Antecedents of Community Source Network Formation: The Case of Kuali

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Abstract

Community source system development has emerged as a new way of developing enterprise applications, leading to a unique type of open source development involving collaborative investment decisions by multiple institutional partners. The community source network formation has become an interesting issue to study. We use the social entrepreneurship case of the Kuali community source network to examine the antecedents of community source network formation, and in particular the likelihood of existing organizations to join such a network. We develop propositions and a model, and offer some thoughts on future directions for research on this emerging phenomenon.

1. Introduction

In recent years, we have witnessed remarkable growth in various forms of co-operation among organizations [3]; [19]; [25]. Within the US biotechnology industry, for example, firms with no formal cooperative ties to other firms have become increasingly rare, while the connectivity of firms within and outside the US has increased significantly [13]; [56]; [57]. A form of inter-organizational collaboration called community source is now emerging. We define community source as “an open source project that requires significant investments from institutional partners in both human resources and cash contributions” [45]. Further, the community source developers are typically employees designated to the project by partner institutions.

Community source development is a new way for organizations to collaborate in the development of enterprise applications that are either not available as a commercial-off-the-shelf system or too expensive to acquire. Also, the software products of community source are usually shared with the greater community as open source. A unique feature of community source is the requirement for partner institutions to invest a significant amount in order to accomplish the software project.

Community source networks have several unusual features. First, there are different levels of actors in community source networks. There are partner institutions at the institutional level, and managers and developers at the individual level. Second, community source networks are in a virtual organization very like a virtual team. As in virtual teams, the teams working in a community network often (1) have no common past or future - No network existed among partner institutions in the past and the network will be ended when projects are finished; (2) are culturally diverse and geographically dispersed - The partner institutions are located in different places and may have different cultures; and (3) communicate electronically [43]. As a new form of cross-organization collaboration, community source networks warrant close study. Specifically, as described in this paper, we focus on the antecedents of community source network formation and examine the contribution of multilevel factors (individual and institutional) to their formation. Key research questions that motivate this study are: What are the individual factors affecting community source network formation? What are the institutional factors affecting community source network formation? How do individual factors affect community source network formation? How do institutional factors affect community source network formation? A real world community source project called Kuali is examined to better understand the community source phenomenon and the research questions.

The remainder of this paper is structured as follows. In Section 2, we briefly review the literature on networks and open source/community source software development. Our research methodology is introduced in the third section. In Section 4, we introduce the Kuali case as an example of a community source project. A research model and propositions are then presented in the Section 6. Finally, the paper concludes with the implications of this study and future research directions.

2. Literature Review
2.1. Networks

Community source networks exist at the inter-organizational level, as they involve multiple institutions collaborating and forming networks. Inter-organizational networks have been widely studied. Inter-organizational networking represents a particular form of organizing, or governing, exchange relationships among organizations [16]. While networking can take different forms, all these forms are characterized by recurring exchange relationships among a limited number of organizations that retain residual control of their individual resources yet periodically make joint decisions about their use. As in the field of organization studies as a whole, explanations of inter-organizational networks were produced by a number of different approaches and theories [2]; [4]; [19]; [20]; [48]; [64]. Panteli et al. [52] examined trust and conflict within inter-organizational alliances. Paulraj et al. [54] extended the stream of research in supply chain management by investigating the antecedents and performance outcomes of inter-organizational communication. Sherif et al. [62] examined the effects of different types of inter-organizational networks on knowledge creation across organizations.

The variables explaining the formation of inter-organizational networks include motives, learning, trust, norms and monitoring, equity and context [8]. Learning capability and technological parity interact to predict firms’ successful use of inter-organizational cooperation to produce desired new produces [30]. Also, according to Brass et al. [8], antecedents of interpersonal networks include actor similarity, personality, proximity and organizational structure and environmental factors. Some of these variables are able to explain the formation of community source networks.

Koza et al. [40] examined the antecedents of network formation at the interpersonal level through a single longitudinal case study of a professional service network in the public accounting industry. They found that the network was initially created with the strategic intent of producing incremental income in exchange for cross-border referrals. Arora and Gambardella [3] looked at individual motivations and group affiliation, finding that the decision to affiliate with a group significantly impacts both short term and long term engagement with the group. Their findings suggest a possible virtual cycle related to the creation and sustaining of “swift trust”, with group affiliation leading to higher levels of participation and trust, which in turn lead to higher levels of commitment to the organization [34]; [60].

