 2005). One important group of studies is based on traditional innovation theory and is concerned with how new ideas spread in society through diffusion mechanisms and factors that makes people employ innovations (E. Rogers, 1995; E. M. Rogers & Kincaid, 1981). The *diffusion of innovation* (DOI) approach has been influential across several disciplines, and extended versions are widely applied in studies of uptake of new technologies in organizations (Lam, 2005; E. Rogers, 1995). According to this theory, diffusion is about how an innovation is communicated through certain channels over time to the members of a social system. The point of departure is the famous S-shaped diffusion curve, and the adopters are classified within five ideal-typical groups, depending on where they belong on the adoption curve. The distribution process of an innovation is largely driven by informal and formal communication networks, and important for these processes are "opinion leaders" and also "change agents".

In the social-psychological stream of studies, efforts have been made to integrate new variables into the DOI framework, and theories of reasoned actions (TRA) and planned behavior (TPB) have been particularly influential for much subsequent work. Fishbein and Ajzen developed the TRA to define links between the beliefs, attitudes, norms, intentions, and behavior of individuals (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). Central assumptions of the theory are that a person's behavior is determined by their behavioral intention to perform it, while intentions are determined by attitudes and perceived subjective norms regarding the behavior. One of the most popular offshoots of these approaches, when studying the implementation and adoption of information and communication technology (ICT) in organizations, is the technology acceptance model (TAM)(Davis, 1989; Korpelainen, 2011). This theory aims to predict and explain ICT usage behavior, that is, what it is that causes potential adopters to accept or reject information technology. In the TAM, two theoretical constructs, perceived usefulness and perceived ease of use, are the fundamental determinants of system use, and they predict attitudes toward system use. Despite its popularity, the reliability and usefulness of this theory has been widely questioned, among other things, for ignoring the dynamic social aspects of adoption processes and ignoring contextual and cultural factors (Benbasat & Barki, 2007; Legris et al., 2003).

2.2 Transition Theories

More recently, a stream of studies applying a systemic theoretical approach have come to dominate many innovation studies within organizations and beyond. Transition theories (TMs) represent an extended and more dynamic understanding (F. Geels, 2012; F. Geels & Schot, 2007; F. W. Geels, Sovacool, Schwanen, & Sorrell, 2017; Grin, Rotmans, & Schot, 2010; Rotmans & Loorbach, 2010). A central concern of these researchers is in developing a unifying theoretical framework for understanding innovation and social change based on previous work in sociology, economics and technology. Transition theories build on a traditional diffusion framework but extend to a more complex model operating on multiple social levels. One branch of transition studies that has gained much attention in transport and energy studies during recent years is the multi-level perspective (MLP)(F. Geels, 2002; F. W. Geels et al., 2017). The starting

point for this approach is that the process of change takes place at various systemic levels. The term *niches* refers to small groups of entrepreneurs and early adopters experimenting with innovations at a very early stage. These are often considered as communities of practice in which meaning is in the process of being developed, but where it still stands out as improvised and experimental. At a higher level, there are the *socio-technical regimes*, where technologies have been segmented into more permanent structures and configurations. The importance of certain types of technology and associated practices is backed up by relationships with other groups and social institutions (regimes). Geels (2002) claims that the regimes include cognitive, regulative and normative rules. At the highest level, there are *landscapes* in which technology has become a fundamental part of our understanding of limits of existence. This constitutes the external context in which actors within niches or socio-technical regimes largely have to take for granted. The alignment of these forces enables the breakthrough of systemic innovations and the development of new and alternative transition pathways (2007). In this framework, small enterprises exploring new technologies are usually considered to be niches manoeuvring to nurture pathbreaking innovations; so, it becomes competitive and robust and contributes to regime shifts (Smith & Raven, 2012).

2.3 Innovation as a Change in Practices

A third stream of studies increasingly applied in current innovation studies is *social practice theories.* Following this approach, socio-technical innovations must be understood in the context of how they relate to the social performance of everyday routines and behavior (Nicolini, 2012; S. Ortner, 2006; Shove, 2010; Shove et al., 2012; Shove & Walker, 2010; Warde, 2005, 2014). Technological artifacts play a key role in the formation of social practice, as they externalize aspects of practice and transfer parts of it from the mental sphere to the concrete material world. In essence, practices consist of complex networks of tools, concepts and expectations (Tuomi, 2002). The meaning of a new technology is not grounded in individual decisions but is rather created within a community of users communicating and interacting on a regular basis within a given social context. Meaning has its origins in collaborative practical activities, and the community that reproduces specific meanings is labelled as a community of practice (COP). Following Lave and Wenger (1991), adoption of new practices in enterprises—including new technologies—can be analyzed as processes of learning within a community of users. They have suggested that most of practitioners' learning occurs in social relationships at the workplace rather than in a classroom setting, a concept known as "situated learning". The interactions between novices and experts influence the gradual process by which newcomers create a professional identity.

The foundations for social practice approaches to the analysis of human behavior can be traced back to Bourdieau (1977), Giddens(1984b), Schatzki (2002) and deCertau (1984). According to Reckwitz (2002), a common baseline for these theories is that they consider the social as emergent from the flow of practices. Practices are relatively routinized and sustained ways of enacting a set of elements, and everyday practices are anchored in multiple overlapping ties to the social, technical and cultural fabric of everyday

life. In the definition offered by Reckwitz (2002 ,p. 249), a practice is "a routinized type of behavior which consists of several elements interconnected to one another: forms of bodily activities, forms of mental activities, "things" and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge". The exact boundaries of a given social practice may be difficult to define, but practices can be comprehended as "blocks of activities" whose coordination and interdependence make it meaningful to conceive of them as entities. Such elements include bodily as well as mental activities.

Drawing on the definition offered by Reckwitz above, Shove et al (2012) have suggested that three main elements can be addressed to guide empirical investigations of practices: (1) materials, including the use of tools, technologies and equipment; (2) meaning, referring to the particular idea/image that is related to a particular activity; and, (3) competence and skills (learning) that are involved with an activity. In more specific terms, practices are characterized by the linkages that practitioners make or break between a diverse set of pre-existing elements within these three categories. Innovations in practice accordingly involve a changing combination of symbolic and material ingredients and of competence and know-how (Pantzar & Shove, 2010). We shall return to this "element-based" framework when we discuss our theoretical framework.

2.4 Change Agents, Transformation and Change

Traditional diffusion theory, transition theory and practice theory offer very different perspectives for analysing socio-technical innovations and change in enterprises as well as the particular role of individual actors. Traditional diffusion theory and later psychological adoption theories locate change mainly as a decision in the hands of individual actors or business managers. Individual actors are recognized as sufficiently powerful to initiate change processes, yet decisions to adopt or not are based on the rational choices or on an accumulation of individuals' perceptions and attitudes. The transition approach, however, offers a sophisticated framework for analysing long-range social dynamics, where the role of individual actors is significantly downplayed as a source of change. The uptake and success of particular technologies depends on how well niches operate in concert with other niches and regime players (Hodson, Geels, & McMeekin, 2017; Smith & Raven, 2012). Although minimal, the role of the actor is acknowledged as a driver of niche activities, including network building with other niches and regime actors, assisting learning activities and articulating expectations (deHaan & Rotmans, 2018; F. W. Geels, 2010). The importance of engaged and active individuals had been backed up by empirical studies finding that actors often *are* crucial to forging new networks across niches and towards regime actors (Hargreaves, Hielscher, Seyfang, & Smith, 2013; Martiskainen, 2017; Pilloni, Hamed, & Joyced, 2020; Seyfang & Longhurst, 2013; Yua & Gibbs, 2018).

