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Social innovations for transitioning towards sustainable mobility

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Abstract

Mobility is a basic need human need, fostering personal interrelations and exchange of good. Growing mobility also bears negative side effects and costs increase. In search for new mobility solutions, technological innovations play a key role when it comes to electric mobility or automated driving. For a successful mobility transition, new spaces for innovative forms and models of sustainable and inclusive mobility services are emerging based on transition thinking. This paper aims to contribute to a better understanding of the scope and impact of social innovations for sustainable and inclusive mobility by providing empirical evidence for shared mobility solutions in rural areas in Austria. It provides evidence for the power of social innovations driven by civic engagement to create local 'niches' and also points out limits for scaling towards systemic change.

Keywords: social innovation; shared mobility; transition thinking

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1. Introduction

Mobility is a key lever to ensure access to societal life and public services for all people. Urban and rural areas are alike are affected by the implications of demographic change, thus the maintenance of public transport and the accessibility of public services is connected to major societal challenges (Banister, 2008). The dominant transport innovation paradigm shows awareness of negative effects; public policy is still quite technocratic and car-centric. Research and development focuses on the support of technological innovation to shift towards energy efficient electric vehicles (electric mobility) or smart traffic management through the roll-out of intelligent traffic systems. Whereas urban areas have received increased policy and industry attention when it comes to socio-technical innovations, rural areas are still struggling with reduced or eliminated public transport and self-organize to find (socially) innovative solutions.

Social innovation initiatives intend make an important contribution towards achieving fundamental transport and mobility goals: firstly, by relating to the potential to reduce the negative effects of transport (greenhouse gas emissions, air pollution, congestions, noise) by implementing new ways of mobility behavior through social innovations; and secondly, by securing mobility as key for access to societal life (public services, employment, leisure), thus ensuring the quality of life of all citizens.

It is evident that the transition towards sustainable transport requires technological and social innovation approaches to go hand in hand at multiple levels with multiple actors for multiple issues. Given the scarcity of robust knowledge available on social innovation in transport and mobility policy and practice in general and with respect to shared mobility in specific, it is essential to gain a better understanding to leverage its potential by taking an explicit geographical perspective. This paper contributes to a better understanding of the scope and potential impact of social innovations for sustainable and inclusive mobility by providing empirical evidence for sharing mobility solutions in rural areas in Austria.

1.1. The need for systemic change for long-term sustainability in transport and mobility

A key objective of the European Union's council of Ministers of Transport is establishing long-term sustainable mobility and transport systems characterized by low energy consumption and improved mobility for users through better transport times and routes. Besides congestion and high noise levels, the main argument for the current mobility and transport system being not sustainable is the significant oil dependency and high causation of CO_2 emissions (EC 2011, 4f.). Two recent European Commission documents — the European strategy for low-emissions mobility (EC, 2016a) and the Commission's 'Reference Scenario' (EC, 2016b) — suggest that, if no additional measures are taken beyond those currently planned, it will be difficult to reconcile high levels of human development (living well) with environmental sustainability i.e. living within environmental limits. Another major challenge is ensuring mobility for all groups of society in order to give access to places, goods and services. The objective resulting from this challenge is achieving inclusive mobility and transport systems that do not exclude parts of society through limited transport options.

The nature of necessary transition and the thus potential for social innovation (Butzin, 2015) relates to both sustainable mobility (challenge: overcoming high CO_2 emissions, air pollution, congestion, and noise levels) as well as inclusive mobility (challenge: ensuring mobility of all groups of society in order to give access to places, goods and services.). In order to be successfully implemented, both strategies include behavioral change as an integral part and there is thus space for social innovation. The strategies can only be implemented in an integrated approach including different actors from civil society, public authorities, the private sector, as well as from research and development.

