
1 INTRODUCTION

“Throughout history corporations have organized themselves according to strict hierarchical lines of authority. Everyone was a subordinate to someone else – employees versus managers, marketers versus customers, producers versus supply chain subcontractors, companies versus the community. There was always someone or some company in charge, controlling things, at the ‘top’ of the food chain. While hierarchies are not vanishing, profound changes in the nature of technology, demographics, and the global economy are giving rise to powerful new models of production based on community, collaboration, and self-organization rather than on hierarchy and control.”
(Tapscott & Williams, 2008: 1)

Is the way firms are organized outdated? Do firms have to part with the concept of hierarchical business organization in order to stay innovative and create value?

The study of organization and order within business corporations has been of great interest throughout history. Since Max Weber stated: “A fully developed bureaucratic apparatus compares with other organizations exactly as does the machine with the non-mechanical modes of production.” (Weber, 1978: 973).¹ Therefore the organization, that is, the mode of creation of value within a company becomes a crucial competitive advantage. If, as implied by the introductory quotation, firms are faced with a paradigm shift to a new mode of organization, what lessons are to be learned to sustain the competitive advantage? The emergence of a new model of organization especially refers to the topic of innovation. For one thing “[e]veryone knows that innovation is a core business necessity.” (Chesbrough, 2006: xiii). Another reason is that the nature of innovation as a combination of a new idea and its implementation (Rickartds, 1985) makes the innovation process particularly exposed to the paradigm shift. A nearly endless pool of creativity, embodied through volunteers interconnected via the internet and tools like search engines to tap endless amount of knowledge prove to be a strong source for innovation. The rise and application of concepts like open innovation, the opening of the innovation process, is an answer to

¹ Today the term bureaucratic mainly has a negative connotation, signalling restraining effects for the performance of an organisation. Weber's original definition of bureaucracy however, referred to the general organization in the broad sense (cf. Adler, 2011).



the question raised at the beginning of this introduction. Firms have already started to part from the classical concept of a hierarchical business organization when it comes to innovation. The change from a “producer’s model” of innovation to an open collaborative one is already well underway (Baldwin & von Hippel, 2011). However, many questions concerning this new model still need to be answered.

Open innovation is a wide field, involving various areas and perspectives. One intriguing phenomenon is the success of communities of volunteers creating innovative outcomes over the internet, such as open source software or *Wikipedia*. Communities of volunteers, so called open collaborative innovation (OCI)² communities, have risen outside the boundaries of firms and are different from business organizations in the sense that they are not mainly profit driven. However, they have considerable success in taking market share from profit oriented firms as the examples of the operating system *Linux* vs. *Microsoft Windows* and *Wikipedia* vs. *Encyclopedia Britannica* show. Not only because of their success, but also because of their implications for theory and practice have such communities raised large research interest (West & Lakhani, 2008). Different aspects have caught the attention of scholars, such as investigating communities as a new model of innovation creation (cf. Lee & Cole, 2003) or motives and characteristics of members of such communities (cf. Jeppesen & Frederiksen, 2006). A lot of attention has been paid to the question of governance of such communities. Some authors see the issue of organization and governance as one of the most important question for understanding such communities (Baldwin & Clark, 2006; Lerner & Tirole, 2002). Important, because governance within communities is different to the classical market or hierarchy paradigm, and may represent a new mode (Demil & Lecocq, 2006) and is also a necessary ingredient to create an organizational climate to attract volunteers for the community (Shah, 2006; Markus, 2007).

Especially in the field of open source software (OSS) researchers have investigated the mechanisms by which such communities govern themselves in order to achieve direction, control and coordination among community members (Markus, 2007). Recently, a growing number of firms make use of collaborative communities by sponsoring them (O’Mahony & West, 2005; Shah, 2006). A topic which promises new insights, as it has been of less interest so far:

² For a detailed definition of open collaborative innovation (OCI) communities see Chapter 2.2.

"There has been much less research on how firms use communities where they have limited control, which might even jeopardize their competitive advantage, as part of their business models." (Dahlander, Frederiksen, & Rullani, 2008: 116)

The emergence of firms shifts the focus from self-governance of volunteers to external, firm-initiated, governance of communities. This dissertation centers on the question, how a community of self-governed volunteers reacts to the influence of a firm, specifically through exogenous, firm-initiated governance.