Practice theories build on a ontology different from the other two theories as they turn attention to the ongoing and reoccurring accomplishments within groups of individuals and their material surroundings

(Nicolini, 2012). Whether a new technology or social innovation has any significant and lasting impact is a question of to what extent it can contribute to a recrafting of ongoing practices by changing their constituent elements, substituting whole practices with alternative ones or changing how practices interlock with other practices (Shove et al., 2012). Most importantly, the approach suggests that the basic unit of analysis for understanding social phenomena is the reoccurring stream of practices, not the practitioners. This implies a radical decentralization of agency as in favor of structures of reoccurring behavior, in which individuals are mere "carriers of social practices" (Reckwitz, 2002, p. 256). Some advocates of social practice theories argue that people do not usually have control over the circumstances in which they find themselves and that change may come from endogenous forces rather than actors (Warde, 2014). Transformation of practices in general is considered to slow processes based on the recrafting of ongoing practices where individual actors are of minor importance. Criticism have been levelled against some variants of practice theories for downplaying the power of individual actors too much (S. B. Ortner, 2006). Yet, there is always an interplay where agents exert influence on the reproduction or disintegration of practices. As argued by Giddens (1994), one of the founding fathers of the practice approach, although individuals follow pathways of well-established social practices most of the time, there is also room for improvisation and the creation of new social practices, in particular when situations are changing. The implementation of new technologies can in itself represent a "trigger event" that paves the way for a change in practices, and under such circumstances, actors may have more opportunities to influence practices than otherwise. In an organizational settings, individuals with assigned roles (managers, IT staff, administrators) will also influence the power that certain individuals have to enforce actions and change practices (Orlikowski, 2000; Wenger & Snyder, 2000).

Within the field of practice studies, new attention has been brought to how social practice members engage in active establishment, resistance and manipulation of ongoing practices. Practice studies that recognize the importance of local actors in initiating social practice change can be found in studies of consumer goods (Røpke & Christensen, 2012), shared mobility (Kent, Dowling, & Maalsen, 2017) and community energy (Hargreaves et al., 2013). In the field of energy demand management, Strengers (2012) has suggested that the concept of *change agency*—initially developed in the DOI approach—could be reframed through the lens of social practice theory. In analysing households' electricity demands, Strengers argues that demand managers could refocus their role on "a new breed of change agents" that "both deliberately and inadvertently are reconfiguring the elements of problematic practices" (p. 233). Following Strengers, agent include designers of technologies as well as policymakers and manufacturers. Most critical, however, are the performers of the practice who in their everyday lives demonstrate adaptiveness and inventiveness in modifying, scheduling and transforming current routines when the elements of practices are reconfigured.

2.5 Analytical Framework

In this paper, we suggest a theoretical framework within which individuals in communities have room to influence the establishment, stabilization and fragmentation of social practices in enterprises. As a point

of departure, we follow up on Strenger's suggestion, taking up the concept of change agents, but we take it a step further and relate this to three key elements constituting a social practice: meaning, technologies and competence, as suggested by Shove et al. (Shove et al., 2012). Change in social practice occurs as links between elements are broken, reconfigured and realigned in new constellations. As indicated in Figure 1, engaged individuals—change agents—may intervene or enhance the process by facilitating connections between elements, for instance by suggesting linkages between a certain meaning and a technological artefact. The transformations in practices within organizations can in general be described according to three stages: stability, reconfiguration and realignment (Shove et al., 2012). The first stage is the preintroduction stage, where existing technologies are used, and there is a balanced connection between the technologies in use, their particular meanings for the community, and the skills and knowledge required to handle them. In the second stage, a novel technology is introduced, and the other elements are challenged. New ideas or competences may need to be activated as the technology is taken into use in the community of practitioners. This is the stage at which change agents may play a particularly important role in suggesting reasons why this technology "makes sense" for the group and how it should be framed in the context of their daily work. The change agent can also actively take part in learning, even if he or she does not necessarily possess the requisite skills. Yet, the functioning of a technology can improve when change agents, for instance, facilitate demonstrations or group discussions. An innovative technology may find a place in the community if the elements are realigned and stabilized and the new practice is aligned with other practices in the group. In the last stage, a new practice enters a state of reproduction and becomes a part of the everyday routines in the organization, or it is rejected, and the initial way of working is re-established.

As suggested in this framework, agents can and usually will be engaged in social practice changes as new technologies are adopted in their daily work. This does not imply that a manager or someone else has the power to enforce a connection or dictate a particular meaning but that there is room to facilitate and enhance the reconfigurations. In the following analysis, we shall use this framework to explain how change agents in 14 small crafts enterprises were involved in efforts to reconfigure and realign elements related to mobility practices.

Figure 1

Change Agency and Transformation of a Social Practice

3 Case Study Context

This paper is based on a study of 14 craft and service enterprises located in the two largest cities in Norway: Trondheim and Oslo. Since the government has established a comprehensive incentive scheme to stimulate the adoption of battery electric vehicles (BEVs), the level of adoption is high. These schemes include both monetary (e.g., VAT exemption) and nonmonetary (e.g., access to bus lanes) incentives. This policy has been highly successful; since 2013, the market share of BEVs has increased to 18 percent (Fearnley, Pfaffenbichler, Figenbaum, & Jellinek, 2015; Figenbaum & Kolbenstvedt, 2016). Professional BEV users, however, have lagged behind. Their proportion increased slightly until 2014, but since then it has been stable at around one per cent of the total stock of vans in Norway[3]. Yet the potential for reduction in emissions from the crafts and services market is significant. Studies indicate that between 5 and 10 percent of all car trips in the three largest Norwegian cities are made by vans or small lorries (Jon Martin Denstadli, Vågane, & Wethal, 2014). This makes it all the more relevant to understand the processes contributing to or hindering transitions to sustainable mobility in groups of potential users.

Figure 2

Electric Vans and Passenger Vehicles: Market Shares in the Norwegian Market. Source: Figenbaum (2019)

From the perspective of transportation, craftsmen are a particularly challenging group of mobile workers since their job requires carrying tools, materials and other equipment requiring car transportation. Unlike "white collar" professionals, who can use public transport or even nonmotorized modes of travel when moving between clients (in urban areas), craftsmen have few alternatives to the car. Their travel therefore amounts to a considerable number of trips in urban areas on weekdays. According to figures from Statistics Norway (SSB), the crafts industry employs some 250,000 people in Norway, corresponding to 10 percent of the workforce.[4]

The boundaries between craftsmen and service workers are blurred. However, the latter group is more comprehensive, involving employees in public and private sectors (hotels, restaurants, health and social services, among others). The service sector is among the largest and fastest growing in Norway, as in most modern economies, and represents over 60 percent of the workforce in Norway[5]. The proportion involved in related mobile services is unknown, but it may be assumed to be significant. The large majority of craft and service enterprises are small and medium sized, and in these enterprises, uptake of

[3] Figures downloaded from Statbank produced by Statistics Norway: https://www.ssb.no/en/statbank/table/11823/. Webpage last visited April 2019.

