Journal of Community Mobilization and Sustainable Development Vol. 12(1), 72-78, January-June, 2017

Constraints and Strategies in Scaling up of Farmer-led Innovations

Hema Baliwada[1]*, J.P. Sharma[2], R.R. Burman[3], M.S. Nain[4], Anil Kumar[5] and P. Venkatesh[6]

[1]Scientist (on probation) (Part of Ph.D. Research Work), [2]Joint Director (Extension), [3]Principal Scientist, [4]Senior Scientist, Division of Agricultural Extension, [5]Principal Scientist (Design of Experiments), IASRI, [6]Scientist (Agricultural Economics), IARI, New Delhi-110012

ABSTRACT

The present study was undertaken during 2015-16 at Punjab and Uttar Pradesh in order to identify the constraints in scaling up of farmer-led innovations and also to formulate strategies for better replication to similar situations. A sample size of total 100 respondents constituting 50 innovators and 50 non-innovator farmers were selected by stratified sampling to identify the farmer level constraints in scaling up of farmer-led innovations. The Friedman test results revealed that marketing (mean rank 5.00) and technical (mean rank 4.00) were the major constraints for the innovators and non-innovators respectively. Among the marketing constraints for the innovators, the major were promotion of branding to the local innovations (mean rank 4.41) and lack of latest market information (mean rank 4.34). Location specificity of the innovations (mean rank 4.34) and non-validation of innovations (mean rank 4.24) were the major inhibitors among technical constraints for non-innovators. The present study also highlighted some strategies for scaling up the farmer-led innovations with special emphasis on Indian conditions.

Keywords: Farmer-led innovations, Scaling up, Constraints and strategies

INTRODUCTION

Innovation is intrinsic in Indian agriculture from time immemorial and Indian farmers are not an exception to this. In the process of evolution, farmers have come out with numerous grass roots innovations which brought them good returns and made farming a sustainable practice. Farmer-led innovations are new or modified or experimented own or external ideas, practices, techniques or products by farmers or group of farmers without direct support from external agents or formal research institutions (Wettasinha *et al*., 2008; Sule Akkoyunlu, 2013). Farm innovators are those who often work to solve localized problems, and generally work outside the area of formal organizations (Olga, 2015; European Union, 2011; Prolinnova, 2009). According to Roling (2009b) in fact, farmers have been innovating long before the emergence of formal research by scientists and a few studies reported that some of the technologies developed by scientists were actually based on innovations of the local farmers. Their local innovations include both "hard" technologies, such as developing new farm machinery or varieties to "soft" innovations, such as new ways of marketing. Innovations play a crucial role in food production as well as effectively utilizing resources by farmers and are essential for agricultural and economic development (World Bank, 2011). Local innovations not only ensures the technology is appropriate, raising adoption rates, but also keeps it flexible, because the farmers' advice adds a local context, letting the technology evolve and reinvent itself for every new situation.

Although, the initiatives in the form of protection of propriety rights to the farmer-led innovations by government and non-government bodies have been taken in recent past but the replication was at a limited scale. Despite its impact, these farmer-led innovations over a period are not properly either documented or commercialized and the current approaches for commercializing these grass root innovations are severely hindered by many constraints. Resource-poor farmers far from the cities and research centers have difficulty in accessing these finance supporting

*Corresponding author email id: hema.baliwada@gmail.com

organizations and cannot genuinely influence them. Farmers strongly suggest that limitation of resources are the major challenges for scaling up, so that they are not being able to take risks and carry out experiments of their own priorities (Assefa, 2004). Sometimes the benefits of farmers' innovations however ranges from being useful only to the individual farmer, or occasionally even limited to specific circumstances to a wider range of application that can be used by many farmers. There are many innovations in isolated pockets having wide range of implications and need to be refined by research system for scaling up of innovations. However, more rigorous work needs to be pursued to economically measure the cost and benefit trade-offs of grassroots innovations.

