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VALUE ADDITION TRAINING TO AGRICULTURAL EXTENSION FUNCTIONARIES: A PRE AND POST-TEST ANALYSIS

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ABSTRACT

This study evaluated the perceived effectiveness of a value-addition training program on the awareness of agricultural extension functionaries. Using a pre- and post-test analysis, the impact of the training on enhancing awareness and understanding of value-addition practices was assessed through the first two levels of Kirkpatrick's model. The sample comprised all participants of the training program on value addition. The results demonstrated a significant increase in post-test scores (mean = 80.63) compared to pre-test scores (mean = 75.20), with the Wilcoxon signed-rank test revealing highly significant results ($p < 0.01$). The training program markedly improved the awareness levels of extension functionaries, thereby enhancing their ability to promote value-addition practices. This, in turn, contributed to increased income, rural development, and food security. Significant improvements were observed in key areas such as farmers' income, off-farm employment, and the reduction of post-harvest losses, highlighting the program's success in these domains. However, areas such as food production and market roles showed minimal change, suggesting the need for more specialized or in-depth training. These findings emphasize the importance of a holistic approach that integrates technology, marketing, and capacity building to achieve sustained agricultural growth and effective value addition.

Keywords: Kirkpatrick Model, Training programme, Transfer of technology

There is significant potential for advancing agriculture and its products in India, where the economy relies heavily on primary agriculture as a key sector with considerable impact (Lakshmi and Aparna, 2022). Agro-processing has emerged as a burgeoning sector within the Indian economy, recognized for its substantial growth potential and significant socio-economic benefits, especially in terms of employment and income generation. Initiatives aimed at adding value to agricultural products, particularly those targeting women, have the potential to boost family income by approximately 30,000 to 40,000 rupees per year (Sharma, 2017). Value addition in agricultural crops has proven essential for increasing farmers' incomes, fostering rural development, and ensuring food security (Dey *et al.*, 2018; Kumar *et al.*, 2019; Amare *et al.*, 2021).

Agricultural extension functionaries have been identified as crucial intermediaries between research institutions and farmers, tasked with disseminating knowledge and information about value-addition techniques (Govindarajan and Rajendran, 2017; Zeng *et al.*, 2019). To effectively promote and support these practices, it is essential for extension functionaries to possess a thorough understanding and awareness of the subject. Inadequate awareness and training among these functionaries can impede the adoption of value-addition practices. Thus, comprehensive training is vital to enable extension functionaries to deliver value-addition initiatives effectively at the grassroots level, empowering farmers with the necessary knowledge and skills to exploit value-addition opportunities and enhance their income. Without such training, the potential benefits for rural communities may be limited (Kadam and Palaskar, 2020). To address this need, a training program was developed to improve extension functionaries' awareness of value addition in agricultural crops.

The purpose of the study was to evaluate the perceived effectiveness of the training program through a pre- and post-test analysis (Smith *et al.*, 2020). The

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pre-test was administered prior to the training to gauge the baseline level of awareness among extension functionaries. Following the training, a post-test was conducted to assess improvements in their knowledge and understanding of value-addition practices. By comparing the pre- and post-test scores, the study aimed to measure the impact of the training program on enhancing extension functionaries' awareness of value-addition techniques for agricultural crops.

This study aimed to assess the baseline level of awareness among agricultural extension functionaries regarding value addition to agricultural crops prior to the training program. Following the completion of the training, the study sought to measure the level of awareness through a post-test. By comparing the pre- and post-test scores, the study aimed to evaluate the effectiveness of the training program in enhancing the functionaries' understanding of value-addition practices. Additionally, the study intended to identify specific areas where extension functionaries might require further support and training.

By achieving these objectives, the study aimed to offer valuable insights into the impact of training programs on enhancing the knowledge and skills of agricultural extension functionaries. This, in turn, is expected to contribute to the promotion of value addition practices in agriculture, ultimately benefiting farmers and rural communities.

MATERIALS AND METHODS

The Kirkpatrick Model is a widely used framework for evaluating the effectiveness of training programs, encompassing four levels: Reaction, Learning, Behavior, and Results (Kirkpatrick, 1996). Each level builds on the previous one to provide a comprehensive assessment of training impact.

Reaction: This level measures participants' immediate responses to the training, focusing on their satisfaction and engagement. It aims to assess whether the training was well-received and perceived as relevant and enjoyable. Common methods for collecting reaction data include surveys, feedback forms, and questionnaires administered immediately after the training session.

Learning: This level evaluates the extent to which participants have acquired the intended knowledge, skills, and attitudes from the training program. It measures the increase in participants' knowledge or capabilities as a direct result of the training. Evaluation methods at this level often include pre- and post-training tests, quizzes, practical demonstrations, and assessments to determine whether the training content was effectively communicated and understood by the participants.

Together, the Reaction and Learning levels offer immediate feedback on both the training experience and its educational impact. The Reaction level ensures that the training environment is conducive to learning by assessing participants' satisfaction and engagement, while the Learning level verifies the actual acquisition of knowledge and skills. These foundational levels are essential for the success and continuous improvement of training programs. In contrast, the Behaviour level assesses how effectively participants apply what they have learned in their job roles, while the Results level measures the overall impact of the training on organizational goals and outcomes. This comprehensive approach ensures that training programs are not only well-received and educational but also translate into tangible improvements and benefits for the organization.

