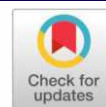


Original Research Article

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Analyzing Online Training Effectiveness: Kirkpatrick's Model-Inspired Approach for up-scaling mushroom enterprise for Sustainable rural development



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ABSTRACT

Bihar is leading in mushroom production at the national level with a total production of 33500 ton. This off-farm agro-enterprise is gaining popularity owing to its wider acceptability amongst growers and consumers as well. Since times, training for farmers has been accepted as a crucial component of capacity building. To improve the effectiveness of online training programme has become a greater challenge for us. This article uses the Kirkpatrick evaluation model to measure the effectiveness of online training programs received by heterogeneous farmer respondents for mushroom farming. The study is based on four levels —Reaction, learning, behaviour and result. The reasons for receiving training and barriers to receiving training are being highlighted and computed with responses directly received from the trainees. Based on the original findings, a result-oriented modified training evaluation model "FUNNEL Model" has been designed for enhancing the training efficiency at the farmer level. The proposed model is based on specific determinants. Application of such a model while designing online training programmes will definitely improve the performance of trainers and trainees as well and innovation in digital agriculture catalyzing growth in agriculture and allied sectors can be realized.

Keywords: Online, Training, evaluation, Kirkpatrick model, funnel-shaped, learning behaviour

Introduction

Agriculture is affected by globalization, and as a result, agriculture scientists are using new technologies in their work. When looking at the entire planet, it is predicted that by the year 2050, there would be 9.2 billion people on the planet. To meet this demand, farmers will need to produce 70% more than they did in 2006, according to the United Nations Food and Agriculture Organization (FAO) (WBCSD 2008). In order to meet the rising need for wholesome and adaptable food products, mushroom cultivation and processing have emerged as profitable and sustainable agribusiness operations. Investigating new and effective ways of mushroom cultivation is essential to supplying the world's growing food demand as the population continues to grow. Sustainable mushroom farming techniques can also greatly support environmental protection and rural economic growth. Mentorship, workshops, and hands-on learning have historically been the primary ways that mushroom-growing expertise has been transmitted. To ensure that farmers can adopt best practices and obtain optimal yields, the efficient transfer of mushroom production technologies is of utmost importance. The use of traditional training approaches, which frequently include workshops, seminars, and field demonstrations, dates back many years. Although effective, these techniques might not be able to reach a wider audience,

especially in distant or resource-constrained areas. Online training platforms and technology-driven strategies have become more popular as the globe transitions to the digital era, promising increased accessibility and flexibility for knowledge transmission. We intend to evaluate the influence of training on the mushroom production technologies demonstrated to farmers using a thorough and cutting-edge methodology, motivated by this possibility. The dissemination and knowledge of mushroom production and processing skills could be revolutionized, nevertheless, thanks to the quick development of technology and the wide use of online learning platforms. Online training is a novel method that aims to equip prospective mushroom cultivators and processors with thorough knowledge of the industry. Kirkpatrick's model, a highly effective pedagogical framework known for boosting skill learning, served as inspiration. Kirkpatrick's concept is a prime option for increasing engagement and retention in agricultural training environments since it is built on the ideas of adaptive learning, gamification, and personalized feedback. To maintain agricultural sustainability in the face of all these changes, farmers must switch from using traditional farming techniques to next-generation farming models.

Given the aforesaid background urged the researcher to assess the impact of digital training given to farmers. The present study was designed with the Objective of assessing the impact of mushroom production technologies demonstrated to farmers with respect to mushroom training.

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The research questions addressed by this study are as follows:

- What socioeconomic factors influence farmers' willingness to participate in the training programme?
 - Given the training modules on mushrooms, which module impacts positively to the farmers?
 - What are the change in knowledge and skills of production technology?
 - What gain in income is realized after receiving digital training?
- The ex-post facto assessment of the online training was carried out using Kirkpatrick Training Evaluation Model approach in this study. The study proposes an extension approach with applicability to formulate future programmes with utmost accuracy.

Materials & Methods

Study area, sampling method, and data collection

The research was carried out in Bihar state of India. Bihar is a state in eastern India and is the third largest state by population, the 12th largest by area, and the 14th largest by GDP in 2021. The agricultural sector served as the state's economic backbone in the previous decade, with rice as the primary crop. According to data released by National Horticulture Board, Bihar has become the largest mushroom-producing state and produce more than 28,000 tonnes of mushroom in the year 2021-22. Mushroom cultivation is emerging as an important source of income for farmers in the flood-prone areas of Bihar.

