



How institutional logics hamper innovation: The case of animal testing



Marlous Kooijman^a, Marko P. Hekkert^{a,*}, Peter J.K. van Meer^b, Ellen H.M. Moors^a, Huub Schellekens^b

^a Innovation Studies, Copernicus Institute, Utrecht University, Heidelberglaan 2, 3584 CS Utrecht, The Netherlands

^b Utrecht Institute for Pharmaceutical Sciences, Utrecht University, Universiteitsweg 99, 3584 CG Utrecht, The Netherlands

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ABSTRACT

For radical innovation to become successful the substitution of established practices are essential. Nevertheless, in the innovation literature novelty is often at the center and only little attention is paid to the influence of established technologies and underlying routines. This paper aims to contribute to this gap by increasing the understanding about the effect of persistence of established practices on the innovation process. We do this by using a framework that combines the Technological Innovation System approach with an analysis of the institutional logics reinforcing the established practice. The studied case concerns the innovation process to animal-free medicine development. Despite the fact that the substitution of animal tests is called for since the 1980s and animal-free methods are available, animal tests are still being used in medicine development. This study shows that adding institutional logics to the innovation systems analysis creates a much better understanding of the speed and direction of radical innovation.

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1. Introduction

Radical innovations are necessary to tackle the grand societal challenges society is currently facing. The transformation of socio-technical systems, including technical, organizational, economic, institutional, social-cultural and political changes, due to the introduction and diffusion of radical innovation are referred to as sociotechnical transitions (Van den Bergh et al., 2011). The research field of transition studies tries to understand the mechanisms that underlie these complex change processes (Markard et al., 2012). This resulted in frameworks to study the dynamics of transition processes as the Multi-Level Perspective (MLP) and the Technological Innovation System (TIS) approach. Both frameworks recognize that new technologies are key to realize societal transitions and that transitions do not easily occur because new technologies are often poorly aligned with established practices (Kemp et al., 1998; Geels, 2002; Hekkert et al., 2007). Nevertheless, novelty is at the center of attention in most transition studies. For example, the TIS approach focuses on emerging technologies and the development of the innovation system supporting the emerging technology (Negro et al., 2008; Suurs and Hekkert, 2009; Van Alphen et al., 2010). This approach regards the success of innovations mainly as a consequence of the performance of the innovation system and the capability of innovation system actors to impact dominant socio-institutional structures. It does not conceptualize explicitly the broader context outside the TIS such as established

practices (Markard and Truffer, 2008). The importance of a better understanding of the TIS context is stressed in a recent article by Bergek et al. (2015). Contrary to the TIS framework, the MLP framework does take the established practice and underlying rules into account. For this, the regime concept is used. The regime, however, is often analyzed only as a barrier to be overcome or as creating windows of opportunity and not as a dynamic context continuously influencing the innovation process (Geels, 2005; Elzen et al., 2011; Yuan et al., 2012).

In the transition literature there is strong recognition that the success of emerging technologies depends as much on the development of the emerging technology as on changing technical regimes (Kemp et al., 1998; Turnheim and Geels, 2012). Nevertheless, the transition literature pays little attention to understanding how the persistence of established practices and underlying rules can impact the creation of novelty. In MLP terms: far less notice is taken of processes that stabilize the technical regime (Turnheim and Geels, 2012). This paper contributes to this gap by focusing on how established practices persist and influence the innovation process of emerging technologies.

This paper focuses on the persistency of established technologies by taking an institutional theory perspective. This is in line with Fuenshilling and Truffer (2014) who operationalized socio-technical regimes by making use of the institutional logics theory. The term institution refers to rules. Not just rules in the form of a set of commands and requirements, but also rules in the sense of roles and practices that are being established and that are not easily dissolved (Kemp et al., 1998). Following institutional theory stability and change can be understood in terms of institutional logics. Institutional logics refer to 'the belief systems and related practices that predominate in an organizational field' (Scott, 2001, p 139). They provide the organizing principles of a field

* Corresponding author.

E-mail addresses: Marlous.Kooijman@gmail.com (M. Kooijman), M.P.Hekkert@uu.nl (M.P. Hekkert), P.J.K.vanMeer@uu.nl (P.J.K. van Meer), E.H.M.Moors@uu.nl (E.H.M. Moors), h.schellekens@uu.nl (H. Schellekens).

(Friedland and Alford, 1991). A poor fit of emerging technologies with the prevailing institutional logic hampers successful diffusion, because it creates economic, technological, cognitive and social barriers for new technologies (Kemp et al., 1998). Change in the institutional logic is then essential for innovation to become successful (Reay and Hinings, 2009). The reason for deploying the TIS approach in this study is that it is praised for its powerful analysis of the conditions that enable and hamper emerging technological innovation processes (Markard and Truffer, 2008). The aim of this paper is twofold. First, we aim to increase understanding about how established practices persist, often labeled as lock-in, while pressured by novelty and how they influence the innovation process of emerging technologies. We already know that several types of feedback loops reinforce lock-in processes as explained by Unruh (2000) who proposed the concept of Techno-Institutional Complex (TIC). While Unruh (2000) highlights the interaction between technological systems and institutional systems, he under-conceptualized the institutional dimension in lock-in processes. In this study we aim to enrich insight in the institutional dimension of lock-in. Second, we aim to conceptually improve the TIS perspective by combining the TIS approach to analyze the innovation process of emerging technologies with an analysis of the institutional logic related to established practices. Third, applying a framework that stems from institutional theory may be worthwhile for the broader field of innovation studies. The evolutionary perspective on innovation highlights the importance of institutions through the use of concepts like technological paradigms and technological trajectories (Dosi, 1982). Using institutional theory as we propose in this paper may create a more detailed insight in what institutional mechanisms create technological paradigms and trajectories.