The study of network formation plays an important role in the literature. Human and Provan [32] demonstrated that networks ultimately had to address three conceptually distinct dimensions of legitimacy: the network as form, the network as entity, and the network as interaction. The failure to build legitimacy across the three dimensions may lead to network collapse. Similarly, Wassmer and Dussauge [66] found that organizations do well by entering alliances which build on their existing knowledge bases and those of their existing allies, but suffer when entering alliances that compete with their established ones. In community source, the study of the formation of community networks is critical for us to better understand community source networks.

The networks studied in this paper are in the higher education sector, which consists mainly of non-profit universities. Steinberg [63] reviewed the economic literature and suggests several objective functions for nonprofits, such as maximizing budgets, inputs, and social welfare, all of which are unrelated to profits. Organizational research has shown that nonprofits are driven by resource enhancement [1]; [10]; [41]; [55]; [58]. Non-profits may typically be more constrained than businesses in terms of scope of innovation, but innovation that allows them to pursue their current mission more effectively with the same resources fits within the constraint [31]; [36]. Lam [44] found that universities are particularly valuable partners for industry partners because universities have a more open knowledge structure with less focus on profit, which allows firms to learn more from these partners than from other firms.

2.2. Open source/Community source

Open source software (OSS) has become the object of much commercial interest [19]; [38]. OSS seems to hold much promise in addressing the core issues of the software crisis. Feller et al. [18] studied the OSS development paradigm and derived a framework for OSS. Hann et al. [27] explored what motivates participation in OSS development.

Community source is the most recent trend in the development of scalable and flexible information systems by multiple organizations in collaboration [38]; [45]; [46]. Community source is a type of open source because it tends to make the source code of the resulting information systems available to the public. Three examples of existing and successful community source projects in higher education include the uPortal Project (www.uportal.org), the Sakai Project, and the Open Source Portfolio Initiative (OSPI). The uPortal project began in 2000
as a $3.2 million open source project of JA-SIC to create portal software for education. The Sakai Project (www.sakaiproject.org) became a $6.8 million open source project in January 2004 and promises to develop a next generation course management system (CMS). The Open Source Portfolio Initiative (OSPI) (www.theospi.org) was formed in January 2003 to address the software needed for student electronic portfolios (ePortfolios). Community source projects are also appeared in the industry outside of higher education. For example, in 2007, a group of leading IT companies, including Google, T-Mobile, Intel, Qualcomm, and Samsung, formed Open Handset Alliance and launched an initiative called Android to develop an array of innovative infrastructure platforms and software applications for mobile technologies.

Application software for higher education appears to be the next arena for open source efforts [67]. Wheeler [68] argues that developing a collaborative capability is not an option; it is a necessity for effective college and university IT organizations. In this paper, we present a higher education community source case – Kuali.

3. Research Methodology

For this first-cut study of network formation in community source [17]; [70] we collected qualitative data from the real world case of Kuali. The propositions are observable in our case analysis. The case study method was used because it enables investigation of a contemporary phenomenon in its natural setting, and is especially appropriate for newer topic areas such as network formation in community source, where theory and research are still in their formative stages.

Our case inquiries were conducted in accordance with prevailing case study field procedures, including the development of a case study protocol prior to data collection, triangulation using multiple sources of evidence, and the maintenance of a chain of evidence [53]; [71]. During the early stage of Kuali projects, we attended the Kuali Foundation’s semi-annual conference, called as “Kuali Days.” The data collection effort included semi-structured interviews with Kuali participants and observers, direct observation of project events, milestone review presentations and minutes of meetings, and formal project documentation.

4. Community Source: The Kuali Case

Kuali is an example of community source (www.kuali.org), which began with the conversion of Indiana University’s Financial Information System to the web in 2004. Indiana University and the University of Hawaii led the effort, launched in August of 2004, to build Kuali. In 2005, four new partners, Cornell University, San Joaquin Delta College, Michigan State University, and the University of Arizona, joined as core investors. In April 2006, the Kuali Project announced the availability of the Kuali Test Drive, which enables universities to explore Kuali Financial Systems. There are now more than 50 development partners in the Kuali project including Carnegie Mellon University, Colorado State University, Cornell University, Indiana University, Massachusetts Institute of Technology, Michigan State University, University of Arizona, University of British Columbia, University of California, and University of Hawaii. To deploy the releases as open source, universities that are not part of the development community can become a member by paying about $25,000 per year to collaborate in the deployment and customization efforts.