MATERIALS AND METHODS

A list of innovative farmers recognized and awarded by various institutions from ICAR (Indian Council of Agricultural Research), PPVFRA (Protection of Plant Varieties and Farmers Rights Authority), Department of Science and Technology (Technology Information, Forecasting and Assessment Council; and National Innovation Foundation), ICAR institutes, ICAR-IARI (Indian Agricultural Research Institute), SAUs (State Agricultural Universities) was prepared. The data from secondary sources revealed that Uttar Pradesh and Punjab have more number of innovative farmers compared to other states. Therefore the present study was conducted in two purposively selected states *i.e.*, Uttar Pradesh and Punjab. The whole population of innovative farmers was divided into 5 broad categories. The broad areas of innovation selected for the study were crop production, horticulture, farm machinery, processing and value addition and animal husbandry. At least 5 innovative farmers were available; therefore 5 innovative farmers were selected from each category by stratified random sampling. Similarly 5 non-innovative farmers were selected randomly from the same locality for better comparison. These selected farmers fall into 7 districts of Punjab (Batinda, Faridkot, Hoshiarpur, Nawanshahar, Ludhiana, Patiala and Sangrur) and 10 districts of Uttar Pradesh (Aligarh, Bulandshahr, Ghaziabad, Hapur, Kanpur nagar, Kannauj, Meerut, Muzaffarnagar, Rampur and Saharanpur). Fifty innovative and fifty non-innovative farmers constituted the total sample size of 100 farmers. The innovators were asked about the constraints most severely faced in scaling up of their innovations. Similarly the responses from the non-innovators about the hindering factors in adoption of the innovations were collected. Their responses were content analyzed in order to identify the set of major constraints perceived by them separately for these respondents. The responses were rated on a five point continuum- very severe to least severe. These response scores were converted into ranks using a non-parametric Friedman's test to ascertain the major category of constraints perceived by different groups of respondents.

RESULTS AND DISCUSSION

Constraints experienced by innovators: The overall comparison among different categories (technical, organizational, economic, infrastructural and marketing) of constraints of innovators in scaling up of innovations was made. The results from Friedman analysis (Chi-Square = 156.61, df = 4, $p < 0.05$) indicated that the mean rank corresponding to marketing constraints (5.00) is more and therefore it is the most important constraint among the innovators. It is followed by technical constraints (mean rank 3.06), economic constraints (mean rank 3.01) and infrastructural constraints (mean rank 2.89). The less severe are organizational constraints perceived by the innovators with the mean rank of 1.03. The difference in mean ranks for different constraints reveals that the constraints vary for different type of innovations. Further analysis in Table 1 revealed the most severe constraint within each major category of these constraints.

It is clear from the Table 1, that the major among the technical constraints is lack of awareness on promoting organizations (mean rank 6.51). Even though there are many government and non-government organizations working for scaling up of farmer-led innovations but majority of the farmers are not aware of these existing facilities. It may be due to the distant location of these facilities from their areas or due to huge procedural formalities in approval for commercialization. The least affecting constraint is heterogeneity of cropping systems (mean rank 1.19). Technical and economic feasibility are the important parameters for scaling up the innovation, heterogeneity makes it difficult for its technical feasibility from one crop to others. In the organizational

Table 1: Severity comparison of different components of constraints among innovators based on Friedman's test (n=50)