1.1 Research objective and approach

If firms interact with communities they can choose different modes of interaction ranging from a loose affiliation to the foundation of own communities. To great extent different modes of firms' involvement depend on the business model of the firm (Dahlander & Magnusson, 2008). A firm that regards a community as one source among many for innovation and creativity is likely to interact differently than a firm that regards the value generated within the community as its major business. For that reason one has to conclude that there is not just one firm-community interaction, but many modes and configurations.

It is evident that the goals of profit oriented firms and communities of volunteers are not inevitably the same which can result in considerable tension (West & O'Mahony, 2008). Therefore the question of governance is central within the relationship of firm and community, since a large number of involved parties with diverse objectives, capabilities and involvement come together (Dahlander et al., 2008).

One key strategic issue for firms is "[...] how to attract the participation of a broad community of contributors, and then how to sustain their participation over time." (Chesbrough & Appleyard, 2007: 68). The way governance is structured in sponsored communities, that is, how work is organized and activities are controlled, will influence intrinsic motivation of volunteers to contribute (Jeppesen & Frederiksen, 2006). Negative reactions by volunteers are reported if a firm executes too much control and unfair ownership demands (Shah, 2006). Firms are aware of such challenges and try to counter it by legitimizing such decisions in letting volunteers participate by making the governance accessible (West & O'Mahony, 2008) (see also O'Mahony & West, 2005).

While the realization that participation in procedural processes seems indispensable, to date little is known about the precise effects of participation vs. no participation on the community. Field and experimental research from other fields, namely common-pool resources (CPRs) such as fishing grounds, provide evidence that externally imposed rules may crowd out endogenous cooperative behavior (Ostrom, 2000a) and preferences (Cardenas, 2004) thereby possibly negatively impacting intrinsic motivation (Frey, 1994). Valuable insights can be gained from these findings. However, open collaborative innovation (OCI) communities differ in many ways from the CPRs environment, for instance the specific nature of innovative work and contextual factors like communication over the internet. I therefore believe it to be worthwhile to investigate the question how a community of volunteers creating innovative outcomes copes with the influence of external regulation by an authoritarian institution like a firm.

It comes down to the question whether firms should impose governance rules on a community or rather leave it to itself by relying on self-governance. The aim of any OCI community is to produce (innovative) beneficial outcomes. Such a goal can only be reached if certain preconditions or influential key factors (e.g. motivation of participants, conflict resolution within the community) are fulfilled. Therefore the main research question that needs to be answered is how the choice between endogenous and exogenous governance rules affects such key factors.

This question is studied empirically using an experimental approach to directly manipulate exogenous vs. endogenous governance rules. The analyses of the empirical studies link quantitative and qualitative data. Such an approach, also known as triangulation blends a variety of data and methods in order to “[...] capture a more complete, holistic, and contextual portrayal of the unit(s) under study.” (Jick, 1979: 603). To achieve a holistic view to the extent possible, further research questions are derived from the guiding one. Depending on these research questions hypotheses are developed and appropriate analyses are chosen. This leads to three interconnected studies, answering five research questions by employing three separate sources of data.

The first study addresses the effect of exogenous vs. endogenous governance rules on key factors, namely motivation, conflict and perceived justice of community members by analyzing self-reported quantitative data.

The second study investigates the association of these factors with the behavior and performance of a community. This is achieved by the quantitative analysis of interaction frequencies and performance measures.

The third study explores three further questions, employing a content analysis of community interaction. First, the reaction of a community to the exposure of exogenous vs. endogenous governance rules is investigated. Second, the type of governance a community chooses, contrasting 'closed' vs. 'open' types, is examined. Third, the emergence of rules within the community is observed.

1.2 Structure of dissertation and research approach

To answer the guiding research question, how key factors (e.g. motivation, conflict, justice) of an OCI community are influenced by exogenous vs. endogenous governance rules, this thesis consists of seven chapters. This chapter, **chapter 1**, initially presents the overall research interest and the guiding research question.

Chapter 2 gives an overview of the context of this thesis by describing open collaborative innovation (OCI) communities as a phenomenon of open innovation. A particular focus is placed on how such communities organize and govern themselves by reviewing prior work and concepts. Furthermore the relation of firms with OCI communities is set out and examined.

