



A REVIEW

An assessment of technological gap constraints and remedial measures : A farmers purview

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Abstract : The present study was undertaken to examine the barriers encountered by the farmers in minimization of the technological gap and to find the suitable remedial solutions to overcome the widened technological gap in Katni district of Madhya Pradesh during 2013-14. Information and communication technology (ICT) user farmers confronted the barriers in minimizing the technological gap in agriculture. On the other hand the farmers also suggested that, equipping the farmers with the necessary knowledge inputs” and providing, “subsidized supply of inputs should be on priority basis” would be the best measures to minimize the technological gap.

Key Words : Farmer, Technological gap, Information, Communication technology, ICT

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INTRODUCTION

It is a well established fact that Indian economy is vitally linked to agricultural development (Swami *et al.*, 2013). Agriculture provides direct and indirect livelihood support to the large majority of rural population and is still, a key sector of Indian economy (Shashikant *et al.*, 2014) and Agriculture holds the key to rapid economic development, social transformation and poverty alleviation (Bello, 2004). Various researchers have reported the existence of technological gap among tribal farmers (Trivedi, 1994) and technological gaps in cultivation of crops (Singh and Mathur, 1992). Although extension service in the country has a huge network of professional extension workers at national, state, district,

block and village levels several programmes which are helping the farmers in adoption of new technologies are in operation throughout the country; still a wide gap exists between technologies available with the researchers and their adoption at farmers field (Satyapriya *et al.*, 2012).

At some instances the technology gap in pigeonpea and chickpea was reported more than extension gap at farmers' field (Kumbhare *et al.*, 2014). In view of Wani *et al.* (2010), the technological gap of small saffron growers had positive and significant relationship with attitude and socio-economic status, while a positive and non-significant relationship of technological gap with age and caste was observed. High technological gaps were noticed by Swami *et al.* (2013) in Chikkodi and Hukkeri talukas of Belgaum district Karnataka. While working

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with mustard farmers at Bharatpur Rajasthan Bhati *et al.* (2016) concluded that, the main problem as it exists today is that of transfer of fruitful technologies and their skills pertaining to various practices of cultivation among the farmers it has also been observed that even if the farmers have technological know-how, they restrict adoption, as they are unskilled in utilization of technology in their fields. Whereas the composite technological gap in summer groundnut technology at Parbhani, Maharashtra, indicated that majority of the respondents belonged to medium level of composite technological gap followed by high and low level of composite technological gap (Kapse *et al.*, 2007).

According to Satyapriya *et al.* (2012) effective transfer of farm innovations and their practical application to the field situation is the key to the economic development of India but choosing policies for agricultural development requires the use of information about the existing farming situation (Sharma, 2012). Nain *et al.* (2012) reported that most professionals assume they know what farmers want and need but are often wrong but conversely, identifying farmers' priorities and helping farmers meet them leads to innovations which are adopted but Waman *et al.* (2006) opined that higher the education, more social participation and extension contact, more level knowledge and adoption, lower was the technological gap in case of banana production technology at Raver and Yaval tahsils of Jalgaon district, Maharashtra state.

MATERIAL AND METHODS

The experimental area of the study was Katni district of Madhya Pradesh. The Katni district comprises of six blocks which are Dhimarkhera, Bahoriband, Murwara, Reethi Karondi and Slimnabad. As of census 2011 district Katni had a population of 1,2,91,684. Among these population males are found to 663,064 which constitutes 51.33 per cent of the population. On the other hand, females are found to 628,620 which constitutes 48.67 per cent of the total population. The district is mainly rural in nature and the rural population is found to be 1028,149 which constitutes 79.60 per cent of the total population.

Multistage sampling design at Katni district of Madhya Pradesh was used for the purpose of study in the year 2013-14. Five blocks of Katni district namely Mudwara (Katni), Reethi, Bahotoband, Vijairadhogher and Badwar were selected on the basis of random sampling

technique. A list of ICT developed villages was prepared with the help of personnel of Block Development Officers from each selected blocks. Among these villages group of 4 villages cluster from each block were selected on the basis of random sampling technique. Thus, by this way, total 20 villages from 5 selected blocks were formed as sample villages for study. The ICT user farmers (respondents) have been selected on the basis of accessing the ICT system. For this purpose, a list of farmers using ICT for development of agriculture in each village was prepared carefully. From this list 15 respondents belonged to different socio economy strata were selected through stratified random sampling technique. So, finally a group of 300 ICT user farmers was pooled for the study.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Barriers encountered by the farmers in minimization the technological gap:

