INSTITUTIONAL ENVIRONMENT FOR ICT UTILIZATION IN RURAL INDIA

Grzegorz Sobiecki

Department of Economics and Economic Policy, Warsaw University of Life Sciences
– SGGW, Poland
Head of Department: dr hab. Alina Daniłowska

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A b s t r a c t. Agriculture is one of the most important sectors in India, and could benefit tremendously with the applications of ICTs especially in bringing changes to socio-economic conditions of the poor in rural areas. Achieving these benefits requires proper institutions for ICT adoption and utilization. Therefore The current state of major Indian institutions (ICT and rural policies) using document analysis is evaluated against supporting progress in areas of the horizontal side of the "cube framework" in rural India. Major finding is that The Five Year Plans, National ICT and Telecom Policies are developing in the right direction and government initiatives are increasingly maturing, but may lack some specific solutions.

INTRODUCTION

Domination of agriculture sector in India is still clearly visible: more than half of India citizens is employed in this sector, which stems from the fact that almost 70% people live in rural areas (more than 80% in 1965). Ca 60% of land has been used for agricultural purpose for the last 50 years. In terms of value added, agricultural sector has been steadily decreasing since 1965, when it accounted for 45% of India's GDP to 17% in 2012, mostly because of rapid growth of value added in manufacturing and even greater in services.

Changes in rural India are even more visible in quality-terms and expectations. Today's farmers not only want to feed their families, but also want some extra food production that can be sold in the market to earn sufficient money to fulfil other needs. Along this line, new methods of agricultural growth and rural development are sought to enable this. One of them is the introduction of Information and Communication Technologies (ICT), which enable the dissemination of requisite information at the right time. Although ICT sector brings opportunities for rural development, they are dependent on a series of factors. All these factors rely on certain institutional environment, with significant participation of the government and its support. Institutions at the highest level in the country are set to assist and reinforce building specific solutions for specific problems in rural areas which cover utilisation of ICT for broader development of rural India. Properly shaped institutions enable development of ICTs and its influence on rural India.

GOAL AND METHOD

The field of research that examines the link between information and communication technologies and socioeconomic development (which is referred to as ICTD or ICT4D[1]) has been carried forward by researchers mapping methods from their disciplines onto this terrain. The ICT4D community has searched for comprehensive and adequate conceptual frameworks. In 2003, the United Nations Regional Commission for Latin America and the Caribbean (UN-ECLAC) proposed a three-dimensional conceptual framework that models the transition toward information societies as the interplay among technology, policy, and social change, a so-called "cube framework". It has its theoretical roots in Schumpeterian innovation theory [Hilbert 2012]. In line with the Schumpeterian school of thought, the first enabling factor for the associated socio-economic transformations is the existence technological infrastructure: hardware infrastructure and generic software services. Additionally, capacity and knowledge are the human requirements to make use of these technologies. These foundations (horizontal green dimension in Figure) are the basis for the digitization of information flows and communication mechanisms in different sectors of society. More and better information and communication furthers the development of a society. Aside from its reliance on technology, ICT4D also requires an understanding of community development, poverty, agriculture, healthcare, and basic education.

Based on the "cube framework" an ICT4D analysis framework was compiled by the author [Sobiecki 2012] which comprises of a set of complementary vertically-aligned groups of factors of ICT development. Major factors for ICT development and influence on economy are grouped into:
– diagonal side of the cube:
    – institutions & regulations (environment for other categories),
– horizontal side of the cube:
    – technology (innovations),
    – market implementation (profitability and business environment),
    – accessibility (physical presence),
    – affordability (reasonable price),
    – know-how (knowledge to use),
    – adoptability (acceptance).

Progress in all of these areas makes the development of ICTs complete and enables the society (vertical side of the cube) to develop – utilize (apply) ICTs in real life.

