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Perceived Effectiveness of Lead user developed Innovations in Agriculture

Akanchha Singh* and VLV. Kameswari

Department of Agricultural Communication, GBPUA&T, Pantnagar, India

*Corresponding author

A B S T R A C T

Lead users are primarily responsible for generating user innovations and are defined as individuals or organizations that are well ahead of market trends and have needs that go far beyond those of the average user. In agriculture users of technology are basically farmers and they can be considered as lead users. The present study was conducted to know the perception of lead users regarding effectiveness of their own innovations. For this, 30 lead users developed/practiced innovations from 13 districts of Uttar Pradesh were selected purposively. Lead users were asked to rate their innovations on five attributes of innovations. All the respondents rated their innovations high in terms of relative advantage while majority of respondents felt that their innovations were low on compatibility (60%) less complex (56.6%). It was found that majority of respondents ((70%) rated their innovation as effective followed by highly effective (16.6%) and less effective (13.3%).

Introduction

Lead users are primarily responsible for generating user innovations and are defined as individuals or organizations that are well ahead of market trends and have needs that go far beyond those of the average user. This concept is an exception to Rogers's adopter categories because adopter categories are people who wait for the innovations to happen while a lead user develops innovations and sets a trend for others. The concept has been popular in marketing and other allied sectors but its applicability in agriculture has not been widely explored. In agriculture, farmers can be considered as lead users of innovations if they on the basis of their needs, innovate and get monetary or non-monetary benefits in the form of solution of their problems, respect and recognition etc. In different fields, commercial organizations often scout for lead users as they want to collaborate with them in order to identify the need of consumers. But in case of agriculture, identification of lead

users is rare and even after their identification, innovations developed and practiced by them are rarely given due importance in mainstream agriculture. Lead users and their innovations that come under focus are consistently evaluated on the basis of scientific parameters and criticized. However, it is important to know the perception of lead users regarding their own innovations, what they think about their innovations and how they perceive their innovations on different attributes in comparison to previously used ones.

Dasgupta (1989) mentioned that an innovation is an idea, object or practice perceived as new or improvement over the existing one by the members of social system. There can be two parts of an innovation; one is the 'idea' which constitutes the central element of an innovation which often manifests itself in a material form, which is second part of it. Saad (2002) defined innovation as a new material or tool (e.g. seed, hand pump, etc) or a new way of doing something (e.g. crop rotation).

The novelty need not be new to the world, nor to science but new to the context where it is being used. OECD (2005) defined innovation as the implementation of something new or improved (whether technology or otherwise) in products (goods or services), processes, marketing or organizational methods. Leach *et al.,*(2012*)* broadly defined innovation as new ways of doing things in science and technology but associated institutions and social practices also have an essential role to play. IICA (2014) defined innovation as a process by which something new is implemented in a given context.

It is socially appropriate and provides benefits for the parties involved. Thus, innovation means novelty (newness) in the form of an idea (income generating farming, exotic

vegetable cultivation for market etc), product (different varieties and implements), and practices (using clay pallets for paddy sowing or in plant-germination of sugarcane etc). Innovation may be confined to the people of a single village of a district. Thus, novelty and social system are the two key components of an innovation.

Research Methodology

The study was carried out in Uttar Pradesh. Uttar Pradesh was selected as agriculture sector continues to predominate and contributes a large share of the state output. Agriculture is main source of livelihood to majority of the population. The contribution of agriculture in UP's Gross State Domestic Product (GSDP) was 25% during 2016-17. Also, Uttar Pradesh Council of Science and Technology (UPCOST), Krishi Vigyan Kendra (KVKs), Non-Government Organizations (NGOs) and other organizations are actively involved in identification and documentation of innovations.

A comprehensive and exhaustive district wise list of lead users and their innovations were prepared. It included lists from Society for Research and Initiatives for Sustainable Technologies and Institutions (SRISTI) database, National Innovation foundation (NIF) database, Krishi Vigyan Kendra (KVK) reports of Innovators Meet (2017-18) and list obtained from Uttar Pradesh Council of Science and Technology (UPCOST). From the consolidated list 30 lead users from 13 districts were selected purposively based on number of lead users.

Perceived effectiveness was evaluated on the basis of attributes of innovations, viz: relative advantage, compatibility, complexity, trialability and observability. Lead users were asked to rate their innovations on a five point

continuum. Based on their scores, the innovations were categorized into high, medium and low category on each attribute. At the end, overall perceived effectiveness was calculated.

