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Impact of Interactive Cardboard Game on Cotton Growers in Punjab and Madhya Pradesh

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Abstract

Games are especially pertinent to agricultural field research since other experimental methods may be prohibitively expensive and impractical and they are also often used for non-experimental and experimental reasons including simulating educational experiences and fostering community engagement. Board games offer a methodological approach for increasing, extrapolating and validating relevant information and overall understanding of a difficult and extensive land use pattern. The games have become popular as a main ingredient for participatory approaches and they can be very efficiently used in engaging the local communities. So, the main objective of this study was to assess the impact of interactive cardboard game on cotton growers of Punjab and Madhya Pradesh. For the farmers of Punjab and Madhya Pradesh, the game was developed in Punjabi and Hindi language respectively. For selection of area, three districts from Punjab were purposively selected with respect to highest area under cotton crop and one district (Maheshwari) from Madhya Pradesh was selected randomly. Thus,40 farmers from each district were selected. Therefore, a sample of 160 respondents was selected for the study. An interview schedule was prepared for the collection of data in which statements regarding input usage in cotton crop has been included. Then the data regarding the existing practices of the cotton crop was collected from the respondents. The respondents played the interactive cardboard game and then same statements regarding input usage were recorded through questionnaire to check their gain in knowledge after exposure to the cardboard game. The findings revealed that there was a significant difference after the exposure to the cardboard game. The farmers were now well aware about the recommended practices of cotton growing after the exposure of the interactive cardboard game. The study recommends that the interactive cardboard game would be an excellent disseminating tool for extension workers. This interactive cardboard game will be instrumental in making decision, for the farmers of Punjab and Madhya Pradesh for judicious usage of inputs.

Keywords: interactive, cardboard game, cotton growers, exposure, impact

JEL Classification: Q10, Q16, Q18

Introduction

Farmers have long been using the knowledge sharing concept in agriculture (Chambers 1985), and it is becoming more widely recognized as one of the important parameters (Raymond *et al* 2010). Games have grown in popularity as a key component of participatory research methods. Serious games, like other participatory methods, can be used to involve and elevate regional populations or to extract the knowledge and planning processes (Castella *et al* 2014 and Perrotton *et al* 2017). Games allow a greater deal of explanation and are a greater source of entertainment as well which have the capability to attract large number of people towards it (Castella *et al* 2005). Educational games are a unilateral strategy that inculcates these fundamental qualities. "Goal-directed competitive (activities), done inside a framework of agreed upon rules" is the definition of a game (Ranchhod *et al* 2014). Games facilitate more effective communication between practitioners and researchers from various fields and industries engaged in humanitarian and development work (Fortungo 2012). The use of board games better caters to the needs of modern students (King *et al* 2014). Actual scientific research demonstrates that educational games give students unique experiences, help them improve their conceptual knowledge, promote their communication skills, and focus on the cognitive aspects of learning, which is consistent with this claim. (Hague *et al*

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2011). In research and development, the game method has become more and more prevalent. To guide the expansion of games in the field of research, boosting researcher affinity for games is required. More significant, regular, and inclusive experiments and data could be useful in agricultural games possibilities made possible by digital technology (Castella *et al* 2005). Games are gaining popularity in education and, in addition, they are capturing the interest of scholars and practitioners working in natural resource and environmental governance (Pvente *et al* 2016). Games are a clearly salient technique for removing barriers in agricultural research because they imitate the setup and phrasing of problems such as food security, biodiversity conservation, climate change, and resource governance, such as the lengthy time horizons required for studying decision making and crop output in agriculture (Deaton 2018). Dolinska (2017) observed that games have been endorsed as a key instrument for including farmers in agricultural research projects in recent years as in agriculture, games with both trial and quasi objectives seem to be essential in agriculture to comprehend the way people process and make choices. Overall, by emulation the actual contexts as well as rewarding structures where policy measures and reactions will take place, cardboard games can help us understand people and groups (Goentzel 2012). Games are used to test theories, duplicate an experience, and/or imitate a situation in the field of agriculture.