The original motivation for the Kuali project was that existing financial systems used in the universities were outdated and too difficult to maintain. Commercial products are often too expensive and hard to customize; some schools and colleges realized that they need to operate expensive "shadow systems" to provide needed features absent from currently available ERP packages. On the other hand, building a financial system in house is equally daunting and can only be considered by the largest universities. The cooperative Kuali project provides an attractive alternative to the “buy or build” dilemma. It pools institutional resources to develop an open source financial system, thus dramatically reducing the cost of managing fiscal data and processes in higher education.

Although the Kuali project got an award of $2.5M from the Andrew W. Mellon Foundation, it is mainly funded by member universities. A Kuali development partner must pay between a half million and one million dollars, consisting of 25% cash and 75% personnel costs. Kuali uses a community source approach to allow member universities to share the cost for and the benefit of system development.

Figure 1 shows the structure of the development partners working in a project organization. Kuali project team works in a formal organization under a virtual environment, which ensures close collaboration among partner universities. The organization includes a Kuali board, an extended
board, a functional council, and a technical council, with members from partner universities.

![Kuali organizational chart](image)

**Figure 1. Kuali organizational chart**

The selection process of the partners is critical to the success of the community source project since it requires formal collaboration among partners and operates on distributed trust. In Kuali, there were several initial investors, such as Indiana University and the University of Hawaii, who initiated the project with external funding and initial investments. Later on, additional potential investors showed interest in joining, and the Kuali foundation had to be very careful in this selection process. Attracting as many investors as possible is not the goal of the Kuali foundation. Instead, it selects additional investors that have the requisite ability and the right philosophical fit. The Kuali foundation was exceedingly cautious when adding any new investors after the project had started and the team was formed. For example, it accepted the University of Southern California (USC) as a development partner after extensive review two years after Kuali began because USC was considered to fit very well into the Kuali project. If there is a difference of opinion regarding a new institution joining Kuali, the members of Kuali foundation have to vote to make the final decision.

The initial mission of the Kuali consortium was to develop a baseline system for financial services (KFS) and has later been expanded to other systems such as research administration (KRA) and student management (KS). As a community source project, Kuali must balance varying requirements from many universities. Thus, it is imperative to make the Kuali system flexible in terms of both customizability and extensibility.

5. The Research Model and Propositions

Since a community source project requires formal collaboration and frequent communication in the development stage, networks, both individual and institutional level, play an important role. For example, the individuals in the Kuali network include managers and developers, while the institutions are partner universities. Little research has examined how community source network formation is affected by individual and institutional factors, though Fjeldstad et al. [19] have recently highlighted the importance of actor-oriented organizational studies.

Figure 2 shows the research model of community source network formulation (CSNF). There are seven factors in the CSNF model: motive, learning, trust, norms and monitoring, actor similarity, external funding, and external environment. These factors are based on the literature and on observing the Kuali case. In Brass et al. [8], the antecedents of inter-organizational network formation include six variables: motives, learning, trust, norms and monitoring, equity and context. In the CSNF model, equity and context are not examined as factors affecting the formation of the community source network. Equity is defined as the status and power of institutions [51]; [59]. Context includes cultural, historical and institutional context.

![Research model of community source network formation](image)

**Figure 2 The research model of community source network formation**

Institutions involved in community source projects are typically roughly equivalent in terms of status and power. The community source network is studied in the context of higher education in this study. These universities have similar status, power and cultures. Equity and context may play important roles in the formation of other community source network, but in this study they are subsumed into the concept of actor similarity. In Brass et al. [8], actor similarity was considered as one of the antecedents of interpersonal networks since actor similarity was defined as individual similarity.
We consider actor similarity as similarity among universities and examine actor similarity as one of the institutional factors affecting community source network formation. External funding and external environment are added as institutional factors in this model by observing the Kuali case. Several propositions are generated from the CSNF model.

5.1. Individual Factors

In community source networks, the individuals are decision makers and developers from partner institutions. Individual actors, sometimes called boundary spanners, are considered a major factor in the development of virtual organizations [19]; [49]. Individual factors affecting community source networks include motives, learning and trust.

