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Assessment of constraints and opportunities of technology adoption in agriculture during pandemic by participatory exercise

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Abstract

The Covid-19 impacted the world in many ways, firstly it shattered the human health and then it shown ill some effect on economy and agriculture. In India the farmers faced many constraints in utilizing technology in agriculture during pandemic. This study has been done in Guntur district of Andhra pradesh with a sample size of 60 respondents of rice and Chilli Cultivators i.e., 15 respondents from four villages of two mandals by simple random sampling method. The study has been done by using participatory exercises like Focus group discussion and Opportunity matrix for assessing the constraints and opportunities respectively. The focus group discussion has been done in the mandals of Prathipadu and pedakakani of guntur district. It elicited the major constraints faced by the farmers in adopting technology during pandemic. The major constraints identified by this study are Reverse migration of labour from cities to rural areas, Farmer financial crisis, small farmers quitting agriculture and turning into labour, and Reduced extension contact. The opportunity matrix exercise reveals the opportunities for the identified constraints. The major opportunities found are Rythu bharosa kendras, Community hiring centres, RBI moratorium on agricultural loans, providing employment opportunities for the reverse migrants.

Keywords: constraints, covid-19 pandemic, opportunities, focus group discussion, opportunity matrix, Guntur district

Introduction

PRA is considered as one of the most popular and effective approach to gather information in rural areas. PRA as an approach and methods for learning about rural life and conditions from, with and by rural people. He further stated that PRA extends into analysis, planning and action. PRA closely involve villagers and local officials in the process- chambers (1992).

There are so many PRA tools which are applicable to the process of capturing information relating to the key areas for investigation with regard to agriculture in rural areas. some of them are Brainstorming, Focus group discussion, Transect/maps, constraints analysis, opportunity matrix etc., among all PRA tools like Focus group discussion, constraint analysis, opportunity matrix are more suitable for the present study of identifying constraints and opportunities.

Focus Group Discussion: A Focus Group Discussion is a relatively low cost and quick qualitative research method to gain an understanding of local perceptions, opinions, beliefs and attitudes to the issue(s) being studied. One can get a great deal of information during a focus group session. In FGD a group of participants discusses specific issues. It is a popular method to collect relatively large volumes of information in a relatively short time. This information contains different forms of cognition expressed by the groups involved, like, for example, experiences, perceptions, insights and opinions.

Focus groups Discussion are dialogue sessions with less than 20 persons (preferably 6 – 10 persons) participating in the group and is quite similar to a brainstorming session. Focus groups can also be viewed as multiple interviews where questions are asked in an interactive group setting and where participants are free to talk with other group members.

Opportunity Matrix: The development of an opportunity matrix starts with rephrasing each identified constraint into positive desirable conditions and detailing the opportunities for innovation and change. Identifying constraints, their causes and effects and the most appropriate and practical ways to overcome them, initiates communication and builds trust

among all key actors and stakeholders involved in the PRA process.

In 20th century Indian agriculture is self-sufficient, but according to united nations (U.N) projections population of India will be 1.64 billion by 2050 and highest populated by 2027 hence growing population obviously rises the food demand. In order to meet the demand the agriculture productivity per unit area must be enhanced through adoption and adaptation of new advanced technology in agriculture. During unprecedented times of pandemic the technology adoption plays a major role in agriculture in coping up the impact of pandemic. It is important to conduct the study and examine the crisis management techniques using by the farmers during pandemic like COVID-19 in order to provide them better opportunities. This study can fetch information on the constraints and opportunities of technology adoption by the farmers during this pandemic.

Methodology

This particular study has done in the prathipadu and pedakakani mandals of Guntur district, Andhra pradesh. The study on factors operating technology adoption and constraints faced by the rice and chilli cultivators during pandemic has been done through set of Independent variables (X_1 - X_{15}) which influence the farmer. The data is collected from the farmers through a pre-tested structured interview schedule and Descriptive Statistics of Independent Variable with Respect to Minimum, Maximum, Mean, Standard Deviation of Values, Variance, and Coefficient of Variance has been analyzed through Quantitative methods. In this particular study the investigator had chosen Participatory

Rural Appraisal (PRA) exercises more appropriate for the study. Among all the PRA tools Focus Group discussion and Opportunity matrix tools are done by the investigator. These tools are used for identifying the constraints and opportunities of agricultural technology Adoption in rice and chilli crop cultivators. The investigator had done focus group discussion in following procedure.

