

IBM Research Report

Increasing Technology Adoption in Developing Regions through Trust Routes

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ABSTRACT

A significant percentage of human population in developing regions lies towards the Bottom of the Pyramid. Many of these cannot afford their own IT infrastructure or be able to use it directly due to low literacy levels. This results in lack of use and awareness of technology in various segments leading to several inefficiencies. Increasing technology awareness and adoption is therefore a prime requirement for enabling the benefits of ICT for this population segment.

In this paper, we introduce the notion of Trust Routes that can be used as a catalyst for increasing technology adoption. We discuss the role Trust Routes play and how they can be used to penetrate the mindsets of the target end users with trust and confidence. We report some of our experiences from field work in India.

Author Keywords

Developing Regions, Trust Routes, Culture-sensitive design, Ethnography.

INTRODUCTION

The impact of information technological advances in the form of various IT systems and the World Wide Web has not been able to reach a large percentage of human population. For instance, only 22% of human population has access to Internet [5]. The rest suffers from unaffordability, illiteracy and lack of locally relevant content.

As a result, most activities, personal as well as business related, in the developing regions are manual and primarily paper based [2]. This leads to failed commitments, little or no accountability, and inefficiencies in markets leading to suboptimal behavior [4, 3].

Previous work has demonstrated that several benefits can be delivered through the use of technology for this user

segment. A voice based version of Wikipedia¹ -- the online, community created encyclopedia, for the underprivileged is presented in [6]. A village community portal called VoiKiosk [7] creates an ecosystem of a closely knit rural community and provides them a channel for sharing locally relevant information as well as to network socially. Mobile phones have been used to benefit fishermen and buyers [4] and to integrate online processing with paper documents, both in India [8].

While technology can be used by others to enable new solutions for the underprivileged as in [8], the real benefits would be realized when these people start using such solutions on their own. Here lies our challenge since direct use of technology by this segment is quite low.

In this paper, we introduce the notion of Trust Routes as a channel for reaching out to masses in a culture-sensitive manner while gaining their confidence and trust. We discuss how these Trust Routes can be used to increase technology awareness and adoption and to design services more suited and relevant for the target users. The findings are based on the insights gained from field work in India.

MOTIVATION

A pilot ethnography research was carried out around the city of Bangalore in India to understand our target population and the role that technology currently plays in their lives. Non-participant observation was the primary method used to carry out the ethnographic research. The population was researched in their residential environment and their work environment.

From our experiences in the field and the ethnography study we learnt that apart from affordability reasons, personal technological inhibition was a major deterrent for this population. As a result, they are not even aware of the benefits they could derive through the use of technological solutions. Many view IT and computer literacy as a means to get an IT job rather than as an effective tool to optimize

¹ <http://www.wikipedia.org>

their daily operations and derive benefits. Lack of relevant services for these people is yet another reason for low technology adoption by this segment. Most services available today such as railway/airline reservation systems, matrimonial/job matchmaking portals etc. are aimed at serving the affluent people and do not address the needs of these people. For instance, most people in this segment do not make a reservation before traveling to save the reservation cost as well as the overhead cost and effort needed to visit a reservation office. The daily-wage nature of jobs they do also do not permit them to plan their travel much in advance.

This led us to investigate if relevant applications and good usability designs will eliminate the problem. We realized that good usability design or relevant applications can only help once they are ready to trust themselves and take the first steps towards technology.

We also found that using their social network, however small it may be, is the preferred means of this population. This means that they will find it easier to take the first step towards technology if there is a known person showing a direction. They are more likely to graduate to being a regular user if there is a more knowledgeable person in their network to fallback upon, in case they fumbled or landed into some difficulty.

During our study we also found that the villagers had a preferred person they would go to for help even for non technical tasks. The person was different for different domains. These helpers/guides are somewhat like SMEs (Subject Matter Experts) in their domain. Besides being SMEs, they were very helpful by nature. Helping others gave them sometimes monetary and more often non-monetary rewards – gratitude, acceptance, satisfaction etc. We call these people PALs -- the friend in need. We also realized that these are the links between the outside world and the underprivileged population.

TRUST ROUTES

Here we present the notion of Trust Routes, the role they play in the adoption of technology as well as how they can be utilized in practice.

Introducing Trust Routes

We define a Trust Route as a link chain, with human and/or virtual nodes, that enables acceptance of a concept, idea, or a view to percolate from the producer to the end consumer. All of the nodes of a Trust Route trust at least the immediate node in the previous segment of the route.

