



Monetary donations to an open source software platform

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ABSTRACT

Online open source software platforms, such as Sourceforge.net, play a vital role in creating an ecosystem that enables the creation and growth of open source projects. However, there is little research exploring the interactions between open source stakeholders and the platform. We believe that the sustainability of the platform crucially depends on financial incentives. While platforms can obtain these incentives through multiple means, in this paper we focus on one form of financial incentives—voluntary monetary donations by open source community members. We report findings from two empirical studies that examine factors that impact donations. Study 1 investigates the factors that cause some community members to donate and not others. We find that the decision to donate is impacted by relational commitment with open source software platform, donation to projects and accepting donations from others. Study 2 examines what drives the level of donation. We find that the length of association with the platform and relational commitment affects donation levels.

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1. Introduction

Open source online software platforms (e.g. Sourceforge.net and Savannah) play a vital role in the creation, updation, maintenance, support and distribution of open source software (OSS). A software platform is defined as “a software package that enables the realization of application systems” (Taudes et al., 2000). A software platform built on virtual organization (Nambisan, 2002) is an online software platform.

Online platforms facilitate virtual software development of OSS projects for free. As a result, the platform is of vital importance to a variety of stakeholders including volunteer software developers, universities, non-profit organizations and corporations. Volunteers help with activities related to software development (Lerner and Tirole, 2002, 2004; Von Hippel, 2001), bug fixing (Crowston and Howison, 2003) and user-to-user customer service (Lakhani and Von Hippel, 2003). With greater integration of open source in the development of software, some firms have created business models around OSS projects hosted on these platforms (Fitzgerald, 2006). Others have made their projects available on platforms to encour-

age participation. For instance, Google has made available at least five open source projects on Sourceforge.net, Google mAIM, Core-Dumper, Sparse Hashtable, Perfertools, and GoopyFunctional, and Microsoft has released projects such as WiX, WTL and FlexWiki. OSS participants use the infrastructure, code and tools provided by these software platforms to create OSS projects and participate in projects created by others. Non-profit institutions and universities benefit from the presence of free software and source code in implementing mission-centric applications. For instance, Moodle is an open source courseware that competes with professional software products such as Blackboard.

Communities form around open source projects hosted on online platforms and bring in positive network effects for its members. The role of network externalities in open source has been well documented. One set of studies has argued that network externalities compensate for the openness of software and code. Bonaccorsi and Rossi (2004) have argued that open source software aid in the diffusion of new products due to the creation of direct, indirect and complementary service-based network externalities. Dahlander (2005) argues that the creation of network externalities allows firms to offset the absence of intellectual property protection in open source. Another stream of research has investigated the role of network externalities in competition between open source and proprietary software. Economides and Katsamakos (2006) model the competition between open source and proprietary software platforms and argue that the open source approach leads to greater variety in applications. Bitzer and Schröder (2007) argue that

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network externalities might lead to the lowering of the total cost of ownership of software programs providing open source vendors with an advantage.

Both these sets of research focus on a single product-selling firm and how it might compensate for factors inherent to the nature of open source by leveraging network externalities. However, our perspective is that of a platform and the diverse stakeholders that benefit from it. On open source online platforms, network externalities with respect to one stakeholder group reinforce the attractiveness of the platform to other groups. For instance, the presence of a large group of open source developers might make the platform attractive to potential users of software programs. However, building these various networks leads to greater infrastructure costs—examples of cost components might include the cost of computers, servers and a dedicated staff. Finding the right financial incentives to support the platform to ensure its long-term survival and innovation becomes crucial.

At this point, there is no study investigating whether and why the stakeholders of an online platform respond to this need by voluntarily donating to OSS online software platforms. Our paper fills this important gap by investigating the motivation of individuals to provide one type of financial incentive, i.e., voluntary monetary contributions, to the online software platform provider. In two empirical studies, we add to the open source literature by studying the causal antecedents to monetary donations to an online software platform. We contribute to the literature by—(a) explicating the role of the online software platform in the OSS universe, (b) investigating the causal antecedents to donation behavior with respect to online software platforms and (c) applying reciprocity and identification theory in the context of open source software.

