

Unpacking Actor Interactions in ICT4D Ecosystem

Research-in-Progress

Reet Kaur

Ashir Ahmed

Abstract

Effective stakeholder identification and engagement has been associated with positive project outcomes in Information Systems literature. However, in Information and Communication Technology for Development (ICT4D), there is lack of formally capturing stakeholder perspectives and a current lack of knowledge related to stakeholder interactions may be one of the barriers in fulfilment of ICT4D project objectives. This research-in-progress paper aims to explore this issue and attempts to address this gap by proposing how ICT4D projects can be better understood through the lens of Actor Network Theory (ANT). We propose that ANT logic may be applied to ICT4D projects to explain stakeholder interactions and behaviors more effectively.

Keywords: ICT4D, Actor Network Theory, Stakeholder interactions.

Introduction

Involving project's stakeholders plays a significant role in the success of Information and Communication Technology for Development (ICT4D) Projects (Bailur 2006; Neville and Menguc 2006; Pade-Khene et al. 2013; Proches and Bodhanya 2015). Lack of formal capture of the stakeholders' perspective (Hansen et al. 2011) coupled with ineffectiveness or overlooking of stakeholder interactions (Proches and Bodhanya 2015) add complexity to ICT4D projects. Research has proposed that these stakeholder interactions have influence on the way project management teams do stakeholder management and how practices emerge as stakeholders respond to the actions by other stakeholders (Eskerod and Vaagaasar 2014). Thus highlighting that management response strategies are not formed in dyadic interactions but evolve from sequences of interactions among multiple stakeholders (Van Offenbeek and Vos 2016). Though research identifies the importance of managing interactions, it is still limited in defining what these interactions are and how these interactions are managed.

This research not only addresses the above-mentioned limitations but extends it to examine the range of actors involved in an ICT4D project. An ICT4D project set in India is used as a case study for this purpose. Aligned with the recommendations of (Luoma-aho and Paloviita 2010), the use of term "actors" is preferred over "stakeholders" as the term actors includes both human and non-human stakeholders. The overarching aim of the research is to identify the characteristics of interactions among the actors of an ICT4D project and to understand their contribution towards the project's outcome. The understanding of complex interactions between diverse actors will provide rich insights into the challenges faced by ICT4D projects and how they evolve in response to these interactions.

This paper is structured as follows. First, the current issues in ICT4D projects are discussed followed by a discussion on Actor Network Theory (ANT) as a lens for holistic understanding of the interactions between the actors in an ICT4D project ecosystem. The paper then discusses the theoretical background, methodology along with the analysis and findings. As this is a research in progress paper the analysis and findings are initial and limited to understanding of the project network through the lens of ANT. Lastly, the paper concludes with discussion of anticipated contributions and future research direction and opportunities.

ICT for Development (ICT4D) projects

Generally, ICT4D projects require partnership among various individuals and organizations (collectively referred as ‘actors’). For instance, the United Nation’s (UN) recent emphasis on working together in Millennium Development goals and Sustainable Development Goals places a strong emphasis on partnerships (e.g. goal 17). As a result, the interest and use of partnerships in ICT4D has grown (Ismail et al. 2018). With this growth in practice of ICT4D partnerships, there has been a rise in problems faced by multi-stakeholder ICT4D projects. The interweaving of actors, agencies, political, public and private institutions and foreign and global players complicates the ICT4D projects especially in developing countries (Muranga Njihia and Merali 2013). The varying stakeholders may have different objectives, incentives, metrics for success and initial conditions (Tongia and Subrahmanian 2006), from different innovators and service providers to multiple stakeholders and different contexts and frameworks for development. Furthermore some authors claim that project success is dependent on the appropriate management of the stakeholder (Lückmann and Färber 2016; Zidane et al. 2015). Stakeholder management has been extensively explored in the project management literature and various models and methods have been proposed to identify and analyze the stakeholders (also see Chung and Crawford 2016; Clarkson 1995; Freeman 1984; Goodpaster 1991; Mitchell et al. 1997). However they are limited in identifying the role of stakeholder networks, which forms the very basis of ties and relations that facilitate, develop and influence stakeholder interaction and behavior (Aaltonen and Kujala 2016; Chung and Crawford 2016). Aaltonen and Kujala (2016) emphasizes the need for understanding stakeholder landscapes for better stakeholder management. Their work identifies stakeholder interactions as one of the complexities in multi stakeholder projects, linking the effect of these interactions to stakeholder relationships, engagement, management and decision making (Aaltonen and Kujala 2016). They highlighted the importance of managing interactions but were limited by not defining what these interactions are and how these interactions are managed. Instead the authors urge for future research to explore the stakeholder interaction patterns (Aaltonen and Kujala 2016). This study not only meets this call but extends it further than stakeholders to examine all actors.