Particulars	Mean Rank	Groups		
Technical constraints				
Heterogeneity of cropping systems	1.19	A		
Complexity of tools and techniques requiring new skills	2.90		B	
Non-availability of high value inputs	2.93		B	
Lack of technical guidance	3.09		B	
Non-availability of skilled labour	4.97			C
Small and marginal land holdings	6.41			C
Lack of awareness on promoting organizations	6.51			C
Organizational constraints				
Lack of proper documentation	2.11	A		
Lack of separate policy of the government	2.51	A		
No proper recognition/rewarding	2.70	A		
Ignorance of grassroots knowledge	3.31	A		
Lack of awareness programmes on IPR	5.16		B	
No standard set of indicators for validation	5.31		B	
No incorporation of grass root innovations in package of practices	6.90			C
Economic constraints				
Unaware of credit facilities	3.76	A		
Lack of enough capital	3.83	A		
Lack of financial guarantees	3.84	A		
High labour cost	3.87	A		
High cost of inputs	4.00	A		
No insurance facilities for the innovations	4.19	A		
Problem of access to credit	4.51	A		
Infrastructural constraints				
Irregular supply of electricity	3.64	A		
Lack of own equipment and problem in handling	3.81	A		
Lack of proper online/offline data bases	3.81	A		
Poor transportation and communication facilities	4.04	A		
Distant organizations	4.07	A		
Lack of design support for refinement	4.08	A		
Lack of testing facilities nearby for validation	4.55	A		
Marketing constraints				
Heavy fluctuation in price	2.24	A		
Exploitation by middlemen	4.20		B	
Lack of awareness on export standards	4.20		B	
Lack of accessibility to market	4.27		B	
No procurement policy of the government	4.34		B	
Lack of latest market information	4.34		B	
Branding is a problem	4.41		B	

constraints, the mean rank (6.90) corresponding to non-incorporation of grass root innovations in package of practices published by state agricultural universities or research institutions is the major constraint. Even though there are many technically and economically feasible location specific success stories, their utilization is limited to recognizing and documenting in majority of the cases but they are not incorporated in package of the practices for wider diffusion. Incorporation not only motivates the innovators but also increases the adoption rate by fellow farmers. Among the economic constraints, the most severe is problem of access to credit (mean rank 4.51) due to lack of financial guarantees and many procedural formalities. In case of

infrastructural constraints, lack of testing facilities nearby for validation (mean rank 4.55) is the major constraint. Validation requires subject matter expertise for checking the novelty which is not available at village level. It is followed by lack of design support for refinement (mean rank 4.08) as value addition requires R&D support and modern infrastructure. The branding of local innovations (mean rank 4.41) is severe constraint in case of marketing. For institutional innovations, authenticated logo provides brand name whereas for local innovations, there is no proper packaging or registration of the products. The least severe constraint is the heavy fluctuation in price for the products (mean rank 2.24).

Constraints of non-innovators: Broadly four categories of constraints of the non-innovators (technical, economic, extension and socio psychological) relevant to the present study were identified. The questions were asked to the non-innovators mainly to analyze the reasons for non-adoption of innovations. Friedman test statistic results (Chi-Square = 109.49, df =3, $p < 0.05$) revealed that the mean rank corresponding to technical constraints (4.00) is more and therefore it is the most severe constraint followed by socio psychological (mean rank 2.35), extension (mean rank 2.26) and economic constraints (mean rank 1.39). The most severe in each category is given in Table 2.

Table 2: Severity comparison of different components of constraints among non-innovators based on Friedman's test (n=50)

Particulars	Mean Rank	Groups			
Technical constraints					
Non-availability of skilled labour	3.24	A			
Requirement of complementary inputs	3.40	A			
Small and marginal holdings	3.61	A			
Lack of published literature and technical guidance	4.03		B		
Lack of awareness on promoting organizations	4.04		B		
Package of the practices of the innovators are not validated	4.24			C	
Location specificity of the innovations	4.34				D
Economic constraints					
Lack of enough capital and proper funding	1.10	A			
Heavy fluctuation in price	3.29		B		
Lack of insurance for the innovations	3.55			C	
High cost of inputs	3.55			C	
High cost of labour	3.72			C	
Unaware of credit facilities	6.04				D
Problem of access to credit and lack of financial guarantees	6.75				D
Extension constraints					
Poor economic condition and size of holdings	3.72	A			
Distant organizations and lack of vehicles	3.75	A			
Adoption of innovation requires more expertise	3.77	A			
Lack of transportation and communication networks	4.11	A			
Lack of motivation from officials	4.14	A			
Lack of local technical expertise	4.23	A			
Lack of demonstrations on innovations	4.28	A			
Socio psychological constraints					
Favoritism of organizations towards some members	3.66	A			
Not profitable and consumes more time	3.69	A			
Culture, attitude and perception of farmers	3.93	A			
Fear, if adoption of innovation fails	3.95	A			
Friends and neighbors discourage to adopt the innovations	3.97	A			
Previously experienced failure	4.14	A			
Risk factor and psychological fear	4.66	A			