Not only games encourage new learning settings but are also becoming more common among students, with majority of households regularly playing games (Bunch *et al* 2014). Games are also being used in field experiments are becoming more and more common on the experimental side, enabling researchers to identify the relevant parameters of theoretical frameworks and contribute cognitive observations to discussions of decision making (Levitt 2009). Barrios (2013) in his research "Gaming for Small Holder Participation in the design of more Sustainable Agricultural Landscapes" developed The RESORTES board game, which was the cornerstone of this methodology and revealed the outcomes of four pilot sessions in a usufruct community in the buffer zone of a Man and Biosphere Reserve in Chiapas, Mexico, where the game sessions generated an open and engaged discussion among participants, was a stylized yet complex land-use game rich in ecological and social outcomes. Cartwright (2018) in his study reported that overall, more significant, regular, and inclusive experiments and data—all opportunities provided by digital technology-could be beneficial for games in agriculture. Also these games prove to be very beneficial in the sector of agriculture. Major areas have been analysed in which the technology transfer through games was eminent. The use of board games better caters to the needs of modern students (King *et al* 2014). Actual scientific research demonstrates that educational games give students unique experiences, help them improve their conceptual knowledge, promote their communication skills, and focus on the cognitive aspects of learning, which is consistent with this claim. (Hague *et al* 2011).

Data Sources and Methodology

From Punjab state three cotton growing districts (Bathinda, Fazilka and Mansa) were selected purposively on the basis of maximum area under cotton cultivation. At the same time Maheshwari district from Madhya Pradesh was selected purposively because of the association BIORI that is also the part of the project under Bern University. From each district forty respondents were selected randomly. Thus, a total of 120 farmers from Punjab and 40 farmers from Madhya Pradesh were selected for this study. With the consultation of agricultural experts from Punjab Agricultural University and Bern University of Applied Sciences, a cardboard game for different regions, i.e., Punjab and Madhya Pradesh was developed with the languages such as Punjabi and Hindi respectively. Validation of this cardboard game regarding judicious use of inputs in Punjab and Madhya Pradesh was ensured experts from PAU and Bern University of Applied Sciences, Switzerland.

An interview schedule was prepared for the collection of data from cotton growers. The data was collected from the farmers through personal visits. It consisted of statements regarding input use by cotton growers. It was bifurcated into two sub-parts. Part A consisted of statements that checked the knowledge level of cotton growing farmers before exposure to interactive cardboard game. Part B covered the statements that checked the gain in knowledge level of farmers after exposure to the interactive cardboard game. Gain in knowledge was defined as the amount of new information that a farmer personally acquired as a result of participating in the interactive cardboard game. Each response the farmer gave throughout the knowledge test was recorded as a yes-or-no, fill-in-the-blank, or multiple choice questions. For each successful response, a score of 1 was given, and for each incorrect response, a score of 0. The percentage shift was then calculated based on the final result. Z-test was used to evaluate the importance of the interactive cardboard game as well. Three levels of knowledge, low, medium, and high, were used to categorize the overall knowledge score.

Results and Discussions

The information in table 1 demonstrates that there is a significant difference between the levels of exposure that farmers had before and after they played an interactive cardboard game. The majority of farmers were not familiar with the advised methods for cultivating cotton. The data also shows that the majority of farmers were unaware of the ideal timing for the last irrigation, as indicated by the biggest percentage shift in such situation. The overwhelming majority of scores in the z-test that show variation between before and after engagement to the interactive cardboard game are substantial.

Table 1. Distribution of respondents according to the level of knowledge at before exposure and after exposure to interactive cardboard game in Punjab

