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Consumption, Configurations and Innovation: Exploring New Patterns of User Dynamics

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In this paper, we explore, both conceptually and empirically, the recent turn towards more hybrid technologies, usually referred to as technological configurations (Fleck, 1993; Peine, 2009; Voss et al., 2010). In particular, we address the policy implications of more differentiated patterns of consumption with more active and co-creating consumers that help create such configurations. Configurations are technological systems, yet their overall identity depends on local contingencies and on the (enacted) prescriptions of users. Configurations bring together technical components, software, standards, services and user practices in more or less unique ways, and they are thus dependent on specific contexts of applications. Recent examples are infrastructure technologies like Smart Grids, Tele (Health) Care, or e-mobility and consumer technologies like Smart Homes or learning technologies. Understanding the configurational nature of these emerging systems, we claim, is a key element towards devising adequate policy measures for their creation and diffusion thus fostering growth and social welfare by innovation policy.

This paper particularly discusses and explores the marked shifts in the role of consumers as drivers of distributed innovation processes around technological configurations. We build our analysis on Fleck's original studies of configurations, which have analyzed industrial technologies and highlighted shifting roles for the organizational routines of corporate users in technological development (Fleck, 1988 & 1994 & 2000). Our empirical domains as highlighted above, however, also heavily involve infrastructure and consumer technologies, and, therefore, consumers as well as the process of consumption. When such technologies become more hybrid and distributed, entangled with the everyday life consumers, these consumers move to the centre of innovation; their activities, instead of providing a tail-end to the activities of companies and researchers, start to define the very nature of configurations-in-use. In innovation processes of technological configurations, consumers more actively co-shape innovation processes as a focal point in the triangle of education, research and innovation, and thus give rise to new forms of collaborations.

Using a set of explorative case studies, we explore these seismic shifts in the meaning of consumers for innovation, and introduce the notion of "innosumer" to capture these shifts and spur discussions on future avenues of innovation policy:

We first explore new organizational models and product design approaches, which take into account or better empower users to take up more active roles. We show on the basis of case studies – in the field of smart grids, and a software company's social business initiatives in Southern Africa that develops and roles out new mobile-based enterprise resource planning/supply chain software solutions – that users are increasingly taken on board at an early stage of system design processes to reduce costs and failures of product development processes and creating markets for these technological solutions.

We discuss these cases in the light of the notion of technological configurations, and show that these shifting roles of consumers in the development process of hybrid technologies are undertheorized and still await a thorough conceptualization. To fill this gap we introduce our notion of the "innosumer" to capture how consumers are integrated in innovation processes of configurations in novel and fundamental ways with their knowledge creating activities ranging from the creation through to application down to marketization. This also asks for a reconceptualization of the understanding of (and the term) technology; innosumers contribute substantially to broadening and refining *technological knowledge*, which is the basis for the development of new applications.

We also show, that the emerging innosumer concept – especially in the field of smart grid technologies, in which industrial customers' feedback is used to improve smart grid solutions as well as in the field of do-it-yourself activities with suppliers of machinery integrating end-users' ideas – is distinct from other notions such as 'user innovators' (von Hippel, 1988) or 'prosumers' (Toffler, 1980; Humphreys and Grayson, 2008). Due to the neat integration in product development and marketing processes of configurational technologies, the innosumer contributes more actively and epistemologically more relevant to innovation processes.

Finally, our case studies in software development and learning technologies, in particular, show that both the broadening and the refinement of the knowledge bases ('what should work' and 'how it works') and the development and rolling out of technological systems-in-use ('what really works at which costs') is most valuable to be put under scrutiny. Departing from Stankiewicz' (1990) conceptualization of technologies, we thus argue that consumption in the emerging world of everyday life configurations is more knowledge-intensive: the users contribute with their own knowledge-intensive activities (like coding in improving moodle solutions in education technologies or mobile learning apps) or own experimentation ("tinkering"), when they create new technological configurations, for instance in the form of integrated student-life-cycle-management and higher education software management systems. In the case of end-users actively coding and co-creating new software solutions, or in the case of some corporate strategies

that take up the agency for the prescribed end-users (in the form of the use of advanced marketing techniques like 'lead-user approaches' or 'future acceleration' in the automotive or the aviation industry), today's consumers are more heavily integrated in designing hybrid, technology-based solutions.

Finally, we show that these profound changes to consumption in the emerging knowledge economy have important policy implications. Today most concepts of innovation processes see consumption and the role of consumers as rather passive. There is still a dearth of integrative policy-making models especially for developing/policing environmental, infrastructural and learning technologies. Today, with more differentiated consumption and the nature of technologies changing to more hybrid configurations, we posit that innosumers should be conceptualized as 'the' new balancing point in innovation models. More integrative technology policy models with more refined methods of integrating the interested and effected public (civic participation), new forms of knowledge and technology transfer, new rules in intellectual property (law) not restricting the use of knowledge but even encouraging it by smart standardization, general public licenses and patents are only few of the policy implications which will be discussed in more detail.

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