[4] ssb.no/emner/06/01/yrkeaku/ttab-2012-04-26-01.html

[5] https://www.ssb.no/arbeid-og-lonn/statistikker/regsys/aar/2016-05-27?fane=tabell&sort=nummer&tabell=267368

new technologies is usually done informally through small-scale testing, in contrast to larger organizations where this usually is regulated by predefined protocols and guidelines (Klewitz & Hansen, 2013).

In both Oslo and Trondheim, the number of registered vans has grown in recent years. According to a recent study, the number of registered vans in Norway has increased by almost 70 percent during the last decade, more than twice the growth of passenger cars (Jon Martin Denstadli et al., 2014). The study estimates that craftsmen's travels amounted to 11 percent of the vehicles passing through the toll stations in Oslo on an average workday and five percent in Trondheim.

4 Methodology

This study relied on qualitative interviews with managers and employees in craft and service enterprises that have taken EVs into use. The number of enterprises that have bought such vans is small, as mentioned above, and to get information about early users, we consulted the national registry of EV owners. We also contacted three of the largest distributors of EVs to the Norwegian market—Renault, Peugeot and Nissan—to get information about buyers[6]. We then approached a selection of enterprises that fall within the relevant business categories in the two cities. Thus, the sample was based on informants that are theoretically relevant, even if not representative of a larger diversified group of early adopters.

Qualitative investigations were conducted at 14 enterprises that had purchased one or more EVs during the previous 1–3 years. In total, 27 employees and managers were interviewed alone or together, and all interviews were conducted in the workplace. On the one hand, the sample included a number of traditional crafts industries, including carpentry, electrical, bricklaying, painting and roofing enterprises. On the other hand, it included a number of enterprises in service-related industries, including cleaning, security, home care and caretaking services (Table 1). The interviews took place in the period January–May 2015.

All of our informants were either managers or employees with a high level of daily mobility. All were involved in different types of travel activities within the two city centers. Tasks carried out in the service enterprises may be on the "periphery" of what is usually considered craft work. However, inclusion of these enterprises was beneficial because it ensured a certain amount of diversity across cases. While crafts enterprises were usually at an early stage in the adoption process, many service enterprises had several years of experience. Service enterprises can therefore function as points of reference for crafts businesses.

It should be noted, however, that there were some key differences between the craft and service enterprises in this sample: The crafts businesses were typically small-scale Norwegian enterprises with 3–

[6] Four small electric vans are available on the Norwegian market (Nissan E-NV200, Renault Kangoo, Peugeot Partner and Citroën Berlingo) (Figure 1), ranging in price from NOK 199,900 to 216,000. Electric vans are exempted from all procurement and investment taxes. The Nissan and Renault vehicles are available in several versions. The nominal range is 170 km and the battery warranty is 5 years/100,000 km

20 employees. The service employers were often departments of larger private or public enterprises [10,11]. In all cases, however, the interviewees were part of smaller groups of 3–20 individuals, making it reasonable to consider them as communities of practice.

Table 1

The Craft and Service Enterprises Studied. (If the Enterprise is Part of a Larger Enterprise the Number of Employees is in Parentheses)

5 Results

It is beyond the scope of this article to give a full picture of the work practices of craft and service workers. Our point of departure here is the "practices as performances", i.e., the observable activities they performed that in some sense involved mobility (Schatzki et al., 2002). A central part of these activities centered around the traditional van or lorry as their most central mobility technology. As we shall show, change agents played a crucial role in this process, which in some cases led to a stable realignment of practices. Thus, this chapter follows the analytical model but focuses in particular on the reconfiguration of practices facilitated by managers as change agents.

5.1 Reconfigurations of Links and Elements

5.1.1 Promoting EVs—Suggesting Meaning to the Community

The adoption of EVs in the small companies was often done without much planning or preparation. In some cases, the initial idea to buy EVs came from a car dealer (PA1, RO1); in other cases, the notion was recommended by other enterprises (BL1, CL1) or simply came on a leaflet in the mailbox (CA2). However, someone in the enterprise responded and took the initiative to test it out further. As outlined above, we understand these people to be agents of practice change. It should be noted, however, that most of the small crafts enterprises were managed by a core of 2–3 people, who in some cases also had started the companies (CA1, EL1, RO1). This meant that the organizations had a very flat structure, where no one was specifically responsible for technology development of the car fleet. The change agent was therefore in most cases an individual in a small community of workers, who either was the first to have the idea of using EVs or had a persistent belief in EVs. This was mostly managers, but sometimes it was people with a strong connection to the manager. In several cases, the change agent was someone who already owned an electric car privately. As one co-manager at a cleaning company said:

"I consider myself an 'e-car guy'. I've been driving electric cars for years. Long before they looked like cars. So I was a driving force behind this, and just after I started the job, I initiated this project …." (Co-manager, CL2)

In the smaller crafts enterprises, implementation was usually informal, with one or two staff members trying out the vehicle for a time to see how it worked. Often the process ended there if the car did not live up to their expectations (PA1, RO1). In the service enterprises, however, the EVs were evaluated more thoroughly before being fully implemented. In some cases, this included programs to educate the intended drivers, and one security company (SE1) had conducted a one-year pilot project followed by a course in "eco-driving". In many of our cases, they described the adoption process up to that point as an "experiment" or a "test" to see whether it could actually work for them (PA1, CA3).

The implementation cannot be understood without relating it to the particular *meaning* attached to this. Typically, the main argument in favor of the EV was cost savings, sometimes also backed up by environmental arguments. Two young managers at a carpentry enterprise explained how the environmental benefits were an important factor in their early motivation.

"It was a time when we were very much interested in electric cars because of the environment. Privately, first and foremost, because you looked very closely at Tesla during that period. (…) And it was quite a coincidence that we ended up with those cars, but the reason we did it, it was because you were involved with that environmental stuff in your spare time too. You looked at Tesla, you looked at electric cars, and you were really proelectric in those days…." (Co-manager, CA2)

However, not everyone was driven by genuine concern for the CO_2 emissions per se. The environmental arguments were mainly framed as a question of "image" more than as contributing to a reduction in GHGs. As the manager at the painting firm explained to us:

"For us, the economic side was the most important thing, but the environmental aspect was also a part of it. And that it was new and exciting. After all, it is timely to think about the environment, and it is a signal to the public. If this had worked optimally we would have milked it for all it was worth in our marketing. Then we would have replaced the whole car park and the whole gang would have driven electric cars, but we haven't come that far yet." (Manager PA1)

The environmental image was considered particularly important for their business sector as one that traditionally had a bad reputation for polluting the environment with "all kinds of chemicals". EVs could help to mitigate this. However, three of the enterprises (RO1, JA1, SE2) had signed agreements with the certification company[7] in which they committed themselves to gradually improving their environmental profile and reducing emissions. They were then awarded a green certificate, making the firm more attractive for potential customers who prefer "green subcontractors". Implementing EVs was one way to improve their scores in the certification scheme.

In addition to the issue of sustainability, an element of being innovative and smart was attached to the implementation. This was related to the image and self-conception of being an innovative firm.

[7] Eco-Lighthouse (Miljøfyrtårn) is Norway's most widely used certification scheme for enterprises seeking to document their environmental efforts and demonstrate social responsibility. http://www.eco-lighthouse.org/

"I can say that we are a company that uses new things in many other areas as well (…) We do not think about things, we are making quick decisions. We're early movers, even though it can turn out badly. All in all, we try to keep ahead, and I think we benefit from that…." (Manager RO1)

Thus, efforts were made to build a connection between the technology and such meanings as being environmentally friendly, smart and innovative. The change agents needed these as "selling points" to obtain goodwill from other partners or employees. However, in many of the enterprises, the negotiation about this was not settled, and managers admitted that the idea that this a smart or green way of travelling was disputed.

