

Perpetuating ‘Structural’ Hierarchies - Rethinking Agricultural Extension Practices

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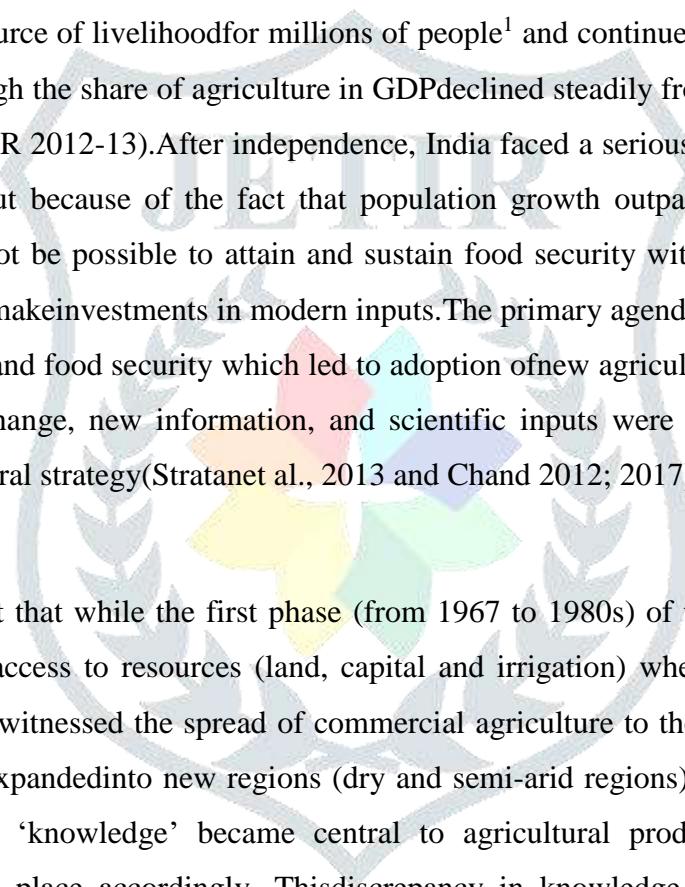
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Introduction

Agriculture has been the source of livelihood for millions of people¹ and continues to remain a major sector of the Indian economy, although the share of agriculture in GDP declined steadily from 55 percent in 1950- 51 to 15 percent in 2009-10 (IRDR 2012-13). After independence, India faced a serious food grain shortage not just due to regular droughts, but because of the fact that population growth outpaced food production. It was strongly felt that it would not be possible to attain and sustain food security without incentivizing farmers to adopt new technology and make investments in modern inputs. The primary agenda for the state was to achieve food grain self-sufficiency and food security which led to adoption of new agricultural strategy known as green revolution. Technological change, new information, and scientific inputs were the crucial components that facilitated the new agricultural strategy (Stratan et al., 2013 and Chand 2012; 2017).



Aggarwal (1971) points out that while the first phase (from 1967 to 1980s) of the green revolution focused only on farmers who had access to resources (land, capital and irrigation) whereas the second phase (post 1990s) of green revolution witnessed the spread of commercial agriculture to the new sections like marginal and small cultivators and expanded into new regions (dry and semi-arid regions) (Byres 1981). During second phase of green revolution ‘knowledge’ became central to agricultural production, whereas knowledge dissemination did not take place accordingly. This discrepancy in knowledge dissemination is termed as ‘knowledge gap’. The existence of this gap does not mean that the lower sections of farmers remain completely uninformed or even absolutely worse off in knowledge, but rather they become relatively lower in knowledge and hence the gap widens (Scott 1998; Tichenor et al., 1970).

Farmers could no longer survive pest attack on their own after the introduction of green revolution which leads them to rely upon scientists to create newer seed varieties which could resist newer and evolving pests. In

¹. The agriculture sector, which engages 64 per cent of the rural workforce and half of the farmers’ income comes from crop cultivation (Srivastava et al., 2017). 59% of male workers and 75% of women workers were dependent on agriculture in 2011–12 (NSSO 2014:14).

this context, it is argued that generation and application of agricultural knowledge has become increasingly important after the adoption of high yielding varieties, especially for small and marginal² farmers, who need relevant information in order to improve, sustain, and diversify their farm enterprises (Glendenning and Pier 2012). It is argued that despite number of initiatives, policies and well-organized agricultural extension manpower, around 60 per cent of farmers in the country hitherto remained un-reached and un-served by any extension agency or functionary (Richa 2016; Aker 2011 and Singh et al., 2015).