5.1.1. Motives. Organizational ties in community source are similar to those of consortia, which allow universities to achieve common objectives, sharing cost and risk. Cost savings may be the result of economies of scale and/or scope that can be achieved. For example, inter-organizational networking represents a cost-efficient way of gaining access to crucial know-how that can neither be made available internally nor be easily transferred by licensing [5]; [15]; [30]; [42]; [65]. Accordingly, inter-organizational networking is seen as a fast, effective, and efficient way of learning and of short-circuiting the process of acquiring and appropriating skills [14]; [24]; [30]. Finally, risk reduction comes into play as a cost-related motivation for inter-organizational networking when organizations seek to spread out financial or other risks.

The goal of Kuali is to share resources among multiple universities to minimize the risk and financial burden of system development. Kuali pools institution resources to develop an open source financial system which targets higher education. The most important motivations for universities to join this community source project are resource sharing and cost reduction. Although there are other motivations for universities joining community source networks, such as early deployment and risk control, the institution can always pay more to speed up development process and better control the risk if cost is not a concern. In an institution, the decision maker for IT investment is top management, whose motivation for joining the community source plays an important role in the decision-making process. Thus, our first proposition is as follows:

Proposition 1: Institutions in which top management has strong motives for cost reduction are more likely to join community source projects.

5.1.2. Learning. Firms that have more experience working with other organizations are more likely to form new and more diverse network ties and to become dominant players in networks [8]. In Kuali, one benefit for partner universities is that their developers join the system development and gain knowledge about Kuali. In the deployment stage, partner universities can deploy the system at lower cost and in less time than non-partner universities because the developers at partner universities become Kuali experts. The non-partner universities might pursue consulting with the partner universities when the system is adopted. Burkhardt et al. [9] argue that those who become early adopters may increase their level of influence relative to late adopters. Universities which adopt Kuali earlier can have more influence in community source networks. Partner universities that have a strong learning capability will benefit more by being early adopters. Partners which join later which have strong learning capabilities will have better odds of catching up with the early adopters. Institutions at which developers have strong technical capability and learning capability will therefore have more incentive to join as a development partner. [19]; [30]. Thus, we propose the following proposition:

Proposition 2: Institutions in which developers have strong learning capabilities can get more benefit from the community source network, and thus these institutions are more likely to join community source projects.

5.1.3. Trust. The traditional conceptualization of trust assumes that trust resides in personal relationships and past or future membership in common social networks that define the shared norms of obligation, expectation and responsibility [7]; [52]). Based on this traditional conceptualization of trust, trust in the community source, which is a virtual organization, might seem hard to define. Some researchers argue that trust does not exist in the virtual organization. Bradach et al. [7] point out that the lack of past and future association decreases the potential existence of trust, and the diversity in cultural and geographic backgrounds should similarly challenge the potential existence of trust. Handy [26] argues that trust needs physical touch, which the current technological context also eliminated. However, there is a conflicting line of reasoning that has empirical support to the effect that trust forms more quickly in virtual teams [29]; [33]. Jarvenpaa and Leidner [35] show that
virtual teams that reported high levels of trust in the beginning appeared to be more capable of managing uncertainty at the end. “Swift trust” [29]; [34]; [60] can form rapidly within virtual teams and is particularly important in digital entrepreneurship ventures such as community source projects [23]. Two aspects of community source projects may contribute favorably to the formation of trust. First, as community source projects tend to be formed within a specific industry (such as the higher education industry in the case of Kuali), it can be anticipated that actors in the project will recognize the possibility of future interactions with their virtual partners – on future projects for their current employers, but also as potential contacts in the event of filling or applying to job openings. Second, a community source project that is aimed at solving an ongoing problem for all participants, such as the need for financial systems and other enterprise software geared specifically for academic bodies, may become a permanent project, so again there are possibilities of long-term relationships to be formed.