It is general observation during the study that productivity of crops in study area found to low, while, there exist high potential and prospect for increasing the crop productivity. The low productivity of crops could be due to various reasons. Crop cultivation in the state is facing a number of constraints and the production technology is to be appropriately modified to counter these challenges. Erratic deviation of rainfall pattern entailing into severe water stress coupled with sudden rise in temperature during pod filling stage had been a major problem factor responsible for drastic reduction in productivity. The loss of productivity also occurred due to non-judicial or lack of adoption of improved production technology. Large scale adoption of technological innovation is essential feature of agricultural development. However, some farmers adopt all the recommended practices while some others don't. The personal, social, economical and technological aspects of the farmers play a major role in their adoption process. It was felt that information about the adoption level is limited and technological gap in cultivation of crops are too wide. Due to low adoption of technology there exist vast technological gap in adoption of recommended crop production technology. Such constraints confronted by farmers in technological gap required to be analyzed and

removed through research and developmental efforts so that not only area under crop can be enhanced rapidly with increasing productivity, but also to generate good income to the growers through increased productivity.

The opinion survey of constraints was divided into 5 parts in which each and every part of constraints is having their own importance. The serious constraints confronted by ICT user farmers encountered to minimizing of technological gap was found to be “barriers to uptake of new technology” with mean score of 2.09 (rank Ist) followed by “economic barriers” with mean score of 2.08 (rank IInd), “lack adoptable information” with mean score of 2.00 (rank IIIrd), “social and motivational issues” with mean score of 1.91 (rank IVth) and “unavailability of basic facilities” with mean score of 1.82 (rank Vth), respectively. The detail constraints

countered by the farmers in minimization the technological gap are presented in Table 1.

Unavailability of basic facilities :

It is clear from the Table 1 that out of the total ICT user farmers, the maximum proportion of the ICT user farmers 44.33 per cent confronted never faced this constraint followed by 29.67 per cent farmers confronted sometime faced this constraint and 26.00 per cent farmers confronted always faced this constraint in minimizing the technological gap.

Under the head “unavailability of basic facilities” the main constraint is “non-accessibility to electricity” with mean score of 2.10 (rank-I). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 40.00 per cent confronted always faced this

Table 1 : Barriers encountered by the farmers in minimization the technological gap

(n=300)

Sr. No.	Constraints	Frequency			Mean score	Rank
		Always	Sometime	Never		
	Unavailability of basic facilities	78 (26.00)	89 (29.67)	133 (44.33)	1.82	V th
1.	Unavailability of inputs in time	64 (21.33)	98 (32.67)	138 (46.00)	1.75	ii
2.	Non accessibility to electricity	120 (40.00)	90 (30.00)	90 (30.00)	2.10	i
3.	Unavailability of mass media	50 (16.67)	78 (26.00)	172 (57.33)	1.59	iii
	Barriers to uptake of new technology	115 (38.33)	96 (32.00)	89 (29.67)	2.09	I st
1.	Traditional belief	92 (30.67)	105 (35.00)	103 (34.33)	1.96	iii
2.	Lack of relevant technology	118 (39.33)	89 (29.67)	93 (31.00)	2.08	ii
3.	Lack of basics training facilities for use of ICT tools	135 (45.00)	95 (31.67)	70 (23.33)	2.22	i
	Economic barriers	115 (38.33)	95 (31.67)	90 (30.00)	2.08	II nd
1.	Inadequate operational funds	105 (35.00)	80 (26.67)	115 (38.33)	1.97	iii
2.	Unable to fetch reasonable prices for their produce	110 (36.67)	105 (35.00)	85 (28.33)	2.08	ii
3.	Costly technology and inputs	130 (43.33)	101 (33.67)	69 (23.00)	2.20	i
	Social and motivational issues	84 (28.00)	104 (34.67)	112 (37.33)	1.91	IV th
1.	Lack of knowledge about technology	108 (36.00)	99 (33.00)	93 (31.00)	2.05	i
2.	Lack of adoption awareness	85 (28.33)	130 (43.33)	85 (28.33)	2.00	ii
3.	Absence of accountability	96 (32.00)	101 (33.67)	103 (34.33)	1.98	iii
4.	Missing link of farmers in extension programme	56 (18.67)	96 (32.00)	148 (49.33)	1.69	v
5.	The extension personnel have little interest in helping the farmers through with their problems	73 (24.33)	95 (31.67)	132 (44.00)	1.80	iv
	Lack of adoptable information	98 (32.67)	104 (34.67)	98 (32.67)	2.00	III rd
1.	Lack of information towards uptake of technology	118 (39.33)	105 (35.00)	77 (25.67)	2.14	i
2.	The information provided by the extension service appear to lack relevance to the need of the farmers	69 (23.00)	83 (27.67)	148 (49.33)	1.74	iii
3.	Huge disconnect between the flow of latest information from the research institutes and the farmers	107 (35.67)	123 (41.00)	70 (23.33)	2.12	ii
	Overall average	98 (32.67)	98 (32.67)	104 (34.66)	1.98	