Agricultural extension has been recognized as an essential mechanism for delivering information and it is said that appropriate, continuous and timely advice about farming is not reaching farmers with the existing (traditional) extension system, thus hampering the productivity. The problem with the traditional agricultural extension services is that they have become more bureaucratic with rigid hierarchical structures. Likewise, agricultural information in traditional extension system flows from top to bottom and is supply-driven rather than demand driven. In traditional extension system information is pushed to the farmer and lacks the feedback mechanism (Umali and Schwartz 1994; Maru 2004)

In addition, the role of state has become minimal during the post-reform period and the policies pursued resulted in a reduction of public investment in rural infrastructure, including irrigation, agricultural research and extension services. The post-reforms, thus seen as an inimical to petty production in general and agriculture in particular (De Roy 2017). Evenson (1999) observes that the share of public spending on agricultural research and extension services in GDP of agriculture in India has been lower than that observed in the 1990s in developed nations (2 per cent to 4 per cent), and the average share in developing nations (0.75 per cent).

Table 1 shows public expenditure on research and extension in agriculture. The share of public spending on research and extension in GDP of agriculture was low since 1960s, as well as in the subsequent decades. In other words, public spending on agricultural research and extension services did not increase after reforms. It is quite important to mention that the state has become paralyzed in administrating the agricultural sector due to the liberalization policies and the role of state has declined gradually on the development of agriculture sector. On other hand, in the present context of globalization and market economy information has become essential in agriculture for the fact that expensive, imperfect and asymmetric information generates several problems for farmers like increasing of risks associated with marketing, inefficient allocation of resources, higher transaction costs and poor decisions about marketing (White 2003).

². Between 1970-71 and 2005-06, the total number of operational holdings in India increased from 71.01 million to 128.89 million and operational holdings area declined from 162.18 million ha to 156.62 million ha. This resulted in the reduction of average farm size from 2.28 ha to 1.21 ha. In the same period, the share of small and marginal holdings in operated area doubled. Smallholders now cultivate 42% of operated land and constitute 83% of total landholdings (Ramesh Chand, et al, 2015). 91% of households are marginal, small and medium farmers who cultivate on less than 2 hectares (5 acres) of land (De Roy 2017).

Table – 1. Public Expenditure on Research and Extension in Agriculture and Allied Sector as Share of GDP of Agriculture and Allied Activities (%)

Year	Research & Education	Extension
1960–62	0.21	0.09
1970–72	0.23	0.14
1980–82	0.39	0.11
1989–91	0.41	0.16
1992–94	0.40	0.15
1995–97	0.38	0.14
1998–2000	0.44	0.15
2001–03	0.52	0.13
2004–06	0.52	0.13
2009–10	0.30	0.06
2011–12	0.32	0.05

Source: Balakrishnan et al (2008). Figures for 2009–10 and 2011–12 are computed by the author from Finance Accounts, Comptroller and Auditor General of India.

As a result of reduction of public investment in extension services on one hand and the advent of Information Communication technologies (ICTs)³ on other (after post-reforms) led to new ways of managing knowledge in agricultural system. With the advent of ICT initiatives, the way we communicate transact and deliver things has gone for a paradigm shift (Sassen 2000; 2002 and Chapman & Slaymaker 2002). The advocates of technological interventions for agricultural development vouched for making use of the advances in agricultural extension and scholars are of the view that ICTs in agricultural extension would help the newcomers into agriculture, who belong to the marginal and small farmers' category, coming from the marginalized sections of society, located in the fragile regions of the country, and who lack expertise in making the best use of external input (Ruttan 1998; Zijp 1994; Heeks 2002; Singh et al., 2015).

Emergence and function of e-Choupal

Traditionally, agricultural produce is sold in the mandis⁴. Mandis are the age old major agricultural marketing centers in rural areas. A typical mandi is a local market, which is specific to a particular geographic location where a large majority of the small and marginal farmers sell their produce. Mandis are laced with various problems⁵ and largely controlled by middlemen who are said to make most of the profit. They decide the price

³. Over the last few years the Internet is no longer what it was in the 1970s or 1980s; it has become a contested space with considerable possibilities for segmentation and privatization. The first phase of the Internet was confined largely to a community of insiders – Scientists and select government agencies. The second phase of the Internet, centred in the 1980s, opened it up to a far larger and less specialized community. However with the establishment of the worldwide web in 1993 and its large scale discovered by business by 1995, the Internet has entered a third phase, one characterization by attempts to commercialize it (Sassen 1998).