Chapter 3 explores existing theories explaining economic governance, more specifically governance of communities. I define the term of governance which is central within this thesis. Furthermore a theoretical frame, namely the Institutional Analysis and Development (IAD) framework is described. This theoretical framework is important with regard to the design of the experiment, as expected relationships for the formulation of research hypotheses are based on it.

I start **Chapter 4** formulating five research questions which shall be answered by three empirical studies. The second part explains the choice for an experimental method followed by a review of the methodology. The rest of the chapter describes the framework and its different components for the experiment. A major element includes the formulation of research hypotheses, which comprises the review of existing theories.

The detailed design and procedure of the empirical study is laid out in **chapter 5**. This includes a detailed description of the experimental setup, as well as instructions and the data collection.

Chapter 6 is devoted to the analysis of the experiment. At the beginning of the chapter the quantitative data sample is examined to meet assumptions for the following statistical analyses. The rest of the chapter is divided into three separate, but interconnected studies. Study 1 investigates the effects of different governance modes on key factors, namely motivation, conflict and justice within an OCI community via statistical analysis. Study 2 explores the effects of these factors on the behavior and overall performance of an OCI community. The chapter concludes with a qualitative investigation, study 3, exploring the reactions of the community to different modes of governance and the emergence of self-governance.

Finally, **chapter 7** concludes with a summary of findings. The summary is completed by a discussion of limitations of the findings, followed by implications for research and management.

2 PHENOMENOLOGICAL BACKGROUND

What is open innovation? What defines an open collaborative innovation community? And how do firms and communities interact? These fundamental questions are discussed within the following chapter. Based on prior work of various researchers, this chapter aims at setting the scene for my own research.

2.1 Open Innovation

Until today, the dominant model of innovation has been a 'producers' model, where the most important innovations are invented by firms and supplied to consumers (Baldwin & von Hippel, 2011). Such a classical model is also described as a 'closed' (Chesbrough, 2003) or 'vertical' (Bogers & West, 2012) innovation paradigm, where firms control the complete process of innovation. By contrast the new model is described as an 'open innovation' model:

“Open innovation is a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology.” (Chesbrough, Vanhaverbeke, & West, 2008: vii)

While this definition primarily focuses on the research and development (R&D) process of firms, the open innovation field has outgrown this narrow view, now representing many streams and perspectives (Gassmann, Enkel, & Chesbrough, 2010). According to Gassmann et al. different perspectives contribute to the field of open innovation, such as the spatial perspective focusing on the globalization of innovation, the structural perspective focusing on increased separation of innovation activities and the user perspective, integrating users into the innovation process. Other authors consider user innovation as a parallel stream to open innovation (West & Bogers, 2010). User innovation has gained much attention and considerable research already. One of the reasons for this is the fact, that examples of user innovation have been found long before the radical diffusion of the internet and were never limited to software (von Hippel, 2001). No matter where one stands in the discussion concerning the roots and streams within the field of open innovation, it can be stated that the field of open



innovation is a fast growing research field. Especially since 2005, the number of published papers on open innovation has grown rapidly (Dahlander & Gann, 2010). A systematic review of the growing research on open innovation by Dahlander and Gann (2010) revealed that the different streams are rather fragmented and that collaboration of researchers across diverse teams is rather the exception than the rule (see also Lee, Herstatt, & Husted, 2012). Both studies reveal that user innovation is considered an important – if not the most important – stream within the field of open innovation. Users joining together to form a community to innovate have been given much attention by researchers, mainly because it is recognized that communities outside the boundaries of the firms play a decisive role in creating and disseminating innovations (West & Lakhani, 2008).

2.2 Community-based Innovation

Communities of volunteers developing products in an open collaborative manner are outstanding examples of the success of a particular application of the 'open innovation' model.³ Especially in the field of open source software (OSS) products developed by such communities are shown to be competitive with commercial products. OSS communities are a special form of innovation communities (von Hippel, 2006). The characteristics of such communities are described as a group which develops a new solution or solves a problem over the internet (Dahlander & Wallin, 2006). Fleming (2007) highlights that work is done free of charge and all outcomes are freely revealed:

"We define an open innovation community as a group of unpaid volunteers who work informally, attempt to keep their processes of innovation public and available to any qualified contributor, and seek to distribute their work at no charge." (Fleming & Waguespack, 2007: 166)