1.2. Transition management for sustainable and inclusive transport and mobility

Transition management is considered an attractive model for sustainable transport and mobility policy-making (Kemp et al., 2011, Loorbach, 2010, Geels, 2012). It was proposed as a new mode of governance to orient policy and societal interactions in the field of mobility more towards sustainable mobility as current policy, practice and research regimes are considered too oriented on technological fixes and criticized for being too fragmented and opportunistic, with experiments being carried out more or less ad hoc, without a coherent future vision and without

sustainability considerations (Kemp et al., 2011). Transition management orients policy more towards systemic and long-term "solutions" (development paths) that are attractive from a user and societal sustainability point of view. Transition management (Kemp and Rotmans (2004) thus calls for utilizing long-term goals and sustainability visions; social experiments with promising technologies and creation of niches for promising technologies; flexible programs for system innovation; and the institutionalization of a long-term innovation agenda based on ideas from innovative outsiders.

Transitions are viewed as the outcomes of developments at the micro, meso and macro level. The micro level is the level of practices, situated in a context of product regimes, regulatory regimes, science and research regimes (conceptualized as meso structures), and the overall macro landscape of values, infrastructures etc. as the broader context (Geels, 2002, Grin et al., 2010). According to the transitions scheme, novelties emerge in niches, particular domains of use, actor constellations and geography. The novelty may be a new practice, a new technology or special government intervention. Novelties must compete with well-developed alternatives under the predominant framework conditions. In the transition perspective this competition is conceptualized as a niche-regime interaction process (Kemp and Rotmans, 2004). In transport, there is a regime of car-centred mobility and a regime of public transport. There are powerful actors behind them and that they have an element of autonomy which makes it difficult for others to gain attention and power, e.g. cyclists or intermodal transport. The sociotechnical landscape is the wider context for mobility practices and regimes. It is composed of infrastructure and other physical aspects (houses, cities, ...), systems of governance, political associations, regulations, societal values, beliefs and concerns, the media, prices and incomes, social security and so on (Geels, 2002).

1.3. Measures and policies that can create regime change: shared mobility

Shared mobility is seen as a key lever for creating more sustainable and inclusive mobility futures (European Environment Agency, 2016). Developments in information technologies have led to new business models which have the potential to rewrite the rules of mobility including a focus on options for sharing, both for private and public transport, especially in cities. Shared mobility covers a wide range of services, ranging from established options such as car sharing, carpooling and bicycle sharing to more recent services, such as on-demand rides. In broader definitions, it also includes smartphone apps that enable the implementation of such services. Shared mobility is able to complement or substitute public transport: wherever shared mobility is a complement to public transport, it can be an effective tool to bridge the first and last mile in a transport chain. Shared mobility is also able to complement or substitute private transport, thus reducing the number of trips and the (European Environment Agency, 2016). Yet, although there are many plans, the realization of car-sharing as sustainable shared mobility on the ground is uneven. Current users of shared mobility tend to be younger, better educated, live in urban areas, and have less car-dependent lifestyles than the general population. The observed behavioral changes may not necessarily extrapolate over to the general population (European Environment Agency, 2016).

2. Social innovation

Social innovations have gained prominence on policy and research agendas (Reeder et al., 2012). Expectations rest on the assumption that social innovation can ultimately drive societal change and empower actors to deal with societal challenges and a retreating welfare state (Avelino et al., 2017).

Stronger solutions are required from markets and public policy to speed up the transition towards sustainable mobility practices. Social innovation initiatives intend make an important contribution towards achieving fundamental transport and mobility goals: firstly, by relating to the potential to reduce the negative effects of transport (greenhouse gas emissions, air pollution, congestions, noise) by implementing new ways of mobility behavior through social innovations; and secondly, by safeguarding mobility as key for access to societal life (public services, employment, leisure), thus ensuring the quality of life of all citizens (SI-DRIVE). In this sense, social innovations encompass new practices (concepts, policy instruments, new forms of cooperation and organization), methods, processes and regulations that are developed and/or adopted by citizens, customers, politicians etc. in order to meet social demands and to resolve societal challenges in a better way than existing practices" (Howaldt 2014).

As with many emerging research paradigms, social innovation definitions come in many different shapes and sizes (Murray et al., 2010). What they have in common though it that they focus on intention, practice and impact of social innovation as solution approaches to tackle societal challenges. For the purpose of this paper, social

innovation will be defined as "a new combination or figuration of practices in areas of social action, prompted by certain actors or constellations of actors, with the goal of better coping with needs and problems than is possible by use of existing practices" (SI-DRIVE; Howaldt and Kopp (2012).