⁴. Mandi is a Hindi term referring to the conventional place where buyers and sellers assemble. It basically refers to agricultural produce market. The social organization of mandi is controlled by customary practices.

⁵ . The various problems facing the agricultural marketing system were summarised by the Twelfth Plan Working Group on Agricultural Marketing (Planning Commission 2011).

of the product usually with a low price when compared to the national and international market. It is argued that, present marketing system and marketing institutions were plagued by inefficiencies, corruption, bureaucratic control and politicization (Pandey et al., 2010; Chand 2012 and Krishnamurthy 2012).

Due to inefficient market linkages and ineffective procurement system, small and marginal farmers have been facing many difficulties in marketing their produce. As a result, they mostly prefer to sell off most of their produce in the traditional local markets at very low prices immediately after the harvest. It is argued that, the rural markets witness interlinked transactions and are dominated by certain sections of people (traders and money lenders) who thrive on the exploitative practices. As a result, small and marginal farmers suffer serious disadvantages in the traditional marketing and distribution. Moreover, farmers have only an approximate idea of price trends and have to accept the price offered to them at auctions on the day they bring their produce to the mandi (Chand et al., 2011; Pachouri 2012 and Vijaysankar & Krishnamurthy 2012).

In mandi system the main sources of market information for farmers are their peers and market intermediaries. Intermediaries, in general, are not perceived to be transparent when doing business as they are oriented to maximize profit. Even though they perform an important role in the market, they are often criticized by farmers because they take advantage of the farmer's unfamiliarity about market prices through control of information. In order to raise the income of small and marginal farmers and to reduce their vulnerability of social, economic, and environmental challenges, enhancing market information is one of the important needs (Urquieta 2008).

In this context, e-Choupal has started in the year 2000 by ITC's Agri Business Division with an objective to provide linkage between farmers and the agricultural markets. The major focus of the initiative is to provide information about market prices on different crops to farmers at the village level. e-Choupal can be seen as a medium of delivering critical market information, thus allowing farmer an empowered choice of where and when to sell the crop. This model uses information technology, i.e., Internet as an important tool to deliver information. ITC -IBD conducts meetings with the farmers and creates awareness among the farmers about the marketing/procuring their produce at ITC- hub (place where the procurement takes place) and how it reduces the time and transportation costs and increases transparency (Singh et al, 2015; Marco and Zhou 2011).

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- Too many intermediaries, resulting in high cost of goods and services;
 - Inadequate infrastructure for storage, sorting, grading, and post-harvest management;
 - Private sector unwilling to invest in logistics or infrastructure under prevailing conditions;
 - Price-setting mechanism not transparent;
 - The inspection process is unscientific and often arbitrary
 - Ill-equipped and untrained mandi staff and
 - Market information not easily accessible.

e-Choupal kiosk is equipped with a computer and Internet connectivity. The computer with Internet connectivity in the e-Choupal enables farmers to obtain information on market prices, good farming practices and offers scope to place orders for agricultural inputs such as seeds and fertilizers online. e-Choupal also provides information on crop prices, weather, scientific farming practices, crop insurance and soil-testing services. This access to information helps farmers in improving the quality of produce and obtaining better prices. e-Choupal claims that it serves both as a place for social gathering where exchange of information on agricultural practices and market trends takes place between farmers of the village (Annamalai and Rao 2003).

Two important stages that farmers should go through if once farmer decides to sell the produce at the ITC-IBD procurement center.

- (i) Inspection and (ii) Grading & Payment

Methodology

In the given context, the present study made an attempt to provide a comprehensive understanding on e-Choupal and its potentials. There is a need to understand the issues of access and inclusion of ICT based agricultural information to all sections of farmers critically. The question to be probed was to what extent the ICT initiative could overcome the existing social hierarchies and barriers in communication. The study relied on empirical evidence. Qualitative and quantitative methods were used in data collection. In-depth interviews and intensive interactions with the respondents and participant observation constituted the core of the study methodology. Data were collected using semi-structured questionnaire and interview method. Interviews were aimed at capturing the perception of farmers about the agricultural information communication so as to understand how agency acts and responds to the new information technology based initiatives in agricultural extension. Data were collected from 120 households in Parbhani district spread across two villages (Asola and Malsonna). The researcher aimed to understand the organizing and functioning of e-Choupal by studying different variables like level of education, advices received from different channels, marketing produce and by ranking of information needs.

