SAMQUEST-Journal of Emerging Innovations
E-ISSN 3108-1207
Vol.1,Issue 2,pp.180-187 , July- Dec 25
Available online at : https://www.samglobaluniversity.ac.in/archives/

Research

ASSESSMENT OF TECHNOLOGICAL ADOPTION AND GAPS AMONG WHEAT GROWERS IN THE SEMI-ARID REGIONS OF MADHYA PRADESH: A COMPARATIVE STUDY OF HOSHANGABAD, HARDA, AND SEHORE DISTRICTS

Satwik Sahay Bisarya[1] and Maya Bisen[2]

[1] Faculty of Agriculture Science, SAM Global University, Raisen, Madhya Pradesh
[2] Faculty of Agriculture Science, APJ Abdul Kalam University, Indore, Madhya Pradesh
Corresponding E-mail: deanagriculture@samglobaluniversity.ac.in

Received:12/July/2025; **Accepted**:15/July/2025 ;**Published**:7/Feb/2026.

Abstract

Wheat is a staple food and an essential part of the diet in many parts of the world, including northern India. However, despite the long history of wheat cultivation in the region, many farmers lack comprehensive knowledge regarding the modern production techniques and new wheat varieties. The present study was conducted to assess the technological gap among wheat growers across different categories of farmers in the Hoshangabad, Harda, and Sehore districts of Madhya Pradesh. A total of 324 wheat growers, including 9 farmers from each of the 36 selected villages (3 big, 3 medium, and 3 small farmers), were chosen randomly from nine blocks of the aforementioned districts.The findings revealed significant differences in the technological gap among small, medium, and large-scale farmers. Among small farmers, 20.37% exhibited a low technological gap, 38.88% had a medium gap, and 40.74% faced a high technological gap. In the case of medium farmers, 37.96% had a low gap, 12.03% had a medium gap, and 50% exhibited a high technological gap. For large-scale farmers, 50% had a low technological gap, none had a medium gap, and 50% experienced a high technological gap. Overall, 46.91% of the farmers were found to have a high technological gap, 36.11% a low technological gap, and 16.97% a medium technological gap.Furthermore, the study revealed that 41.66% of wheat growers had a medium level of adoption of recommended wheat production techniques, 33.95% had a low level of adoption, and 24.38% exhibited a high level of adoption. The results suggest that a substantial proportion of wheat growers are moderately to highly adopting the recommended wheat production techniques. This indicates the need for enhanced awareness and training programs to further bridge the technological gap and improve the adoption of modern practices for increased productivity.

Keywords: *Wheat growers; Technology Gap; Adoption; Category of Farmers, Malwa Region*

Introduction

Wheat (*Triticum aestivum*) is one of the most important and strategic cereal crops globally, providing a staple food for approximately two billion people, or 36% of the world's population. It is the most widely cultivated grain crop, surpassing others like rice and maize in terms of acreage and production, making it the world's leading cereal grain. Wheat serves as the primary source of carbohydrates in many countries and is rich in essential minerals, vitamins, and lipids. Additionally, a small amount of animal or legume protein can enhance the nutritional value of wheat-based meals.

In India, wheat is grown over an area of 30.60 million hectares, yielding a total production of 98.38 million tonnes, with an average yield of 3,216 kg per hectare (DAC & FM, 2017). Within Madhya Pradesh, wheat is cultivated across 6.03 million hectares, with a production of 17.94 million tonnes and an average yield of 2,976 kg per hectare (DAC & FM, 2017; FWADD, 2017). The Hoshangabad district produces wheat on 0.26 million hectares, yielding 1.11 million tonnes with an average yield of 4,440 kg per hectare. In Harda district, wheat is grown on 0.17 million hectares, with a production of 0.66 million tonnes and an average yield of 3,843 kg per hectare. Sehore district grows wheat on 0.25 million hectares, yielding 0.90 million tonnes with an average yield of 3,645 kg per hectare (FWADD, 2017).

Given the significance of wheat as a primary crop, it is crucial to explore various aspects of its cultivation to better understand and improve production and efficiency in the agricultural sector. The agricultural system in India consists of three key components: research, education, and extension (ICAR Handbook of Agriculture). Extension services play a critical role in bridging the gap between research and farmers, as seen in the success of the Green Revolution programs of the late 1960s. At all levels—from national to village—the extension network aims to increase farmer knowledge and encourage the adoption of new technologies. Despite this, there remains a significant gap between the available technology developed by research institutes and its application on farmers' fields, especially in wheat cultivation.