The university (Dr Rajendra Prasad Central Agricultural University, Pusa) organizes training programs on Mushroom Production Technology, regularly. Training programs are being organized for the farmers as well as entrepreneurs. The training programs cover wide range of activities through practical demonstration more often or wherever required. During Covid-19 pandemic, people looked forward 2 things mostly -immunity concerns and employment. The pandemic has also prompted a few experts to look at the consumption of mushrooms, known for their immunity-boosting anti-viral properties, with renewed vigour. Experts are also looking at promoting mushroom production through a lens of employment in the face of the reverse migration triggered by COVID-19 lockdown.

The study was conducted in four districts of Bihar, East Champaran, Samastipur, Muzaffarpur, Madhubani, Vaishali. 4 Villages was selected randomly from each district and 20 households from each villages. Total 400 respondents were selected for study. The data for the same were collected as part of filling the questionnaire which included their socio-economic affair, level of reaction,behaviour change, if any,so on and so forth. From time to time the responses were validated by talking with extension agents,group members and also the trainers.

After administering the training modules and before and after the intervention, we analyzed the data separately. The results for pre- and post-intervention were then placed side by side for the Paired t-test and the level of significance was then measured statistically.

As our sample are random, and observations are truly dependent (i.e. pre and post done on the same individuals), and the differences (i.e. Post minus Pre) are normally distributed and our total sample size is big enough (n=400), so we test mean of 'score difference' (i.e. whether the score after intervention is different from 0 or not).

The measurement output, Mean (SD) of Pre value, Mean (SD) of Post value,Mean of score difference (95%CI)and P value. A significant +ve P value (<0.05) = significant improvement after intervention is described accordingly.

Overview of Kirkpatrick Training Evaluation Model

The Kirkpatrick model, also known as Kirkpatrick's Four Levels of Training Evaluation, is a key tool for evaluating the effectiveness of training conducted by an organization. This model is globally recognized as one of the most effective evaluations of training. The Kirkpatrick model consists of 4 levels: Reaction, learning, behavior, and results. It can be used to evaluate either formal or informal learning and can be used with any style of training. So methodologically inspired by this model, it was chosen to find the learning effectiveness in a more informal learning environment where respondents are the farmers.(Fig. 1)

Results and Discussions

This section of the paper elaborated the findings by responding to the proposed research questions. The long-term adoption approach of the digital training service is based on certain determinant factors.

Figure 1 summarizes the findings .The approach developed based on original findings and below is the infographics of the research findings in form of a Funnel shaped Process Flow

Socio-economic profile of respondents

Socio-economic factors especially age,gender, education, and standard of living affect the participation and acceptance of any new initiatives which is going to change their lives or way of life.Table 1 reveals a social categorization of farmers under study.

Table 1 revealed that 68.50 participants are male, the majority of participants were aged between 21-30 years (33.50%). Regarding marital status, 80.25% of participants were married, while 19.75% were unmarried.In terms of education, the highest percentage (35.5%) had a 12th-grade education, followed by 35.00% with 10th and below education. Income distribution revealed that 35.75% of participants earned 60,000/- and above, Family size categories included 9.25% with 1-2 members, 44.25% with 3-4 members, and 46.50% with 5 and more members.

The Model inspired findings as discussed below.

Reaction measures how respondents react to the training programme at first (e.g., satisfaction/like). *Level 2 Learning* analyzes if they truly captured the essence of training (e.g., change in knowledge, new skills or experience?)*Level 3 Behavior* looks at if they are applying the acquired knowledge or not (e.g., change in behaviors?), and *Level 4 Results* determines if the interventions implied a positive impact or not.

Level I Evaluation of Reaction

The first level of evaluation is "reaction," which gauges how well-liked, beneficial, and applicable the training is to the learners' jobs. Most frequently, a post-training survey (sometimes known as a "smile sheet") asking trainees to rate their experience is used to measure this level

General Reaction

Most important: Module 2, Least Interest: Module 10

Table 3 revealed the satisfaction levels of participants who underwent training on mushroom cultivation using both online and offline methods. The majority of participants expressed satisfaction with both training approaches, but the satisfaction levels were somewhat higher for offline training (47% fully satisfied) compared to online training (34% fully satisfied). Additionally, the percentage of participants who reported being

"Not Satisfied" was higher for offline training (21%) than for online training (15%). Hence it is proved that offline learning is still preferred by people.

Fig 3. revealed that more than 350 farmers said that mushroom production and processing is one of the most profitable agribusiness followed by more than 300 respondent said that mushrooms give return in a short period of time compare to another agri enterprise. Almost 300 respondent agreed that participation in training programmes give ray of hope to earn their livelihood amid Covid-19.