2. Literature review and theory building

2.1. Collective action

Open source software, inherently, involves collective action among the participants (Olson, 1965). Collective action has been studied by theoretical and experimental economists, psychologists and other social scientists for decades—an extensive review of this literature is beyond the scope of this paper. This research may be found in studies of social dilemmas (Dawes, 1980), common resource dilemmas (Hardin, 1968), public goods (Ledyard, 1995) and Prisoner's Dilemma games (Axelrod, 1984). This literature is chiefly interested in the tradeoff between private gain (e.g. through “free-riding” in Prisoner's Dilemma games) and public good. Even though rational choice models predict complete free-riding, experimental evidence suggests that participants respond to the size of the incentives, pre-play communication, contribution targets or thresholds (Davis and Holt, 1992, Chapter 6), group size and expectations of others' behavior (Dawes, 1980).

From the earliest conceptualization, open source software has been regarded as a theater of collective action—notable examples include the use of descriptors such as “bazaar” (Raymond, 1998) and “cooking pot markets” (Ghosh, 1998). Notably, Von Hippel and Von Krogh (2003) have argued that open source exhibits features of both private and collective action, i.e., participants obtain private benefits while creating a public good. They argue that participants gain “selective incentives” that will not be available to free-riders. For instance, those who participate might derive a great sense of fun and enjoyment stemming from problem solving and might derive a deep sense of identification with a community. Von Krogh et al. (2003) argue that the size of a project is the central collective action problem and find that unless a developer follows a specific “joining script”, entry into an open source software project is restricted. Lerner and Tirole (2002) bring up the

free-riding issue by asking—“Why should thousands of top-notch programmers contribute freely to the provision of a public good?” Von Hippel and Von Krogh (2003) answer this by stating that “programmers contribute freely to the provision of a public good because they garner private benefits from doing so.” The current empirical research has sought to identify Lerner and Tirole's question by identifying three fundamental dimensions of open source developer motivation (Lakhani and Von Hippel, 2003; Lakhani and Wolf, 2005; Lerner and Tirole, 2004; Roberts et al., 2006; Rossi, 2004; Stewart and Gosain, 2006). Intrinsic motivation stems from the act of participation—e.g. fun, flow, learning and community. Extrinsic motivation originates from external rewards—e.g. financial rewards, improving future job prospects, signaling quality. Ideological motivation comes from a strong belief in the values underpinning OSS development methodology. These components are not mutually exclusive and can co-exist (Roberts et al., 2006).

2.2. Giving behaviors

Giving behaviors have been studied in various social sciences including psychology, economics and anthropology. In an extensive review of the literature on donor behavior, Bendapudi et al. (1996) describe four steps in a sequential process—perception of need, motivation, behavior and consequences. Donors are likely to give to charities that they identify with, that others like themselves identify with (Shang et al., 2008), that they perceive as being in greater need for funds—especially due to external causes that are not within the control of the agency, when they are labeled in a way that is consistent with their moral identity (Reed et al., 2007). Donors also like to give when they have received help from the agency in the past and when normative or social-comparison appeals are used in the marketing communication (Bendapudi et al., 1996).

There is also an extensive anthropological or interpretive literature on gift-giving behavior (Otnes and Beltrami, 1996). This literature views the act of gift-giving as symbolic, i.e., “what it would appear to convey about the giver and the giver-recipient relationship” (Belk, 1976, p. 155). Gift-giving occasions are given importance in this literature—e.g. Fischer and Arnold (1990) study Christmas gift-giving and conclude that while it might be a “labor of love” for some, it is generally viewed as “women's work.”

The motivation to give to charitable institutions may be egoistic or altruistic (Bendapudi et al., 1996; Rose-Ackerman, 1996). Donors are interested in the size of their donation, also called “the warm glow” effect, as well as the total level of donations to the charitable institution (Andreoni, 1990). The level of household income affects the size of the donation and a recent meta-analysis by McClelland and Brooks (2004) concluded that the variable with “the most predictive power over charitable giving is income” (p. 483) and that previous research has “always found positive income elasticities, although there is a wide variance in these estimates” (p. 484).

Open source is characterized by an ethos of volunteerism that extends to developers as well as firms. Developers voluntarily contribute their time, code and software programs. The online platform similarly voluntarily contributes a platform to facilitate the development and distribution of open source software. The effect of financial incentives on this volunteerism ethos is a matter of great discussion. Some have argued that building a system that involves on a group of volunteers is simply not sustainable in the long-run. As one scholar put it, “. . . those involved (in open source) are neither driven primarily by ideology nor seeking to make vast fortunes. They simply wish to earn a reasonable livelihood from their efforts” (Fitzgerald, 2006). Others argue that providing financial incentives to volunteer developers might reduce their productivity. This argument is based on the voluminous literature in psychology that has investigated the role of extrinsic rewards on motivation (Deci et al.,

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