Profile of the Respondents

Data were collected from 120 farmers located in two villages of Maharashtra State. Respondents belong to different castes like Kumbi, Patil, Dhangar and Vanjari, Mahar and Mang. The name OC is used to refer to these castes because all these castes are the dominant castes in the region. The status of dominant caste comes from the large land holdings the castes own in these villages. These castes are also politically dominant. Table 2 suggests that apart from the respondents belonging to OC (35 per cent) respondents from SC, BC and NT are also included in the study.

Table 2: Caste wise distribution of respondents

Caste	No. of respondents (%)
Other castes (OC)	42(35)
BC	22(18)
SC	31(26)
Nomadic Tribes (NT)	25(21)
Total	120

OC= Upper caste, BC = Backward caste, SC = Scheduled caste (Dalit) and NT = Nomadic Tribe

Landholding pattern among respondents

The size of land holding plays a crucial role in accessing agricultural information, credit, and in the commercialization and mechanization of agriculture. A majority of the respondents included in the study belong to the marginal and small farmer category. Table 3 suggest that about sixty one per cent of the respondents own less than five acres of land. About five per cent of the respondents include farmers belonging to the large farmers' category and 67 per cent respondents belong to OC category who own more than five acres of land each, whereas a large majority of the SC and NT farmers (84 per cent and 72 per cent respectively) own less than five acres each. Out of 31 SC farmer respondents 17 (55 per cent) are marginal farmers. One respondent belonging to the NT category reported owning more than 25 acres of land. Data also reveals that the majority (59 percent) of the total land holdings is marginal and small.

Table 3:Landholding pattern

Type of land holding	Number of respondents (%)
Marginal (below one 1 ha.)	43 (36)
Small (1to 2.0 ha.)	28 (23)
Semi-Medium (2 to 4 ha.)	26 (22)
Medium (4 to 10ha.)	17 (14)
Large(above 10ha.)	6 (5)
Total	120 (100)

Education

India's rural population is characterized by significantly lower levels of education. Data on the educational profile of the respondents of the field site suggests that about 25 per cent of the respondents have no formal education. Out of these 25 respondents 22 (88 per cent) belong to SC and NT categories. A large majority of the OC farmer respondents is educated beyond secondary school. Table 4 suggests that there is a marked difference in the levels of education along caste lines.

Table 4: Caste and Education level among the respondents

Caste	No. of respondents (%)					
	No formal Education	Primary	Secondary	High School	Above 10 th	Total
OC	4 (10)	7 (17)	13 (30)	7 (17)	11 (26)	42 (100)
BC	3 (13)	7 (32)	6 (27)	1 (5)	5 (23)	22 (100)
SC	16 (51)	3 (10)	3 (10)	0 (0)	9 (29)	31 (100)
NT	16 (64)	2 (8)	3 (12)	1 (4)	3 (12)	25 (100)

'It is reported by the famers who belongs to SC and NT community that education is one of the important factors to access the information provided by the e-Choupal or by any other agricultural extension services. As they are illiterate, they couldn't access the updated information and they are unable to question the queries regarding the new agricultural practices. Hence they couldn't adopt the new practices and innovative methods. Agricultural officials are also not interested to provide information to the illiterate farmers. They are often discriminated at agricultural meetings. Even though illiterate farmers are interested in adopting new technologies but they are not encouraged to adopt new agricultural practices. Illiterate farmers are often deceived by the traders and agents. However, it is said that the initiative developed by ITC-IBD doesn't make any difference from their former situation'.

Table 5 presents the data regarding the agricultural information received by the famers through various means. OC farmers (52 per cent) and NT farmers (80 per cent) depend on Sanchalak for information while the majority of the BC and SC farmers depend on input dealers for information.

It is reported by one of the farmer who belongs to SC community that '*he usually seeks agricultural advice from their neighbours who are from the same community. He also stated that majority of houses of their community is far from Sanchalak's house. It is very hard for them to visit Sanchalak's house regularly. He said that neither he seeks any kind of information or advise from the Agricultural officer's normakes a call to the call center due to lack of awareness. Further, he reported that majority of Dalit (SC) farmers possess small land holdings and non-irrigated lands. Due to this reason, the Agricultural officers and other agricultural bureaucratic officials never visit agricultural fields. He said that usually he attends and participates in most of the gatherings or meetings and interact with the farmers who belong to same community*'.

