AATCC Review

30 October 2024: Received
25 January 2025: Revised
16 February 2025: Accepted
20 February 2025: Available Online

https://aatcc.peerjournals.net/

Original Research Article

Open Access

Success determinants of knowledge gain in quality seed production using logistic regression analysis

Gottemukkula Bhavani[1], Sreenivasulu. M[2], Ravinder Naik.V[3], Vidya Sagar. G. E. Ch[4]. and Srinivasa Chary. D[5]

[1]*Subject Matter Specialsit, Agricultural Extension, KVK,Mahabubnagar-I, Wanaparthy, Telangana, India*
[2]*Coordinator Electronic Wing, ARI campus, Rajendranagar, PJTSAU, Hyderabad, Telangana, India*
[3]*Department of Agricultural Extension, College of Agriculture, Rajendranagar, PJTSAU, Hyderabad, Telangana, India*
[4]*Department of Agronomy, College of Agriculture, Rajendranagar, PJTSAU, Hyderabad, Telangana, India*
[5]*Department of Statistics & Mathematics, College of Agriculture, Rajendranagar, PJTSAU, Hyderabad, Telangana, India*

ABSTRACT

Seed production is a critical practice for ensuring the self sufficiency of good quality seeds to the farming community, thereby to the nation. This study examined farmers' overall knowledge of rice seed production and its success determinants using data collected from 180 rice seed producers across all the three zones of Telangana state. The empirical analysis, based on binary logistic regression, identified the success determinants of knowledge gain in rice seed production. The findings revealed that perceived market orientation, mass media utilization, extension contact, and risk orientation were driving factors to gain the knowledge on quality seed production in rice. However, majority of the farmers reported lacking updates on seed supply under the programme. Limited technology choices and inablility to sell their produced seed as seed in the market, leading them to sell it as grain for immediate cash flow for next crop season. Furthermore, farmers indicated that absence of buy-back system for seed at farmer level in the study area. Farmer-to-farmer selling of seed is hardly possible due to lack of trustworthiness among farmers in study area. Thus, from a policy perspective, the findings suggest a shift toward demand-driven extension services,rather than the existing supply driven approach, sucha drift would likelt enhance Farmers' satisfaction increase their involvment in seed production programmes, and utilmately improve the knowledge of seed production techniques. To address the key challenges of the study such as limited market access, lack of trust, and inadequate extension services, the study contributed by suggesting that strengthening market orientation, fostering trust among farmers, and implementing demand-driven extension services can enhance seed production knowledge, promoting long-term sustainability and self-sufficiency.

Keywords: *Rice seed production, Telangana, Farmers' knowledge, Success determinants,binary logistic regression, Market orientation, Extension services, Risk orientation, Agricultural policy*

Introduction

The Indian seed market is undergoing a crucial transformation for the past one decade and more. The increasing private participation in seed production and the development of new varieties were progressing day by day. However, breeder activity is still predominantly undertaken by the state through agricultural universities and other research institutes. Even though the reliance on the marketplace for the event of seeds and varieties marks a new seed regime, we are yet to evolve a foolproof regulatory mechanism that ensures quality and standards in the production of seeds and effective laws to deal with failures associated with thereof. This became much clear in the recent experiences of the agrarian crisis faced by the farmers in Andhra Pradesh, Telangana and elsewhere. It is important to identify the mechanism, where farmers can produce their own seed to have self-sufficiency of quality seed produced and same time getting a remunerative price over the market price for seed sold. Hence the answer to this issue can be a programme called Seed Village Programme.

Corresponding Author:* ***Gottemukkula Bhavani*

DOI: https://doi.org/10.21276/AATCCReview.2025.13.01.412
© 2025 by the authors. The license of AATCC Review. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (http://creativecommons.org/licenses/by/4.0/).

The advantage of this system is the availability of foundation seed at 50% cost of the seed of crops to produce quality seed. From this programme the SVP beneficiaries can able to multiply and sell the seeds to fellow farmers.