In terms of rural development it means that ICT may enable farmers not only to develop better in terms of production, but also to have better lives because the access to accurate, current prices and the demands of the products gives them opportunity and more market power to negotiate which improves their incomes. Second, they may have access to agriculture information on efficient grooving crops, weather dealing with climate change, drought, poor soil, erosion and pests etc. ICTs may also give access to national and international markets for the farmers. In terms of societal development – great distances between villages become smaller. ICT may contribute to a favourable policy on development and sustainable growth of the agriculture sector [Motes 2010].

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[1] Further reading: Heeks [2008], Sutinen, Tedre [2010], Unwin [2009], Harindranath, Sein [2007], Kleine [2013].

This paper focuses on the diagonal side of the cube with respect to the horizontal side. The current state of major Indian institutions (ICT and rural policies) using document analysis are evaluated against supporting progress in areas of the horizontal side of the cube in rural India.

Documents which are being evaluated are: recent Five year plan (2012-2017), National Telecom Policy 2012 and chosen public initiatives/activities run, initiated or funded by central government (Ministry of Rural Development and Ministry of Communications and Information Technology), state governments and major public and non-government organizations (IAMAI, NASSCOMM).These documents cover major sources of institutional environment for development of ICT in rural India. General law and economic system, pure ICT or pure rural development policies (e.g. poverty reduction) as well as specific institutional solution in states (except for funded programmes) lie beyond the scope of the article.

LITERATURE REVIEW

The directions of institutional change in Indian agriculture sector and ICT sector have been widely discussed. S.M. Pal et. al. [2003] review broadly existing theories of institutional economics and examine the roles of the government, the state, markets and collective actions for evolving the knowledge-intensive agriculture in India [Motes 2010]. Research on role of ICT in Indian socioeconomic development: in general as well as in rural areas have also been undertaken several times. Geoff Walsham [2010] used the published academic literature to examine ICT-based initiatives and their impact on the broader development of India, described remaining problems and suggested approaches for the future. A. Garai et. and B. Shadrach [2006] analysed the potentials of ICT for a holistic development of India, with special focus on rural development process, "by infusing knowledge connectivity to human agencies while smoothening the nation's migration from an agrarian society to a knowledge society". They asses developmental impact of ICT on society using the human development measurement tools. Many authors contributed to the subject by evaluating specific initiatives, being a part of general institutional environment. Among them are C.J. Glendenning and P.P. Ficarelli [2012], G. Kumar and R. Sankarakumar [2012], T.M. Qaisar et. al. [2011], S.Y. Bhor et. al. [2010] and many others.

There are, however, none known research specifically on subject being the goal of this article, that is on institutions supporting the ICT development in rural areas of India. This article aims at fulfilling this gap.

ANALYSIS

GENERAL REFORMS AND REGULATIONS

The spread of ICTs began accelerating in India with the liberalization of the telecommunications sector as part of the New Economic Policy in July 1991. Throughout the early 1990s, various aspects of the telecommunications industry were opened to the private sector, including radio paging and mobile phones. The government's New Telecom Policy of 1999 and New Internet Policy of 1998 have further spurred the growth of the ICT sector, resulting in a large number of manufacturing units and internet service providers (ISP) setting up bases in the country. Since the deregulation of the telecommunications sector in

the late 1990s, users in India have been able to choose among hundreds of different public and private service providers [FreedomHouse 2012].

The Indian economy since independence in 1947 is based on multi-level planning through the institutions of five-year plans, medium-term plans, annual plans, state plans and specific policies. The plans are built, developed, implemented and monitored by the Planning Commission, established in 1950. The Commission's mission is to gather information on the state of country development, exploring the possibilities of further development and plan the best use of the resources of the country, by setting quantitative indicators to be achieved. The institution of the plans evolved from a highly centralized specific planning to setting a mission, vision and strategies for development and decision-making on national priorities. The master executive authority is the government, who also finances its implementation via its agencies [Sobiecki 2012].