Table 5: Advice on field problems

Caste	No .of respondents (%)						
	Neighbors	AO.	Call centers	Input dealers	Sanchalak	Multiple Sources	Total
OC	4 (10)	4 (10)	0 (0)	10 (24)	22 (52)	2 (4)	42 (100)
BC	0 (0)	0 (0)	0 (0)	10 (45)	7 (32)	5 (23)	22 (100)
SC	5 (16)	0 (0)	0 (0)	15 (48)	4 (13)	7 (23)	31 (100)
NT	0 (0)	0 (0)	0 (0)	3 (12)	20 (80)	2 (8)	25 (100)

Table 6 makes it clear that 96 per cent of the respondents sell their produce at the e-Choupal procurement hub. When the reasons for such a shift from traditional market to e-Choupal hub were ascertained from the respondents, it was found that e-Choupal procurement system is hassle-free transparent and has an immediate payment system. Farmers observe that e-Choupal services are better than local mandis as the transactions in local mandis are secretive and exploitative. It is said that while the mandi traders pay the amount in instalments or pay after a few months e-Choupal allows them to collect cash immediately. Moreover mandi collects a fee from farmers. Many farmers stated that at the local mandi, the marketing process is very complex and unfair, whereas in e-Choupal it is transparent and the loading and unloading charges are paid by e-Choupal itself.

Table 6: Marketing the produce

Caste	No. of respondents (%)			
	(ITC-IBD)	Middlemen	Local Market (nearby towns)	Total
OC	42 (100)	0 (0)	0 (0)	42 (100)
BC	22 (100)	0 (0)	0 (0)	22 (100)
SC	30 (25)	1 (1)	0 (0)	31 (100)
NT	22 (100)	0 (0)	3 (3)	25 (100)

Table 7: Caste wise ranking of information needs

Rank	Farmers' information needs	No. of farmers (%)			
		OC	BC	SC	NT
1	Procurement of the produce	42(100)	19(86)	15(48)	22 (88)
2	Latest agricultural practices	40 (95)	10 (45)	13 (41)	11 (44)
3	Input services	40 (95)	11 (50)	11 (35)	9 (36)
4	Access to the Sanchalak of e-Choupal	37 (88)	7 (32)	4 (13)	11 (44)
5	Market information and price trends	37 (87)	20 (91)	13 (41)	18 (72)
6	Export of produce	33 (79)	10 (45)	9 (29)	7 (28)
7	Solution to the problems in cultivation	33 (79)	16 (72)	5 (16)	7 (28)
8	Reduce the cost of cultivation	33 (79)	9 (41)	13 (42)	15 (60)
9	Weather Forecast	33 (78)	12 (54)	12 (38)	10 (40)
10	Soil testing	28 (66)	7 (32)	6 (19)	9 (36)
11	Crop Insurance	27 (64)	18 (81)	9 (29)	11 (44)
12	Field trials	19 (45)	1 (1)	0 (0)	4 (16)
13	Information on crop loans	18 (42)	18 (81)	25 (80)	17 (68)
14	Advices from scientists	14 (33)	9 (40)	5 (16)	6 (24)
15	Government policies	13 (30)	17 (77)	9 (29)	8 (32)

Table 7 highlights the varied priorities among farmers. The variation in the priorities may be explained in terms of caste. Caste is a key social institution which plays an important role in agriculture. This is because caste determines the extent of social capital farmers have. The anxieties of BC, SC and NT farmers, for example, about the information on crop loans, crop insurance and knowledge about practices related to reducing the cost of cultivation are not the priorities of the OC farmers. The OC farmers who were the first beneficiaries of green revolution have required knowledge about crop loans, crop insurance, etc. whereas the BC, SC and NT farmers who lack the social capital and who entered into commercial agriculture recently feel the necessity of seeking information on those issues which add risk to agriculture. Table 6 suggests that except on marketing the produce and price trends there is a common feeling across castes, other information priorities do not match with each other. This finding highlight the fact that the information accessed by the farmers are not uniform and vary based on the caste and land holdings.