5.1.2 Reconsideration of the Meaning of EVs Through Community-Based Learning

As the new vehicles were being introduced in the enterprises, problems of all kinds arose, and in many enterprises, there was strong resistance. Various aspects of the vans were questioned. First of all, there were questions concerning the functionality of the EV, with its more limited travel distance, possible need for charging during the day, and reduced capacity to transport goods. These limitations challenged the mobility-related dimensions and routines mentioned above, although they were accentuated differently across the enterprises. The driving distance for the EVs used in the case enterprises varied significantly; for instance, it was estimated that the vans used by the bricklaying enterprise in the sample were driven approximately 150–200 km per day. For this enterprise, it was important to learn how to find time during the day to charge the batteries. And it was also necessary to find a charging location. Asking the customer for power to recharge was an option, but was something to be avoided, as this could be seen as "unprofessional" (CA3). Electricians (EL1) usually had the advantage of being able to make electricity available for charging at work sites. However, many stated that the public charging infrastructure in their area was inadequate (CA1, PA1).

The "range anxiety" was closely related to the irregularity of their trips. A manager at the painting/decorating enterprise, for instance, explained that they often got calls from customers during the day, calls that required unplanned trips, and this made it difficult to adapt to the capacity of the battery:

"It is the telephone that manages my day. I can plan as much as I like, (…) but when they call from Orkanger (a location outside Trondheim), I just have to go. I cannot say that I don't have charged batteries …." (Manager, PA1)

Unplanned trips were mostly described as a problem for roofing and painting businesses, where service was one of their work tasks. In the service enterprises where the daily trips tended to follow a regular pattern, this was easier to manage. Home care workers as well as cleaners usually followed a predefined route between clients during the day, but the clients of the care worker would change within a geographical zone as a result of changing care needs. Similarly, mobile units in the security enterprises followed a given route between locations, though they could be interrupted by more urgent tasks during

the day. Some of the security workers could have as many as 25 destinations during the day/night, yet nevertheless they followed a predefined route. In general, this made it easier to manage the use of electric power. Thus, as the likelihood of unexpected trips was lower, the use of EVs became more appropriate.

Some respondents told us that the winter had given them unpleasant surprises, as cold weather dramatically reduced the driving range. Stories of employees running out of power and getting stuck in various places were common. As a manager as a carpentry firm (EL1) told us:

"There are always stories…everyone knows someone who has an electric car, and they did not get to the cabin, because it was cold and suddenly ... Yes, such stories, or what is written in the newspapers, they're not always based on the truth. But there is some truth to it as well because we know the cars have a limited range." (Manager, EL1)

Another set of stories included episodes of failed charging at home or elsewhere. For instance, one of the painters (PA1) told us that one morning he could not get to work because one of his children had removed the charging cable from the car.

The small size of the EVs at the time of the study, which limited their capacity for transporting heavy and bulky equipment, was also often highlighted as a drawback. A carpenter told us that the size of the van and its poor loading capacity made it a bad choice for craftsmen:

"So, a guy who is an independent carpenter, he cannot manage with such a car. But, a guy who is an independent electrician, he can, and a plumber too I guess…." (Manager, CA2)

The reactions and resistance during the implementation phase were largely related to functional (material) aspects of the EVs: size, capacity and driving range. But the experiences "rebounded" on the meaning attached to the technology. A manager at a janitorial service (JA13) complained that the staff were reluctant to use the small electric vehicle since it did not look like a "real car" to the customers. At the same time, others saw an opportunity to promote themselves with a green image. Thus, in some enterprises, after a while the EVs were painted with slogans promoting the company as environmentally concerned. The meaning of the technology was thereby re-evaluated during the course of the trials.

5.1.3 Learning to Use EV Technology

In some cases, the way the technology was used was transformed during the learning process. As discussed above, several companies initially perceived the range of the EVs to be insufficient when they first took them into their fleet. This was a key experience and for some also a critical barrier to further use, yet this often took the form of learning to cope with "a new type of car". During the process of learning, the idea of how to use the technology and drive the EV shifted. In particular, learning to drive in ways that charge the vehicle efficiently was an important way to improve the usefulness of the cars:

"There is definitely a competitive edge to it. You must learn to get a calmer driving style. When using the pedal you must think of regenerating, by releasing the gas instead of using the brake. So you drive in a completely different way… you drive more softly then, I think. …."(Manager, EL1)

The manager of a caretaking company at the university (JA2) had a typical role as a change agent. He explained how the employees had learned to drive in ways that saved power:

"… when we started, during the first weeks, we had two postal cars … they went a few miles, and we could hardly manage to get around the route. The cars ran out of power. We then wondered; what are we going to do? So we had a discussion on economic driving, how to save energy through more careful driving, reduced heating, and so on. And there was a competition among our drivers to see how far you actually could get. So, from having to charge every day at lunch, after a while one could get by with charging only twice a week perhaps." (Manager, JA2)

As is evident from this quote, the learning took on a social character, where the technology was the object of discussion and shared activities. At one of the security enterprises (SE2), EVs had been tested out earlier, but the test came to a halt due to problems with charging during the cold season. Implementation was then continued with a more step-by-step approach, where they changed their routines.

"...we bought it [the van] and started to use it in January. And then I took part during the first weeks just to see how it worked. And it went really badly. (…) And we found out the first night that 'this was not very smart to do. I think we should write that down'. But then I thought: after all, we bought these cars. So we have to find some solution." (Manager, SE2)

The manager persuaded the others to continue the process and initiated collective travelling along the routes to improve the way the cars were used and charged:

"...and then we drove around and tested our way forward. Figured out how to charge them and stuff like that (…). So then we found out, we have to figure out how to run the routes. How to drive the car. We also had some courses or discussions with Nissan and… .. and then tried to get a plan for how to solve this. And then we got one car to go on the route at the end. And once we got it up and running, we found out we would like to have one more, and then we got it running too. Then we just decided how many electric cars we were going to use, so within three quarters of a year, we had only electric cars. Now we have seven electric cars." (Manager, SE2)

The persistent learning that had taken place in this small security enterprise illustrates the importance of joint learning and also the role of a change agent as a driving force in the process. The manager in this enterprise thus worked to strengthen a connection between organizational competence and new technology. In the end, this also influenced the understanding of the technology and how they could use it in their work.