Current, Twelfth Five Year Plan for years 2012-2017 [Planning Commission 2011] relies on an extensive range of government programmes (mentioned further), which cover a wide variety of sectors, to help achieve the inclusive and sustainable growth. Unlike in the Eleventh Five Year Plan, there are only a few targets specifically for ICT in rural areas set. One of the targets for the Telecommunication Sector however is "Mobile access to all villages and increase rural teledensity to 70 per cent by 2017." In the specific plan for rural development, however, we do not find tasks based on ICT development in rural India, which shows that role of ICTs has been under-valuated. There are no new initiatives as well in rural development, nor skill development, which may be considered as a drawback in comparison with the 11th plan, where more than 10 targets concerning Network Expansion and Rural Telephony were set[2]. The explanation for this may be need to concentrate in the general plan on still-not-enough-developed fundamental areas like improving sanitation conditions, providing drinking water and electricity, teaching basic skills, while leaving existing projects concerning ICT development in rural areas intact.

NATIONAL POLICIES

In 1999 an important policy was introduced (New) National Telecom Policy 1999, which announced a new era in ICT sector. Completely new approach and goals were set. Among the objectives were: "Strive to provide a balance between the provision of universal service to all uncovered areas, including the rural areas, and the provision of high-level services capable of meeting the needs of the country's economy", "Encourage development of telecommunication facilities in remote, hilly and tribal areas of the country", "Transform in a time bound manner, the telecommunications sector to a greater competitive environment in both urban and rural areas providing equal opportunities and level playing field for all players", "Encourage development of telecom in rural areas making it more affordable by suitable tariff structure and making rural communication mandatory for all fixed service providers." and "Increase rural teledensity from the current level of 0.4 to 4 by the year 2010 and provide reliable transmission media in all rural areas" [*National Telecom…* 1999].

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[2]   Among them we find: one telephone per three rural households by 2007; One phone per two rural households by 2010; 200 million rural connections by 2012 (i.e. a rural teledensity of 25%); For rural telephony the infrastructure will be shared at least amongst three service providers; To support for development of general telecom infrastructure in rural areas, initially pilot projects would be undertaken for the same [Planning Commission 2006].

The stated objectives of the draft National IT policy include the goals of making at least one individual of every household e-literate and of leveraging ICTs for key social sector initiatives like education, health, rural development and financial services to promote equity and quality. Equally significant are the objectives of enabling access to content and ICT applications by differently-abled people to foster inclusive development and of encouraging use of mobile phones for value added services and transactional services such as financial services. The stated mission draft National Telecom Policy 2011 included creating a knowledge based society through proliferation of broadband facilities in every part of the country. Its objectives include enabling citizens to participate in and contribute to e-governance in key sectors like health, education, banking etc. to ensure equitable and inclusive growth and to reposition the mobile phone from a mere communication device to an instrument of empowerment that combines communication with proof of identity, fully secure financial and other transaction capability, multi-lingual services and a whole range of other capabilities that ride on them and transcend the literacy barrier [Gulat 2011].

National Telecom Policy 2012 continued this path. Most of this policy was to underscore the imperative that sustained adoption of technology would offer viable options in overcoming developmental challenges in education, health, employment generation, financial inclusion and "much else. [*National Telecom…* 2012]. Therefore in the multi-level scheme of the policy, the first point of the mission in NTP 2012 was "To develop a robust and secure state-of-the-art telecommunication network providing seamless coverage with special focus on rural and remote areas for bridging the digital divide and thereby facilitate socio-economic development" [*National Telecom…* 2012]. Among the objectives we find "Increase rural teledensity from the current level of around 39 to 70 by the year 2017 and 100 by the year 2020.", and "Simplify the licensing framework to further extend converged high quality services across the nation including rural and remote areas. This will not cover content regulation." [*National Telecom…* 2012]. There is a whole section (strategy) aimed at rural areas, where the goal is "To develop an eco-system for broadband in close coordination with all stakeholders, including Ministries/ Government Departments/ Agencies to ensure availability of media for last mile access, aggregation layer, core network of adequate capacity, affordable equipment including user devices, terminals and Customer Premise Equipment and an environment for development of relevant applications. Formulate policies to promote competition by encouraging service providers, whether large or small, to provide value added services under equitable and non-discriminatory conditions", "To lay special emphasis on providing reliable and affordable broadband access to rural and remote areas by appropriate combination of optical fibre, wireless, VSAT and other technologies. Optical fibre network will be initially laid up to the village panchayat level (…). Extension of optical fibre connectivity from village panchayats to be taken up progressively to all villages and habitations. (…)" and "To stimulate the demand of broadband applications and services, work closely with Department of IT in the promotion of local content creation in regional languages which would enhance the investment in All-Internet Protocol (IP) networks including NGN". No skill development in ICT area is set as a strategic field." [*National Telecom…* 2012].