Social innovations promise to increase impact by practicing more bottom-up, user-centered practices of mobility behavior. The scope is growing and includes, amongst others, alternative automotive mobility approaches such as car-sharing and car-pooling, multi-modal mobility supported digitalization or new ways of active mobility such as walking school buses. Increasingly citizens' initiatives get involved in planning car-free city areas to improve the amenity value or closing the gaps in public transport timetables or routes.

Social innovation are considered able to bring about new forms of social interaction that empower actors to undertake strategies and actions which, under certain conditions, lead to transformative, systemic change (Avelino et al., 2017). Key ingredients of transformative social innovations focus on equality, justice and empowerment - from inception to impact (Anderson 2014).

3. Empirical evidence: social innovation solutions for sharing mobility in rural areas

In order to shed more light on the role and dynamics of social innovation in moving towards more sustainable and inclusive mobility systems, we will present empirical evidence from a shared mobility case in a rural area in Austria. Given the paucity of knowledge on this topic, case study research has been identified as an appropriate exploratory tool (Yin, 1984).for better understanding "why" and "how" social innovations contribute to contemporary transitions towards sustainable transport and mobility. In-depth interviews have been conducted with four members of the association in July 2016 and complemented with desk research (web search, newspaper clippings, etc.).

The case will be described along the phases of the social innovation process spiral (Murray et al., 2010).

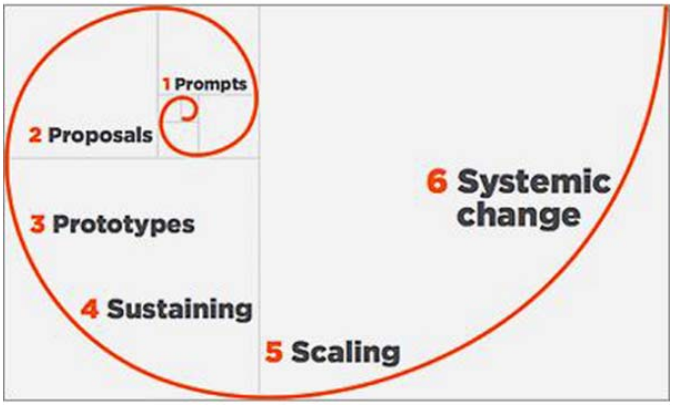

Fig 1 Phases of the social innovation process (Murray 2010)

At the beginning of a social innovation process is a ‚prompt' which is usually based on a social need, embedded in local context; followed by ‚proposals', i.e. first ideas and visions for change. First action steps follow through 'prototyping', where development and testing is conducted to check feasibility. It is then important to ‚sustain' the momentum if the initial successes were to grow and/or 'scale' and eventually lead to 'systemic change'.

3.1. Context, core idea and inception

The municipality of Moosdorf in the area of Innviertel, a region close to the German border the city of Salzburg, consists of several smaller hamlets with very limited local public transport. Thus most residents of Moosdorf depend on private cars. When in 2010 the regional transport plan was put on hold by the provincial government and the last taxi company quit service, early 2011 the idea for the initiative „Moosdorf macht mobil" (German for "Moosdorf mobilizes", short: MMM). Particularly the elderly and those in need of care should benefit from a „village vehicle". These residential groups were at risk of exclusion and personal autonomy. The municipality – represented by engaged citizens and supported by the mayor – decided to develop a shared mobility solution, purchase their own vehicle and offer scheduled on-demand transport service to local institutions and interregional

public transport hubs. The core idea of MMM was to provide accessible and affordable local mobility services for citizens with reduced mobility (physically, financially, etc.). The service has been initiated and is still run by a group of engaged citizens on a voluntary basis.

3.2. Developing visions and goals

In spring 2011 a regional futures process was run by Agenda 21 network and the regional development agency of Upper Austria conducting a survey across the entire municipality – collecting unmet needs in the community. With the results available in January 2012, a group of engaged citizens – with ideational support from the mayor - started to translate the needs in concrete services. The idea of a community-based transportation service emerged quickly. Volunteers should offer collect and on-call trips to doctors, transportation hubs etc. When research showed that a municipality in Salzburg had a similar project running, a site visit was organized to build on existing knowledge and adapt it to own needs.