It is evident from the Table 2 that the major among the technical constraints is location specificity of the innovations (mean rank 4.34) as majority of the innovations developed by the farmer's suits to their own requirement or to a particular locality. It is followed by package of the practices of the innovations developed by innovators are not validated (mean rank 4.24). In case of economic constraints, the most severe are problem of access to credit due to lack of financial guarantees (mean rank 6.75) and unawareness of credit facilities (mean rank 6.04). Lack of demonstrations on innovations (mean rank 4.28) and lack of local technical expertise (mean rank 4.23) for guidance are the most severe among extension constraints. Lastly in socio-psychological perspective of the non-innovators, risk factor and psychological fear (mean rank 4.66) is the hindering factor in adoption of innovations.

Strategies for scaling up of farmer-led innovations

- The present study identified that even though the farmer-led innovations were documenting by the organizations to some extent, proper documentation and scaling up with suitable approaches need to be taken care of.
- There is a need to make use of existing support from 642 Krishi Vigyan Kendras (KVKs) in India as every district has at least one KVK. As KVKs are at the district level and in touch with farmers, a network of KVKs can be utilized for documentation of farmer-led innovations and maintain a repository at district level. Besides this, the farmers should be empowered to be in charge of their own documentation of farm level innovations and get through to people at village level.
- The new mandate of the present government "Mera Gaon Mera Gaurav (MGMG)" in 2015 envisages scientists of every ICAR institutes, SAUs, KVKs to adopt villages and provide information to the farmers on technical and other related aspects in a time frame. For example the IARI has adopted 575 villages with 115 teams visiting monthly. This ongoing scheme can also give more emphasis for documenting farmer-led innovations across the country and which can be subsequently validated and disseminated. Launching of separate network projects or All India Coordinated Research Projects (AICRP) on farmer-led innovations may have better impact.
- Farmer-led innovations would often require validation and refinement for which the existing system of agricultural universities and ICAR research institutions could provide laboratory equipment and facilities and can act as referral centers. The validation process requires different level of experts based on type of innovation. Some need laboratory facilities and others can be done through local people. Engaging local people also in the validation of innovations at grassroots level generates motivation to them and to fellow farmers. Benefits of such refined and validated innovations could be shared among the farmer entrepreneurs and the concerned scientists/institutions through commercialization.
- It has been inferred from the present study that scaling up of innovations requires commitment and greater budgetary support towards innovations mainstreaming in all location specific farmer-led innovations. For performing this, the private sectors should be engaged for commercialization of replicable innovations. This can be achieved through effectively utilizing 'Corporate Social Responsibility' (CSR) funds of various organizations. Alternatively, the partnership programme between innovators, public and private institutions can be made by defining roles and responsibilities.
- As the farmer led innovations are location specific, region wise local innovations of a particular zone where similar situations exists can be popularized for better dissemination. However some of the innovations are location-neutral, these can be channelized through the existing facility of ATARIs linking with KVKs can assist and having a center for display of region specific innovations. The ATIC (Agricultural Technology Information Centers) working as single window centre and KVK, visited by large number of farmers should have the honour board at the entrance depicting the innovators along with their innovations for the benefit of the visitors. The existing facility of Directorate of Knowledge Management in Agriculture (DKMA) of ICAR can also act as a platform for showcasing of farmer-led innovations.

