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Abstract

Previous research on information and communication technologies (ICT) in developing countries has documented multiple variations in technology acceptance, use and work practices. While these variations are mainly seen as culturally, historically and contextually based, recent research suggests that these can also occur because because new actors, different from the state, market and international organizations traditionally providing access to the technology, appear. Richard Heeks introduced the notion of grassroots development. Here organizations spring up from within poor communities as a result of ICT-enabled empowerment and appropriation of technology. These grassroots organizations can transform the processes and structures of the digital economy by transforming (frequently through improvisation) those not previously having access to technologies from victims through to consumers innovators. However, there is a lack of solid research in this area. This study aims to answer this challenge through the 15-year history of grassroots development in Minsk, Belarus. Based on interviews and other sources, we focus on work practices underlining how grassroots models were created and developed by people lacking significant financial and organizational resources and in conditions apparently unfavorable for innovation creation.

Keywords: Grassroots Development, ICT-enabled Transformative models, Improvisation, Developing Countries, Belarus, Improvisation

1. Introduction

1.1. Motivation for this research

Davison et al. (2000) argue that the process, actors and resources of technology leapfrogging, i.e. the implementation of a new and up-to-date technology in developing countries where the previous version of that technology has not been deployed, should be carefully planned and designed. On the other hand, research on ICT in developing countries, has documented multiple variations in technology acceptance, use and work practices with these variations being seen as culturally, historically and contextually based (e.g. Avgerou, 2003; 2005; 2008; Silva & Westrup, 2009; Walsham & Sahay, 2006). Recent research has proposed that these variations can also be caused by the appearance of new actors of a digital economy different from the state, market and international organizations traditionally providing access to the technology. Thus Heeks (2010) introduced the notion of grassroots development that occurs from within poor communities, as a result of ICT-enabled empowerment and appropriation of the technology to such an extent that they start to do new things with it. Grassroots ICT-enabled models have the potential to transform the processes and structures of digital economy by transforming those not previously having access to technologies, from victims to consumers, producers and then finally innovators of a digital age. However, the

processes of grassroots creation, development and impacts have not yet been properly studied and there is lack of solid research in this area (Heeks, 2010).

We answer to this gap by studying the 15-year period of the creation and development of grassroots organizations in Belarus, a developing country that previously has been under researched. We study the development of the home local area networks (LANs) that were created for quality and cheap Internet-access and resource-sharing by citizens themselves and incorporate thousands of users in Minsk. Based on over 50 interviews as well as archival and document data sources this research studies work practices underlining how grassroots models were created and developed by people who lacked significant financial and organizational resources and in conditions unfavorable for innovation creation from that normally accepted as necessary in the literature (e.g. Ein-Dor et al., 1997; Heavin et al., 2003; Trauth, 2000). For example, contradictory and even hostile government policy, lack of financial investments, and elements of coercive pressure all existed. Nevertheless, home LANs managed to develop their own infrastructure for Internet-access and to compete successfully with government monopolistic organization and private Internet-providers over a long period of time.

Belarus was chosen as a research setting for a several reasons. Belarus is a potentially interesting research setting that has been largely unstudied in IS research. As argued by Tihanyi & Roath (2002) Eastern European markets are interesting for enabling huge opportunities in the global economy; for their low wages, yet high standard of education; and close geographical and cultural ties with Western Europe. Moreover, unlike similar home LANs existing in some other countries such as Russia and Ukraine, where they quickly underwent a significant transformation from their free origins to more commercially viable forms, in Belarus this process was greatly decelerated. In Belarus the creation and development of grassroots models and their transformation to more commercially viable forms lasted 15 years because of administrative conditions, a state monopoly on Internet channel sale and undeveloped marketing conditions. Such a deceleration creates a rare opportunity to study and understand the process of grassroots creation and development in depth. This makes Belarus a unique research setting for studying the phenomenon of grassroots models development. In the following section we describe the research question and the potential contribution of this study.

1.2. Research Question and Potential Contribution

The research question aims to understand: *What work practices enabled the creation and development of transformative grassroots models?* We explore how people previously victims of leapfrogging dissonance (not having access to the technology) turn into consumers and even innovators of the leapfrogged technology.