On a managerial level, the most demanding challenge was learning to coordinate the use of the cars so that they always had enough power for their tasks. As mentioned, several managers realized that with battery electric vehicles in the fleet, the company needed to plan trips more efficiently on account of the limited battery capacity. This included having staff switch between EVs and regular cars in accordance with expected driving distance, allocating time for charging, and setting up routes where chargers were available. This type of planning was much easier to do, of course, when there were few ad hoc trips and high work flexibility. A manager at one of the carpentry firms explained:

"You have to make sure that you have enough power to arrive, you can't just start driving. So you have to plan your day a little more. There was a transition in the planning during the first days, we have to plan in a slightly different way. There were a couple of such 'empty stream moments' in the first few months, but since then we have had no problems with it at all." (Manager, CA2)

The managers at this small carpentry enterprise managed to reorganize their trips and schedules so that the charging could be done between longer trips. In cases where the employees had very specialized knowledge, and only one or two workers could handle certain jobs, the switching of people and cars could become more difficult. A manager at the painting company perceived that the planning of trips was getting too complicated:

"The planning part is important with such a car, and painters are not necessarily known as the best planners! They are more focused on the task, and should they start thinking about the range of the cars as well, then it will be difficult. The car just has to work. Hard to imagine a craftsman sitting at home on Sunday and planning where to drive on Monday." (PA1)

While the managers in the carpentry firm had acquired skills to handle the need for charging, the painters felt that this was a critical failure of the technology. Managers at this firm expressed a wish to adopt new innovations, but the link between learning and changes in use of technology were weakly developed. In some sense, this enterprise expected to use the EV as if it were a traditional van, without changing anything in how the car was used during the day. Indeed, the willingness of managers and employees to change their routines and reschedule their plans appeared to be an important characteristic of the crafts companies that succeeded with the adoption process. The electrical company succeeded in reorganizing their work-related trips, but it required significant learning and changes in routines:

"For example, if you are going to have lunch, then you take it to a charging station. Or if you come to the company here, then we have a quick charger outside. So when you have to take a break or do paperwork or things like that, you put in the charger. So in a way, you have to focus on charging whenever you can…." (EL1)

6 Discussion and Conclusions

The enterprises and managers in this study were all early adopters of EVs in a segment of users who so far have given little attention to electric vehicles. By focusing on the ways in which the new technology was implemented or rejected in their daily work practices, the study has shed more light on the question of why the adoption of this technology can be challenging for craft and service enterprises and also on how some enterprises have been successful in adopting it as part of their routines.

The study found that some engaged employees, usually managers, played a crucial role in enabling changes to be made in the mobility practices and that in many cases they served as change agents. This was obviously related to the initial move to buy EVs and also to the subsequent practice-based learning and development of necessary skills to handle the technologies related to and materiality of using EVs. The consolidation of links between elements of learning, meaning and technology were thus influenced

by the change agents, but it was also a product of the ongoing communication and negotiations in the community. Figure 3 gives an overview of key themes across the cases, related to the establishment of links between technology-meaning, meaning-competence and competence-technology.

Figure 3

Cross-Case Themes Linking Elements in the Establishment of E—Use as a Social Practice, Facilitated by Change Agents. (M = Meaning, C = Competence and T = Technology)

The connections made between the key elements constituting the new mobility practice were a dynamic and nonlinear process, where it often was impossible to isolate one element from another. Building meaning and developing new skills cycled through an ongoing process of experimentation accompanied by discussions and "sensemaking" (Weick, 1995). As was also evident in Pantzar and Shove's study of the uptake of Nordic walking (Pantzar & Shove, 2010), the elements of practice were continuously transformed during the innovation process in response to experiences and discussions. Clearly, the knowledge and images that were drawn upon were not primarily produced within the group, but were taken from a reservoir of pre-existing ideas available in the Western cultural sphere about what an electric car can be used for, what a professional craftsman should look like, etc.

The learning was key, but this depended on change agents' persistence in improving employees' driving style and finding solutions to the "charging problem". Negative experiences from use, such as a craftsman that experienced that he couldn't get to work because a child had removed the charging cable, created images and conceptions of EVs as an unreliable or immature technology. Sharing such "war stories" was part of the learning process, which could easily move from positive to negative appraisals of the technology, and change agents could only control this type of dynamic to some degree. This reflects findings from works in organizational ethnography where sharing of knowledge among practitioners often takes the form of narratives and descriptions of episodes (Brown & Duguid, 2001; Lave & Wenger, 1991; Orr, 1996).

In some enterprises, the trials reached the level of a stable configuration of elements. In one of the groups of security workers (SE2), for instance, employees gradually learned to charge the EVs during the day and drive them in ways that saved battery power. The adaptation to the technology was supported by an understanding of the car as a "green car" that helped to build their company image and also by the idea that this was a "smart" and economic way of moving around. The EV became part of a larger system of practices that took place at the workplace, for instance with charging of vans being aligned with changed practices of where to have lunch (close to chargers) or of commuting.

In other enterprises, the configuration could not be made stable, because the functionality of the cars could not be integrated into the workers' mobility patterns and routines. An example was the painting enterprise (PA1), which found it difficult to coordinate the use of cars in such a way that they would not

run out of power. The experimentation did not lead to improvements, and the EVs gradually came to be seen as unreliable and "unsuited for craftsmen". As a result, the EVs were accorded the status of a curiosity that did not work, and the use of traditional vans was re-established. In most cases the situation followed a slower trajectory, where the companies continued to use the EVs, but only for special types of transport, or as an extra vehicle at the headquarters. In most cases this was related to a lack of trust in the technologies, and ambivalence about the potential role and meaning of these vans for the enterprise. Therefore, in many groups the implementation was rejected, or was put on hold awaiting further technological development

The role of change agents as a facilitator was important, but the study also revealed how the material conditions, in particular as manifested in pre-existing mobility patterns, constrained the enterprises' possibilities to transform their practices. The complexity of the mobility patterns differed significantly, and enterprises with established, ad hoc travel patterns tended to experience more problems with implementing EVs in their transport. The best opportunities for successful adoption were found in enterprises with predictable work routings, mainly security, caretaking and cleaning firms. In addition, the distance of the trips was important, and the most complicated cases had a combination of ad hoc and long-distance travel.

Theoretically this work has suggested that change agents should be viewed as actors influencing the implementation and use of sustainable innovations in small enterprises through the lens of practice theory. In contrast to the strands of organizational innovation literature where the uptake of sustainable innovations is considered to be driven by the adopter's motives/attitudes, a practice approach situates the process of adoption in the community of users. Following the analytical pathway suggested here, the question of adoption and use is reframed as a question of how the new technology can be aligned with the ongoing work practices in the setting of everyday performances of work routines. As we have shown, this requires transformations and adjustments in pre-existing mobility practices that involve the establishment of new meanings and skills adapted to the affordances of the new technology. In a work setting, managers occupy a particularly favorable position to promote and recommend the use of new technology, yet their role as a change agent can be fulfilled by others, probably also outside the formal boundary of the organization. By taking on the role of change agents, engaged individuals facilitated new configurations by introducing technologies, negotiating meaning or initiating learning. Still, as numerous studies have shown, the outcome of the implementation of innovations in organizations depends on much more than a managerial initiative or decision-making (Hatch, 1997; Tsoukas & Chia, 2002). Technologies find their final form after being interpreted and experimented with by a group of potential users (Orlikowski, 2000; Orlikowski & Gash, 1994; Shove & Panzar, 2005). As discussed earlier, the role of agents in creating successful niches has already been recognized in several other works in transition management studies, and our work adds to these works, although with a more elaborate theoretical framework.