constraint followed by 30.00 per cent farmers confronting sometime faced this constraint and 30.00 per cent farmers confronted never faced this constraint in minimizing the technological gap. The second the main constraint was “unavailability of inputs in time” with mean score of 1.75 (rank-II). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 46.00 per cent confronted never faced this constraint followed by 32.67 per cent farmers confronted sometime faced this constraint and 21.33 per cent farmers confronted always faced this constraint in minimizing the technological gap, whereas the third main constraint was “unavailability of mass media” with mean score of 1.59 (rank-III). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 57.33 per cent confronted never faced this constraint followed by 26.00 per cent farmers confronted sometime faced this constraint and 16.67 per cent farmers confronted always faced this constraint in minimizing the technological gap.

Barriers to uptake of new technology :

The result presented in Table 1 shows that out of the total ICT user farmers, the maximum proportion of the ICT user farmers 38.33 per cent confronted always faced this constraint followed by 32.00 per cent farmers confronted sometime faced this constraint and 29.67 per cent farmers confronted never faced this constraint in minimizing the technological gap.

Among the “barriers to uptake of new technology” the main constraint is “lack of basics training facilities for use of ICT tools” with mean score of 2.22 (rank-I). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 45.00 per cent confronted always faced this constraint followed by 31.67 per cent farmers confronted sometime faced this constraint and 23.33 per cent farmers confronted never faced this constraint in minimizing the technological gap. The second main constraint was “lack of relevant technology” with mean score of 2.08 (rank-II). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 39.33 per cent confronted always faced this constraint followed by 31.00 per cent farmers confronted never faced this constraint and 29.67 per cent farmers confronted sometime faced this constraint in minimizing the technological gap. The third main constraint was “traditional belief” with mean score of 1.96 (rank-III). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 35.00 per cent

confronted sometime faced this constraint followed by 34.33 per cent farmers confronted never faced this constraint and 30.67 per cent farmers confronted always faced this constraint in minimizing the technological gap.

Economic barriers:

The result presented in Table 1 shows that out of the total ICT user farmers, the maximum proportion of the ICT user farmers 38.33 per cent confronted always faced this constraint followed by 31.67 per cent farmers confronted sometime faced this constraint and 30.00 per cent farmers confronted never faced this constraint in minimizing the technological gap.

Among the “economic barriers” the main constraint was “costly technology and inputs” with mean score of 2.20 (rank-I). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 43.33 per cent confronted always faced this constraint followed by 33.67 per cent farmers confronted sometime faced this constraint and 23.00 per cent farmers confronted never faced this constraint in minimizing the technological gap, followed by second main constraint as “unable to fetch reasonable prices for their produce” with mean score of 2.08 (rank-II). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 36.67 per cent confronted always faced this constraint followed by 35.00 per cent farmers confronted sometime faced this constraint and 28.33 per cent farmers confronted never faced this constraint in minimizing the technological gap. The third main constraint was “inadequate operational funds” with mean score of 1.97 (rank-III). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 38.33 per cent confronted never faced this constraint followed by 35.00 per cent farmers confronted always faced this constraint and 26.67 per cent farmers confronted sometime faced this constraint in minimizing the technological gap.

Social and motivational issues :

The result presented in Table 1 showed that out of the total ICT user farmers, the maximum proportion of the ICT user farmers 37.33 per cent confronted never faced this constraint followed by 34.67 per cent farmers confronted sometime faced this constraint and 28.00 per cent farmers confronted always faced this constraint in minimizing the technological gap.

Among the “social and motivational issues” the first main constraint was “lack of knowledge about

technology” with mean score of 2.05 (rank-I). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 36.00 per cent confronted always faced this constraint followed by 33.00 per cent farmers confronted sometime faced this constraint and 31.00 per cent farmers confronted never faced this constraint in minimizing the technological gap, followed by “lack of adoption awareness” as second main constrain with mean score of 2.00 (rank-II). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 43.33 per cent confronted sometime faced this constraint followed by 28.33 per cent farmers confronted always faced this constraint and 28.33 per cent farmers confronted never faced this constraint in minimizing the technological gap. Whereas the third main constraint was “absence of accountability” with mean score of 1.98 (rank-III). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 34.33 per cent confronted never faced this constraint followed by 33.67 per cent farmers confronted sometime faced this constraint and 32.00 per cent farmers confronted always faced this constraint in minimizing the technological gap.