- Initially for conducting Focus group discussion PRA tool the investigator chosen the area where to conduct i.e., in two mandals of Guntur districts Prathipadu and Pedakakani Mandals.
- On the day before conducting Focus group discussion all the respected farmers are informed about the venue, time and Topic regarding the discussion.
- On the day of focus group discussion the investigator along with 7 farmers sat in a public place at once randomly and the investigator explained everything about the discussion and initiated the session, like that 4-5 sessions of Focus group discussions done.
- All the farmers responded well and told the constraints what they are facing during pandemic COVID-19 in general as well as related to the technology adoption.

Later based on the major constraints raised by the farmers in the focus discussion group the investigator asked the farmers group regarding opportunities they have for technology adoption and adaptation, then prepared the opportunity matrix for the constraints raised.

Results and Discussion

Table 1: Descriptive Statistics of Independent Variables in rice cultivators with Respect to Minimum, Maximum, Mean, Standard Deviation of Values, Variance, and Coefficient of Variance

Variable	Minimum	Maximum	Mean	Std. Deviation	Variance	CV (%)
1. Age	27.000	76.000	49.500	13.420	180.120	27.11111
2. Education	0.000	15.000	5.766	4.702	22.116	81.547
3. Annual income	55.000	600.000	194.333	159.701	25504.712	82.17904
4. Family size	2.000	8.000	4.766	1.695	2.874	35.56441
5. Farm size	0.500	14.000	4.333	3.519	12.385	81.21394
6. Farming experience	4.000	40.000	21.700	9.021	81.389	41.57143
7. Farm mechanization	2.000	8.710	4.774	1.928	3.720	40.38542
8. Extension contact	3.000	7.000	5.266	1.201	1.443	22.80668
9. Mass media exposure	10.000	19.000	14.133	3.048	9.291	21.56655
10. Social participation	0.000	3.000	1.166	1.116	1.247	95.71184
11. Scientific orientation	8.000	18.000	14.400	3.389	11.489	23.53472
12. Risk orientation	10.000	18.000	12.966	2.894	8.378	22.31991
13. Management orientation	19.000	48.000	33.966	10.851	117.757	31.94665
14. Economic orientation	10.000	18.000	13.133	3.002	9.016	22.85845
15. Innovativeness	9.000	24.000	16.466	5.056	25.567	30.7057

The table represents different socio-economic characteristics of the rice cultivating farmers.

Table 2: Descriptive Statistics of Independent Variables in chilli cultivators with Respect to Minimum, Maximum, Mean, Standard Deviation of Values, Variance, and Coefficient of Variance

Variable	Minimum	Maximum	Mean	Std. Deviation	Variance	CV (%)
1. Age	26.000	69.000	49.566	12.033	144.805	24.27672
2. Education	0.000	15.000	5.566	5.069	25.702	91.07079
3. Annual income	55.000	525.000	193.666	136.703	18687.820	70.58699
4. Family size	2.000	8.000	5.000	1.681	2.827	33.62
5. Farm size	1.000	13.000	4.483	3.136	9.835	69.95316
6. Farming experience	5.000	40.000	22.200	8.384	70.303	37.76577
7. Farm mechanization	2.000	8.830	4.892	1.905	3.629	38.94113
8. Extension contact	3.000	7.000	5.433	1.250	1.564	23.00755
9. Mass media exposure	10.000	18.000	14.266	3.095	9.581	21.69494
10. Social participation	0.000	4.000	1.366	1.272	1.619	93.11859

11. Scientific orientation	8.000	18.000	14.000	3.363	11.310	24.02143
12. Risk orientation	10.000	18.000	13.333	3.155	9.954	23.66309
13. Management orientation	19.000	50.000	34.966	10.246	104.998	29.30275
14. Economic orientation	10.000	18.000	13.800	3.122	9.751	22.62319
15. Innovativeness	10.000	23.000	16.200	4.737	22.441	29.24074

The table represents different socio-economic characteristics of the chilli cultivating farmers.