Trust Routes can be derived from the informal social networks of end users and formal organizational networks. Among other uses, they can be utilized to aide technology adoption amongst the underprivileged. The notion can be explained by use of couple of examples (human links were more applicable for our target users):

- *A Trust Route for people at home:* A villager, novice to technology, is gifted a new mobile phone with pre paid mobile service but does not know how to make a call using the mobile. Let us call him V1. V1 knows a PAL, V2, who could be a tech savvy neighbor, a youth in the house or a respected village authority. V2 also knows an agent A of a wireless service provider SP and uses his help, if needed. Agent A trusts the Service Provider, SP, he works for and the Service Provider trusts the Technology Supplier, TS, with whom he partners. Then a Trust Route would be: $TS \leftrightarrow SP \leftrightarrow A \leftrightarrow V2 \leftrightarrow V1$. Here, the $V2 \leftrightarrow V1$ part of the Trust Route comes from informal social network of end users while the remaining part comes from a formally established organizational network.
- *A Trust Route for people at work:* A non-tech savvy laborer, L is given a new mobile phone by his employer E1 primarily for official work. Employer E1 needs the laborer L to use an application on mobile to carry out assigned tasks. L trusts E *for his job* and carries out his orders. Employer E trusts the task related application, App on the mobile instrument. Employer E also trusts the Technology Supplier, TS, who developed/supplied the application App. Here the Trust Route would be: $TS \leftrightarrow App \leftrightarrow E \leftrightarrow L$. Here, the Trust Route is an enforced one and entirely based upon the organizational network. When an employer distributes a technical instrument to his workforce, the adoption becomes easier as those laborers get acquainted with technology as part of their job requirements.

The first example demonstrates that informal social network and the Trust Route portion derived from it, plays a role in helping the user getting rid of his inhibitions about his own competence to use technology. While the formal organizational network portion of the Trust Route brings in second level of trust. Here, the user starts trusting the technology after having used it for sometime and having gotten over the difficulties with the help of formal PALs in the Route.

Identifying Trust Routes

Trust Routes are highly culture specific. Different cultures have different Trust practices. Trust in technology and trust in one's self to be able to use technology are very much affected by various cultural, financial, political, and other reasons.

The base terrain of Trust Routes is the presence of underlying social networks in a particular culture. The social networks can be purely human interaction based, non technology aided networks, or technology aided on-line social networks. The Trust Routes for online networks can be found by means of on-line software tools but online networks for under-privileged are currently missing precisely due to low technology adoption. Ethnographic

study or a subset of it is needed to find the Trust Routes among non-IT social networks.

Ethnographic studies need to be conducted for different cultural settings to find out different trust mechanism applicable for different ethnic groups. Patterns of Human Interactions reveal the trust mechanism of social groups. For example, the trust mechanism of Indian communities can be social relations² (not necessarily familial relations) and that of Middle Eastern communities could be familial social relations [9]. Once the trust mechanism is identified, contextual field research is done to find out the trust nodes and hence the trust routes can be mapped for different communities.

Trust Routes in Action

The real use of Trust Routes would come if they can be constructed for underprivileged in different cultures and ethnic groups and be captured into a searchable knowledgebase. Better still, ontology or other logic systems could be used to represent Trust Routes so that new Trust Routes could be inferred from the knowledgebase populated through ethnographic studies. Notations such as TNA-SL [10] could be used for that purpose.

A Trust Route knowledgebase can then be used as a powerful tool to make several decisions related to the represented communities. The Trust Route channels can be utilized in both directions. From technology providers to end users, the channel can be used to propagate awareness about benefits of technological solutions. From end-users to technology providers, these channels can be used to gather requirements that can feed into the design process resulting in solutions having direct positive impact on their lives.

RELATED WORK

The notion of Trust Path has been used in online ecommerce. Atif et al. [9] propose the use of a network of trusted intermediaries that can establish a trusted channel through which terminal transacting parties deal virtually directly and risk-free with each other.

TNA-SL [10] provides a formal notation for specifying transitive trust relationships which enables construction of trust networks involving people, organization and software agents. Using subjective logic, trust between two parties can be derived by analyzing the trust paths linking the parties.

In the above mentioned approaches, the goal is to compute trust levels among individuals which could be people, organizations or software agents. However, Trust Routes capture culture specific knowledge about kinds of people or entities that are likely to be trusted by end users for different purposes. Trust Routes do not aim to capture trust

relationships between individuals though they could eventually be used to determine that.

Ban Al-Ani and Redmiles [11] examine the trust mechanism and forces that influence trust in Global North American Technology by Middle Eastern population. The ethnic influences - familial influence on adoption of foreign concepts and the political, historical reasons are explored and explained with a suggestion of grandparent – grandchild being one possible link-chain to create better technology adoption in the population.

FUTURE WORK

We intend to build upon our current work towards creating a software tool. The tool would assist technology promoters in various organizations to identify their most promising path to their end-users in a given cultural setting. The path returned could be used to identify products or services relevant to them as well as to enable successful launches of new products and services. We would also like to find out how dynamic the Trust Route maps will be. Research on on-line social networks indicates that the average properties of social networks appear to reach an equilibrium state [12].

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² <http://www.eks.in/mdr/>

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