Level II Learning

Level II evaluates each participant's learning based on whether they develop the desired attitudes, knowledge, abilities, and commitment to the course. Pre- and post-assessments should be used to determine accuracy and comprehension while evaluating learning, which can be done both formally and informally.

Table 4. revealed that Modules II, IV, VI, VII, VIII, IX, X, and XII show a statistically significant improvement in knowledge scores after completing the respective modules (indicated by a 'p' value of 0.001 or less). These modules appear to have had a notable impact on participants' knowledge. Modules I, III, V, and XI do not show a statistically significant improvement in knowledge scores after completing the respective modules (indicated by 'p' values greater than 0.05). It suggests that these modules may not have had a significant impact on enhancing participants' knowledge.

Level III Behaviour change

Behaviour of typical farmers is dependent on social/economic, internal/external/incentivization and economic motivation to learn and apply a particular skill to improve the overall living and earning.

The changes in behaviour were measured for three variables: acquisition of skills; technology utilization pattern and content accessibility.

The Fig. 4 reveals the general behaviour while receiving the online training had differential responses from the farmers. The farmers response on the same narrated that above 40% revealed that research methodology part was above average whereas most of them said that during online training programs, queries or doubts are not that easily and frequently resolved.

Level IV Results

The final level, Level 4, is dedicated to measuring direct results

The table 6 displayed details on how mushroom training affected respondents' monthly income gains and savings across a range of incomes. It demonstrates that after taking the training, a large proportion of respondents in the lower income categories (up to 2000/-) reported an increase in their income and were able to save money. However, the percentage of respondents reporting a monthly income rise and savings was comparatively lower for those with higher income ranges (> 5000), probably because of their higher initial income levels. The findings indicated that mushroom training, especially for those with lower income levels, can have a positive impact on income and savings.

Barriers faced by trainees in online training

Several studies are referring to barriers to the adoption of phone and computers for learning and also limited studies talk about

its adoption constraints. So, knowledge about the transformative capacity of digital extension is still limited (Ingram and Maye 2020). This study attempted to find out the same while interviewing for analyzing the constraints. Further working on constraints will definitely improve future designing and implementation of online trainings. The figure. represents that participants felt the lecture schedule was not sufficient to give a brief introduction and background about the training in Online mode. This creates confusion sometimes saying that either trainer or trainee or both lacked experience in virtual training. Experts often are at too ease while delivering online lectures and perhaps for that reason participants have narrated that too much use of scientific terminologies has created confusion and also least Reactive to specific training modules.

Conclusion

This paper aims to evaluate the effectiveness of farmers' training programs in the mushroom sector in Bihar, India. Using the Kirkpatrick's four levels of evaluation model, this paper specifically examines: (i) the reactions of the farmers to the training programs; (ii) the level of farmers' learning; and (iii) the change in behaviour of the farmers. The findings of this study revealed varied type of responses. The findings also showed some evidences that respondents had improved their knowledge level and were able to apply the knowledge and skills learned in the training. Since there were positive empirical evidence for reactions, learning and transfers of training; this study suggests that scientists should plan their interventions accordingly. In the human capital improvement, this research will have future implications for further introducing innovation solutions for better training approach. This study would also add value to the literature on training and development, as well as human resource management in the digital revolution.

Conflict of Interest: There exists no conflict.

Acknowledgement: The authors are indebted towards the farmers who responded to the questionnaire.



Fig. 1 Overview of Kirkpatrick Evaluation Model

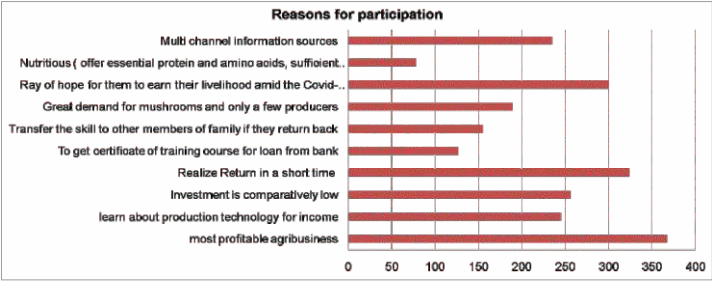


Fig.2. Funnel shaped Process Flow (developed by Author)