Fourth main constraint was “the extension personnel have little interest in helping the farmers through with their problems” with mean score of 1.80 (rank IV). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 44.00 per cent confronted never faced this constraint followed by 31.67 per cent farmers confronted sometime faced this constraint and 24.33 per cent farmers confronted always faced this constraint in minimizing the technological gap. This was faced by “missing link of farmers in extension programme” as fifth main constraint with mean score of 1.69 (rank V). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 49.33 per cent confronted never faced this constraint followed by 32.00 per cent farmers confronted sometime faced this constraint and 18.67 per cent farmers confronted always faced this constraint in minimizing the technological gap.

Lack of adoptable information:

The result presented in Table 1 showed that out of the total ICT user farmers, the maximum proportion of the ICT user farmers 34.67 per cent confronted sometime faced this constraint followed by 32.67 per cent farmers confronted never faced this constraint and 32.67 per cent farmers confronted always faced this constraint in minimizing the technological gap.

Among the “lack of adoptable information” the main constraint is “lack of information towards uptake of technology” with mean score of 2.14 (rank-I). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 39.33 per cent confronted always faced this constraint followed by 35.00 per cent farmers confronted sometime faced this constraint and 25.67 per cent farmers confronted never faced this constraint in minimizing the technological gap, “huge disconnect between the flow of latest information from the research institutes and the farmers” was second main constraint with mean score of 2.12 (rank-II). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 41.00 per cent confronted sometime faced this constraint followed by 35.67 per cent farmers confronted always faced this constraint and 23.33 per cent farmers confronted never faced this constraint in minimizing the technological gap, third main constraint was “the information provided by the extension service appear to lack relevance to the need of the farmers” with mean score of 1.74 (rank-III). Out of the total ICT user farmers, the maximum proportion of the ICT user farmers 49.33 per cent confronted never faced this constraint followed by 27.67 per cent farmers confronted sometime faced this constraint and 23.00 per cent farmers confronted always faced this constraint in minimizing the technological gap.

The overall opinion survey of constraints clearly showed that 32.67 per cent ICT user farmers confronted that they always faced overall barriers in minimizing the technological gap in agriculture. Similarly, same number of ICT user farmers faced sometimes these overall problems. It was also found out that the maximum number of ICT user farmers 34.66 per cent confronted that they never faced these overall problems.

Remedial solution to overcome the widened technological gap :

As per the constraints analysis certain constraints are confronted by ICT user farmers in relation to the faced barriers in minimizing the technological gap, which needs to be overcome in order to boost up the crop production and productivity. On the basis of result the emphasis should be given by agricultural planners and development agencies to overcome on priority basis of these constraints to overcome the widened technological gap. The opinion survey of farmers under study have resulted in some generating some suggestions so that

the technological gap may be minimized, the suggestions provided by ICT user farmers are presented in Table 2.

The data presented in Table 2 reveal that a good majority of the farmers want “equipping the farmers with the necessary knowledge inputs” as it is the Ist ranked suggested by farmers. This impression is found to be most important suggestion by 58.33 per cent ICT user farmers followed by 25.00 per cent ICT user farmers suggested as partially important and 16.67 per cent ICT user farmers suggested it as least important.

A good majority of the farmers want “subsidized supply of inputs should be on priority basis” as it is the IInd ranked suggested by farmers. This impression was found to most important suggestion by 53.33 per cent ICT user farmers followed by 30.00 per cent ICT user farmers suggested it as partial important and 16.67 per cent ICT user farmers suggested it as least important.

A good majority of the farmers want “the solution of problems should be on localized based and with multiple technological options to choose from depending upon farmers resources” as it is the III ranked suggested by farmers. This impression was found to be most important and is suggested by 56.67 per cent ICT user farmers followed by 23.00 per cent ICT user farmers suggested it as partially important and 20.33 per cent ICT user farmers suggesting it as least important. Whereas a vast majority of the farmers want “more technological

demonstration should be conducted on farmers’ field” as it is the IVth ranked suggested by farmers. This impression was found to be most important suggested by 50.00 per cent ICT user farmers followed by 28.33 per cent ICT user farmers suggesting it as partially important and 21.67 per cent ICT user farmers suggesting it as least important.

A good majority of the farmers want “needs to restore farmers credibility of the efforts meant for them” as it is the Vth ranked suggestion by farmers. This impression was found to most important suggestion by 50.00 per cent ICT user farmers followed by 26.67 per cent ICT user farmers suggesting it as partially important and 23.33 per cent ICT user farmers suggesting it as least important. Also a majority of the farmers want “information related with agricultural development should be easily available and affordable” it is the VIth ranked suggestion confronted by the farmers. This impression was found to most important suggestion by 46.67 per cent ICT user farmers, followed by 29.00 per cent ICT user farmers suggested it as partially important and 24.33 per cent ICT user farmers suggesting it as least important.