This research has several potentially important contributions. Broadly, it contributes to our knowledge of technology development, and innovation creation at group, organizational and industry levels. More specifically, the research has five promising contributions: (i) It addresses the gap existing in the literature about the process of grassroots organizations creation and development as well as a lack of studies on their impacts (Heeks, 2010). This coincides with the argument of Orlikowski (2000) that our knowledge about the conditions in which practices alternative to those originally designed for a technology emerge is limited. (ii) The research also examines leapfrogging from multiple perspectives: leapfrogging is more than a technological phenomenon and examining it from multiple perspectives will improve our understanding of it (Davison et al., 2000). (iii) It contributes to technology studies in developing countries (e.g. Avgerou, 2003; 2005; 2008; Silva & Westrup, 2009; Walsham & Sahay, 2006). (iv) The research focuses on the consequences and use of computers at home**.** This has largely been overlooked in the IS literature with some important exceptions (e.g. Venkatesh & Brown, 2001) and describes the emergence of grassroots organizations as one of these consequences. (v) It can add valuable insights on social process underlining similar to the open-source software metamorphoses into more commercial forms (Fitzgerald, 2006). Grassroots development models are similar phenomenon in several ways: being alternative to traditional organizations; being created by citizens themselves and open to contributions from any volunteer; where the property in home LANs is collective; and where there has been considerable transformation.

2. Theoretical background

Multiple perspectives from IS and organization literature and elucidate on factors and processes of technology development. Below we provide only the main references on these works and further references are available from Zorina and Avison (2010).

Among research investigating the factors influencing technology development and use various perspectives have been proposed. Thus Lamb and Kling (2003) argue that social actors of IS have complex and multiple roles while adapting and using IS within complex social contexts. This coincides with arguments provided by Bailur (2007), Ciborra (2004), Compeau et al. (1999), and Sauer (1999) that people's concerns and anxieties can drive their participation in the technological change process. Some research (e.g. Metiu, 2006; Avgerou & McGrath, 2005; Gopal & Prasad, 2000) point on the important role of power, commitment and emotions in technology development and user-centered research while others (e.g. Venkatesh & Brown, 2001) underline the role of motivation in the process of technology innovation acceptance. These micro human-centered perspectives are supplemented with relevant macro and institutional perspectives. Thus Kogut & Zander (2003) and Hall & Soskice (2001) argue that the macro country environments may act as a manipulator of the micro level's incentives and knowledge of how to work, coordinate and share practices. However, there is a disagreement in the IS research here on how this manipulation can be realized. Some research support transfer and diffusion approach (e.g. Heavin et al., 2003; Trauth, 2000; Ein-Dor et al., 1997) and argue that ICT success builds on one best way of IS development and certain 'standard' common factors, such as demographics, culture, national and enterprise policy, etc. This contradicts with another approach (e.g. Silva & Westrup, 2009; Avgerou, 2008; 2003; Walsham & Sahay, 2006; Madon, 2003) that assumes historical path-dependency and social embededness of ICT development models. The authors position this research in the latter stream of research while also emphasizing the importance of studies on human agency motivation and commitment, as well as the studies on the processes of technology development.

Research on the processes of technology development may be divided to the practice-based approach and studies on improvisation. The practice-based approach to technology development is based on works of Bourdieu (1990) and Orlikowski (2000). Bourdieu (1990) argues that agents construct and transform the field (the IS technology and its appropriate constructs in our case) through their practices and actions based on the capital that they posses. This approach was extended by Orlikowski (2000) practice lens to study technology in organizations. According to this, the same technology in practice can be a variety of technologies-in-practice. Factors that influence the variations of technology-in- practice are the following: users' influence and motivation, interpretive conditions (level of users' technical knowledge), technological conditions (technological properties available to users), and institutional conditions (social structures of the larger social system, type of organizational culture). In particular, Orlikowski (2000) argues that improvisation technology-in-practice occurs when users are highly knowledgeable about technology and highly motivated to use it; when institutional conditions include a strong team focus, cooperative culture, and a strong commitment to ongoing learning; and where people choose to use the new technology to substantially alter their existing way of doing things. Numerous research has also emphasized the link between technological innovation and improvisation (e.g. Brown & Duguid, 2000; Weick, 1998; Moorman & Miner, 1998). It is argued that improvisation can lead to successful ICT innovation because of its main characteristics: adding unique, unplanned, and novel features to something performed (Cuhna & Cuhna, 1999; Weick, 1998; Miner et al., 1996) spontaneous, on the spur of the moment and intuitive, builds on previous knowledge, experience and sustained practice over time (Vera & Crossan, 2005; 2004, Weick, 1998). However, despite numerous research and significant achievement in the area, our knowledge of how practices that are alternative to those originally designed for a technology emerge and proceed is limited (Orlikowski, 2000).