This theoretical constellation may appear to contradict one of the central premises of social practice theories, namely, to focus on routinized behaviors rather than individual actors. Yet, the data show that engaged individuals in these small enterprises *did* play an active role in initiating and influencing the establishment of routines in the organization. In particular, change agents made a difference not only by initiating learning but also by suggesting how the technology should be "framed" in the context of the enterprise (Goffman, 1974). Also, Warde (2005) admits that there is room for individuals to influence and remodel everyday life practices, either through the cross-fertilization of practices from one area to another or through differences in the intention and skills to reproduce practices. When the role of agency is thus acknowledged, it becomes evident that routines and social practices also can be sources of change and renewal. In essence, this can be traced back to Giddens, for whom "intended self-regulation" and "reflexivity of the self" are crucial for the reproduction of structure through agency (Giddens, 1984a, 1994). In an organizational context, Feldman and Pentland (2003) argue that although organizational institutional structures define the possibilities available for the participants, in the performance of routines individuals can find room for improvisation and change: "Agency is apparent in each participant's choice of action and the self-monitoring of those actions. The performance aspect reflects individual agency" (p. 109). Thus, social practice provides stability and continuity but also opportunities for change and renewal.

This study of craft and service workers' use of EVs gives a glimpse of how technology interferes with the involved social practices and social mechanisms when the technology is implemented in such a way that it becomes a real alternative to fossil-fuel vehicles. The intention has been to enhance our understanding of the complex social processes that in the end determine whether or not these technologies find a place in workers' daily routines. Obviously, over time, many of the technological features of the EV may be improved, making range and charging less of a problem. Since the time of the study, new electric vans have already been introduced on the market with longer driving ranges and better loading capacities. Yet many other new sustainable technologies are characterized by having novel designs or features, making the question of transformations in social practices and routines relevant in a wider context. A case in point is the use of smart mobility applications to reduce travel activity (Kunzmann, 2014) or applications for mobility as a service (Wong, Hensher, & Mulley, 2017). Thus, we believe that insight into these processes is important not only from an academic point of view but also to serve as tools for policy makers and developers of technology with the ambition to develop green mobility solutions for the future urban environment.

This work was based on fieldwork in a relatively small set of enterprises, and it has some shortcomings that should be mentioned. The data was based on personal interviews with selected peoples—mostly managers—and they were gathered on single visits at their premises. Only male informants were interviewed, reflecting the gender skewness typical of for much of the Norwegian crafts industry. We welcome further works that are able to study changes in social practices in enterprises over longer periods, exploring the role and work of change agents in more depth, and which include a richer set of respondents.

References

Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior.* . NJ, Englewood Cliffs: Prentice-Hall.

Benbasat, I., & Barki, h. (2007). Quo Vadis, TAM? *Journal of the Association of Information Systems, 8*(4), 211-218.

Bourdieu, P. (1977). *Outline of a theory of practice.* Cambridge: Cambridge University Press.

Brand, C., Anable, J., & Morton, C. (2019). Lifestyle, efficiency and limits: modelling transport energy and emissions using a socio-technical approach. *Energy Efficiency, 12*, 187-207.

Brown, J. S., & Duguid, P. (2001). Knowledge and organization: A social-practice perspective. *Organizational Science*(12 (2)), 198-213.

Certeau, M. d. (1984). *The Practice of Everyday Life.* Berkley: University of California Press.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology *MIS Quarterly, 13*(3), 319–342.

deHaan, F., & Rotmans, J. (2018). A proposed theoretical framework for actors in transformative change. *Technological Forecasting & Social Change, 128*, 275-286.

Denstadli, J. M., & Julsrud, T. E. (2019). Moving Towards Electrification of Workers' Transportation: Identifying Key Motives for the Adoption of Electric Vans. *Sustainability, 11*(14), https://doi.org/10.3390/su11143878

Denstadli, J. M., Vågane, L., & Wethal, A. W. (2014). *Volumes of craftsmen transport in urban areas. Report 1336/2014.* Retrieved from Oslo:

Edwards, T., Delbridge, R., & Munday, M. (2005). Understanding innovation in small and medium-sized enterprises: a process manifesto. *Technovation, 25*, 1119-1127.

Fearnley, N., Pfaffenbichler, P., Figenbaum, E., & Jellinek, R. (2015). E-vehicle policies and incentives – assessment and recommendations. Report 1421/2015. *Report 1421/2015.*

Feldman, M. S., & Pentland, B. T. (2003). Reconceptualizing Organizational Routines as a Source of Flexibility and Change. *Administrative Science Quarterly, 48*, 94-118.

Figenbaum, E. (2019). Can battery electric light commercial vehicles work for craftsmen and service enterprises? *Energy Policy, 120*, 58-72.

Figenbaum, E., & Kolbenstvedt, M. (2013). *Electromobility in Norway - Experiences and Opportunities with Electric vehicles.* Retrieved from Oslo:

Figenbaum, E., & Kolbenstvedt, M. (2016). Learning from Norwegian battery electric and plug-in hybrid vehicle users – results from a survey of vehicle owners. . *Norwegian Institute of Transport Economics, TØI-Report*(Oslo).

Fishbein, M., & Ajzen, I. (1975). *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research.* Reading: Addison-Wesley.

Geels, F. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research Policy, 33*(6-7), 897-920.

Geels, F. (2012). A socio-technical analysis of low-carbon transitions: introducing the multi-level perspective into transport studies. *Journal of Transport Geography, 24*(2012), 471-482.

Geels, F., & Schot, J. (2007). Typology of sociotechnical transition pathways. *Research Policy, 36*, 399-417.

Geels, F. W. (2010). Ontologies, socio-technical transitions (to sustainability), and the multi-level perspective. *Research Policy, 39*, 495-510.

Geels, F. W., Sovacool, B. K., Schwanen, T., & Sorrell, S. (2017). The Socio-Technical Dynamics of Low-Carbon Transitions. *Joule, 1*(3), 463-479. doi:https://doi.org/10.1016/j.joule.2017.09.018

Giddens, A. (1984a). *The Constitution of Society.* Berkley / Los Angeles: University of California Press.