Members of such communities may be either individuals or firms (von Hippel, 2006). Raasch et al. (2009) point out, that the outcome of the collaborative work is in some form exploited, either "[...] that it is produced and sold on a market, integrated into

³ Community-based innovation fits within the definition of open innovation by Chesbrough (West & Lakhani, 2008).

other products that are marketed, deployed during the development of such products or used for any other private or commercial purpose." (Raasch, Herstatt, & Balka, 2009: 383). This is important when making a distinction between collaborative innovation communities and other virtual communities of volunteers. Virtual communities exist in many forms, for example private or professional discussion groups on a variety of heterogeneous topics.⁴ Inevitably, numerous overlapping terms for communities exist: "[...] innovation communities, knowledge producing communities, online communities, scientific communities, technical communities, user communities, virtual communities or communities of practice." (West & Lakhani, 2008: 224). However, such communities do not necessarily produce innovative outcomes according to the definition by Raasch et al., nor do they necessarily cover the innovation process as a whole. Table 1 gives an overview of an attempt to distinct OCI communities from other types of communities along different dimensions.

Within this dissertation project I solely focus on communities' collaboratively producing innovative outcomes, excluding virtual communities in the broader sense. I thus limit the scope according to the definition of West and Lakhani (2008), who define innovation communities as voluntary associations of actors who produce innovations that are brought to market. In order to use a clear and unified term I refer to such communities within this thesis as open collaborative innovation (OCI) communities. This term is strongly based on Baldwin and von Hippel (2011), who speak of open collaborative innovation.

The resounding success of applications like the operating system *Linux* and the browser *Mozilla Firefox* are living proof how OSS products gain market shares from conventional companies. The amazing success of OSS has captured scholarly interest for various reasons. First, it is surprising that a team of volunteers can compete with a highly organized team of professionals (Cheliotis, 2009). Second, the realization that the original assumption "[...] that a requirement to contribute one's innovation to a commons would lead inevitably to the destruction of incentives to innovate [...]" (von Krogh & von Hippel, 2006: 975) has been disproved. This deviation from the "self-interested-economic-agent paradigm" (Lerner & Tirole, 2001) raises the question about

⁴ Attempts have been made to classify such virtual communities by different authors (cf. Hagel & Armstrong, 1997; Markus, 2002)

motives of volunteers in such communities. A question which has been investigated by different authors (cf. Lakhani & von Hippel, 2003; Füller, Jawecki, & Mühlbacher, 2007; Jeppesen & Frederiksen, 2006; Roberts, Il-Horn Hann, & Slaughter, 2006).⁵

A further question is whether the open source community model can be transferred beyond software. An expansion beyond software has been the rise of so called open content, where volunteers produce knowledge resources. *Wikipedia*, an encyclopedia assembled by articles of volunteers, is a prominent example. Less prominent ones are the co-development of goods such as music or films (cf. Cheliotis, 2009) or open science (cf. Hellström, 2003).

A further expansion is the application to tangible goods, so called open design (Vallance, Kiani, S., & Nayfeh, 2001). Raasch et al. (2009) show that the application to this field has already taken place, featuring products such as beverages, telephones and home entertainment equipment.⁶

Obviously, many differences between the production of software or movies and physical good exist. While software and cultural goods share a lot of features (Madison, Frischmann, & Strandburg, 2010), the difference between knowledge resources and physical goods is evident. Since tangible products involve costs for production, the OCI community model may not apply (Lee & Cole, 2003). However, a growing number of authors emphasize that many insights for other industries can be gained from the OSS model (cf. Uihøi, 2004; Franke & Shah, 2003). Even though a direct transfer of the OSS model fails due differences between the goods, the diffusion beyond software has already taken place, as the mentioned examples show:

“User innovation communities are by no means restricted to the development of information products like software. They also are active in the development of physical products, and in a very similar ways.” (von Hippel, 2006: 103).

Considering definitions by the different authors mentioned, six main features of collaborative innovation (OCI) communities are apparent. First, members engage

⁵ For an extensive overview about current research on motivation of volunteers in such communities see Chapter 4.3.2.1.

⁶ The application to sports equipment, such as kite surfing, is a further example from this field (von Hippel, 2006). However, in this example the community does not necessarily communicate virtually.