Researchers, (such as, (Brown and Grant 2008; Muranga Njihia and Merali 2013; Platz and Van Biljon 2015; Van Biljon and Alexander 2014)) also refer to ICT4D research as “fragmented adhocacy”: because literature related to ICT4D represents two distinct domains of ICT for development and ICT in developing countries (Brown and Grant 2008; Platz and Van Biljon 2015; Van Biljon and Alexander 2014). Thus limiting the primary interest of ICT4D to ICT artefact rather than the transformative potential to make a better world (Walsham 2012). According to Zheng et al. (2017) there is limited focus on developing contexts of ICT4D; the majority of the research highlights case examples of ICT applications (Ferguson et al. 2013; Zheng et al. 2018) rather than understanding the implications of ICTs for development. Understanding the ICTs for development implications and not limiting study to their adoption and diffusion will enable ICT4D projects to include the broader social processes and outcome of development (Zheng et al. 2018). The present research attempts to leverage this by observing the interactions among the actors in a social context of an ICT4D project. This approach is also favorable as it considers multiple actors and their concerns in ICT4D project.

Theoretical Background

ANT is used as theoretical lens in this study. It is suitable to study interactions in an ICT4D project as it allows the researcher to examine how a given element becomes important through the number of interactions or connections (Latour 1996). ANT also provides an analytical framework to study interactions in a socio-technical context. The theoretical lens use in this study enables conceptualization of how realities are experienced and enacted by different actors. This is important in ICT4D research due to ever-changing complexities and scenarios.

From the Geographical Information System and local practices study in India by Walsham and Sahay (Walsham and Sahay 1999) to understand the dynamics of financial inclusion and success factors in ICT4D program in India (Jayaprakash and Pillai 2018), ANT (Actor Network Theory) has been used extensively in analysis of ICT4D implementation and/adoption in developing nations (for example see (Bagui and Bytheway 2011; De Zoysa and Letch 2013; Qureshi 2017)). Gao (2007) used this theory to

explain the complexities of achieving standardization between actors (Gao 2007). Moreover, Heeks and Stanforth (2007) applied the lens of ANT to understand e-government project trajectory in Sri-Lankan context (Heeks and Stanforth 2007). It is anticipated that ANT can be employed as an adequate tool to examine interactions among humans and technologies during various stages of project lifecycle. In addition, it enables an analysis amid finding a middle ground between technological and social determinism (Díaz Andrade and Urquhart 2010).

The Translation process of ANT can enhance the understanding of interplay among actors by providing details of the strategies and interactions among actors to identify and enroll other actors. The four stages of translation as applicable to our research are discussed in the Table 1 below:

Table 1. Four phases of Translation Process (Callon 1984)

Problematization	Identify the problem that needs to be addressed Identify relevant actors Focal actor establishes delegates to represent actors Form an Obligatory Passage Point (OPP)
Interessement	Focal actor negotiates the roles and terms of involvement with actors The focal actor helps create a favorable balance of power by constructing system of alliances between the different actors
Enrolment	Actors put the roles and relationships they established in interessement into action. The negotiation and consolidation among actors in interessement phase determine successful enrolment.
Mobilisation	Focal actor ensures that all unions have their delegates or spokesperson selected and accepted by their groups. Establishes Focal actor as main voice of the network. Thus, attaining the properties of irreversibility also known as immutable mobile

After all phases are realized in full, the network becomes successful and all the actors are collectively channeled in one direction. However the network can become unstable again by contesting the consensus and alliances, this is known as dissidence (Callon 1984). This lack of alignment highlights that the agendas, interests and objectives of the ICT4D actors may be diverging or competing. Understanding the interplay among actors during the formation and extension of the ICT4D project network will enable a deeper insight into key characteristics of interactions and the barriers to effective interactions.