Small farmer who belongs to SC community stated that '*he needs information regarding the government policies like loan waive and subsidies. It is stated that majority of small and marginal farmers are interested in knowing the monetary policies which benefits them directly. He also stated they least bothered about the scientific agricultural practices and new techniques of cultivation. Quite interestingly he stated that he benefitted from the e-Choupal as he use to sell his soyabean to the middleman earlier but with e-Choupal set up at his village he sold soyabean at ITC hub. He completed his procurement process with in five hours and amount paid immediately to him by the ITC. He also said that, the interaction between sanchalak and SC farmer take place only during the time of procurement. Information needs are differ from person to person and he stated that e-Choupal is not providing holistic information to the farmers*'. It is quite interesting to know that farmers irrespective of caste are informed regarding the price of soyabean during the procurement. Even sanchalak encourages each farmer to sell their produce at e-Choupal as he receives commission for every transaction.

Findings

Success and failure of ICT projects in rural areas can allow us to engage with some of the emic meanings of technology. In case of e-Choupal, Sanchalak is one of the farmers of the village and a key functionary in e-Choupal. e-Choupal kiosk at the village level is maintained by the Sanchalak. The Sanchalak may be compared with the progressive farmer⁶ notion of the conventional/traditional extension system. If the agricultural scientists and extension officials relied on progressive farmers for information dissemination under the conventional extension system the e-Choupal model emphasizes on the role of the Sanchalak. The socioeconomic characteristics of the Sanchalak and the progressive farmer are same. Although the functions

⁶. The progressive farmers who have enough capital to invest in new technologies. Progressive farmers are considered as those who are ready to accept the innovations quickly and active agents of social change and development in the countryside (Parayil 2002).

of the Sanchalak are slightly different from that of the progressive farmer, structurally both the positions operate similarly.

The present study observes that the design and usage of ICT is greatly influenced by the non-state actor whose interests lie in agriculture. It may also be observed that the new technological initiatives seldom bother about breaking the old structures rather they work with the existing structures. ICTs are used as a new medium of intermediary to hold the structural relations. Thus, it is understood that the ICT-IBD initiative doesn't replace or weaken the old hierarchy rather maintain in a new avatar strengthens. It is said that the establishment of e-Choupal has increased the income of the farmers by reducing the cost of marketing the produce (transportation and baggage costs) and by providing quick and transparent process of sale.

One of the consequences of e-Choupal is that the government agricultural extension services have become non-functional in the villages where e-Choupal kiosks are set up. Since the requirements of the farmers in the villages are taken care by e-Choupal, the state agricultural department officials have stopped visiting the villages. Moreover, e-Choupal is primarily interested in procurement of soyabean, the information requirements of farmers for other crops are being affected by the absence of state extension services in the villages. In fact, since the e-Choupal being driven by profit motive, it doesn't bother much about the issues concerning biodiversity and environmental risks. It promotes the crops in which it has commercial interests.

Conclusion

According to Visvanathan (2001) and Wade (2004), new technologies lead new forms of hegemony of technology. It has given no space to understand the role of broader socio-cultural forces or the classical relations of power through caste, class and gender. The emergence of global capitalism shifts the balance of class forces towards capital and as a result the relative autonomy of state declines. The state is retreating from its welfare commitments on one hand, and it aggressively intervenes in favour of global capital on the other. Thus, the role of the state is taken a back seat, vacating public spaces hitherto prominently occupied by it. As it is discussed, green revolution is directed by capitalist, in the same line ICTs initiatives intended for globalized economic interests. Thus, the present study suggests that ICTs are shaped by structural forces and are deeply embedded in the social and economic milieu. The discourse on information and communication technologies and development has engendered the digital divide as a binary divide

Sreekumar (2011) have ethnographically demonstrated that much of the ICT literature suffers from macro-level assumptions about technology and/or development, which make complex grass-root experiences of ICTs more inaccessible. It is one of the common findings encountered by researchers that the benefits of social development are distributed unequally. In other words, those who are in relatively higher status get the maximum benefit of social development and the vice versa. Thus, programmes for social development always

end up in only benefiting privileged section of the society. In case of Internet technology, it is continuously diffusing around the world but they enter in different social contexts and behave differently (Castells 2000).

ICTs, similar to other technologies are politically neutral. However, the social embeddedness of ICTs becomes problematic. The design for use and the design to use are problematic for the scholars engaged in the social studies of science and technology. The ICT initiative in agricultural extension is designed in such a way that it has to be mediated by individuals. As far its operationalization is concerned, e-Choupal is to be mediated by the Sanchalak. Not only the social structural forces that influence the selection of Sanchalak is problematic, but the demand e-Choupal's web portal places on its users, say farmers of the village where e-Choupal kiosk is set up is the concern. The information on the web portal is available in Hindi and in local languages and accessing it needs some amount of computer literacy on the part of the users. Thus its direct access to a non-literate farmer is limited.