As mentioned in the previous section this research aims to understand the processes and reasons underlining the creation and development of new-emerged and improvisation-based grassroots organizations previously unstudied in the literature.

3. Research Methodology

3.1. Research Design

We design this research as a qualitative single case-study. Below we provide the reasoning for this choice. Following Yin's (2003) recommendations on when a case study can appropriately be a form of social inquiry, we design this research as a case-study because the context and circumstances are crucial to understanding the work practices and meanings of people creating and developing grassroots models, and because this understanding can only be reached based on multiple sources of evidence. As general guides to the research design we use Myers & Avison (2002), Denzin & Lincoln (2000) and Silverman (2000) as well some suggestions on how to manage interpretive research in information systems by Walsham (1995).The novelty of the phenomenon, the importance of the context and process, and the need for nuances and interpretations imply that this research could be designed based on qualitative approach. We position this research as a single case study because it presents an intensive study of a single case of the phenomenon of grassroots development (Markus, 1983). Based on the reasons given above we argue that Belarus provides a unique research setting for this phenomenon. Given that there is a lack of solid research in the area (Heeks, 2010) we argue that an in-depth and detailed study of the grassroots phenomenon should be conducted. Further research, however, can contribute to our knowledge of grassroots phenomena and their impacts by making a comparative case study of Belarus with Russia and the Ukraine or elsewhere.

3.2. Data Sources and Data Collection Procedures

We provide an overview of data sources, their justification and the way of linking them with our research question in table 1.

Research Question	Data source	Justification
• *What work practices enabled the creation and development of transformative grassroots models, i.e. that people being victims of leapfrogging dissonance (not having access to the technology) turn into consumers and even innovators of the leapfrogged technology?*	• Interviews (more than 50 in total of about 40 minutes each, tape recorded and transcribed) with users and administrators of grassroots organizations (home LANs). • Documents (websites of and forum's discussion of home LANs) e.g. including *Homenets.tut.by*, *It.Tut.By* and *Providers.By* • Archival data (opinions of experts and politicians on grassroots creation/development, articles in newspapers and journals, related government laws of Internet-access regulation).	• Interviews to identify the list of main characteristics and working practices, aimed at building a picture of how the administrators and users of grassroots models thought about their roles and practices. • Documents to identify rules and procedures of certain work practices. • Archival data to understand the contextual factors shaping working practices and meanings that people put into them.

Table 1. Research question and data sources justification

Interviews. We carried out a series of semi-structured interviews aimed at building a picture of how the interviewees thought about their roles and practices. They are or were administrators and users of grassroots models and employees of private and state organizations providing Internet access. The interview protocols for administrators and users of grassroots development models can be obtained from the authors on request. Before the data collection process has started, a pilot project was conducted in January to March 2010. Findings from the pilot study and the researcher's previous experience of being a user of one of the most developed home LANs in Minsk, were useful in determining the initial protocols and the most appropriate actors to be interviewed. We also used the guideline of Myers and Newman (2007) to help us structure the interviews. A snowball sampling

strategy was used to choose individual informants for the interview. The other sampling strategy was by means of a notice about this research and finding administrators' contacts at relevant websites. In particular, the www. homenet.tut.by website were the contacts of the majority of the home LANs are presented was used.

Documents. These include websites of home LANs, and related discussions of home LANs in various forums. In order to follow the principle of triangulation, this type of data is planned to corroborate the evidence from other sources.

Archival records. These include documented and recorded opinions of experts and politicians on grassroots creation and development, and articles in newspapers and journals, and related government laws of Internet-access regulation.

The data collection period started mid August 2010 and continued to the end of October, 2010. Details of the interviews can be provided by the authors on request.