Research Design

The research setting for this study encompasses an ICT4D initiative. This research follows an interpretive case study approach in order to investigate the issue in a natural setting (Walsham 2006). Due to the nature of qualitative study and involvement of various actors, the research utilizes ANT as the theoretical lens. The researcher follows the actors and their networks to understand the issues such as inscription, translation, and other processes associated with ANT.

Overview of the case

The research utilized the IT for social impact Project-India site, delivered by an Australian University (here after referred to as International University (IU)) as an undergraduate subject in collaboration with Not for Profit (NFP) organization in Australia and Indian partners (Satpuda Vikas Mandal (SVM)). This project is globally recognized for its work in the remote tribal Maharashtra state. Pal is a village situated in Satpuda ranges on the bank of the Suki River in Jalgaon district of Maharashtra state of India. The project also extends into surrounding villages of Jamnya, Mohamandali and Mongruel and these locations also form part of the extended field research site. Though India has achieved remarkable economic growth and rapid progress in the ICT4D area, but still vast majority of Indian citizens grapple with poverty, limited communication facilities and high levels of illiteracy, particularly within villages and rural communities. The research sites selected for this research are among the rural and least developed parts of India. The travel times indicated in Table 2 are for appreciation of the remote nature of these rural communities. The presence of multiple actors and the project being a currently running

ICT4D project in India makes this research site suitable for said research. Access to the case study was a major determinant too. The IT for social impact-India project has been in full-fledged operation since 2012 and has been working closely with rural tribal citizens to adapt technologies to local context. This multi-year project had its 6th visit to the case site in 2018. Over the last 6 years, this project has worked closely with the community at the case site to deliver IT enabled education in schools, community development and farm science projects. Some of the technology used includes drones, virtual reality and robotics. In 2017, a mobile digital classroom in a box was deployed between remote village schools where there is no internet and a 'computer driver's license' (program to instill basic computer literacy in female students) accreditation process has begun to address the digital literacy gap. In addition to these projects further work has been done on a sustainable housing project for the resident teachers, Digital land and a data governance project, E-waste management projects are also being run.

Table 2. Particulars about case sites (Census 2011)

Particulars		Pal	Jamnya	Mohamandali	Manglur
Population		7041	966	779	1045
Distance from HQ (Jalgaon)		73.5 kms	98.1 kms	50.9 kms	88.5 kms
Literacy rate	Total	72.27%	50.89%	46.50%	48.10%
	Male	79.77%	64.04%	53.16%	53.99%
	Female	64.03%	38.34%	40.64%	41.22%
Tribal Population percentage		50.46%	99.90%	99.61%	84.40%

Methodology and Data collection

This study explores how actors interact and what complexities are faced during these interactions in ICT4D programs. Thus, an access to in-depth knowledge of technology artefacts used, the views of the actors and their interaction with other actors is required. The use of an interpretive approach in this research can better explain the complex social-technical process using ethnographic interviews, document analysis and empirical observation. The researcher used snowball sampling, a type of purposive sampling to recruit the participants for this study. The researcher started by identifying the key informants through program documents and by visiting the research site in India. These key informants were then interviewed and asked to identify other relevant actors. Using recommendations of the key informants allowed following of the actor in the network as suggested by ANT technique. Both primary and secondary data were collected during 2 visits to the research sites in 2017 and 2018. The researcher stayed at the research site among the aforementioned rural tribal community and collected data during the period of stay (approx. 10 days each visit). 17 in-depth face to face interviews were conducted with relevant actors. These were the program directors, head of community institutions, community leaders. The interview protocol suggested by Yin (2015) was followed (Yin 2015). Interviews were conducted both in English and Hindi (where preferable). The researcher's fluency in Hindi and exposure to Indian background helped in establishing a dialogue.