References:

- Aker, C. J. (2011). Dial "A" for Agriculture: A Review of Information and Communication Technologies for Agricultural Extension in Developing Countries. *Agricultural Economics*, 42: 631–647.
- Annamalai, K. & S. Rao. (2003). *What works: ITC's e-Choupal and profitable rural transformation: Web-based information and procurement tools for Indian farmers*. Washington, D.C.: World Resources Institute.
- Aggarwal, P.C. (1971). Impact of Green Revolution on Landless Labourers: A Note. *Economic & Political Weekly*, 6(47), 2363-5.
- Byres, T. (1981). The New Technology, Class Formation and Class Action in the Indian Countryside. *The journal of Peasant Studies*. 8 (4), 405-454.
- Castells, M. 2000. *End of The Millennium* (2 Ed.). Oxford: Blackwell.
- Chand, R., P. A. Lakshmi & Singh, A. (2011). Farm Size and Productivity: Understanding the Strengths of Smallholders and Improving Their Livelihoods. *Economic & Political Weekly*, 46 (26 & 27), 5-11.
- Chand, R. (2012). Development Policies and Agricultural Markets. *Economic & Political Weekly*, 47(52), 53-63.
- Chand, R. (2017). *Doubling Farmers' Income Rationale, Strategy, Prospects and Action Plan*. NITI Policy Paper No.1/2017. National Institution for Transforming India. GoI. New Delhi.
- Chapman, R., & T. Slaymaker. (2002). *ICTs and Rural Development: Review of the Literature, Current Interventions, and Opportunities for Action*. ODI Working Paper 192. London: Overseas Development Institute.

De Roy, S.(2017). Economic reforms and Agricultural Growth in India.*Economic political weekly*, 52 (9), 67-72.

Evenson, R. E., C. Pray, & Rosegrant, M. W. (1999). Agricultural Research and production Growth in India.*Report No 109, International Food policy Research Institute*.

Glendenning J. C.,& P. P. Ficarelli. (2012). The Relevance of Content in ICT Initiatives in Indian Agriculture. *IFPRI Discussion Paper - 01180*.

Golan, E.; F. Kuchler, L. Mitchell. 2001. 'Economics of Food Labeling,'*Agricultural Economic Report No. 793* (p 1-6). Washington, D.C: USDA.

Heidegger, M. (1997).*The Question Concerning Technology and Other Essays*. London: Garland.

Heeks.R. (2002).Information Systems and Developing Countries: Failure, Success and Local Improvisations. *The Information Society*, 18, 101–112.

India Rural Development Report (IRDR) 2012- 13. Delhi: Orient Black Swan.

ITC., 2007. ITC: e-Choupal: Let's put India first. <http://www.itcportal.com/ruraldevelopment/echoupal.htm>.

ITC (Indian Tobacco Company). 2010. e-Choupal. <http://www.itcportal.com/rural-development/echoupal.htm>.

Kumar, R. (2005). e-Choupals: A Study on the Financial Sustainability of Village Internet Centers in Rural Madhya Pradesh.*Information Technologies and International Development*, 2(1), 45–73.

Krishnamurthy .M.(2012). State wheat – The changing Dynamics of Public Procurement in Mandhya Pradesh.*Economic & Political Weekly*, 47 (52),72-83

Marco, Ferroni& Yuan Zhou. (2011).Review of Agricultural Extension in India'.*Syngenta Foundation for Sustainable Agriculture*, (n.d).

Mesthane, G. E. (1972). The Role of Technology in Society'.In H. Albert Teach (Ed.), *Technology and Man's Future* (p 127-151). New York: Martin's Press.

Mohan, R. (1974). Contribution of Researchand Extension to Productivity Change in IndianAgriculture.*Economic & Political Weekly*.9(39), A97–A104.

Maru, A. (2004). ICT, enabled information system for agricultural development in India: status, issues and future directions.*Paper presented at IAITA National workshop on ICT in agriculture and rural development, at DA-IICT, Gandhinagar*. <http://iaita.da-iict.org/ajitmaru.ppt>.

Mbithi, P.H. 1972. *Innovation in Rural Development*. (Discussion paper No158),Kenya: University of Nairobi Institute for Development Studies.

Naveen.C. (2015).*Information and Communication Technologies in Agriculture: Study of A Non-State Initiative in the Deccan Region*. Thesis submitted to University of Hyderabad.