The uneven adoption of improved wheat technologies by farmers is influenced by various factors such as a lack of mechanization, poor-quality seeds, inadequate irrigation facilities, and limited market access (Shitu et al., 2018). Therefore, this research aims to examine the technological gaps faced by wheat growers across different categories of farmers in the Malwa region of Madhya Pradesh, with the goal of identifying factors contributing to the adoption challenges and exploring strategies to enhance productivity and efficiency in wheat cultivation.

Research Methodology

The present study used an ex post facto research design to assess the technological gap among wheat growers of various categories in the districts of Hoshangabad,

Harda, and Sehore in Madhya Pradesh during the 2018-19 agricultural year. This study aimed to identify the technical gaps in wheat production technologies adopted by farmers in these regions.

Study Area and Sampling Procedure: The study was conducted in the districts of Hoshangabad, Harda, and Sehore, selected for their significant wheat cultivation. A total of 36 villages were selected using a stratified random sampling method from nine blocks: Hoshangabad, Pipariya, Itarsi, Harda, Timarni, Khirkiya, Sehore, Ichhawar, and Narsullaganj (4 villages from each block). In each selected village, 9 farmers were chosen at random, representing three categories: large, medium, and small farmers (3 from each category), resulting in a total of 324 wheat growers.

Data Collection: Primary data were collected through group discussions and a pre-tested interview schedule designed specifically for the study's objectives. The data collection focused on understanding the technological gap faced by wheat growers in their adoption of wheat production practices. The technological gap refers to the difference between the recommended agricultural practices (advised by experts) and their actual implementation by farmers.

Technology Gap Index Calculation: The study considered eight wheat production technologies to determine the technological gap, including:

1. Field preparation
2. Seed and sowing management
3. Fertilizer management
4. Irrigation management
5. Weed management
6. Plant protection management
7. Harvesting management
8. Wheat storage facilities

To assess the technological gap, a Technology Gap Index (TGI) was calculated using the following formula:

$$TGI = \frac{R - A}{R} \times 100$$

Where:

R is the maximum possible score of adoption that a respondent could achieve (i.e., the recommended adoption score),

A is the actual score of adoption of technology by the respondent.

The adoption levels were measured using a three-point continuum, with responses categorized as:

Complete adoption (score of 3),

Partial adoption (score of 2),

No adoption (score of 1).

Based on the Technology Gap Index scores, respondents were grouped into three categories:

Low technological gap: 21 to 26.11,

Medium technological gap: 26.12 to 30.55,

High technological gap: 30.56 to 35.

Additionally, the respondents' overall adoption of wheat production techniques was assessed based on the following classification:

Low adoption: 25 to 28.33,

Medium adoption: 28.34 to 31.66,

High adoption: 31.67 to 35.

The data analysis aimed to examine the extent to which farmers adopted recommended technologies and identify the key technological gaps that hinder optimal wheat production.

RESULTS AND DISCUSSION

The study focused on identifying the technological gap among wheat growers in Hoshangabad, Harda, and Sehore districts of Madhya Pradesh, revealing notable disparities in the adoption of recommended wheat production technologies across different categories of farmers. The results indicated that small farmers had the highest proportion with a high technological gap (40.74%), followed by medium farmers (50.00%). However, a significant portion of big farmers (50.00%) exhibited a low technological gap. Overall, 46.91% of farmers had a high technological gap, 36.11% had a low gap, and 16.97% were in the medium category. This gap can be attributed to various factors, including inadequate mechanization, access to quality seeds, irrigation facilities, and market support. The findings align with previous studies, highlighting the need for targeted interventions to bridge these gaps, such as strengthening extension services, improving input accessibility, and providing training to farmers. Addressing these technological gaps is crucial for improving wheat productivity and ensuring the long-term sustainability of wheat farming in the region.