A majority of the farmers want “the agriculture information should be specific requirement of each region and each socio-economic category” as it is the VIIth ranked suggestion by farmers. This impression was found

Table 2 : Suggestion for minimizing the technological gap at farm level

Sr. No.	Suggestions	Frequency			Mean score	Rank
		Most important	Partial important	Least important		
1.	More extension activities should be given	100 (33.33)	115 (38.33)	85 (28.34)	2.05	VIII th
2.	More technological demonstration should be conducted on farmers field	150 (50.00)	85 (28.33)	65 (21.67)	2.28	IV th
3.	Subsidized supply of inputs should be on priority basis	160 (53.33)	90 (30.00)	50 (16.67)	2.37	II nd
4.	Availability of crop production and marketing credit.	80 (26.67)	120 (40.00)	100 (33.33)	1.93	X th
5.	Availability of technical help in greater degree	108 (36.00)	90 (30.00)	102 (34.00)	2.02	IX th
6.	Need to address farmers’ economic and social issue	83 (27.67)	82 (27.33)	135 (45.00)	1.83	XII th
7.	Equipping the farmers with the necessary knowledge inputs	175 (58.33)	75 (25.00)	50 (16.67)	2.42	I st
8.	Needs to restore farmers credibility of the efforts meant for them	150(50.00)	80 (26.67)	70 (23.33)	2.27	V th
9.	Information related with agricultural development should be easily available and affordable	140 (46.67)	87 (29.00)	73 (24.33)	2.22	VI th
10.	The agriculture information should be specific requirement of each region and each socio economic category	117 (39.00)	93 (31.00)	90 (30.00)	2.09	VII th
11.	The solution of problems should be on localized based and with multiple technological options to choose from depending upon farmers resources	170 (56.67)	69 (23.00)	61 (20.33)	2.36	III rd
12.	The proper and basic training facilities should be available at block level for use of ICT	88 (29.33)	100 (33.33)	112 (37.34)	1.92	XI th

to most important suggestion by 39.00 per cent ICT user farmers followed by 31.00 per cent ICT user farmers suggesting it as partially important and 30.00 per cent ICT user farmers suggesting it as least important. In addition to above a good majority of the farmers also want “more extension activities should be given” as it is the VIIIth ranked suggestion by the farmers. This impression was found to partially important suggestion by 38.33 per cent ICT user farmers followed by 33.33 per cent ICT user farmers suggesting it as most important and 28.34 per cent ICT user farmers suggesting it as least important.

A majority of the farmers want “availability of technical help in greater degree” as it is the IXth ranked suggestion by the farmers. This impression was found to be most important suggestion by 36.00 per cent ICT user farmers followed by 34.00 per cent ICT user farmers suggesting it as least important and 30.00 per cent ICT user farmers suggesting it as partially important. As well as a majority of the farmers, want “availability of crop production and marketing credit” as it is the Xth ranked suggestion by farmers. This impression was found partially important suggestion by 40.00 per cent ICT user farmers followed by 33.33 per cent ICT user farmers suggesting it as least important and 26.67 per cent ICT user farmers suggesting it as most important.

A majority of the farmers want “the proper and basic training facilities should be available at block level for use of ICT” as it is the XIth ranked suggestion by farmers. This impression was found to be least important suggestion by 37.34 per cent ICT user farmers followed by 33.33 per cent ICT user farmers suggesting it as partially important and 29.33 per cent ICT user farmers suggesting it as most important and a majority of the farmers also want “need to address farmers’ economic and social issue” as it is the XIIth ranked suggestion by farmers. This impression was found to least important suggestion by 45.00 per cent ICT user farmers followed by 27.67 per cent ICT user farmers suggesting it as most important and 27.33 per cent ICT user farmers suggesting it as partially important. Similar results were reported by Evenson (1997) and Oladele (2004), who affirmed that an effective agricultural extension can bridge the gap between discoveries in the research laboratories and farmers field.

Conclusion:

Technological gaps are multifaceted and are a major

constraint in Indian agriculture production system. Technological gaps are also dynamic and vary according to location and time. The technological breakthrough generated by agricultural scientists can be used profitably only when farmers have timely access to information and required inputs. The study gives an idea of what barriers are encountered by the farmers and also provides suggestions for minimizing the technological gaps only effort is needed to implement the above suggestions and eliminate the barriers.

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