In Kuali, trust is an important variable explaining the formation of community source network. A university needs to contribute between one half and one million dollars to become a development partner. The potential loss resulting from the community source project failing is great. It would be hard to believe that the top management at this university is confident in joining a community source network if they have little or no trust in the community source foundation. It is difficult for top management of a university to trust the community source foundation since this university has not worked with the community source foundation before. However, the university can judge the community source foundation using existing information, such as the identity of existing partner universities and of specific individuals, technical capability of existing partner universities, or the quality of the base system. Trust is one of the key factors to consider when they make the decision for joining community source. Although there is no guarantee that community source will be a success in the future, the institution with more trust in the community source foundation will be more confident of the project’s success. Thus, the following proposition is generated: 

*Proposition 3: Institutions in which top management have more trust for the community source foundation and its members are more likely to join community source.*

5.2. Institutional Factors

Community source network formation is not only affected by individual factors but also by institutional factors. These intuitional factors include norms and monitoring, actor similarity, external funding and external environment.

5.2.1. Norms and Monitoring. Even if universities trust each other, problems will arise in the course of collaboration. Hierarchy is certainly one solution for settling disputes [69]. Ostrom [51] points out the importance of reciprocity norms and Kogut [39] stresses the importance of rules of behavior. Network structure can help enforce norms and rules. From the Kuali organizational chart (Figure 1), we can see that its monitoring system is well designed. The Kuali Board is the final decision maker during the development of Kuali. The Kuali functional council and Kuali technical council take care of the functional issues and technical issues of Kuali, respectively. The extended board, Kuali investors, Kuali functional council, Kuali technical council and the project manager report to the Kuali board. The project manager supervises the project staff and development staff. Thus, the hierarchy system ensures that problems can be solved effectively. Partner institutions are more willing to join networks and cooperate when they see social controls arising from norms and monitoring that govern this collaboration. Therefore, the following proposition is generated:

*Proposition 4: Institutions will be more likely to join community source projects in which social controls arise from norms and monitoring.*

5.2.2. Actor Similarity. Actor similarity is defined as an antecedent of interpersonal networks in much of the literature. Similar people tend to interact with each other. Similarity is thought to ease communication, increase the predictability of behavior, and foster trust and reciprocity [8]. In this paper, actor similarity means partner institution similarity and is considered an institutional factor. In this study, actor similarity can be explained by the principle of homophily, which is the key to the formation of links between actors. Homophily refers to the tendency of individuals to choose associates who have social and demographic characteristics similar to their own [11]; [37]; [50]. The result is that many networks are homogeneous with regard to their sociodemographic and behavioral characteristics.

In Kuali, how do universities decide with whom they want to collaborate? Co-operation typically involves significant exchange, such as sharing of knowledge or financial resources. These are sensitive issues, and imperfect information about potential co-
operation partners can raise the risk of exposure to opportunistic behavior [21]; [22]; [24]. Homophily can enable (or limit) an actor’s social world in a way that has powerful implications for the flow of knowledge and resources they receive.

In Kuali, while two different universities might each propose to add $1 million in developer talent or cash, the real value of the capital is their ability to deliver quality code, work well with others, honor deadlines/work assignments, and intellectually improve the project. Sometimes, an institution can actually be a negative when values are not aligned or their staff members don’t work well with others. Actor similarity in community source networks can be viewed as good cooperation among institutions. Thus, we suggest the following proposition:

Proposition 5: Similar institutions are more likely to form community source networks.

5.2.3. External Funding. In the traditional system collaboration model, universities joining together to develop a project will not receive external funding. External funding is a unique feature of community source. Kuali received an award of $2.5 million from the Andrew W. Mellon Foundation to start up the project. Universities that joined Kuali can benefit from this external funding. Therefore, external funding is the incentive for universities forming a community source network. But larger amounts of external funding are not always better for community source networks. If the amount of external funding is too small, there will not be sufficient incentive for universities to form community source networks. On the other hand, if the amount of external funding is too large, universities can make little initial investment to join a community source project, which decreases their commitment to the project. If the potential loss resulting from the failure of the community source project is small to partner universities, the effort for the partner universities to ensure success of the project might decrease. Thus, a sufficient amount of external funding is critical to attracting institutions to join the community source network. In Kuali, $2.5 million in external funding was significant enough to start up the project, leading universities to feel more secure about joining. Around $1 million in initial investment from each partner institution makes partner universities collaborate closely to ensure success of the project. Thus, we present the following proposition:

Proposition 6: Institutions are more likely to join a community source project if the community source foundation receives sufficient external funding for starting up the project.