Data Analysis and Findings

Analysis of the qualitative data involved coding, classifying and connecting concepts from interviews, document analysis and observation. The audio recording of the interviews was translated (for Hindi interviews) and transcribed. The transcribed interviews were then coded. In order to better manage the

qualitative data, Nvivo was used to help with the coding. Over 217 codes were identified. Some of the codes decayed during the process. The codes were then classified based on the phrases and words. After classification they were connected into categories, the 3 Cs of qualitative data. Strauss and Corbin's (1990) method was used for thematic coding of the qualitative data including open coding, axial coding and selective coding (Strauss and Corbin 1990). Document analysis was used to understand the policies, procedures, context and demographic information. All these pieces of data were analyzed using ANT as the theoretical lens. The essence of the analysis throughout the research involved the comparison of data in a certain theme constantly being judged to belong to that particular theme. This allowed to identify commonality among themes. Data was coded into sub-themes and combined into themes.

An initial ANT based account of project enabled understanding of how the network was formed, extended and stabilized. The findings discussed in the next section are preliminary and based only on the initial ANT based account. The initial analysis helps in establishing the boundary of the actor network (ICT4D project ecosystem) and identify the primary actors in the network. Understanding the context in which the project was deployed will contribute to understanding of interactions within the network.

Findings

SVM was identified as the focal actor, a feature of problematization in the ANT phases, in the early part of this story. SVM has worked for 60 years to bring education and technology in the region while maintaining the customs and cultures in local communities. Due its long standing and close work with tribal and rural communities, SVM has established trust and support among the local community. This trust and support is illustrated by other actors' comments such as:

"Whenever I face any issues I reach out to the P4 (mediator). I trust him so it becomes easy to share my ideas and concerns".

"Representatives from the community and our organizations are the people that tribals trust and their acceptance of the project is higher due to that trust being built over the years".

SVM also introduced the project team to community which established a dialogue between the team and community members. SVM delegates acted as boundary spanners that enabled building trust, improving coordination in decision making and implementation of the project network. Boundary spanners also known as bridges or brokers are those actors that facilitate transactions and flow of information between people and groups, which have no access to each other or have no basis on which to trust one another (Long et al. 2013).

SVM functions as the primary support provider for the rural and tribal people. SVM defined the roles and identities of actors in the network by both actions and documents. Financial investments made in the existing project are controlled by the SVM. But their expenditure control process is identified as weak meaning it was not timely, accurate and consistent. This leads to delays in procurement of resources and is insufficient to support broader resource allocation. The senior executive from SVM expressed that

"If there is major expense they need to come to me and then I will take this to the management. Majority of the time the requests are made informally. I can work on requests that are formal but not many submit the requests on paper".

Some other members voiced their opinions as

"They listen to all our requests but it takes time to get approvals and sometimes multiple reminders need to be given. I have had requests approved on same day and sometimes waited for months without hearing anything back".

The lack of preference for formal process coupled with long processing times has discouraged some members to interact with the expenditure process.

Another respondent who is a principal of remote school said

“We do not know the management processes and politics; we are just doing our job... with no electricity. If we get electricity, then only we can print forms and fill them. We sometimes request students that go to cities to bring some supplies for schools. They do not know how to use computers so even they cannot get the documents for us. It is very tough to do all this in remote area with no connectivity and electricity.”

Lack of infrastructure and inability to utilize technology have been widely stated by many respondents in SVM as a factor to avoid formal documentation.

As the project got underway 2 other major actors joined the network. These were the IU and NFP. IU are the technology experts: all of whom are from the university's main campus in Australia, travel to the remote location each year to deliver on their roles and responsibilities. NFP got involved in the project primarily due to environmental concerns like deforestation and firewood usage. But with the IT for social impact project conception they have also delivered on sustainable construction, education and gender equity. The other actors that form part of the wider network are Indian government and other social agencies. IU utilizes the SVM network and resources to deliver IT enabled education, gender equity workshops and other projects. NFP also utilizes the SVM links to rural and tribal population to work on community development projects and infrastructure projects. The financial support also flows only through the SVM network. The funds from government are also delivered to support schools and community project by the SVM.