3.3. Checking feasibility

The investment decision in favor of an electric vehicle and the necessary loading infrastructure made longer and iterative testing and developing de facto impossible. The working team set up in early 2012 and the association established as legal entity steered fast towards „real-time“ operation early 2013. To secure long-lasting success it was nevertheless necessary to prove feasibility by developing a business model and business plan. The calculated loss in the first three years of operation is taken over by the local council based on a council order.
The basic idea was that the „village vehicle“, ideally an environmentally friendly automobile, will ship passengers to their desired destinations within the municipality on five days a week –provided there is no adequate public transport. The project had to transform into a legal entity and was finally established as non-profit association in July 2012 to deliver transport services without the necessity of having a transport services license). For legal reasons, both drivers and passengers are required to be members of the association before the first trip.

The door-to-door service initially provided on-call services within certain hours. Priority was given to a few fixed routes on certain weekdays for defined purposes. Additional destinations were served on demand. When demand finally took off, the attractiveness of the door-to-door service for low cost raised so many individual requests that the service was reduced to those trips for which there is no public transport available) so as not to compete with existing offers. In addition, only pre-booking is accepted to efficiently and effectively schedule destinations. Main target groups and users should be seniors, juniors and women for their trips to doctors, authorities, shopping or leisure activities (festivities etc.). For women, it is now easier to take up a job (part-time) as they can travel autonomously from home to workplace. Young families save on second cars and seniors benefit from conducting an autonomous way of life independent from their (working) children.
With the purchase of infrastructure and equipment, targeted competence building was necessary, including the recruiting and training of voluntary drivers with at least three years of driving experience without accident. All drivers receive special training on driving techniques and a first aid course. A call center takes books via mobile phone and is staffed partly by municipal staff and partly by association members.

3.4. Sustaining the momentum

The non-profit association „Moosdorf macht mobil“ (MMM) was able to help many residents in the municipality to remain physically and socially mobile. This was made possible by approx. 30 voluntary drivers and the concomitant professionalization of the association regarding organization and administration. Nevertheless the team stress that social togetherness is a critical success factor of the initiative. This was particularly the case in the first months of operation when the group experienced drastic acceptance problems. “Being driven” was considered as weakness or even lack of competence throughout many parts of the local population. Thus the team participated and promoted their service at local public events to present themselves to users and sponsors.
Major external resources were provided by public funding from provincial and national programs – for the planning phase (Agenda 21 demand survey) and preparing implementation (Climate Alliance for drawing up the business plan). Sponsorings of local firms and minimal membership fees support the ongoing operation.

3.5. Growing and scaling

By 2016 in its third year of operation, the association sees the entire potential fully utilized with 20% of residents using resp. supporting the "village vehicle". The proponents report that short distance trips are substituted with the emission-free vehicle, thus contributing to reducing greenhouse emissions. To date, there is no systematic monitoring or evaluation being carried out to support further evidence on the impact of the initiative.

The key principle behind this local mobility service is that there is never competition with any commercial or public transport service providers. "*You always have to try to cooperate and get everyone on board. We made our ambition to improve the quality of living of the community members very clear and made sure that we do not intend to compete with other services in the area. The trips we offer could neither be done by public transport because it simply does not exist anymore, nor by local taxi businesses because no one can afford a taxi every time he or she visits the doctor*" (Interview with MMM board member).