5.2.4. External Environment. External environment has a great impact in the formation of a network. For example, mergers and acquisitions are environmental jolts than can substantially change network patterns within an organization. The resource-dependence approach and inter-organizational relations can explain why community source becomes a new approach to system development. The resource-dependence approach predicts that organizations will be powerful relative to others to the extent that they (1) control resources needed by others and (2) can reduce their dependencies on others for resources [58]. Before Kuali appeared, there were only one or two main vendors in the market that provided financial systems to universities, so this resource is scarce. Universities that bought products from these vendors are heavily dependent on these vendors for software upgrades and maintenance. Kuali provides an alternative way for universities to acquire a financial system with less cost and better quality, which will impact the market of enterprise application system vendors.

Inter-organizational relations have been viewed as taking place within the context of a large environment [58]. Benson [6] argues that power in inter-organizational networks is based not only on internal network exchanges, but also on external linkages to the larger environment. Currently most universities have to buy expensive software from the market, software that is not specifically designed for the higher education sector. These features of the external environment appear to drive the formation of the Kuali community source network.

If an institution’s financial system is largely dependent on the current vendors in the market, this institution might have more incentive to join community source networks so that they can deploy the community source system earlier. These viewpoints generate the following proposition:

Proposition 7: Institutions greatly affected by the external environment have more incentive for controlling resources, and thus are more likely to join community source projects.

6. Discussion

A community source organization is a virtual organization with unique features – unlike a typical global virtual team, it is potentially permanent and is a collaboration of both individuals and institutions working together to satisfy a need that is not currently being met in a satisfactory manner. The greatest value of community source is the leveraging
of resources of the partners and the community for shared value creation.

Community source can be viewed as one example of social entrepreneurship, a concept introduced and championed by Ashoka (http://www.ashoka.org/), a leading community of social entrepreneurs. Social entrepreneurship differs from other forms of entrepreneurship in the higher priority given to promoting social value and development versus capturing economic value [12]; [47]. Earlier research [61] found that social entrepreneurs tend to be extremely local in their activities and networking. However, the efforts of such organizations as Ashoka suggest that community source may play a major role in worldwide social entrepreneurship efforts in the future. Ashoka itself may organize community source efforts in the social entrepreneurship realm, as it already helps social entrepreneurship ventures organize and network.

Community source projects address unmet or poorly met needs and in so doing impact society. In the Kuali example, educational institutions which cannot afford commercial software may be able to use the software developed through the Kuali community source project. As paying customers are drawn away, commercial software companies may lower prices and improve their products. The collaborative approach to solving problems faced by institutions with an open source license has a high probability of benefiting many people and organizations. The essence of the community source approach is that the institutions develop the collaborative capability that extracts the greatest value from open source.

The present project focuses on building a theoretical basis for understanding the factors that lead to the formation of community source projects and to the organizations joining existing community source projects. This study helps us define individual and institutional factors affecting community source networks and to better understand how these factors affect community source network formation. Drawing upon the Kuali case, we present a model which we hope will serve as a basis for future research in this area. The model offers guidelines for strategic planning and decision making in an institution considering how to develop a best solution to fulfill the need. This study can also help community source foundations to better manage and grow their community source networks.

There are two limitations in this paper. First, the case is in the higher education sector. Universities are different from businesses, particularly in knowledge creation and dissemination [44], so the research results may not apply directly to other industries. Accordingly, a direction for future research is to study the antecedents of community source projects outside the higher education sector. In particular, in other settings we may see different levels of equity and context, which will oblige us to adjust the model accordingly. It would be interesting to see if early participants in community source networks – including the member universities of Kuali – tend to become involved in other community source projects in the future. If so, the “standard practices” we find and describe in the Kuali case may become standard practice in fact in community source projects across various industries. Second, the research framework and propositions are derived based on observing the Kuali cases but require more empirical validation. The present study lays out a model and propositions based on the available data. Formal interviews with representatives and actors from the Kuali partner organization would provide a richer data set from which to further develop this model. A survey would provide quantitative data which could be used to validate the model and, perhaps, to improve upon it. Furthermore, in the present study we have not touched upon such questions as the effects on firm performance (in the for-profit sector) of participating in a community source project or the innovation yield of community source projects as opposed to other approaches to innovation. We hope that the present study opens the door to further study of the Kuali phenomenon in specific and to community source networks in general. In the future, we plan to develop a generic framework for describing network formation in community source under the category of social entrepreneurship.

7. References


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