The Seed Village Programme was introduced in Rabi 2004-05 in the state by the state Government of A.P. and From Rabi 2005-06 onwards the Scheme is being implemented as per the norms of GOI. But from 2014-15 onwards the Seed Village Programme (SVP) has become one of the most important components of the Sub-mission on Seeds and Planting Materials (SMSP) under the Nation Mission on Agriculture Extension and Technology (NMAET) being implemented by the Government of India. The farmers of the scheme are acquainted with knowledge on the package of practices and seed production technology by the village- level training program conducted under the scheme. As the area was increased under the scheme for the last two years the produced certified seed was procured by the seed supplying agencies. [1]

On 2 June 2014, Telangana bifurcated from the northwestern part of Andhra Pradesh as newly formed state and thus, Telangana state is the 29th state of India and it consists of 33 districts. Agriculture is the major source for rural income. Paddy is one of the major crops in the state and the area under the crop is 17.5 lakh hectares [2]. The area under cultivation of paddy in Kharif is 9.73 lakh ha and in Rabi it's 6.38 lakh ha.

© 2025 AATCC Review. All Rights Reserved.

The productivity of the crop is more or less 3.4 tonnes/ ha in both the seasons during 2013-14 [3]. As paddy is cultivated extensively in Telangana state and state is slowly but surely emerging as the 'Rice Bowl of India'. Within a brief span of 5 years, the world under paddy cultivation has doubled, from 22.7 lakh acres in 2014-15 to 40.7 lakh acres within the 2019-20 kharif season. The area under paddy cultivation has increased more than three-fold, from 12.23 lakh acres in 2014-15 to 39.12 lakh acres in the ongoing season (2020) in the State [4]

In the following section, a conceptual framework consists of the list of variables identified for determining the success in knowledge gain for quality seed production. The methodology section outlines the research design, sampling procedures followed, and statistics employed, Besides, it also outlines type of data used for analysis. The results and discussion section provides and discusses the estimated determines of success in farmers' knowledge on quality seed production and constraints faced by the farmers in the production of quality seed. The last section summarizes the main findings and draws some policy implications and outlook for further research.

Conceptual Framework of The Study

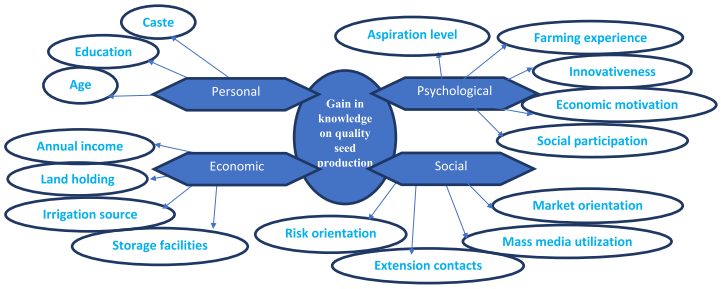

Fig. 1:Conceptual framework of the study.

Knowledge in this study is conceptualized as those behaviors and test situations, which emphazised remembering either by recognition or by the recall of ideas and material on some phenomena [5]. Knowledge is understanding and processing the given information. Here farmers' knowledge of quality seed production can be affected by several factors such as personal, psychological, economic, and social attributes (age, education, annual income, farming experience, land holding irrigation status, social participation storage facilities for seed produced, innovativeness, economic motivation, marketing facilities, aspiration level, mass media utilization, extension contact, rick orientation). Fig. 1. This paper discusses in detail how these aforementioned factors may affect the rate of farmers gain knowledge on quality seed production as follows. According to Adhikari (2007) and Deshmukh et al. (2007)[6,7] middle-aged farmers are more with the gain in knowledge than younger farmers which may be related to their farm experience. On the contrary, middle-aged farmers are often viewed as less willing to engage in a new or innovative activity due to fear of risk whereas old farmers may be more risk-averse to implementing new technologies on their farms [8]. Hence the influence of age on farmers' gain in knowledge is ambiguous.

Education increases the person's resources and the capacity to achieve goals but also it expands one's awareness of alternatives and the rewards expected from one's activities. Aphunu and Otoikhian, (2008) [9] argue that being literate is necessary in effective extension communication. The better the educational status, the better they wisely utilize extension services [10]. Here the service provided by the SVP under training was undertaken in the study to understand this concept.

Moreover, Prasad Reddy *et al* [11], in his study on the analysis of the influence of selected independent variables on the knowledge of rice farmers on eco-friendly technology indicates a positive and significant relation, i.e., higher farmers' education level the greater their gain in the knowledge on eco-friendly technology. In line with this reasoning, we propose that farmers` education status influence positively his/her gain in knowledge. Asset ownership which is usually used as a proxy to explain the wealth status like land holding [12] which shows a positive relation thus, we propose that asset ownership positively influences farmers' knowledge on seed production

Apart from personal and farm attributes, economic benefits gained from the seed production are major determinants to gain further knowledge in seed productions. Benefits should be viewed as one of the most important investments a program makes to optimize beneficiary's performance, provide opportunities for them to succeed financially and gain sustainable competitive advantage. Therefore, the perceived economic return was annual income increase was also been included as one of the variables under the study

Extension contact is a major component of the farming community to utilize various programs and services provided by extension personnels'. In addition, according to Nirmala [12], the use of extension contact has a positive and significant relationship with farmers' knowledge of rice crops.