Sr No	Statements	Before f (%)	After f (%)	'f shift'	'z' test
I	Recommended varieties of PAU	43 (35.83)	107 (89.16)	+63	8.533**
II	Appropriate sowing time	46 (38.33)	88 (73.33)	+42	5.4595**
III	Best soil for cultivation	22 (18.33)	91 (75.83)	+69	8.921**
IV	Optimum time for first irrigation	26 (21.66)	82 (68.33)	+56	7.266**
V	Optimum time for last irrigation	15 (12.50)	97 (80.83)	+82	10.6098**
VI	Roguing off the plant infected with leaf curl virus	92 (76.66)	103 (85.83)	+11	1.8192 NS
VII	Burying of infected plant	32 (26.66)	86 (71.66)	+54	6.9723**
VIII	Dose of fertilizers	14 (11.66)	68 (56.66)	+54	7.3496**
IX	Quality of water for irrigation	58 (78.33)	76 (63.33)	+18	2.3398*
X	Alternate host plants for the insect pests	50 (41.66)	85 (70.83)	+35	4.5542**
XI	If yes, then which of the following	31 (25.83)	85 (70.83)	+54	6.9752**
XII	Exact time to use Hitweed Max 10 MEC 500 ml/L	35 (29.16)	86 (71.66)	+55	6.5843**
XIII	Removal of weeds before sowing	54 (45.00)	95 (79.16)	+41	5.4548**
XIV	Leave animals for grazing after the last picking	76 (63.33)	95 (79.16)	+19	2.7098**
XV	Water logging	62 (51.66)	99 (82.50)	+37	5.0825**
XVI	Fertilizers other than those recommended by the PAU affect the yield	39 (32.50)	82 (68.33)	+43	5.5515**

*Note: *, ** significant at 1 and 5 per cent level, NS means non-significant*

Table 2 illustrates the distribution of respondents in Punjab based on their level of knowledge before and after exposure to an interactive cardboard game. Three distinct categories, namely Low, Medium, and High, were used to classify respondents based on their initial knowledge levels. Before exposure, the majority of respondents fell into the Low category, comprising 70.00 percent of the total, whereas 17.50 percent and 12.50 percent were categorized as medium and High, respectively. Following exposure to the interactive cardboard game, a noteworthy shift in the distribution of respondents across these categories occurred. The percentage of respondents in the Low category dropped significantly to 1.66 percent, indicating a substantial decrease in the number of individuals with lower levels of knowledge after the exposure. Simultaneously, the Medium category witnessed a substantial increase, rising from 17.50 percent to 43.33 percent. This surge suggests that the interactive cardboard game had a positive impact on elevating the knowledge levels of respondents from the Medium category. Moreover, the High category also experienced a notable increase, climbing from 12.50 percent to 55.00 percent. This indicates a substantial improvement in the number of

Table 2. Distribution of respondents according to the category of level of knowledge at before exposure and after exposure to interactive cardboard game in Punjab

Sr No	Category	Before f (%)	After f (%)	'z test'
I	Low (1-6)	84 (70.00)	2 (1.66)	11.0385
II	Medium (7-11)	21(17.50)	52 (43.33)	4.3496
III	High (12-16)	15(12.50)	66 (55.00)	6.962

Table 3. Distribution of respondents according to the level of knowledge at before exposure and after exposure to interactive cardboard game in Madhya Pradesh

Sr No	Statements	Before f (%)	After f (%)	'f shift'	'z' test
I	Recommended varieties	16 (40.00)	36 (90)	+20	3.1337**
II	Recommended spacing	13 (32.50)	30 (75)	+17	2.8615**
III	If yes, then which	8 (20.00)	25 (62.5)	+17	3.1865**
IV	Biodiversity enhancement	26 (65.00)	34 (85.00)	+8	1.1926 NS
V	If yes, which methods	19 (47.50)	28 (70.00)	+9	1.4639 NS
VI	Mixing of Conventional seeds (GMO, market purchased Seeds)?	24 (60.00)	34 (85.00)	+10	1.5078 NS
VII	Best method for pest management in organic farming	19 (47.50)	30 (75.00)	+11	1.765 NS
VIII	Optimum time for first irrigation	18 (45.00)	28 (70.00)	+10	1.6399 NS
IX	Optimum time for last irrigation	6 (15.00)	22 (55.00)	+16	3.2172**
X	Not an organic resource	27 (67.50)	35 (87.50)	+8	1.1797 NS
XI	Undecomposed FYM?	17 (42.50)	27 (67.50)	+10	1.6682*
XII	Burning of crop residue	25 (62.50)	37 (92.50)	+12	1.4597
XIII	Full conversion period	10 (25.00)	24 (60.00)	+14	2.5916*
XIV	Synthetic pesticides are prohibited in organic farming.	12 (30.00)	33 (82.50)	+21	3.473**
XV	Cleaning of spray equipment prior to use	32 (80.00)	37 (92.50)	+5	0.7131
XVI	Contamination and mixing of produce	29 (72.50)	36 (90.00)	+7	1.0168