3.3. Data Analysis Procedures

In this research the unit of analysis is the home local area network and its work practices of the grassroots model creation and development. For each home LAN, its main characteristics and work practices are examined. Characteristics include size (number of users); motivation for development; the type of technology used (cable lines, fiber-optic lines, etc.); inside architecture, etc. These will be identified in the data analysis. According to the data found, home LANs will be compared and contrasted.

This research in progress does not contain data analysis. However, it implies a vision of how the latter should be conducted. The data analysis procedures are planned to be done in several stages. The first stage is the pre-analysis. All interviews are planned to be transcribed as text for detailed analysis with the specialized software NVivo. For each interview and related documents we plan to create a summary form based on Miles & Huberman (1994). Further stages of analysis (developing coding schemas, categories and making connections between them) are planned to be developed in line with recommendations from Strauss & Corbin (1998) and Mason (2002). We plan to triangulate all data evidence (Eisenhardt, 1989) in this research as well as to use the fundamental principles of conducting interpretive field studies as proposed by Klein & Myers (1999) when making data analysis.

4. Preliminary Findings

The research setting of this study is represented by the grassroots development organizations, called home local area networks (LANs), that appeared in Minsk within communities of citizens which formed one of the main forms of Internet-access and resources-sharing for 15 years, incorporating thousands of home computers. The main actors of Internet-access in Belarus are the following: state telecommunication company; private Internet providing organizations, and home local area networks created by citizens themselves to get cheap and quality Internet-access and resource sharing. While the first two actors, represent traditional actors providing Internet-access technologies, the latter, home LANs, represent transformative ICT-enabled grassroots organizations. The state telecommunication company, called "Beltelecom", possesses a monopoly patent for selling the Internet channel. It sells the Internet to its direct users and to private Internet providing organizations.

However, because of high prices, and low quality Internet-access based on telephone cables, users' access to the Internet was complicated and their need for this service was not satisfied. As one of the home LANs administrators argued:

> "Our government is monopolist in allocating the Internet channel. They earn about 1000% profit per month on this, I guess. In Moscow, for example, you can buy an unlimited Internet-access for 20 dollars per month and it has existed for a long time. In Belarus in the time when we were creating the network this was just impossible. Recently the government has created "ADSL" [Internet-access type] that costs 60 thousands [25 U.S dollars approx.]. But this is of a rather bad and vulnerable quality and not all people can afford to pay this money for the

> Internet... In our network you pay 11 thousands [4 U.S. dollars approx.] for Internet-access per month and the quality of it is not worse and sometimes even better compared with the one provided by the government organization."

Private Internet- providers include a number of companies, such as "Solo", "BelInfonet", "Atlanttelecom", "Aichyna", and "NICS". These companies were interested in building a new effective infrastructure of Internet-access (with cables, fibro optics, etc.) and in providing the Internet to as many users as they could. However, they had to buy the access to Internet –channels at the very high prices that the monopoly state "Beltelecom" company had established, and so they could only sell the Internet for high prices to their users. All this made the access of the majority of citizens to the Internet difficult. At the same time, Belarus is characterized as a country where a number of people with a computer science and engineering background is high (Global Outsourcing Report, 2005: 46). Given that a home computer was owned by almost every family, the citizens need for the Internet was high and therefore the number of people able to build the Internet-access and the infrastructure for it from the grassroots was also high.

> "First we bought computers and wanted better equipment facilities so we could play games together, share resources, etc. In those times the Internet was very expensive and hard to buy. So we decided to build it together with a friend of mine."

Home local area networks were the main form of Internet-access and resources-sharing for 15 years in Minsk. They included thousands of members and covered all the city areas, giving their users cheap Internet access, network resources sharing, online and real social communication opportunities. As one of the specialists of home LANs described it:

> "In Minsk home computer networks are everywhere. I think more than 90% of all home computers are currently connected to them. Networks merge with each other and the bigger the network the more people join it…" (Konstantyn Scherban, specialist in home networks, to the Belarusian News Portal "Tut.By" (2.03. 2010), http://news.tut.by/162645.html).

Further stages of this research will include analysis of the interviews (Myers & Avison, 2002), triangulating (Eisehardt, 1989) the results with the relevant documents and archival data analysis, and handling these multiple sources with the methods of process-based theories (e.g. Langley, 1999).

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