Psychological variables like aspiration level, innovativeness, and economic motivation aids farmers overcoming any constraints and thus enables farmers to benefits from available resources. This innovativeness influences farmers' gain in knowledge [12,13]. Hence, it can be said these factors have a positive relationship with farmers' gain in knowledge. In addition, access to training can also an important factor to build farmers' knowledge as well as skill and in turn it might have positive influence on farmers to gain knowledge

Methodology

Data Collection

The data used in this study were obtained from a rice seed production farmers. Surveys conducted in all three agro-climatic zones (Southern, Central and Northern Telangana Zones) of Telangana state were selected for the study as the paddy is one of the important food crops in all three zones. Districts are selected purposively based on a number of units (1unit = 25bags/ Mandal) in seed village program. One district will be selected from each Agro-climatic zone. The three districts namely; Nizamabad, Warangal and Nalgonda, which give an opportunity to make a study on certain selected parameters. Morthad mandal from Nizamabad; and Chilpur mandal from Warangal; Miryalaguda Mandal from Nalgonda were selected randomly to study. Whereas one village from each mandal per district was selected as SVP village. They are Gumeriyal from Morthad, Rajavaram from Chilpur and Miryalaguda respectively were purposively selected for the study. A multi-stage sampling procedure was used to select the district, mandals and villages. A total of 120 (40 from each village) samples of farmers under the programme. Sample farmers were identified from a list made available by the front-line extension workers, and then the information was confirmed by the farmers. The data were collected using a structured and pre-tested questionnaire. Interviews and focus group discussions (consisting of nine groups, each of the groups consisting of 10 farmers) were used to complement the data obtained through the field survey.

© *2025 AATCC Review.* All Rights Reserved.

Reliability and Validity of the Measurement Items

An exhaustive list of possible relevant variables with their measurement items was proposed based on literature review and discussion with experts in the field and academicians. This list included items reflecting socio-economic factors. Knowledge test was developed and standardized by providing the list for relevancy to subject experts from the subject of rice production and senior officials from the agricultural department.

Empirical Methods

As stated earlier, the core variable in this study corresponds to farmers' gain in knowledge in quality seed production of rice crops i.e., the factors that affect the farmers' gain in knowledge in quality seed production. To obtain the levels of farmers' gain in knowledge in quality seed production, respondents were asked the question prepared under the knowledge test. The farmers' response was 0 for wrong and 1 for right answer. The overall knowledge test includes the questions that are important and basic aspects needed to produce the seed with quality in rice crops.

To identify determinants of success binary logistic regression is applied in this study. The dependent variable was dichotomous (0,1). Suppose that the values of Y represent the dependent item. Y is categorical thus a larger value means better knowledge gain with the SVP.

Let Yi be the level of knowledge gained by the farmer, defined as:

$$Yi = \begin{cases} 0 = \text{No gain in knowledge} \\ 1 = \text{Gain in knowledge} \end{cases}$$

Like all regression analyses, the logistic regression is a predictive analysis. Logistic regression is used to describe data and to explain the relationship between one dependent binary variable and one or more nominal, ordinal, interval, or ratio-level independent variables

logistic regression equation:

$$y = e^{(b0 + b1*x)} / (1 + e^{(b0 + b1*x)})$$

Where,

y is the predicted output,

b0 is the bias or intercept term and

b1 is the coefficient for the single input value (x).

Each column in your input data has an associated b coefficient (a constant real value)

Results and Discussion

Determinants of Farmers' gain in knowledge on quality seed production (Rice)

The Chi square ($\chi 2$= 6.540) with significant value 0.805 (more than 0.05) in Hosmer and Lerneshow test was undertaken (Table 1). The result confirms that binary logistic model is relevant to explore the effect of success determinants on the dependent variable (probability of farmer knowledge). The chi-square tests for goodness-of-fit of the model justify that the regression results are significant. As indicated in Table 2, Market orientation, Mass media utilization, Extension contact, Risk orientation were significant success determinants of farmers' knowledge on quality seed production

Table 1: Hosmer and Lerneshow test

Step	Chi-square	Sig.
1	6.540	0.805

Table 2: Logistic regression analysis and effects of variables on farmers' gain in knowledge ***n=180***