We selected the change process towards animal-free testing medicine development as empirical field. Despite the fact that the replacement of animal testing is called for by a range of actors since the 1980s, animal tests are still deeply embedded in medicine development. Therefore, this empirical field is very useful to increase our understanding about why established practices persist when confronted with emerging technologies. Furthermore, the desired change process towards animal-free testing shares characteristics with socio-technical transitions. Turnheim and Geels (2012), for example, describe low-carbon transitions as purposive transitions, which are deliberately pursued from the start to solve an explicit set of societal problems. Because private actors have limited incentives to address societal problems (because of market failures and free-rider problems), it is likely that social movements, public opinion, and policy makers play important roles in purposive transitions (Turnheim and Geels, 2012). Just like low-carbon transitions, the change process to animal-free methods in medicine development can be regarded as a purposive change process to solve the problem of the undesired use of animal tests in which private actors have limited incentives.

To explore the persistence of the institutional logic reinforcing established animal testing practices and the effect of this persistence on emerging animal-free methods we study one particular case; the erythropoietin (EPO) potency test in mice. EPO¹ is a biotechnology-derived medicine developed to treat patients with anemia. This case is of particular interest because EPO received market authorization at the end of the 1980s just after European legislation was implemented that discouraged animal testing and promoted the use of animal-free methods. Despite the public resistance to the use of animal tests, and the availability of animal-free methods, European quality control regulation still requires that the potency of every batch of EPO is assessed in mice. We will show that the institutional logics framework explains why the animal test persisted and how the persistency of this

established practice hampered the development and use of innovative (animal-free) methods.

2. Theoretical framework

In the mid-1980s innovation system approaches were developed in reaction to perceived inadequacies to explain innovation and change processes by neoclassical economics (Sharif, 2006). The Technological Innovation System (TIS) approach is one of the innovation system approaches and is used to conceptualize and analyze the complex process of the development, diffusion and use of new technologies (Bergek et al., 2008; Hekkert and Negro, 2009). The basic assumption of the TIS approach is that innovations do not develop in isolation, but that a socio-technical system, including policy and perceived legitimacy, enables the development, diffusion and use of technologies. An innovation system consists of actors that contribute to the innovation process in a wide variety of ways, for instance through knowledge development, supply of financial resources, standardization, and use of the innovation. These actors are constrained and enabled in their actions by the structure of the innovation system that consists of network characteristics, technological artifacts and institutional settings.

The functional analysis of the TIS focuses on the key processes that take place in the innovation system (see Table 1). These key processes are necessary to provide the necessary circumstances for actors to innovate. When an innovation system is in an emerging stage of development, these key processes contribute to the build-up of the innovation system's structure. When this structure is in place, innovation becomes easier. Important features of systems are the strong complementarities that commonly exist between the components of and processes in a system. If, in a system, one critical component or process is lacking, this may block or slow down the performance of the entire system (Hekkert et al., 2007). Thus, when one or more of these key processes do not take place sufficiently, innovation can be hampered (Jacobsson and Bergek, 2011).

The powerful analysis of the performance of emerging technological fields is the key contribution of the TIS approach to innovation studies (Markard and Truffer, 2008). The main critique on this approach is that it regards the success of innovations mainly as a consequence of the performance of the TIS and does not systematically take into account external influences such as established practices and its underlying rules (Markard and Truffer, 2008). In a recent contribution by Bergek et al. (2015) the context of a TIS is conceptualized by distinguishing several context systems, like other TIS, sectors, policy, and geographical systems. While this is very useful, the deep underlying structures that strongly influence agentic behavior in these different context systems is not conceptualized. We take up the challenge of repairing this weakness by making use of the rich body of literature on institutional theory to conceptualize the context of established practices to enrich the TIS approach.

Institutional theory studies the deeper and more resilient aspects of social structures (Scott, 2008). Scott defines institutions as follows: "Institutions are comprised of regulative, normative and cultural-cognitive elements that, together with associated activities and resources provide stability and meaning to social life" (Scott, 2008, p 48). Thus, institutions are the taken-for-granted rules (e.g. regulations, user practices, symbolic meanings) that structure and stabilize the practices of daily life (Seo and Creed, 2002; Kalantaridis and Fletcher, 2012). Institutions have distinctive properties. They are relatively resistant to change and they tend to be maintained and reproduced across generations (Scott, 2008). Institutions control and constrain behavior because they impose restrictions by defining legal, moral and cultural boundaries, setting off legitimate from illegitimate activities (Scott, 2008; Kalantaridis and Fletcher, 2012; Thornton et al., 2012). However, institutions also support and empower activities and actors (Lawrence and Suddaby, 2006; Thornton et al., 2012). Institutional scholars study how

¹ EPO is a natural occurring hormone EPO controls the red blood cell production in humans. A lack of this hormone causes anemia. EPO is also known as a forbidden performance-enhancing drug in professional sports.

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