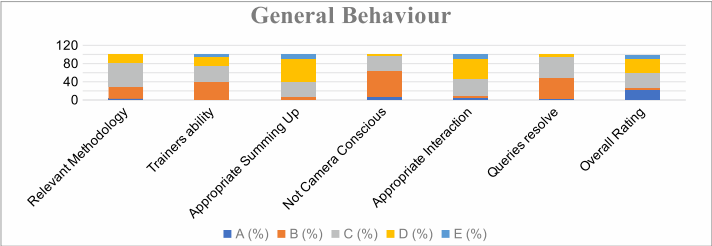


Fig 3. Reasons for participation in training programmes

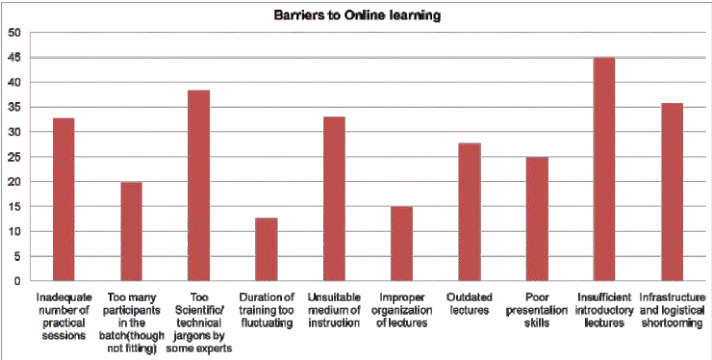


Fig 4. General behavior of respondent

Table 1: Socio-economic profile of respondents (N=400)

Sl. No	Criteria	Class	Frequency (%)
1.	Sex	Male Female	274 (68.50) 126 (31.50)
2.	Age	< 20 years 21-30 years 31-40 years 41-50 years > 50 years	57 (14.25) 134 (33.50) 113 (28.25) 38 (9.5) 58 (14.5)
3.	Marital status	Married Unmarried	321 (80.25) 79 (19.75)
4.	Education	10 th and below 12 th Graduate PG/technically trained	142 35.00) 176 (35.5) 56 (14.00) 26 (6.50)
5.	Income	< 10,000/- 10,000-30,000/- 30,000/-60,000/- > 60,000/- and above	45 (11.25) 98 (24.50) 114 (28.50) 143 (35.75)
6.	Family size	1-2 3-4 5 and more	37 (9.25) 177 (44.25) 186 (46.50)

Table 2 Course Modules Taught

Sl. No.	Course Modules Taught
1.	Button Mushroom Cultivation Technology(Theory &Practical))
2.	Composting, Spawning, Casing (Button mushroom)
3.	Mushroom Production and Processing
4.	Awareness about control unit
5.	Production, processing and value added products development
6.	Crop Management, Harvesting, packaging

7.	Low cost and chemical free substrate - Compost production (Oyster, Milky, Shiitake and Hericium)
8.	Disease, pest, lab weeds and environmental factors of mushroom
9.	Spent mushroom utilization
10.	Cultivation of paddy straw mushroom (Theory and Practical)
11.	Maintenance of culture, media preparation and mother spawn production
12.	Role of banks/NHM/NHB agencies in micro or macro financing for mushroom production

Table 3 Reaction of trainees

Sl.No	Type	Fully Satisfied	Partially satisfied	Not satisfied
1.	Online	34%	51%	15%
2.	Offline	47%	32%	21%

Table 4 Change in knowledge level of respondents after receiving online trainings (n=400)

Sl. No.	Particulars	Pre-test Knowledge (Mean score)	Post-test Knowledge (Mean score)	'p' value
1	Module I	1.70	2.73	0.180
2	Module II	1.45	2.67	0.179*
3	Module III	1.41	2.80	0.977
4	Module IV	1.16	1.85	0.001*
5	Module V	1.37	1.98	0.180
6	Module VI	3.55	4.12	0.001*
7	Module VII	1.15	1.35	0.004*
8	Module VIII	2.25	2.76	0.001*
9	Module IX	1.90	2.55	0.001*
10	Module X	3.24	3.65	0.001*
11	Module XI	1.90	2.17	0.201
12	Module XII	2.25	3.15	0.001*

Table 5 Skills developed by trainees pre and post training

Sl.No	No. of skills	Pre-training (%)	Post -training (%)	"p" value
1.	0	67.81	3.86	0.180
2.	1-3	17.83	42.10	0.001*
3.	4-5	1.54	38.20	0.004*
4.	6 or more	0.00	15.65	0.180

*1% level of significance

Table 6 Respondents gaining after training

Sl.no	Monthly gain(Rs)	Income(%)	Savings(%)
1.	Up to 2000	66.67	86.11
2.	2000-3000	20.83	5.56
3.	3000-5000	8.33	5.56
4.	> 5000	4.16	2.78

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