



Constraints in adoption of smart agricultural practices

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ABSTRACT

It is globally accepted that adoption of smart agricultural practices (SAPs) are only alternate to feed the continuous increasing population of the world. The purpose of this study was to identify the constraints faced by farmers in adoption of smart agricultural practices in Haryana. Study was carried out (2017) in Hisar and Kaithal districts of Haryana state of India. Data were collected with the help of well-structured and pre-tested questionnaire. A sample of 180 respondents were explored in personal interviews using a three-point continuum scale for the constraints i.e. very serious, serious and not so serious and scores were given as 3, 2 and 1, respectively. Data were analysed using Statistical Package for the Social Sciences (SPSS). Present study concluded that major constraints for SAPs were lack of seeds of new high yielding varieties with weighted mean score (WMS) 2.36, lack of knowledge for seed treatment (2.36), lack of farm equipment (2.30), inadequate information (2.92), inadequate knowledge and (2.92), scarcity of canal water (2.61), lack of minimum support price (2.73), all crops not covered under crop insurance (2.69), and non-availability of good animal breed (2.19). Moreover, 11 independent variables included in the study jointly contributed 44% variation in the constraints of the respondents regarding in adoption of SAPs.

Key words: Adoption, Agriculture, Constraints, Practices, Sustainable

It is estimated that India is home for 1.36 billion people who comprise about 17% of the world's population. The nation has to take care of its huge population with only 2.4% of the world's geographical area and 4% of its water resources. While, about two-third population of Indian population is directly or indirectly depends on related activities for their livelihoods (Arjun 2013). Agriculture and allied activities played a significant role in the socio-economic development of the country and major contributor to the economy. India had a population of 1.03 billion in 2001 which increased to 1.21 billion in 2011 (Anonymous 2011). It is estimated with a certainty of 95%, the size of the global population will stand between 8.5–8.6 billion in 2030, between 9.4–10.1 billion in 2050, and between 9.4–12.7 billion in 2100 (United Nations 2019). Thus, population growth rate of 1.58%, India is predicted to have more than 1.7 billion people by the end of 2050. Population growth and dietary changes will drive the global food demand to extraordinary levels in the coming decades. To keep pace, food production will have to increase 60% by 2050.

To prevent agricultural non-target pollution, ameliorate its effects and protect the environment in India, while

maintaining or increasing crop yields, traditional practices are being re-evaluated and new eco-friendly agricultural practices are being intensively researched and developed (Shen and Du 2009). While, Indian agriculture facing challenge i.e. stagnating net sown area and yield levels, degrading soil quality, reduction in per capita land availability and climate change. The present situation of changing climatic conditions is resulting large number of adverse effects on agriculture. Its variability remains to be a major threat in practicing sustainable agriculture among farming community (Rohila *et al.* 2018). In this situations climate smart agricultural practices (CSAPs) could be the alternative to cope up risks and uncertainty.

Keeping in view the above concerns present study was carried out with an objective to identify the constraints faced by farmers in adoption of smart agricultural practices in Haryana.

MATERIALS AND METHODS

Study area and data collection: Present study was carried out in Hisar and Kaithal districts of Haryana state of India. This study subjected to primary data evaluation. Data were collected in 2017 and farmers were interviewed face to face using well-structured and pre-tested questionnaire that was finalized in collaboration and discussion with representatives of advisory committee, experts and professional of agricultural field. The questionnaire consist various sub-heading such as constraints related to improved

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seed, production, non-physical, irrigation and drainage, marketing, crop insurance, and dairy farming.

Three villages were selected from each district, randomly. Thus, six villages, viz, Ladwa, Shahrwa and Rawalwas Khurd villages from Hisar, while, Kaul, Rasina and Bhana villages from Kaithal district were selected, randomly. A specific number (30) of respondents were selected from the population of each selected village. A total of 180 respondents were interviewed in the study to ensure an objective outcome of the research.

Survey instrument and analysis: A structured questionnaire was used for the interviews. The questionnaire was divided into two sections that assessed; (i) socio economic profile and (ii) Constraints faced by farmers in adoption of smart agricultural practices (SAPs). First section was used to collect farmers' socio personal demographic background information which included age, education, land holding, cropping system, farming system, irrigation facilities, mass media exposure, extension contact, risk orientation, economic motivation, and innovation proneness. Constraints towards SAPs were measured on three point continuum scale i.e. very serious, serious and not so serious with respective scores of 3, 2 and 1. After the scoring exercise, weighted mean score (WMS), standard deviation, correlation and regression were calculated with the help of Statistical Package for the Social Sciences (SPSS).