The president of the SVM added that

“Access to these remote areas was impossible in past so government officials came to us. We have been acting like a catalyst for government schemes. We bring the government schemes to them and also have a dialog with government officials on their behalf. In many schemes direct funds are transferred to us”.

There is no formal agreement between SVM, IU and NFP. But the mutual understanding defines the actor's roles, interests and identifies a single way ahead. The focal actor (SVM) now gets all actors to engage, commit and follow this course of action. They maintain this control by documentation, meetings and through informal interactions.

The delegate from NFP highlighted that:

“In our connections that is between ourselves and SVM there's never been a formal agreement ever with that it's always been through relationships it's always been through that long history of working together and trusting each other and knowing each other well enough that we know that we're all working for the same end and so there's never been a Memorandum of Understanding or any sort of formal agreement in that way”.

Another respondent (technology expert) added:

“We mostly interact informally... I think after 5 years of project it's become more of conversations. We do not need letters of Memorandum of Understanding and things; they trust us going back into the village and the community and the relationships we've built with SVM through NFP. It's taken away the formality it's more of a helping out. Yeah there's very formal part of presentation of the Charter for the technology experts which is an assessment item but except that there's very little formal interaction”

This definition of responsibilities and roles forms the interestment phase of ANT and now enrolment phase requires the actors to enact these roles and responsibilities. This happens through actions. Project gets started in 2012, and the focus shifts to IU who acts like the delegated actor of the focal actor (SVM) as they lead the technological developmental projects. They start enacting their role through dialogs with the community and rural schools identifying the needs and estimating the computer literacy. This leads to series of workshops and projects being delivered at community level. However Technical experts from IU who are from Australia face interaction issues due to language barriers, lack of infrastructure and volatility of the community ecosystem. They evolve quickly by working alongside the SVM delegates. Conducting short meeting and direct conversations among the team and with delegated actors from SVM helps overcome some bottlenecks like language barrier and eases volatility

too. Project progress documentation also helps keeping the actors to track. Attempted enrollment reveals that though formal documentation of the roles does not exist, the goals defined in the project inclusion document matched the actual and immediate concerns of the local actors (SVM and community). The questions that stem up are whether lack of infrastructure and facilities will impact the collaboration of technologies? Will this affect the commitment of the actors? Given the above questions and the remoteness of the project site, there are concerns about the delivery of the technology. However, the Project director works to stabilize the network by arranging pre departure workshops with the technology experts, identifying technology deliverables and by working papers. This stabilizing of network establishes the mobilisation phase of ANT. As new technologies are delivered, they play their role in inscribing and enacting the interest of other actors.

In addition to the above described stages of creation of actor network, the process of interactions is critical to the building and stability of these networks. A further analysis on the actor's perceptions about ICT4D project for social impact and how interactions among these networks influence their perception will be done.

Conclusion

This paper utilizes Actor Network Theory (ANT) to understand the interactions between actors in an ICT4D project ecosystem. By using ANT, the objective of this work will be to identify complexities in multi actor interactions in an ICT4D project ecosystem for more-effective delivery of project outcomes. The methodology proposed for this research is in line with ANT concepts. The findings from this research will contribute in better understanding of interactions between actors in ICT4D programs and thereby explain the effect of these interactions on program activities, other actors and networks. It will also enable a better insight into the behavior of stakeholders and contribution of interactions between them in attaining the mutual desired outcomes in ICT4D programs. This will enable scholars and practitioners in understanding the network dynamics of creation and extension of the stakeholder networks and provide explanation to the stakeholder behavior within the realms of practice, research and policy. This research will also provide basis to theorize and extent our understanding of ANT and ICT4D body of knowledge and practice.

The next step in the research is to complete the analysis and validate the research so it can be reviewed for potential amendments to represent the respondents review.

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