Neeraj.D.,& H. Singh. (2010). e-Choupal: Hope or Hype? *American Journal of Economics and Business Administration*, 2 (2), 179-184.

NSSO. (2014). Employment and Unemployment Situation of India: NSS 68th Round. *National Sample Survey Office, Ministry of Statistics and Programme Implementation.*

Pandey, M., K. Sudhir, D. Tewari, & N. Nainwal. (2010). The Roadmap: Linking small farmers to markets. *Policy paper prepared for Gates Foundation.*

Parayil, G. 2002. *Conceptualizing Technological Change*. New York and Oxford: Rowman& Littlefield.

Pachouri, A. (2012). Economic Inefficiencies in Farm-Market Linkages in Agriculture Value Chain in India: Problems and Solutions. *ISAS Working Paper No. 163* - 28 December 2012.

Planning Commission (2011). Report of the Working Group on Agricultural Marketing Infrastructure, Secondary Agriculture and Policy Required for Internal and External Trade for the XII Five-Year Plan 2012-17, Agriculture Division, Planning Commission, New Delhi

Paul, P. (2003). The Mandi is now on the Net. *Deccan Herald.* (Retrieved from: www.itcportal.com).

Ruttan, V. W. (1998). Models of agricultural development. In E. C.K. & J. M. Staatz (Eds.), *International Agricultural Development*, John Hopkins University Press: Baltimore.

Richa Kumar. (2016). *Rethinking Revolutions*. India: Oxford University Press.

Sassen, S. (1998). On the Internet and Sovereignty. *Indiana Journal of Global Legal Studies*, 5(2), 545-559.

Sassen, S. (2000). Territory and Territoriality in the Global Economy. *International Sociology*. 15(2): 372-393.

Sassen, S. (2002). Towards a Sociology of Information Technology. *Current Sociology*, 50(3).365–388.

Scott, J. (1988). *Seeing Like a State: How certain schemes to improve the human condition have failed*. New Haven: Yale University Press.

Sreekumar, T. T. (2011). *ICTs and Development in India—Perspectives on the Rural Network Society*. London: Anthem Press.

Singh, K.M., A. Kumar & Singh, R.K. (2015). Role of Information and Communication Technologies in Indian Agriculture: An Overview. *MPRA Paper No. 62413*, posted 26. February 2015 14:27 UTC.

Srivastava, S.K. & Chand, S. (Eds.) (2017). Changing Crop Production Cost in India: Input Prices, Substitution and Technological Effects. *Agricultural Economics Research Review*. 30, 171-182.

Stratan, A. & M. Victor & E. Lucasenco. (2013). Modernization of the Agricultural Sector in the Context of Sustainable Development in the Republic of Moldova. *Economic Engineering in Agriculture and Rural Development*, 13(2), 405-410.

Tichenor, P. J., G.A. Dohohue & C.N. Olien. (1970). Mass Media flow and Differential Growth in Knowledge. *Public Opinion Quarterly*, 34 (2), 159-170.

Thomas, J. M.; P. Brey and A. Feenberg (Eds.). 2003. *Modernity and Technology*. Cambridge: MIT Press.

Umal, L. D. and L. Schwartz. 1994. *Public and Private Agricultural Extension beyond Traditional Frontiers*. Washington, D.C: The World Bank.

Urquieta, N. R. (2008). *Effects of Access to Information on Farmer's Market Channel Choice: The Case of Potato in Tiraque Sub-watershed*. Master's Thesis, Virginia Polytechnic Institute and State University. Retrieved from ProQuest Dissertations and Theses. (UNRetd-12202009-212022).

Visvanathan, S. (2001). Democracy, Governance and Science: Strange Case of the Missing Discipline. *Economic and Political Weekly*, 36 (39), 3684-3688.

Vijayshankar.P.S.,& M. Krishnamurthy. (2012). Understanding Agricultural Commodity Markets. *Economic & Political Weekly*, 47 (52), 34-37.

Wade, R.H. (2002). Bridging the digital divide: New route to development or, new form of dependency? *Global Governance*, 8 (4), 365-388.

White, B. H. (2003). *Planning and Designing Rural Markets*. Rome: Food and Agriculture Organization (FAO).

Zijp, W.(1994).Improving the transfer and use of agricultural information: A Guide to Information Technology.*World Bank Discussion Paper 247*, Washington: World Bank: 697-706.