RESULTS AND DISCUSSION

Constraints in adoption of improved seed: It was found, constraints related to seed that lack of seeds of new high yielding varieties (HYV) and lack of knowledge for seed treatment both were ranked 1st with equal weighted mean score (WMS) 2.36, followed by lack of seed procurement facilities and high cost of improved seeds and chemical used ranked 2nd and 3rd with WMS 2.25 and 2.24, respectively. Research findings, therefore, concluded that seeds of new high yielding varieties (HYVs) are very essential for enhancing productivity and sustainability of agriculture and thus it may contributes towards low production and adoption level among farmers. These findings derive the support from the study of Singh *et al.* (2008), Medat *et al.* (2016) and Esakkimuthu and Kameswari (2019), while Jat *et al.* (2017) also reported that non-availability of improved seeds and chemical fertilizers were major constraints.

Production related constraints: The data regarding constraints related to production show that lack of farm equipment was serious constraint with weighted mean score (WMS) 2.30, followed by inadequate farm inputs and poor physical and social infrastructure both were ranked 2nd with equal WMS (2.24) whereas, limited credit and finance and shortage of labour ranked 3rd and 4th with WMS 2.23 and 2.01, respectively. Financial situation of the farmers plays a vital role in adoption of improved practices like farm equipment and smart agricultural practices. These findings were confirmed by the results of Tekle (2016) and Nain *et al.* (2015).

Non-physical constraints in adoption of smart

agricultural practices: Constraints related to non-physical concluded that inadequate information and inadequate knowledge and skills both were ranked 1st with highest weighted mean score (WMS) 2.92, followed by lack of appropriate technologies ranked 2nd with WMS 2.90. Moreover, gender inequalities and unfavorable land tenure ranked 3rd and 4th with WMS 2.47 and 2.13, respectively. There should be increase in number of extension personnel that could help farmers to providing valuable information thereby leads to skill development of farmers. The study got strength from the research findings of Sharma (2014) and Kumar *et al.* (2019).

Constraints in adoption of irrigation and drainage: The data regarding constraints about irrigation and drainage constraints reveal that scarcity of canal water ranked 1st with highest weighted mean score (WMS) 2.61, followed by poor quality of underground water, low water use efficiency, uneven rainfall, and poor drainage system ranked 2nd, 3rd, 4th and 5th with WMS 2.52, 2.38, 2.36 and 1.67, respectively. The study revealed that scarcity of canal water and poor quality of underground water were major constraints and may be the root cause in increasing the crop production. These findings are in line with research findings of Weerkoon *et al.* (2011).

Constraints in adoption of marketing: It is clear from the study that lack of minimum support price ranked 1st with highest weighted mean score (WMS) 2.73, followed by wide fluctuations in prices ranked 2nd with WMS 2.69. Singh *et al.* (2017) suggested that minimum support price of the pulses should be announced well in advanced before sowing. Whereas, malpractices in the market, distress sale due to the immediate need for money, scarcity of agro processing unit at local level, lack of procurement facilities, lack of cooperative organization, lack of storage facilities at local level, and lack of marketing knowledge and intelligence ranked 3rd, 4th, 5th, 6th, 7th, 8th and 9th with WMS 2.44, 2.34, 2.26, 2.25, 2.24, 2.22 and 2.14, respectively.

However, lack of grading and packaging was not serious constraint. Therefore, more emphasis should be given to some of the most serious constraints. These constraints can be overcome by providing easy marketing facilities coupled with fixed minimum support price of farm produce. These research findings are confirmed from the findings of Sharma (2014), Kumar *et al.* (2016) and Kumar *et al.* (2018). While, Gunaseelan and Singh (2018) concluded that there is a need to establish market and effective marketing network.