S. No.	Parameter	Estimate of Parameter	S.E.	Wald	Sig.	Odds ratio
	Constant	28.206	22573.395	.000	1.000	61358104.5
1.	Age	-0.039	0.642	0.399	0.527	0.406
2.	Education	0.037	0.218	0.028	0.867	0.965
3.	Caste	0.228	0.222	1.054	0.305	1.255
4.	Annual income	0.128	0.150	0.723	0.395	0.880
5.	Farming experience	-0.126	0.056	0.421	0.516	0.964
6.	Land holding	0.056	0.000	0.655	0.418	1.000
7.	Irrigation status	0.246	0.268	0.847	0.358	1.279
8.	Social participation	0.201	0.104	3.090	0.071	0.718
9.	Storage facilities	0.223	0.132	0.000	0.999	0.405
10.	Innovation	0.107	0.156	0.471	0.493	1.113
11.	Economic motivation	0.091	0.057	2.538	0.111	1.905
12.	Market orientation	0.098	0.059	4.265	0.039*	1.500
13.	Aspiration level	0.036	0.050	0.340	0.148	1.078
14.	Mass media utilization	0.095	0.114	7.151	0.002*	1.108
15.	Extension contact	0.107	0.032	8.693	0.003*	1.890
16.	Risk orientation	-0.092	0.052	4.285	0.038*	0.112

** P<0.05*

© *2025 AATCC Review.* All Rights Reserved.

whereas other proposed predictors such as age, education, caste annual income farming experience, land holding, irrigation facilities, social participation storage facilities, innovativeness, economic motivation, and aspiration level were not significant. Those variables whose odds coefficients are statistically insignificant are not included in the following discussion.

The effect of market orientation is positively significant, implying that for a unit increase in orientation towards the seed market, the odds of being satisfied with knowledge gain with increases by factor of 1.500, holding all other variables constant. Farmers with better availability of markets more likely to implement the seed production that helps them to increase their seed self-sufficient and other farm-related benefits.

Mass media utilization is positively significant for farmers' gain in knowledge. For a unit increase in extension contact score, the odds of being satisfied with gain in knowledge in quality seed production with increases by a factor of 1.108, holding all other variables constant. This could be because the farmer with higher mass media utilization will have better adoption of the available seed production technologies at his level and further improve his decision-making behavior and orienting himself to take risks.

Extension contact is positively significant for farmers' gain in knowledge. For a unit increase in extension contact score, the odds of being satisfied with a gain in knowledge in quality seed production with increases by a factor of 1.890, holding all other variables constant.As the extension worker is the main source of information and training of farmers in adopting new extension packages like seed production practices in our case, their frequent contact with farmers is important for improving the effectiveness of the extension services and effective utilization of the programme.

Risk orientation is negatively significant for farmers' gain in knowledge. For a unit decrease in risk orientation score, the odds of being satisfied with gain in knowledge in quality seed production with increases by a factor of 0.112, holding all other variables constant. As to encounter any adverse situation successfully proper knowledge need to be gained which is possible with extension contact which is the sufficient reason for success in any program. The helps to face many obstacles, hurdles, and untoward incidents in the process of realizing the farm returns. Hence, with decrease in risk taken will tend the farmers to involve in any farm practice and they prefer to gain knowledge with calculated risk undertaken.

Constraints in production of quality seed

We have had focus group discussions with farmers to get an answer for what are the constraints in the production of quality seed under the programme. The majority of the farmers stated that they lack information or updates on seed supply under the programme. Limited technology choices, not able to sell the produced seed as seed in the market hence sold as grain for immediate cash flow for next season crop. Farmers indicated that there is a serious problem that no by back of seed is produced under farmer-level production in the study area. Farmer-to-farmer selling of seed is hardly possible due to lack of trustworthiness among farmers under study area. Therefore, it is important to note that packages provided for farmers should have high quality, be accessible, affordable and need-based to enhance farmers' overall satisfaction with the programme and production

The undefined boundary between the extension service and the local politics is another reason for farmers' dissatisfaction with the programme.

There is also lack of basic infrastructures and facilities for drying and storing of seed and trained human resources in the study area.