Scaling their innovative solution is not important for MMM. Requests for knowledge transfer and experience exchange by other communities are answered on the basis of available (time) resources. The project team has no expressed interest in actively promoting the project or developing a service resp. business model. The social innovation and the associated local impact of social inclusion remains the orientating goal.
MMM encompasses several forms and types of innovation:

- Service innovation: the service offered is that car "hire" by asking someone to drive you. The central idea is to move from no service to service on demand.
- Technological innovations: the electric vehicle is the key technological innovation in the service; it is charged by photovoltaic cells mounted on the roof of the nearby primary school.
- Organisational innovations: MMM is a registered association ("Verein") which allows them to operate mobility services by Austrian law as a non-commercial and non-for-profit service *of* members *for* members. Consequently, all passengers also need to be members of the association.
- Institutional innovations: As mobility service providers need a license and pay taxes by Austrian law, the MMM project team founded a registered non-for-profit association ("Verein") by Austrian law in which both drivers and passengers need to be members. This way service provision is non-commercial and together with the lively dissemination activities serves the assocation's purpose.
- Behavioural innovation: MMM stimulated change in more sustainable mobility behaviour by inducing substitution of private trips. Many passengers had to adapt to planning trips well beforehand instead of having a private car at immediate disposal.

3.6. Towards systemic change

Systemic change in the sense of social transformation is in the case of MMM no explicit goal. Though the proponents of MMM regard themselves as „best practice", their intention is on step-by-step and continuous change (i.e. incremental innovation) towards the desired vision. In developing and implementing the necessary measures, coherence and compatibility with sustainable local development goals and values was important.
Reducing cost was a primary motivation, with social contacts nearly as important. For some also the environmental aspect (electric drive, reducing the number of car trips and thus reduction in CO_2 emissions) was of high significance. However, the initiative does not perceive itself as 'nudge unit', i.e. trying to convince fellow citizens to become more environmentally conscious. The main insights came from the following critical questions over the years:

- Who are our potential customers and how can we make it socially acceptable to use this new, alternative means of 'civic' transportation?
- How can we offer a service that is complimentary and not competitive with potential commercial suppliers of mobility services?

4. Discussion

By purchasing an electric vehicle and powering it with solar energy, the team of „Moosdorf mobilizes" (MMM) successfully established an environmentally friendly local shuttle service serving major points of public and private interest in the district (train station, doctor, pharmacy, church, etc.). The „village vehicle" represents a material symbol for the highly-customized social and environmental intervention and the impact it generates: citizens with reduced mobility were offered better (equal) access to societal life and activities, thus experiencing more autonomy

and quality of life.

The potential for social innovation can be leveraged for both sustainable mobility (challenge: overcoming high CO_2 emissions, air pollution, congestion, and noise levels) as well as inclusive mobility (challenge: ensuring mobility of all groups of society in order to give access to places, goods and services.). Both sustainable and inclusive mobility challenges have thus been addressed in a co-evolutionary mode by MMM. Driven by social innovation, the mobility solution was enabled by a multiplicity of complementary innovations (service, organization, institutional, technological, etc.). With its strong orientation on equality, justice and empowerment - from inception to impact ingredients, MMM shows the key ingredients of transformative social innovations (Anderson, 2014).

In terms of transition management, the socially innovative solution was co-created by various actors on the local level and tailored to the context-specific needs. The service itself is strictly complementary and adaptive to existing transport and mobility offers. The niche-regime interconnection is thus purposefully not addressed by the project owners so as to keep the niche vitally embedded in the local level without risking conflicts with the incumbent mobility regime (e.g. regulations stipulating licensing as taxi company).

Connecting the local experiment processes with multi-level governance is limited to public funding at the national level providing financial support through and expert advice on business model generation. Diffusion and imitation take place selectively on a peer-to-peer and case-by-case basis). The systemic change will most probably remain on the local scale. Upscaling is not planned as this would go beyond the available resources and may have unintended negative consequences on social fabric of team and community.

5. Conclusion

Based on a synthetic account of case study evidence on shared mobility in rural areas in Austria, this paper has sought to contribute to transitions debates on sustainable and inclusive mobility by offering insights and a discussion on why and how social innovations can contribute to improving access to transport and mobility.

Transition management as a new mode of governance for sustainable development aims at resolving persistent problems in transport and mobility systems, based on visions about how mobility needs can be met more sustainably. Engaging with social innovations for sustainable and inclusive mobility contributes to our understanding of the variability and unevenness of shared mobility on the ground and the need for geographically differentiated and context-specific approaches. It is not just single innovations but experimental processes of embedding multiple innovations or schemes simultaneously in a location/context that needs to be better understood.

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