Giddens, A. (1984b). *The Constitution of Society. Outline of the Theory of Structuration*. Cambridge: Polity Press.
Giddens, A. (1994). Risk, trust, reflexivity. In U. Beck, A. Giddens, & S. Lash (Eds.), *Reflexive Modernization* (pp. 184-197). Cambridge UK: Polity Press.
Goffman, E. (1974). *Frame Analysis: An Essay on the Organization of Experience.k*. New York: Harper Colophon.
Grin, J., Rotmans, J., & Schot, J. (2010). *Transitions to Sustainable Development. New Directions in the Study of Long Term Transformative Change*. New York: Routledge.
Hardman, S., Jenn, A., Tal, G., & Axsen, J. (2018). A review of consumer preferences of and interactions with electric vehicle charging infrastructure. *Transportation Research Part D: Transport and Environment, 62*, 508-523.
Hargreaves, T. (2011). Practice-ing behaviour change: Applying social practice theory to pro-environmental behaviour change. *Journal of Consumer Culture, 11*(1), 79-99.
Hargreaves, T., Hielscher, S., Seyfang, G., & Smith, A. (2013). Grassroot innovations in community energy: The role of intermediates in niche development. *Global Environmental Change, 23*, 868-880.
Hatch, M. J. (1997). *Organization Theory: Modern, Symbolic and Postmodern Perspectives.* . Oxford: Oxford University Press.
Hawkins, T., Gausen, R., & Strømman, O. M. (2012). Environmental impacts of hybrid- and electric vehicles - a review. *International Journal of Life Cycle Assessment, 17*, 997-1014.
Hodson, M., Geels, F., & McMeekin, A. (2017). Reconfiguring urban sustainability transitions, analysing multiplicity *Sustainability, 9*(2), 299.
Jochem, P., & Rothengatter, W. (2016). Climate change and transport. *Transportation Research Part D, 45*, 1-3.
Julsrud, T. E., & Denstadli, J. M. (2014). Adoption of transport related innovations in the craft industry: Key theoretical approaches. *TØI-report, 1326/2014*.
Kent, J., Dowling, R., & Maalsen, S. (2017). Catalysts for transportation transitions: Bridging the gap between disruption and change. *Journal of Transport Geography, 60*, 200-227.
Klewitz, J., & Hansen, E. G. (2013). Sustainable-oriented innovation of SMEs: a systematic review. *Journal of Cleaner Production*, 1-19.
Korpelainen, E. (2011). *Theories of ICT System Implementation and Adoption – A Critical Review*. Retrieved from Helsinki: http://lib.tkk.fi/SCIENCE_TECHNOLOGY/2011/isbn9789526041506.pdf
Kunzmann, K. R. (2014). Smart Cities: A New ParadigmOf Urban Developmen. *CRIOS*, 9-19.
Lam, A. (2005). Organizational Innovation. In J. Fagerberg, D. C. Mowery, & R. R. Nelson (Eds.), *The Oxford Handbook of Innovation* (pp. 115-147). Oxford: Oxford University Press.
Lave, J., & Wenger, E. (1991). *Situated learning. Legitimate peripheral participation*. Cambridge: Cambridge University Press.
Legris, P., Ingham, J., & Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information & Management, 40*(3), 191-204. doi:https://doi.org/10.1016/S0378-7206(01)00143-4
Martiskainen, M. (2017). The role of community leadership in the development of grassroots innovations. *Environmental Innovation and Societal Transitions, 22*, 78–89.
Moradi, A., & Vagnoni, E. (2018). A multi-level perspective analysis of urban mobility system dynamics: What are the future transition pathways? *Technological Forecasting & Social Change, 126*, 231-243.
Nicolini, D. (2012). *Practice Theory, Work & Organization*. Oxford: Oxford University Press.
Nykvist, B., & Whitmarsh, L. (2008). A multi-level analysis of sustainable mobility transitions: Niche development in the UK and Sweden. *Technological Forecasting & Social Change, 75*, 1373–1387.

Orlikowski, W. J. (2000). Using technology and constituting structures: A practice lens for studying technology in organizations. . *Organization Science, 11*(4), 404-428.
Orlikowski, W. J., & Gash, D. C. (1994). Technological frames: Making sense of information technology in organizations. . *ACM Trans. Inform. Systems, 12*(2), 174–207.
Orr, J. (1996). *Talking about Machines. An Ethnography of a Modern Job*: Cornell University Press.
Ortner, S. (2006). *Anthropology and Social Theory: Culture, Power, and the Acting Subject*. London: Duke University Press.
Ortner, S. B. (2006). *Anthropology and Social Theory. Culture, Power and The Acting Subject*. Durham & London: Duke University Press.
Pantzar, M., & Shove, E. (2010). Understanding innovation in practice: a discussion of the production and re-production of NordicWalking. *Technology Analysis & Strategic Management, 22*(4), 447–461.
Pilloni, M., Hamed, T. A., & Joyced, S. (2020). Assessing the success and failure of biogas units in Israel: Social niches, practices, and transitions among Bedouin villages. *Energy Research and Social Science, 61*, 101328.
Reckwitz, A. (2002). Toward a theory of social practices:a development in cultural theorizing. *European Journal of Social Theory, 5*(2), 243-263.
Rogers, E. (1995). *Diffusion of Innovations* (4th ed.). New York: Free Press.
Rogers, E. M., & Kincaid, D. L. (1981). *Communication Networks. Toward a new paradigm for research*. New york: The Free Press.
Rotmans, J., & Loorbach, D. (2010). Towards a Better Understanding of Transitions and Their Governance. In J.Grin, J.Rotmans, & J.Schot (Eds.), *Transitions to Sustainable Development. New Directions in the Study of Long Term Transformative Change .Part II* (pp. 105-220). New York: Routledge.
Røpke, I., & Christensen, T. H. (2012). Energy impacts of ICT - Insights from an everyday life perspective. *Telematics and Informatics, 29*, 348-361.
Schatzki, T. R., Knorr-Cetina, K., & Savigny, E. v. (2002). *The Practice Turn in Contemporary Theory*. London: Routledge.
Schippl, J., Gudmundsson, H., & Sørensen, C. H. (2016). Different pathways for achieving cleaner urban areas: A roadmap towards the white paper goal for urban transport. *Transportation Research Procedia, 14*, 2604-2613.
Seyfang, G., & Longhurst, N. (2013). Desperately seeking niches: Grassroots innovations and niche development in the community currency field. *Global Environmental Change, 23*(5), 881-891.
Shove, E. (2010). Beyond the ABC: Climate Change Policy and Theories of Social Change *Environment and Planning A, 42*, 1273-1285.
Shove, E., Pantzar, M., & Watson, M. (2012). *The Dynamics of Social Practice*. London: Sage.
Shove, E., & Panzar, M. (2005). Understanding innovation in practice: a discussioon of the production and reproduction of Nordic Walking. *Journal of Consumer Culture, 5*(1), 43-64.
Shove, E., & Walker, G. (2010). Governing transitions in the sustainability of everyday life. *Research Policy, 39*(4), 471-476.
Smith, A., & Raven, R. (2012). What is protective space? Reconsidering niches in transitions to sustainability. *Research Policy, 41*, 1025-1036.
Strengers, Y. (2012). Peak electricity demand and social practice theories: Reframing the role of change agents in the energy sector. *Energy Policy, 44*, 226-234.
Tsoukas, H., & Chia, R. (2002). On organizational becoming: Rethinking organizational change. *Organisational Science, 13*, 567-582.
Tuomi, I. (2002). *Networks of Innovation. Change and Meaning in the Age of the Internet*. Helsinki: Oxford University Press.
Warde, A. (2005). Consumption and Theories of Practice. *Journal of Consumer Culture, 5*(2), 131-153.

Warde, A. (2014). After taste: Culture, consumption and theories of practice. *Journal of Consumer Culture, 14*(3), 279-303.

Watson, M. (2012). How theories of practice can inform transition to a decarbonized transport system. *Journal of Transport Geography, 24*, 488-496.

Wegener, M. (2013). The future of mobilities in cities:Challenges for urban modelling. *Transport Policy, 29*, 275-282.

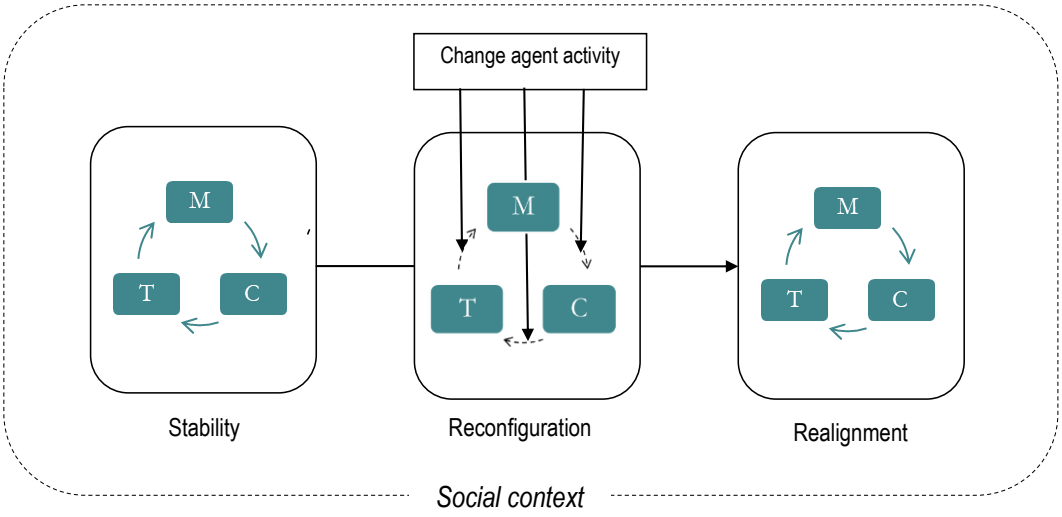
Weick, K. E. (1995). *Sensemaking in Oganizations*. Thousand Oaks, California: Sage.