Table 1: Percentage distribution of different categories of farmers on the basis of their technological gap

Sr. No.	Categories	Small farmers (n = 108)	Medium farmers (n = 108)	Big farmers (n = 108)	Overall farmers (n = 324)
1.	**Low (21.67 to 26.11)**	22 (20.37%)	41 (37.96%)	54 (50.00%)	117 (36.11%)
2.	**Medium (26.12 to 30.55)**	42 (38.88%)	13 (12.03%)	-	55 (16.97%)
3.	**High (30.56 to 35)**	44 (40.74%)	54 (50.00%)	54 (50.00%)	152 (46.91%)
Total		108 (100.00%)	108 (100.00%)	108 (100.00%)	324 (100.00%)

Figures in parenthesis represent the percentage.

The findings from Table 2 indicate that the adoption of recommended wheat production practices varied among different categories of farmers. For small farmers, 41.66% exhibited a medium level of adoption, followed by 37.03% with low adoption and 21.29% with high adoption. Among medium farmers, 41.66% showed a low level of adoption, 32.40% had medium adoption, and 25.92% adopted high levels of recommended practices. For big farmers, 50.92% demonstrated medium adoption, followed by 23.14% with low adoption and 25.92% with high adoption.

When considering all categories together, the pooled data revealed that 41.66% of wheat-growers had a medium level of adoption, followed by 33.95% with low adoption and 24.38% with high adoption. This suggests that most farmers fell into the medium to high adoption category for recommended wheat production technologies.

Several factors likely influenced the adoption levels among farmers. These factors include medium extension contact, medium material possession, medium economic motivation, medium scientific orientation, and a moderate level of

knowledge regarding wheat production practices. As the landholding and income increased, farmers were more likely to adopt technologies that promised higher economic returns.

Extension programs also played a significant role in shaping the attitude, skills, and knowledge of wheat-growers, particularly in areas like disease and pest management. This aligns with the findings of previous studies (*Kumar et al., 2012; Meena, 2012; Painkra et al., 2014; Singh et al., 2014; Balaji & Manjunath, 2011; and others*), which highlight the importance of extension efforts in promoting adoption of agricultural technologies.

Table 2: Distribution of different categories of farmers based on their adoption of recommended wheat production practices

Sr. No.	Categories of Adoption Level	Small Farmers	Medium Farmers	Big Farmers	Overall Farmers
1.	**Low (25 to 41)**	40 (37.03%)	45 (41.66%)	25 (23.14%)	110 (33.95%)
2.	**Medium (42 to 57)**	45 (41.66%)	35 (32.40%)	55 (50.92%)	135 (41.66%)
3.	**High (Above 57)**	23 (21.29%)	28 (25.92%)	28 (25.92%)	79 (24.38%)
Total		108 (100.00%)	108 (100.00%)	108 (100.00%)	324 (100.00%)

(Figures in parenthesis are percentage)

Conclusions

The study highlights the need to address the technological gap in wheat production practices, particularly through the extension system. To effectively close the gap, it is essential to provide low-cost, improved technologies tailored to the needs of all farmer categories. Many farmers face difficulties due to a lack of updated information on wheat production technologies. Therefore, adopting a new extension strategy that enhances farmers' attitudes toward scientific methods is crucial. This approach will help farmers understand the value of scientific suggestions and increase their crop benefits.

The study underscores the importance of identifying which technology components farmers are able to retain and adopt. Adequate and targeted training on new innovations is necessary to ensure effective technology transfer in agriculture. It is also evident that a generic advice model will not suffice; specific needs and interests of different farmer categories must be considered when planning training programs. Extension professionals can design more effective programs by understanding the technology gaps.

The findings suggest that 46.91% of farmers had a high technology gap, while 36.11% had a low gap, and 16.97% had a medium gap. This indicates that a significant proportion of wheat growers are still in the medium to high adoption levels of recommended wheat production technologies. Therefore, focused efforts are needed to close these gaps through strategic and inclusive extension initiatives.

Future Scope

This article emphasizes the importance of wheat yield projections, given that wheat constitutes a major part of the human diet. The continued increase in wheat yield is viewed as a critical factor in meeting future global demands for food, feed, and fuel. The study distinguishes between farm yield (FY), achievable yield (AY) determined by the best available technology and sensible economics, and prospective yield (YP), which refers to the potential yield achievable

with the best varieties and agronomy without manageable biotic or abiotic stresses.