National Policy on Electronics 2012 is expected to create an indigenous manufacturing eco-system for electronics in the country therefore does not rely on rural areas. Only in one of the 14 objectives in the draft of the policy one could find [*Approval of National…* 2012] "To use technology to develop electronic products catering to domestic needs, including rural needs and conditions, as well as international needs at affordable price

points". In final version this objective was changed into "To use technology to develop electronic products catering to domestic needs and conditions at affordable price points" [*National Policy…* 2012].

Among programmes of the Ministry of Rural Development we find five major programmes: Rural Employment, Rural Livelihoods, Rural Connectivity, National Social Assistance and Caring for the Differently Abled. In the livelihood programme (Aajeevika-National Rural Livelihoods Mission, NRLM) ICT are mentioned only once: Aajeevika will coordinate with the financial sector and encourage use of Information, Communication & Technology (ICT) based financial technologies, business correspondents and community facilitators like "Bank Mitras" [*Annual report…* 2012]. In the rural employment programme the Ministry has strongly supported the use of Information Communication Technology (ICT) to improve programme efficiency, streamline processes as well as place information in public domain via e-FMS (an electronic Fund Management System), e-MMS (Electronic Muster Management System).

NASSCOMM AND IAMAI

NASSCOMM, National Association of Software and Services Companies is the biggest industry association for the IT-BPM sector, established in 1988. Its members represent 95 per cent of industry revenues. The objective of NASSCOMM is to build a growth led and sustainable technology and business services sector in the country. Its mission covers general ICT development, however without mentioning the support for rural development. NASSCOMM runs couple of programmes: Global Trade Development, educational Sector Skills Council (EdI), National Skills Registry for IT/ITES Professional (NSR-ITP), Diversity & Inclusivity, Domestic Market Forum, National Skills Registry, but none of them aims directly at or covers the rural development issue [NASSCOM 2013].

IAMAI, Internet And Mobile Association of India is another not-for-profit industry body. It was registered under the Societies Act, 1986. Its mandate is to expand and enhance the online and mobile value added services sectors [IAMAI 2013]. The association's activities include promoting the inherent strengths of the digital economy, evaluating and recommending standards and practices to the industry. IAMAI is the only specialized industry body in India representing the interests of online and mobile value added services industry. IAMAI provides yearly reports on the state of ICT development in India on digital advertising, mobile VAS, online entertainment, general Internet development (I-Cube) with specific version dedicated to rural India, mobile Internet and social media in India. IAMAI generally underlines the need to support digital revolution in rural India [*Digital India…* 2009] pointing out that there are 5 broad areas which if taken together and deployed over internet would truly empower rural India by providing much needed economic security: Healthcare, Education, Poverty alleviation, Democracy/Governance, Commerce, and recommends specific actions and changes in law and regulations to improve access, affordability, application and adoptability, but does not run or funds any programmes by itself.

MAJOR GOVERNMENTS INITIATIVES

The flagship project of the government in India is NeGP (National e-Governance Plan) [NeGP 1, 2013], that has been underway since 2005. The NeGP aims at improving delivery of Government services to citizens and businesses with the following vision: *"Make all Government services accessible to the common man in his locality, through common service delivery outlets and ensure efficiency, transparency & reliability of such services at affordable costs to realise the basic needs of the common man"* [NeGP 2, 2013]. NeGP therefore is one of the biggest central government projects and comprises 31 mission mode projects (MMPs), which are further classified as state, central or integrated projects. None of the central government mission mode projects[3] is aimed at rural development nor at ICT.

