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Article *in* International Journal of Social and Organizational Dynamics in IT · January 2017

DOI: 10.4018/IJSODIT.2017010101

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International Journal of Social and Organizational Dynamics in IT
Volume 6 • Issue 1 • January-June 2017

Heterogeneity in Digital Innovation: A Study of the e-Newspaper Case

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ABSTRACT

This paper focuses on challenges that arise because of the heterogeneous nature of digital innovation. These challenges are studied through a case study involving a two year long research and development project concerning the development of the e-newspaper concept and a demonstrator based on e-paper technology. To enable the exploration of these challenges, a multi-method approach was chosen. The paper is built using a two-step process; first, presenting a framework based on a review of related literature identifying characteristics and aspects of heterogeneity in digital innovation, and secondly, applying this framework into the analysis of the e-newspaper case. Based on the empirical findings, the paper presents a discussion which elaborates on how digital innovation can be organized in order to address the identified challenges with heterogeneity in digital innovation. Furthermore, it is suggested that digital technology targeted towards everyday use is inherently leading to innovation networks of heterogeneous actors as well as heterogeneous users of digital innovation.

KEYWORDS

Digital Innovation, e-Newspaper, e-Paper, Heterogeneity Challenges, Heterogeneous Actors, Heterogeneous Users, Innovation Network, Layered Digital Technology

INTRODUCTION

Digital innovation refers to the embedding of digital computer and communication technology into a traditionally non-digital product (Henfridsson et al., 2009). The notion also refers to the process of creating new combinations of digital and physical components that produce novel products or services (Yoo et al., 2010). Digital innovation aimed at consumer markets is nowadays representing a complementary line of research interest. This research focuses on understanding the development, diffusion, and adoption of digital innovation in consumer markets, for example new mobile services or new digital products (see e.g. Constantiou et al., 2007; Mallat, 2006).

Digital technology can be categorized by layers consisting of devices, networks, services and content (Yoo et al., 2010). As different layers of digital technology require different competencies, knowledge, and resources, organizations often need to either setup or join innovation networks to be able to succeed with digital innovation. As a result, digital innovation becomes more networked and complex with an increased need for heterogeneous actors and resources (Boland et al., 2007; Yoo et al., 2009; Yoo, 2010). Heterogeneity in this case primarily relates to the diverse sets of knowledge, competence, and assets that the actors have. Even if heterogeneity is also important in several other fields, in order to enable successful innovation, it is especially evident in technical and knowledge intense fields such as digital innovation (Powell & Grodal, 2005; Vanhaverbeke, 2006). As a response to digital innovation becoming more knowledge intense and networked, innovation actors are growing more dependent on each other's knowledge, competence, and assets (Vanhaverbeke & Cloodt, 2006).

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Another example of heterogeneity in digital innovation relates to the users. When working with digital innovation targeted against everyday use and consumer markets, user needs and requirements are often highly heterogeneous (Henfridsson & Lindgren, 2010). This becomes evident when targeting markets for mundane digital innovations, such as smart phones and electronic books. In these markets, the notion of 'users' needs to be extended from organizational users to individual users with much more diverse needs (Yoo, 2010).

Based on this background, this paper will categorize heterogeneity in digital innovation based on three different perspectives. The first perspective concerns the characteristics of digital technology. The second perspective concerns aspects of heterogeneous users. Finally, the third perspective concerns aspects of heterogeneous actors involved in the networks of digital innovation. User groups can be informal or formal actors in innovation networks developing digital innovation. However, in this paper actors are defined to have business or research interests in the innovation network, and users are defined as the actual user or consumer groups intended to use a digital innovation.

One example of digital innovation, which is used in this paper, comes from the newspaper industry. In the last decade, newspapers all around the globe have faced declining subscription and advertising revenues. This is something that has forced them to seek new ways to profit, and attract a new audience (WAN, 2006; The Economist, 2006). E-paper technology captured the interest of the newspaper industry through revealing the possibility of a newspaper service via an e-paper device with high readability and low power consumption (IFRA, 2006; The Swedish Newspaper Publishers' Association, 2007). The digitization of the newspaper presented several opportunities for the industry to reach new markets, and cut production and distribution costs. However, newspapers needed to team up with other actors to be able to explore the digital innovation at hand. The case of the e-newspaper, a newspaper service specifically designed for an e-paper device, illustrates the need for heterogeneity when working with digital innovation. Several previously unconnected actors such as newspaper organizations, network providers, software companies, hardware device manufacturers, and advertising companies, had to intertwine their perspectives, business models and technological frames to realize the e-newspaper concept.

Increased innovation network heterogeneity promotes innovation capacity, and supports learning important for innovation (Powell & Grodal, 2005). Network heterogeneity also enables faster diffusion of innovations (Yoo et al., 2009). However, heterogeneity might create learning boundaries and inhibits the spread of ideas and innovations (Carlile, 2002). Based on the logics of these bipolar effects of heterogeneity, it seems important to harvest the positive outcome, whilst managing the negative aspects of heterogeneity in digital innovation. Reviewing literature about digital innovation, some specific challenges with heterogeneity can be identified. One challenge concerns how to manage the heterogeneity of knowledge resources when working with digital innovation (Yoo, 2010). Another challenge concerns the increased complexity of the process when innovating digital technology. This complexity increases the risk for failure or unintended consequences when working with digital innovation (Yoo et al., 2012; Yoo et al., 2009).

Even if some challenges are already identified in earlier research, this paper specifically focuses on investigating and illuminating challenges connected to heterogeneity in digital innovation. With this specific focus, earlier findings about challenges in digital innovation will be expanded. The paper is structured around the research question: What are the challenges with heterogeneity in digital innovation? Based on empirical and theoretical findings, this paper aims to contribute to the emerging academic field of digital innovation, as well as to practice. This is done firstly by presenting a framework based on a review of related literature identifying characteristics and aspects of heterogeneity in digital innovation. Secondly, identifying challenges with heterogeneity by applying the framework in the analysis of a case of digital innovation. Finally, based on the empirical findings, elaborate on how digital innovation can be organized to address challenges with heterogeneity in digital innovation.