Conclusions

This study examines the level of farmers' gain in knowledge on quality seed production and identifies success determinant factors for farmers' gain in knowledge. The binary logistic regression analysis results indicate which aspects to concentrate on to make improvements to increase the farmers' gain in knowledge. The empirical results revealed that market orientation, mass media utilization, extension contact, and risk orientation increase the probability of farmers' overall gain in knowledge on quality seed production in rice crop under the given program. As the perceived mass media utilization followed by extension contact and so on is the most important driving factor for gain in knowledge among beneficiary farmers, the SVP programme needs to focus on diversified services that suits and reach the specific needs of farmers. Besides promotion of certification is been important criterion to enhance economic rewards from farming as farmer can sell his seed with full confedence outside the village, he belongs that strikes down the lack of trustworthiness constraint. More importantly, there is always needed to go for demand-driven extension service instead of the existing supply-driven approach. In this way, farmers' satisfaction with the programme can be enhanced and this tend to involve them in programme an increase in the level of knowledge in seed production can be achieved

With the acknowledgment, however, the results of this study need to be viewed in the light of its limitations. These limitations, along with the study findings, suggest directions for further research. The study did not use a large sample size and geographic area coverage which affected the generalization of the findings. Besides, it did not include the reflection of other stakeholders. Hence, further studies remain important to obtain a more representative picture of farmers' gain in knowledge on quality seed production in Telangana.

Scope of the study

Future research that could be expanded based on the study could be by exploring the impact of specific technological interventions on improving seed production knowledge and practice among farmers in different regions. Additionally exploring the role of digital platforms and mobile technolgies in bridging the information gap and enhacong communication between farmers extension agents and seed suppliers could offers valuabe perspective for improving the seed production system

Conflit of interest

The authors report no conflate of Interest related to the study

Acknowledgement

The author expressed sincere gratitude to PJTSAU, Hyderabad for providing comprehensive aupport throughout the research

References

1. Saisanthosh, K., Keshavulu, K., Jhansi Rani, K., Razia Sultana and Sujatha, P. (2017). Seed sector development strategy for AP and Telangana after bifurcation.*Agriculture Update*. Volume 12 Techsear-4, 1168-117.

2. AAP (2014), Agriculture Action Plan 2014-15, Department of Agriculture, Telangana

© *2025 AATCC Review.* All Rights Reserved.

3. Raghavender Sharma, M and Raju. G. (2016). Paddy Production in Telangana State: Current and Future Trends. *Indian journal of applied research*. Volume 6, issue 3.

4. Telangana sees a steady rise in paddy area. Telangana Today https://telanganatoday.com/telangana-sees-a-steady-rise-in-paddy-area

5. Bloom, M., Eagalhadt, E., Farst, W., Hill and Krathwool, P.R. (1958). Taxonomy of Education Objectives. The Cognitive Domain, New York, Logmans Green and Company

6. Adhikari, G. (2007). Knowledge and adoption behaviour of rice growers in Hoshangabad district of Madhya Pradesh. *M.Sc. (Ag.) Thesis,* JNKVV, Jabalpur

7. Deshmukh, P. R., Kadam, R. P and Shinde, V. N. (2007). Knowledge and adoption of Agricultural Technologies in Marathwada. *Indian Res. J. Ext. Edu*. 7 (1): 41-43.

8. Satish, R. M. (2003). Astudy on risk preception and adoption of risk management practices by papaya growers in Kadapa district of Andhra Pradesh. *M.Sc. (Ag.) Thesis* submitted to Acharya N.G. Ranga Agricultural University. Hyderabad

9. Aphunu, A. and Otoikhian, C. S. O. (2008). Farmers' Perception of the Effectiveness of Extension Agents of Delta State Agricultural Development Programme (DADP). Afr. J. General Agric., 4(3): 165-169.

10. Hegde, N.G. (2005). Traditional Extension Methods in Modern Agriculture. Indian Farming Special Issue on World Food Day, PP. 45-47

11. Prashad, Reedy.T.S., Prabhakar, K and Gidda, R.P. (2007). Analysis of influence of selected independent variables on knowledge of rice farmers on eco-friendly technology. Journal of Research ANGRAU. 32(2): 31-37.

12. Nirmala, K. (2012). A study on diffusion status and adoption of System of Rice Intensification (SRI) in Mahaboobnagar district of Andhra Pradesh. *M. Sc. (Ag.) Thesis*. Acharya N.G. Ranga Agricultural University, Hyderabad.

13. Geetha, B. (2002). An analysis study on diversified farming in Chittoor district of Andhra Pradesh. M.Sc. (Ag.) Thesis. Acharya N.G. Ranga Agricultural University, Hyderabad

© *2025 AATCC Review.* All Rights Reserved.