One of the most important for rural areas MMPs on the state level is e-Panchayat, providing comprehensive software solution attempting automation of Gram Panchayat (local self-governments) functions. National Land Records Modernization Programme (NLRMP) is another MMPs on a state level with main objective to modernize the land records system in the country. NeGP implementation involves setting up of common and support IT infrastructure such as: Common Services Centres (CSCs), State Wide Area Networks (SWANs), State Data Centres (SDCs) and National e-governance Service Delivery Gateway. The CSCs provide high quality and cost-effective video, voice and data content and services, in the areas of e-governance, education, health, telemedicine, entertainment as well as other private services. A highlight of the CSCs is that it offer web-enabled e-governance services in rural areas, including application forms, certificates, and utility payments such as electricity, telephone and water bills. In addition to the universe of G2C services, the CSC Guidelines envisage a wide variety of content and services.

There are about 90,000 CSCs operational in various parts of India. With India having about 600,000 villages, each Common Service Centre on an average serves about 6 villages approximately [*Internet in rural…* 2011]. SWAN is also an important ingredient for the success of the CSC scheme, as it is the backbone for CSCs with its optic fibre bandwidth connectivity.

Other notable Government initiatives include Sarva Shiksha Abhiyan (SSA) and the National Rural Employment Guarantee Act (NREGA) scheme. The SSA has helped computer literacy to rise among school children while also increasing Internet awareness and usage. As part of NREGA, a web based system has been designed that villagers can use for their personal use and obtain their payment online, while also storing their money safely. The scheme provides a legal guarantee for 100 days of employment in every financial year to adult members of any rural household [*Internet in rural…* 2011].

T.M. Qaisar et. al. [2011] show in their analysis that vast majority of the agricultural information services via ICT are initiated, implemented by public organization (international organizations, NGOs, central government, state government, national agricultural research centre and other): 54 out of analysed 69. In terms of funding – public organizations' share is even greater: 67 out of 75.

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[3]   These project's names are: Banking, Central Excise, e-Office, Income Tax, Insurance, IVFRT, MCA21, MNIC/UID, Passport, Pensions, Post.

DISCUSSION AND RECOMMENDATIONS

Agriculture is one of the most important sectors in India, and could benefit tremendously with the applications of ICTs especially in bringing changes to socio-economic conditions of poor in backward areas.

The Five Year Plans, National ICT and Telecom Policies of the Indian Government are developed in the right direction and the government initiatives are increasingly maturing, but may lack some specific solutions.

As X. Fua and S. Akter show in their study[4], the most important problem for majority of farmers in adopting ICT is 'Tendency of following traditional method of cultivation', followed by 'Language of data information provided by ICT media are not able to access', 'Poor rainfall and irrigation facilities make dispassionate to access ICT application on agriculture' and 'Market information on price, supply and demand adversely affect the price paid to the farmers' [Fua 2012]. These problems are still not faced by the institutional solutions. Therefore the author recommends some changes.

Achievements of India's rural telephony objectives needs to be approached in a holistic and integrative manner wherein not only due policy and regulatory glitches need to be ironed out, but also various procedural concerns also need to be addressed. A good example is the system of European Union programmes and projects within them on specific subjects.

Many programmes and policies respond to the problems of inadequate physical and financial resources, technical capabilities and extremely limited computerization – concentrating on delivering infrastructure, services that facilitate solving problems of rural folks and markets (i.e. PPP), but seem to forget about the human factor. There are programmes addressing the problem of languages in ICT services (i.e. Technology Development for Indian Languages [*Technology development...* 2013]), but still the central policies and general institutional framework lack underlining the role of know-how in ICT and attitude towards ICT in rural areas. A step forward may be a central government initiative "e-Governance in Municipalities" that envisages covering Urban Local Bodies (ULBs) to improve the efficiency and effectiveness of delivery of municipal services to citizen, but still it is limited to know-how in municipal services.