Major constraints of Technology adoption during pandemic

1. Reverse migration acts as constraint in technology adoption and adaptation during pandemic. Reverse migration refers to the urban labour went back to native rural areas, Because of the COVID-19 lockdown protocol these labour lost their source of income and work. This leads to flood of urban labour in some rural areas which makes the farmers to hire the labour for farm operations instead of using farm machinery technologies in pandemic.
2. Due to COVID-19 protocol of lockdown the agricultural operations impacted initially in terms of delayed sowing and seed unavailability.
3. The financial status of the farmer is also affected a lot with the pandemic situations. with this affect the farmers willingness to take risk of adopting new innovations and technologies is greatly minimized.
4. Major impact of pandemic is on small farmers who are not financially stable instead of coping up the impact with innovations in technologies, they are quitting the agriculture and becoming the fruit and vegetable vendors.
5. Even though some farmers are ready to adapt for new innovations of agriculture technology, they don't have much extension contact and mass media exposure for implementing due to lockdown in pandemic.
6. Marginal farmers and small farmers faced the unavailability of farm machinery for hiring purpose and experienced high labour cost for operations even though the labour availability is there, wages asking by them are more.
7. Unavailability of tested quality seeds, GM crops, drought resistance varieties make the farmer cultivate the old traditional varieties instead of newly innovated varieties.
8. Amid of pandemic COVID-19 protocol there is lack of Training sessions, workshops, method demonstrations on latest innovations and technologies, his has made the farmers are unaware of latest adapting strategies.
9. youth and young farmers are choosing alternate occupations and quitting agriculture due to financial crisis which impacts the technology adoption as the old aged farmers are more become like laggards and follows traditional methods of practices.
10. Higher raise in prices of fuels like petrol and diesel in pandemic is a constraint in the technology adoption in a way of increasing cost of cultivation by using machinery.

Major opportunities for constraints identified in Technology adoption during pandemic

1. Reverse migration due to COVID-19 provides an opportunity for hinterland administration to engage the returned labourers in gainful employment, and the sole short-term option is to leverage the potential of agriculture. Especially labour-intensive sectors like livestock, fisheries and food processing have not developed over the years, and the labourers who have returned can be used to reverse this trend. So that the flood of urban labour reduces and the farmer tends

towards latest innovation need to be adapted to cope up the pandemic effect.

2. The Reserve Bank of India (RBI) has announced a moratorium on agricultural term loans (including crop loans) for a period of three months. so that the immediate financial distress on farmers has been reduced.
3. The Government of India has announced that the first installment of the PM-Kisan Yojana payment to farmers, i.e., Rs. 2,000 will be paid up front to farmers, benefitting over 8.7 crore Indian farmers. It has also announced that the wages under MGNREGS will be raised from Rs. 182 to Rs. 202 per day which reduces the labour flood on agriculture.
4. In the state of Andhra Pradesh RYTHU BHAROSA KENDRAS (RBK) are established as one single solution centres. RBK's are giving subsidiaries for seeds, machinery purchasing so that the technology adoption will increase which is needed during pandemic.
5. Community hiring centres (CHC's) under RBK's giving machinery for group of 5-6 members of a village with 40% subsidiary and 50% of bank loan facility. This machinery is maintained by those group of farmers and make them available to the small and marginal farmers for hiring at low cost is a good opportunity for Technology adoption during pandemic.
6. Adopting irrigation technologies like Micro irrigation i.e., Drip irrigation systems reduces not only the labour cost in pandemic. But also makes efficient water utilization for irrigation.

Conclusions

This entire study concludes that Reverse migration- urban labour flood in rural areas, Financial economic crisis due to COVID-19 pandemic, Poor Extension contact, Poor mass media exposure, the unavailability of farm machinery for hiring purpose, and Higher raise in prices of fuels are the main constraints facing by the farmers in Technology adoption during pandemic COVID-19. Whereas Providing gainful employment to reverse migrated labour, Rythu Bharosa kendras (RBK's) giving subsidiaries for seeds and machinery purchasing, Community hiring centres (CHC's) under RBK's giving machinery with subsidiaries, Irrigation technologies like Micro irrigation i.e. Drip irrigation are the suitable opportunities for Technology Adoption in agriculture during pandemic COVID-19. The study also finds out the innovated adaptation strategies which are followed by the farmers during pandemic i.e. Cooperative farm operations by 2-3 farmers, Reduced number of Irrigations, shifting from manual to mechanical harvesting, multiple harvest pickings in chilli crops, choosing local markets instead for distant markets, selling entire produce at paddy procurement centre through RBK's at Minimum support price instead of storing in ware house which in turn reduce the cost of storage during pandemic economic crisis, and using weedicides in place of manual weeding.

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