- Farmer led innovations identified in one region need to be replicated in similar eco-regions elsewhere, through publication, documentation and dissemination of success stories. The farmers' innovations should be incorporated in the "package of practices" of state agricultural universities, to provide authenticity and wide spread. There is a need to start Front Line Demonstrations (FLD) in innovative farmer fields and experimentation sites to promote farmer to farmer learning. Wherever possible, farms of innovative farmers should be recognized as agri tourism centres to facilitate the visits of other farmers. Agro-tourism around farmer's innovative efforts would not only generate public awareness but will also help in revenue generation and greater community involvement in protecting our rich biodiversity.
- Every KVK is organizing pre-*kharif* and pre-*rabi* season exhibitions and displaying farmer stalls. This facility can be used to motivate and mobilize innovative farmers at district level to display their innovations and recognizing them with awards. The successful innovative farmers should be invited as a resource farmer in training programmes conducted by KVKs of ICAR and SAUs. Multi-lingual, multimedia kiosks at various public places, educational institutions and local bodies disseminating location specific innovations should be installed. District level institutions should motivate farmers, especially youth about the importance of IPR in the field of innovations.
- Conferences, seminars and workshops involving successful innovative farmers to share the experiences for replication and to blend with modern science should be often organized and media campaign must be there to increase visibility of grass root level innovations. The validated innovations should be disseminated through social networks like you tube, twitter, etc for wider coverage. ICAR should provide outstanding awards to the farmers those who follow best innovative practices in all fields like Jagjivan Ram Innovative Farmer Award, fellow farmer award and it should launch a separate journal for successful innovative farmers for better dissemination.
- DD kisan which has completed its one year of operation in providing agriculture information 24hours. Up to some extent, they are inviting innovative farmers to share their experiences. For broader dissemination of their innovations, it should be a practice to invite innovative farmers from all regional states. For achieving this directory of innovations need to be developed.

CONCLUSION

The creativity, determination and curiosity of farm innovators need fast identification and replication but all the local innovations are not out scaled to other fellow farmers. Present study has tried to highlight the constraints faced by the innovators and non-innovators in scaling up the innovations. Marketing and technical were the major constraints for the innovators and non-innovators respectively. Proper documentation and scaling up with suitable approaches need to be taken care of by appropriately utilizing the existing facilities. The necessity of policy focus on these aspects stems from the fact that scaling up of farmer-led innovations capitalize on new experiments which can be easily replicated to similar elsewhere situations.

REFERENCES

Assefa A. 2004. Farmer Led Innovation: Experiences and Challenges in Ethiopia. National Workshop Proceedings on Promotion of Farmer Innovation and Experimentation in Ethiopia (Addis Ababa: ASE), pp. 145–157.

European Union Report. 2011. Recognising The Unrecognised: Farmer Innovation In Northern Malawi: Find Your Feet. The Development Fund.

ICAR. 2014. Report of the High Power Committee on Management of Krishi Vigyan Kendras. http://www.icarzcu3.gov.in/forms/KVK%20New%20Guidelines.pdf

NIF (National Innovation Foundation) Report, 2015. Available at http://nif.org.in/aboutnif and http://nif.org.in/sd

Olga V. Ustyuzhantseva. 2015. Institutionalization of grassroots innovation in India. *Current Science,* 108(14768): 25.

Prolinnova. 2009. Notes on Local Innovation and Participatory Innovation Development, Available at: http://www.prolinnova.net.

Roling N. 2009b. Conceptual and methodological developments in innovation. In: Sanginga *et al.* (eds), Innovation Africa: enriching farmers' livelihoods. London, UK: Earthscan.

Sule Akkoyunlu. 2013. Agricultural Innovations in Turkey. Swiss National Science Foundation under a grant to the National Centre of Competence in Research on Trade Regulation, University of Bern, Switzerland. NCCR Trade Working Paper No. 30.

Wettasinha, C.; M. Wongtschowski and A. Waters-Bayer. 2008. Recognising local innovation: experience of PROLINNOVA partners. Silang, Cavite, the Philippines: International Institute of rural Reconstruction/Leusden: PROLINNOVA International Secretariat, ETC Eco Culture.

World Bank. 2011. Agricultural Innovation Systems: An Investment Source Book. World Bank, Washington, DC.

Received on June, 2016, Revised on December, 2016