Constraints in adoption of crop insurance: Study regarding constraints in adoption of crop insurance indicated that all crops not covered under crop insurance ranked 1st as major constraint with weighted mean score (WMS) 2.69, followed by compulsory deduction of premium from KCC ranked 2nd with WMS 2.59. Whereas, poor claim settlement process, delay in surveying of damaged crop, lack of information and motivation, and high premium for crop insurance ranked 3rd, 4th, 5th and 6th with WMS 2.56, 2.54, 2.28 and 2.16, respectively. Crop insurance is a confident supporting tool for farmers and could be effective tool for

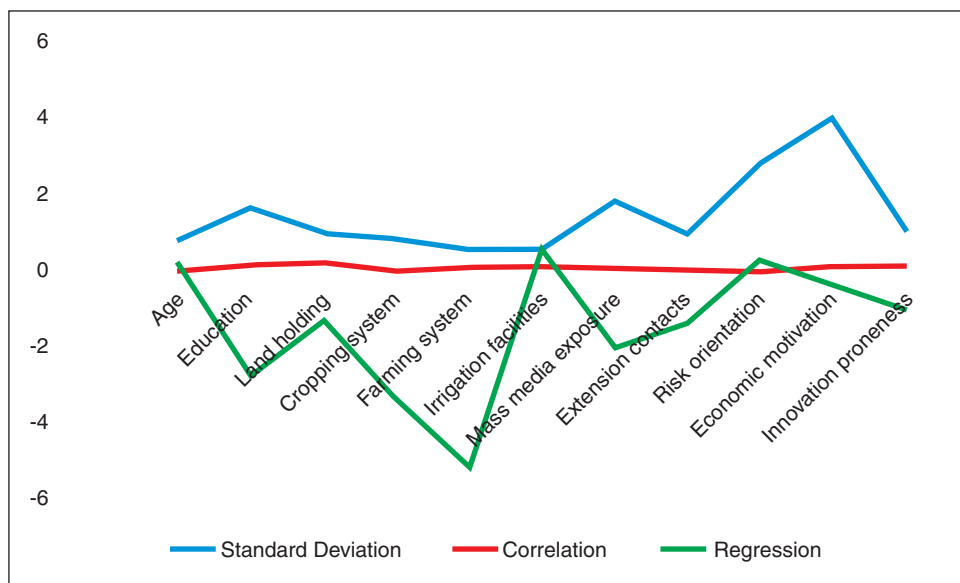


Fig 1 Standard deviation, correlation and regression coefficients of farmers' personality traits with constraints.

risk management in agriculture. Adoption of crop insurance can be increased by providing minimum premium, timely information and claim settlement. Moreover, new technology like crop insurance is dependent on many factors such as education, land holding and financial situation etc. of the farmers. These findings were found to be partially supported by study of Varadan and Kumar (2012). While, according to Aditya *et al.* (2018) adoption of crop insurance by farmers was very poor.

Constraints in adoption of dairy farming practices: Result pertaining constraints in adoption of dairy farming practices showed that non-availability of good animal breed ranked 1st as major constraint with weighted mean score (WMS) 2.19, followed by non-availability of desired technology, shortage of feed and fodder, non-availability of veterinary surgeon/VLDA at local level, and miscarriage problem ranked 2nd, 3rd, 4th and 5th with WMS 2.18, 2.02, 1.51 and 1.49, respectively. Constraints faced by farmers' can be countered by providing training with assistance in getting technical advice and subsidy for different agricultural programmes at local level. These findings were same with those of Shashekala *et al.* (2012), Dhindsa *et al.* (2014), Dhaka and Meena (2016) and Gupta *et al.* (2019).

Correlation and regression coefficients of farmers' personality traits with constraints encountered in adoption of smart agricultural practices: A perusal of data (Fig 1) indicated the relationship between farmers' personality traits as independent variables and constraints as dependent variables. The traits selected in the study were age, education, land holding, cropping system, farming system, irrigation facilities, mass media exposure, extension contact, risk orientation, economic motivation and innovation proneness.

Correlation coefficient was computed to indicate the nature and extent of association and variation caused by these traits on constraints in adoption of smart agricultural

practices. Among the various attributes, age and land holding with the constraints had positive and significant correlation at 0.05 level of probability. These findings were found partially supported by reports of Rajashekar *et al.* (2017). While, in case of partial regression coefficient education, cropping system, farming system and, mass media exposure, were found to be significant. Further, it is revealed that all the eleven independent variables included in the study jointly contributed 44% variation in the constraints of the respondents regarding in adoption of smart agricultural practices when other factors

were kept constant. This means that only 44% of the variation in the dependent variable was due to these variables and remaining 56% variations is due to other variables.

Study concluded that information on SAPs should be disseminated through effective means among farming households. Government should emphasize on the constraints faced by farmers in adoption of SAPs. Moreover, the action plans which may be more efficient and effective must be formulated and implemented at ground level by the state as well as central government.

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