Relative advantage was ascertained in terms of five parameters; viz., economic profitability, low initial cost, decreases in discomfort, social prestige, saving of time and effort. Compatibility was measured in terms of suitability to existing values and beliefs, previously introduced ideas and needs of the users. Complexity of innovation was measured by asking the ease with which innovation could be used and practiced. Trialability was studied in terms of use of innovation on small scale and observability in terms of whether or not the results of innovation were visible. Overall effectiveness was calculated by summing of the scores obtained on different attributes viz., relative advantage; compatibility, complexity, observability and trialability. With the help of mean and standard deviation three categories were formed viz: highly effective, effective, less effective.

Results and Discussion

Characteristics of lead users and description of innovations

From Table 2 it can be easily observed that majority of lead users belonged to old age category (60%) followed by middle (33%) and young (7%) age. Maximum of lead users (26.6%) were educated up to primary level followed by intermediate (23.3%) and graduation (20%). Also maximum of them (30%) belonged to less than 1 lac income group followed by 1 to 5 lac (26, 6%) and above 10 lac (23.3%). Majority of lead users (80%) had small landholding followed by large (16.6%) and marginal (3.3%) landholding. Majority of lead users (86.6%)

has medium extension contact followed by high extension contact (13.3%). Thus, majority of lead users were old, educated up to primary level had small size landholding, earned less than 1 lac rupees annually and had medium extension contact.

Innovations developed by lead users can be categorized into three categories. They were crop-related, implements and other category (for those innovations which do not belong to any of these three categories). In crop-related category there were three high yielding varieties of wheat. In implements category there were 12 innovations of different kind which includes combine harvester, fodder cutter, trench opener, rotator, mobile sprinkler irrigation system, portable biogas plants etc. In other category different practices of agriculture were included starting from exotic vegetable cultivation, large scale, organic farming, income generating farming, multiple varieties of mango on a single tree ,in-plant germination of sugarcane, innovative technique of using clay pellets for sowing paddy etc.

Perceived Effectiveness of Innovations

Data regarding the effectiveness of innovations as perceived by lead users has been presented in Table 3. It is clearly evident from the table that all the respondents (100%) rated their innovations high in terms of relative advantage. It can be interpreted from the findings that all innovations had high relative advantage in terms of profit, low initial cost, social prestige and saving of time and effort**.**

While considering the attribute of compatibility, majority (60%) of respondents considered their innovations low in-terms of compatibility followed by highly (40%) compatible**.** Innovations like cultivation of adverse climatic crops, exotic vegetable

cultivation, bicycle operated foot-pump, large scale organic farming, Godson organic farm, gudel yantra etc. were less compatible to their situations. It can be interpreted from the findings that majority of lead users did not find innovations suited to beliefs and values of people living in the village. From the field observation it can also be concluded that people did not want to come out of their comfort zone. There were several reasons associated with it like lack of market of new product, initial cost was high, huge investment, slow results and this was why several innovations were confined to lead users themselves.

With regard to complexity of innovations, majority of respondents (56.6%) rated their innovations as medium in terms of complexity followed by low (26.6%) and high (16.6%) complexity. Innovations like combine harvesters, mobile sprinkler system, portable biogas pant, low cost sugarcane rotavater, modified trench opener, in-plant germination of sugarcane, varieties of wheat (Kudart-9, JP-151, Baba Vishwanath), low cost production of sugarcane , exotic vegetable cultivation, innovative technique of using clay pellets of sowing were categorized in less complex innovations. It can be interpreted from the findings that these innovations were easily practiced in field situations.

In terms of trialability, majority (63.3%) of respondents rated their innovations in medium trialability category. This is due to the fact that like new varieties (Kudart-9, JP-151, Baba Vishwanath), Implements(combine harvesters, mobile sprinkler system, portable biogas plant, cultivation of Karan Vandana variety, bicycle operated foot pump, modified tractor, marigold oil extraction, trench opener, scythe etc can be tried out on a small scale before full adoption. With regard to observability attribute of innovations,

majority (63.3%) of the respondents rated their innovations in medium category followed by low (36.6%) category. Innovations like varieties (Kudart-9, JP-151, Baba Vishwanath), Implements (mobile sprinkler system, portable biogas plant, higher yield of Karan Vandana variety, modified tractor, marigold oil extraction, trench opener, scythe, combine harvesters (Captain Basti, Kabir, AGM) had given observable results. After analyzing attributes of innovations, it was observed that relative advantage was the attribute in which all innovations received highest score because of advantage in terms of profit, recognition or less initial cost that motivated lead users to innovate and use those innovations.

Overall effectiveness

When overall effectiveness was analyzed, it was observed that majority (70%) of respondents rated their innovation as effective followed by highly effective (16.6%) and less effective (13.3%). (Table.4). Thus, majority of innovations were considered effective by lead users on the five attributes of innovations which were relative advantage, compatibility, complexity and observability and trialability.