The progress in FY is largely determined by the advancements in PY and the gap between PY and FY, expressed as a percentage of FY. Currently, annual global wheat yield gains are around 1%, which is quite modest, and in many emerging nations, yields are even declining in absolute terms (kg/ha/year). With projections indicating that global demand will significantly increase by 2050, yield growth rates will become highly sensitive to real price changes, leading to major price hikes if current rates of yield increase cannot be sustained.

The future scope of wheat production research will need to focus on:

1. Identifying and closing the yield gap between FY and PY through improved farming practices and technology.
2. Promoting innovations that enable sustainable yield increases while addressing biotic and abiotic stresses.
3. Enhancing policy measures and agricultural support systems to boost wheat yields, particularly in emerging nations, where yield growth has stagnated or declined.
4. Incorporating climate-smart agricultural practices to adapt to changing environmental conditions and ensure long-term wheat productivity.

In light of these challenges, a comprehensive approach involving technological advancement, capacity building for farmers, and a focus on sustainable practices will be crucial to meet the future demand for wheat.

References

1. Balaji, J. and Manjunath, (2011). Technological Gap in Adoption of Recommended Practices of Mango Cultivation. *Agric. Updat*, 6(2): 38-41.
2. Bisarya, S. S. (2017). Technological Gap and Adoption of Modern Agricultural Practices in Madhya Pradesh. *Journal of Agricultural Extension*, 22(4): 56-60.
3. Bisarya, S. S. (2019). Assessment of Technological Gap in the Adoption of Modern Agricultural Practices Among Farmers in Madhya Pradesh. *Indian Journal of Agricultural Research and Extension*, 31(2): 123-129.
4. Bisarya, S. S., & Mishra, P. (2020). Challenges in the Adoption of Sustainable Agricultural Practices in Semi-Arid Regions. *Journal of Agricultural Extension and Rural Development*, 14(3): 45-52.
5. Bhatia, J. N., Devender, C., and Chauhan, R. S. (2011). Technological Gap in Adoption of Improved Mushroom Cultivation Practices in Haryana. *Agricultural Updates*, 6(3-4): 206-209.
6. Chinmalatpure, U. R., Bhugul, M. K., and Rajput, S. N. (2011). Technological Gap in Adoption of Dr. DKV Recommended Dryland Technology. *Journal of Global Communication*, 4(2): 131-137.

7. Choudhari, R. P. (2011). Technological Gap in Rice-Wheat Production System. *Indian Res. J. of Extn. Edn.*, 8(10).

8. DAC&FM (2017). Agricultural Statistics at a Glance 2017.

9. Dubolia, S. R. and Jaiswal, P. K. (2000). Technological Gap of Groundnut Cultivation among Groundnut Growers, Maharashtra. *J. of Agril. Sci.*, 19: 216-217.

10. FWADD (2017). District Wise Area Production and Yield (2011-12).

11. Kadam, S. S., Thombare, B. M., and Mande, J. V. (2010). Technological Gap in Sugarcane Production Technology. *Journal Maharashtra Agriculture University*, 35(3): 424-427.

12. Kalpana Kumari, Pyasi, V. K., and Sharma, A. (2017). Impact of Front Line Demonstration (FLD) on Area and Productivity of Wheat Growers in Jabalpur District of Madhya Pradesh, India. *Int. J. Curr. Microbiol. App. Sci.*, 6(12): 2237-2242.

13. Kumar, A., Rathod, M. K., and Kalantri, L. B. (2012). Behaviour of Farmers in Adoption of Recommended Technology of Soybean. *Indian Research Journal of Extension Education*, 2: 223-227.

14. Lokesh Kumar Tinde, Arbind Kumar Sai, Kshitij Parmar, Deepak Hembram, Dibyendu Pal, and Kushwaha, R. K. (2017). Socio-economic Characteristics of Wheat Growers Regarding Adoption of Improved Wheat Production Technology in Kanpur Dehat District, Uttar Pradesh (India). *Int. J. Curr. Microbiol. App. Sci.*, 6(12): 2225-2229.

15. Machhar, R. G., Patel, S. K., Kacha, H. L., Patel, U. M., Patel, G. D., and Radha Rani, R. (2015). Technological Gap in Adoption of Improved Soybean Production Technology by Soybean Growers in Dahod District, Gujarat. *American Journal of Agriculture and Forestry*, 3(6): 376-379.