Wenger, E., & Snyder, W. (2000). Communitites of Practice: The organizational Frontier. *Harvard Business Review, January- February*, 139-145.

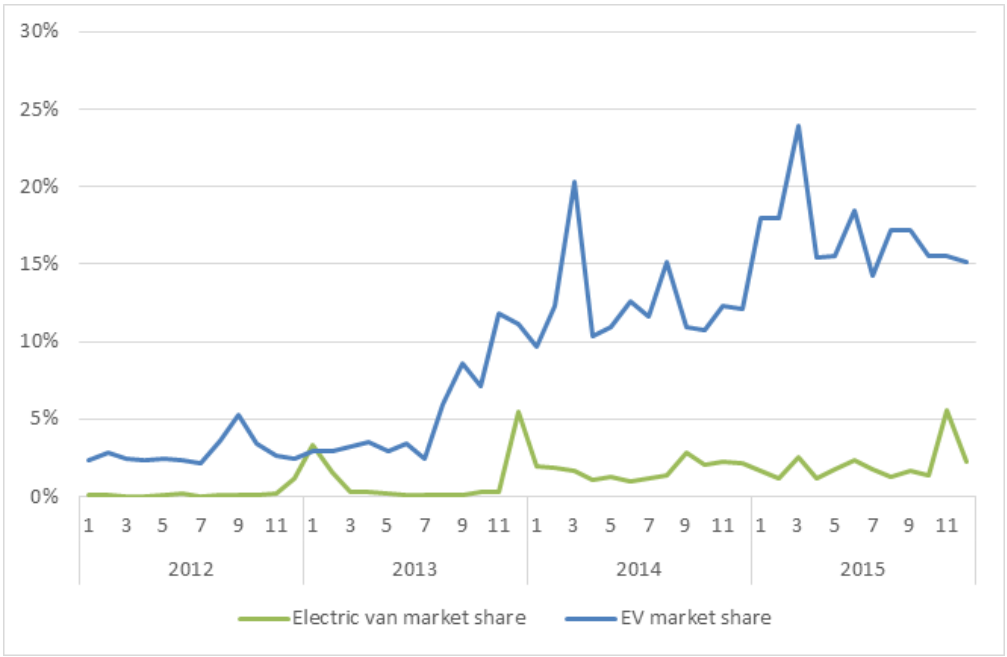
Wong, Y. Z., Hensher, D. A., & Mulley, C. (2017). *Emerging transport technologies and the modal efficiency framework: A case for mobility as a service (MaaS).* . Paper presented at the Thredbo, Stockholm.

Yua, Z., & Gibbs, D. (2018). Social ties, homophily and heterophily in urban sustainability transitions: User practices and solar water heater diffusion in China. *Energy Research & Social Science, 46*, 236-244.

Figure



Figur 1 Change agency in the process of social practice change



Figur 2 Electric vans and passenger vehicles: market shares in the Norwegian market. (Source: Figenbaum, 2019)

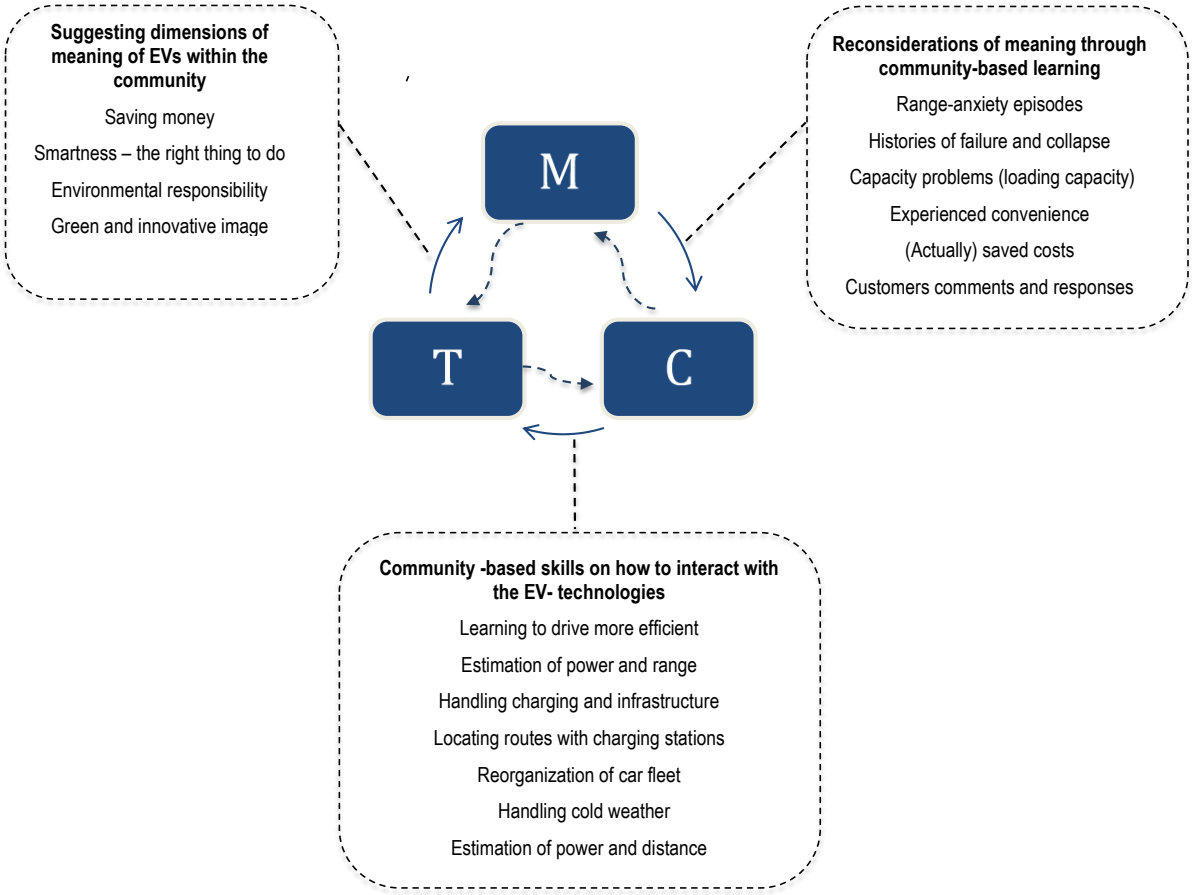


Figure 3 Cross-case themes linking elements in the establishment of EV- use as a social practice, facilitated by change agents. (M=Meaning, C=Competence and T = Technology).

Table