The innovations which were considered effective by lead users were Kudat-9, JP-151 variety, Baba Vishwanath variety, exotic vegetable cultivation, combine harvesters (AGM, Kabir, Captain Basti), mobile sprinkler system, Vikalp scythe, portable biogas plant, modified trench opener, low cost sugarcane rotavator cum water pumping set, innovative technique of clay pellets for sowing paddy, in-plant germination of sugarcane, highest yield of Karan Vandana variety, low cost high production of sugarcane, vertical bud plantation, modified tractor, key communication, marigold oil extraction, income generating farming, multiple varieties of mango on a single tree.

Table.1 District-wise number of Lead Users and Innovations

S. No.	Districts	No. of Innovations	Innovations	Previously used or observed technologies/practices
1.	Gorakhpur	4	Low cost sugarcane rotavator cum water pumping set	Adopted technologies on rent
			Gudel Yantra	Manual/observation
			Bicycle operated foot pump	Foot pump
			Highest yield of Karan Vandana Variety through organic farming	Use of traditional cultivation method
2.	Lakhimpur Khiri	4	In-plant germination of sugarcane	Other methods of sugarcane cultivation
			Low cost high production of sugarcane	Other method of cultivation
			Vertical bud plantation	Other methods
			Modified tractor	Simple tractor
3.	Varanasi	3	Kudrat-9	Adopted varieties
			JP-151	Adopted varieties
			Baba Vishwanath Variety	Adopted varieties
4.	Kanpur	3	Marigold oil extraction through whole plant	Marigold oil extraction through petals only
			Income generating farming	Traditional Farming
			Vikalp Scythe	Harvester
5.	Basti	3	Improved Fodder Cutter	Traditional fodder Cutter
			AGM Combine harvester	Harvester
			Captain Basti Combine Harvester	Harvester
6.	Kausambhi	3	Portable Biogas Plant along with purification system	Large Bio gas plant
			Large scale organic farming	Farming using chemical fertilizer and pesticides
			Linking of mother dairy to other farmers	Traditional method of selling milk to middleman
7.	Gonda	2	Mobile Sprinkler Irrigation System	Traditional irrigation methods
			Cultivation of adverse climatic crops	Traditional Farming
8.	Lucknow	2	Exotic vegetable Cultivation	Traditional vegetable cultivation
			Multiple varieties of mango on a single tree	Traditional method of mango cultivation
9.	Bareilly	2	Godson organic farm	Through use of chemical fertilizer and pesticides
			Modified trench opener	Traditional trench opener
10.	Barabanki	1	Introduction of strawberry cultivation	Traditional cultivation (Banana, Tomato)
11.	Sant Kabeer Nagar	1	Kabir Combine Harvester	Thresher
12.	Deoria	1	Production of bio-fertilizer	Traditional farming
13.	Allahabad	2	Innovative technique of using clay pellets for sowing paddy	Transplanting method
	Total	**30**		

Table.2 Characteristics of Lead Users (n=30)

S. No.	Particulars	Categories	Percentage
1.	Age	Young (<30)	7
		Middle (>30-50)	33
		Old(>50)	60
2.	Education	Illiterate	3.3
		Primary	26.6
		High School	10
		Intermediate	23.3
		Graduation	20
		P.G	13.3
		PhD	3.3
3.	Annual income	Less than 1 lac	30
		1 to 5 lac	26.6
		5 to 10 lac	20
		Above 10 lac	23.3
4.	Landholding	Large	16.6
		Small	80
		Marginal	3.3
5.	Extension Contact	High	13.3
		Medium	86.6
		Low	0

Table.3 Distribution of respondents on the basis of perception regarding effectiveness of innovation

S. No	Attributes	Category	Frequency	Percentage
1	Relative	High	30	100
		Medium	0	0
		Low	0	0
2	Compatibility	High	12	40
		Medium	0	0
		Low	18	60
3	Complexity	High	5	16.6
		Medium	17	56.6
		Low	8	26.6
4	Trialability	High	0	0
		Medium	19	63.3
		Low	11	36.6
5	Observability	High	0	0
		Medium	19	63.3
		Low	11	36.6

Table.4 Distribution of respondents on the basis of their overall perception on effectiveness of innovations

S. No.	Perceived Effectiveness	Frequency	Percentage
1	Highly effective (>24.53)	5	16.6
2	Effective (>20.59-24.5)	21	70
3	Less Effective (<20.59)	4	13.3

Mean=22.56, S.D=1.97

Farmers' perceived their innovation as effective in comparison to previously introduced/observed technologies on different attributes of innovations. This will not suffice to ensure the use of those innovations by other farmers. Further attributes of innovation are subjective and hence, may aid/hinder adoption by larger section of social system. Innovation that were rated highly need to be promoted by formal institutions after validation and testing their compatibility to the farming situations.

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