16. Maraddi, G. N., Meti, S. K., and Tulsiram, J. (2014). Extent of Adoption of Improved Technologies by Groundnut Farmers and Constraints Analysis. *Karnataka Journal of Agricultural Sciences*, 27(2): 177-180.

17. Meena, B. S. (2012). Adoption Behavior of Wheat Production Technology. *Agric. Update*, 7(3-4): 283-286.

18. Painkra, S. K., Singh, D. P., and Chauhan, A. S. (2014). Knowledge and Adoption Gap of Farmers towards Wheat Technology. *Research J. Science and Tech.*, 6(1): 20-22.

19. Patel, A. G. and Vyas, H. U. (2014). Technological Gap in Adoption of Sugarcane Cultivation Practices by Sugarcane Growers. *Gujarat Journal of Extension Education*, 25(2): 227-229.

20. Patel, B. S., Patel, U. M., and Chaudhary, K. V. (2014). Technological Gap in Adoption of Recommended Maize Seed Production Practices by the Maize Seed Producers. *Gujarat Journal of Extension Education*, 25(2): 197-200.

21. Patel, Y. V., and Late Padheria, M. M. (2010). Extent of Technological Gap and

Its Relationship with Situational, Personal, Socio-Economic, Psychological, and Communication Characteristics of Safflower Growers. *Indian Research Journal Extension Education*, 10(2): 93-98.

22. Rajashekhar, T. B., Kale, S. M., and Sunil (2014). Technological Gap in Adoption of Recommended Practices in Farmers about Papaya Cultivation. *Agriculture Update*, 9(2): 197-200.

23. Raut, P. S. (2014). Technological Gap in Wheat Cultivation in Akola District. M.Sc. (Agri) Thesis (unpub.), Dr. PDKV, Akola.

24. Roy, D., Bandyopadhyay, A. K., and Ghosh, A. (2013). Identification of Technological Gap in Pineapple Cultivation in Some Selected Areas of West Bengal. *International Journal of Science, Environment and Technology*, 2(3): 442–448.

25. Sasane, K. L., Patil, P. A., and Suthar, P. P. (2012). Knowledge and Adoption of Paddy Cultivation Practices among Farmers in North Kashmir. *Asian J. Extn. Edu.*, 23(2): 46-51.

26. Sharma, C., Pande, A. K., and Khedkar, N. S. (2018). Technological Gap in Recommended Sesame Production Technology Perceived by Farmers of Jabalpur District. *International Journal of Chemical Studies*, 6(3): 822-824.

27. Shitu, A. G., Nain, M. S., and Singh, R. (2018). Developing Extension Model for Smallholder Farmers' Uptake of Precision Conservation Agricultural Practices in Developing Nations, Learning from Rice Wheat System of Africa & India. *Current Science*, 114(4), 814-825.

28. Singh, H., and Jat, J. R. (2014). Constraints Faced by the Farmers in Adoption of Improved Technologies of Sesame Crop in Jodhpur District of Rajasthan. *International Journal of Extension Education and Research Development*, 22: 190-191.

29. Singh, R., Dogra, A., Sarkar, A., Saxena, A., and Singh, B. (2018). Technology Gap, Constraint Analysis, and Improved Production Technologies for Yield Enhancement of Barley (Hordeum vulgare) and Chickpea (Cicer arietinum) under Arid Conditions of Rajasthan. *Indian Journal of Agricultural Sciences*, 88(2): 93-100.

30. Tengli, M. B., and Sharma, O. P. (2017). Technological Gap in Adoption of Improved Paddy Cultivation Practices. *International Journal of Current Microbiology and Applied Sciences*, 6(11): 1224-1229.

31. Wadekar, R. P. (2013). Adoption of Rice Cultivation Practices by Warli Tribal Farmers from Thane District of Maharashtra. M.Sc. (Agri.) Thesis, Dr.Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli (M.S.). (Unpublished).

32. Nirwan, P. P. (2016). Technological Gap in Adoption of SRI Method of Paddy Cultivation. M. Sc. (Agri.) Thesis (Unpub.), Dr. PDKV, Akola.