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Socio-Technical Innovations in Urban Logistics: new Attempts for a Diffusion Strategy

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Abstract

Popular diffusion strategies of technical innovations are so far characterized by a type of linear modelling, following the principles of causal communication chains from the developer to the adopter. From this perspective, neither the consumer nor the technology itself is understood as an actor in the diffusion process. Especially in times in which our understanding of the functioning of social systems increase, we should use this knowledge for the initiation of system change. Diverse environmental, health and economic problems are especially in urban agglomerations of working; living and supply reason enough for implementing a sustainable infrastructure in urban logistics. This paper aims to offer an understanding of technology equally operating with humans in actor networks, which influences our behaviour. So to change our behaviour, we have to start changing our interaction models with technology and offer attractive conditions for more sustainable uses. Thus, the diffusion of an innovation won't be the question anymore, but the translation of lifestyles into actor networks, like sustainable structures for intermodal interchanges. This paper can be assigned to the area of governance and policy development and should be read as an attempt for the development of systemic implementation strategies in urban logistics.

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1. Introduction

According to a current forecast by the Organisation for Economic Cooperation and Development (OECD), two thirds of the world population will live and work in cities and urban agglomerations in the year 2050 (OECD, 2012). Even today, cities produce 80 percent of greenhouse gases and consume three quarters of the world's energy requirements (Siemens, 2010). By 2050, outdoor air pollution is projected to become the top cause of environmentally related deaths worldwide (OECD, 2012). This trend shows that the increasing urbanisation claims new sustainable mobility concepts for cities to face the negative externalities of current traffic systems by forcing a social change. Actually, environmentally friendly solutions have been developed long time ago, so the history of e-mobility for example already began in 1881 (BundesverbandeMobilitäte.V., 2016). But after a short period of prosperity combustion engines gained popularity because of assembly line production, longer ranges and the introduction of electrical drives. Against the background of an increasingly propagated ecological awareness in the 21st century, e-mobility found his way – at least in Europe – to the political agenda back again. So the German Government i.e. aims to bring one million electric cars onto the road by 2020 (Bundesregierung, 2016). But despite this ambitious governmental targets and the long-standing technical development of sustainable innovations in the area of traffic systems, electric cars and cargo bikes do lack of diffusion and thus the market share in Germany remains minimal (KBA, 2015). Obviously the lack of technological know-how or ecological awareness doesn't seem to be the problem – it might be the lack of implementation strategies and contextual social awareness.

Still the common sense is to consider technological artefacts as something separate and independent from the social context. As the social sciences normally exclude technology from their scientific field, the engineering sciences are used to exclude the social belongings. Defacto both approaches are inseparably linked with each other, as every technological innovation implicates social conditions and consequences, which therefore have already to be considered in the process of technological development. As follows, designing technology means designing society and designing society means designing technology. A systemic approach on the interface of engineering and human sciences, on civil society, economics and politics is needed to work out co-evolutionary strategies between humans and technological artefacts for the extension of technological acceptance.

The scientific contribution of this paper is the strengthening of logistics in its character as a cross-sectional science, especially by focusing the necessity of its normative part. Lying crosswise to engineering, economic and social sciences as well as to mathematics and informatics, logistics is at least theoretically virtually predestined for translation processes between technical innovations and social needs. The “peek behind the scenes” of social systems that logistics practices by analyzing and modelling material and information flows, reveals what the science theorist Bruno Latour means by the expression: “Humans are no longer amongst its peers” (Latour, 2000).

On the theoretical background of the Actor-Network Theory of the sociologists Bruno Latour (2000) and Michel Callon (2006) and with the help of the design model of Knut Borrmann (2014) an integrative urban intermodal transportation system will be presented hereinafter as one possible systemic approach for a diffusion strategy of sustainable technological innovations. This approach can be understood as a theoretical basis for economic, political and private decision-makers.

2. Theoretical Background: The Actor-Network Theory

The Actor-Network Theory (ANT) of (Latour, 1996) sets the theoretical frame of a socio-technical consideration of technical innovations in urban logistics to elaborate adequate implementation strategies. The ANT is a sociological approach, which arose at the interface of engineering and social sciences itself (Latour, 2005) and therefore understands technological artefacts as nonhuman actors, building up networks with human actors. Thus, it follows a different line to conventional, linear diffusion and life cycle models, like the theory diffusion of innovations (Rogers, 2003), which describes the process of social innovation adoption by individuals and social systems by giving an empirically scrutinized review of the target groups to be addressed in the right chronological order to achieve a successful adoption process. In the understanding of Latour instead, innovation diffusion starts with technology development, which turns into a task of networking by procedural connecting heterogeneous entities. In the present case the electric car can be understood as an actor network, whose components "are the

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