Farmers sometimes become averse to adopting technology as they think that it might result in their losing their traditional methods of cropping practices [Marichamy 2013]. They simply do not want to use such systems, even if the cost incurred is negligible. Other authors like S. Sanyal underline [Sanyal 2011] that many projects aiming at technological upgradation and implementation of ICT in rural areas have failed in the past because of lack of willingness among rural people to absorb such schemes. Therefore, the attitude and mind-set of farmers needs to be changed first. There is a need to win their confidence and create awareness about the benefits of ICT in agriculture. S. Sanyal proposes an addition to the national ICT policy – the Development Communication, which intensifies the rural development process by mobilizing rural people for development action and ensuring an information flow among all concerned with a development initiative. Methods of development Communication include: community radio, participatory video, documentaries, folk media, grassroots comics, community newspaper, street theatre, puppetry, bioscope and photography – methods already used but not integrated in any general framework.

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[4]   The study was conducted on a sample of 300 farmers selected by lot, therefore can't be regarded as representative, but shows some trends.

Unlike in European Union, there are no accessible, official, comprehensive, quantitative analyses or reports of fulfilling the millennium goals, the national plans; nor are there any reports on on-going, completed or interrupted projects. The absence of comprehensive information on the projects suggests that projects need to be more carefully documented, information on the projects needs to be more readily available and project evaluations need to be shared [Qaisar et al. 2011].

There is a needed for a more discriminating attitude towards regulations by TRAI, taking into account specifics of rural regions and supporting its development in the fields of rural markets (rural ICT entrepreneurship), accessibility and affordability.

No rural national policy supports ICT utilisation or ICT entrepreneurship in rural India, nor it uses it in guaranteed employment programme as an option of employment, nor in Aajeevika, a programme aimed at improving skills of the rural folks [*Aajeevika Skills…* 2013]. More cooperation between the Ministry of Rural Development and the Ministry of Communication & Information Technology is needed.

Greater emphasis must be placed on the availability and relevance of services and content in local language or multi-media/accessible format as per needs of target beneficiaries. Capacity building of various stakeholders to use ICTs is essential for the goal of ICT enabled rural development to be achieved. This requires a shift in focus away from purely technology related issues to the evolution of policies, strategies and schemes that ensure cross-sectorial and multi-stakeholder involvement and engagement including most of all the local communities and target beneficiaries themselves**.**

FURTHER STUDIES

The goal of this study was to assess the current state of institutions in India. There is already a growing body of evidence to show that sound ICT institutions does benefit development goals. However these results do not answer if this correlation is direct or indirect, nor about the strength of the link.

Therefore, as a next step, the author encourages those involved in ICT4D practice and research to consider empirical links that they have worked on, and to review them against the rural development. Further works in the field of ICT4D in rural India are needed to verify the strength of the positive link between ICT institutions and rural development, which will give further possibilities to verify the link in other countries.

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INSTYTUCJONALNE OTOCZENIE DLA ZASTOSOWANIA ICT NA OBSZARACH WIEJSKICH W INDIACH

Streszczenie

Rolnictwo to jeden z najważniejszych sektorów Indii, który może w znacznym stopniu skorzystać z zastosowania ICT, szczególnie dla budowania zmian w warunkach społeczno-gospodarczych biednych regionów wiejskich. Osiągnięcie tych korzyści wymaga odpowiednich instytucji, które wspierałyby przyswajanie i wykorzystanie ICT. Podjęto próbę przedstawienia obecnego stanu głównych instytucji Indii, aby ocenić je pod kątem budowy dogodnego środowiska dla przyswajania i wykorzystania ICT w regionach wiejskich Indii. Stwierdzono, że pięcioletnie plany polityki narodowej dotyczące ICT i telekomunikacji rozwijają się w dobrym kierunku, a rządowe inicjatywy stają się coraz dojrzalsze, ale brakuje im specyficznych rozwiązań.

Coresspondence address:
Dr Grzegorz Sobiecki
Warsaw University of Life Sciences – SGGW
Department of Economics and Economic Policy
Nowoursynowska 166, St.
02-787 Warsaw, Poland
e-mail: grzegorz_sobiecki@sggw.pl