*Note: *, ** significant at 1 and 5 per cent level, NS means non-significant*

Table 4. Distribution of respondents according to the category of level of knowledge at before exposure and after exposure to interactive cardboard game in Madhya Pradesh

Sr No	Category	Before f (%)	After f (%)	'z test'
I	Low (2-5)	16 (40.00)	-	4.4721
II	Medium (6-10)	14 (35.00)	10 (25.00)	0.9759
III	High (11-16)	10 (25.00)	30 (75.00)	4.4721

respondents with high levels of knowledge after exposure. To statistically validate these changes, 'z test' values were calculated for each category. The 'z test' value for the Low category was 11.0385, while the Medium and High categories had 'z test' values of 4.3496 and 6.962, respectively. These values are indicative of statistically significant differences, affirming that exposure to the interactive cardboard game had a meaningful impact on the knowledge levels of the respondents across all three categories in Punjab.

Further in the table 3, it is obvious that the majority of farmers lacked the necessary knowledge of cotton cultivation. The latter assertion is backed by the findings. The farmers' before and after exposure scores showed a striking difference. Additionally, percentage movement makes it abundantly evident. The vast majority of farmers mistakenly think that synthetic pesticides are allowed to be applied to organic farming.

Table 4 presents the distribution of respondents in Madhya Pradesh based on their level of knowledge before and after exposure to an interactive cardboard game. The categorization involves three distinct levels: Low, Medium, and High. In the Low category, 40 percent of respondents were present before exposure, constituting the majority. Notably, there is no specified percentage provided for the After column in this category. The absence of this information suggests that there might not have been any respondents falling into the Low category after exposure. Moving to the Medium category, 35 percent of respondents were initially classified within this group. Following exposure, this percentage decreased to 25 percent. The 'z test' value for this category is 0.9759, denoting a less significant change. This suggests that the impact of the interactive cardboard game on the knowledge levels of respondents in the Medium category may not be as pronounced as observed in other categories. In the High category, 25 percent of respondents had high levels of knowledge before exposure, and this percentage notably increased to 75 percent after exposure. The 'z test' value for this category is 4.4721, indicating a statistically significant change. This suggests that the interactive cardboard game had a substantial positive impact on elevating the knowledge levels of respondents in the High category in Madhya Pradesh. In summary, while the impact on the Medium category appears to be less significant, the changes in the Low and High categories are noteworthy. The absence of an 'After' percentage for the Low category implies that there might be a substantial reduction in respondents falling into this category after exposure. The 'z test' values, especially in the High category, confirm statistically significant changes in knowledge levels due to the interactive cardboard game in Madhya Pradesh.

The results showed that interactive cardboard is extremely helpful and quick at spreading breakthroughs across the uneducated. It implies that an engaging cardboard game is a fantastic technique to rapidly spread agricultural knowledge amongst farmers. Farmers think that by playing this engaging cardboard game, they are inspired to cultivate cotton in accordance with best practices. They also think that this interactive cardboard game will transform cotton farming practices for the better and aid farmers increase their output.

Conclusion and Policy Implications

The interactive cardboard game may increase perception, acquisition of information, and implementation of advised practices. Mean scores showed a substantial increase in knowledge from before to after exposure, indicating that the interactive cardboard game had a significant effect on cotton growers' knowledge gains. An image is worth a thousand words, as is true, and the same is true of the interactive cardboard game. The interactive game's distinctive approach aids in leaving a lasting impact on the farmers' thoughts. Therefore, extension personnel's should make a conscious decision to spread information about advised cotton farming practices utilizing this interactive cardboard game.

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