The training program aimed at improving farmers' income through value addition was held at State Agricultural Management and Extension Training Institute (SAMETI), Vijayawada, in September 2023. This study employed a pre- and post-test design to evaluate the effectiveness of the training in enhancing agricultural extension functionaries' awareness. Participants were selected through purposive sampling, based on their roles as intermediaries between research institutions and farmers. The training program was comprehensive, featuring theoretical lectures, practical demonstrations, case studies, and interactive sessions. It covered a range of value addition techniques for agricultural crops, emphasizing best practices, processing methods, and economic benefits. The program was conducted by subject matter experts, agricultural specialists, and experienced trainers to ensure an in-depth and practical learning experience.

Before the training program, a pre-test was administered to the selected extension functionaries to gauge their existing level of awareness regarding value addition practices. The pre-test included an assessment of participants' understanding of value addition concepts and their applications in agriculture. Responses were collected using a 3-point continuum—**Agreed, Undecided, and Not Agreed**—to evaluate their familiarity with and perceptions of value addition practices. The statements and corresponding responses are detailed in the following table.

S.No.	Particulars
1	Due to Government and Extension efforts, food production has increased. (+)
2	Due to Government and Extension efforts, the majority of farmers' income has not increased. (+)
3	Value addition improves off-farm employment opportunities. (+)
4	Value addition of agricultural products does not affect their shelf life. (-)
5	The market is not the key to the success of any product. (-)

6	Value-added products should have high value for high volume. (-)
7	Value addition helps in the avoidance of post-harvest losses. (+)
8	Value addition will not decrease food wastage in India. (-)
9	Value-added products are changing only for consumption purposes. (+)
10	Value addition starts from post-harvesting operations. (-)
11	Value addition may be merely a form of an agricultural product. (-)
12	The fortification and enrichment of foods during processing harm population health. (-)
13	Agro-processing improves value-addition opportunities (+)
14	India's dietary patterns are changing across both urban and rural landscapes (+)
15	The brand ensures consistent and assured quality for consumers. (+)
16	I buy good brands and high-quality food to ensure the best for my family. (+)
17	Branding does not offer the most value addition to agricultural crops. (-)
18	Branding assures greater returns to exporters but not to farmers. (-)
19	Marketers must articulate the voice of the customer to segment the market. (+)
20	The 4Ps of marketing are Production, Place, Price, and Promotion. (-)
21	The 4Ps present the marketing mix elements from the buyer's perspective rather than the seller's. (-)
22	The 4Cs present the marketing mix elements from the buyer's perspective rather than the seller's. (+)
23	Quality is not the key to marketing success. (-)
24	The farmer gets maximum value when selling produce directly to the consumer. (+)
25	Advertisements are necessary for the sale of value-added agricultural products. (+)
26	Social media enhances the efficiency of agricultural marketing. (+)
27	There is no possibility of value addition of farm produce due to fragmented land holdings. (-)
28	Cooperatives cannot help farmers move up the value chain through ownership. (-)
29	Inadequate technological knowledge hinders the value addition of agricultural crops. (+)
30	India's geographical situation does not provide a unique advantage for the export of value-added agricultural products. (-)
31	Technology transfer and capacity building are not linked together. (-)
32	I have published or documented success stories on value addition. (+)
33	I will not publish or document success stories on value addition. (-)

The program was conducted over a predetermined duration, providing participants with ample opportunity to acquire knowledge and skills. Upon completion of the training, a post-test was administered to evaluate the effectiveness of the intervention. Both the pre-test and post-test utilized knowledge assessments to measure improvements in participants' understanding of value addition practices.

The study collected feedback from trainees regarding constraints and suggestions for value addition in agriculture using an open-ended question format. The responses were tabulated, and a percentage analysis was performed to identify common themes and trends. This qualitative approach provided a comprehensive understanding of the trainees' perspectives, offering valuable insights for refining and tailoring the value addition training program to better address their needs and challenges. For the statistical analysis, mean scores were calculated, and paired t-tests or Wilcoxon signed-rank tests were employed, depending on data distribution, with a significance level set at $p \leq 0.05$.

RESULTS AND DISCUSSION

From Table 1, it is evident that the majority of participants (40%) were between 36 and 45 years old. A significant proportion of the participants (83.34%) had 11 to 20 years of experience in the field. Additionally, 60% of the participants had completed a B.Sc. in Agriculture, and 73.34% held the position of Mandal Agriculture Officer.

Table 1. Profile characteristics of the respondents

Sr. No.	Particulars	Frequency	Percentage
1	**Age**		
	≤ 35 years	1	3.33
	36-45 years	12	40.00
	> 46 years	17	56.67
2	**Experience**		
	≤ 10 years	2	6.66
	11-20 years	25	83.34
	> 21 years	3	10.00
3	**Education**		
	B.Sc. Agriculture	18	60
	MSC Agriculture	12	40
4	**Designation**		
	Mandal Agriculture officer	22	73.34
	Assistant Director of Agriculture	7	23.33
	Deputy Director or Director	1	3.33

Table 2. Percentage analysis about value addition concepts

Sr. No.	Particulars	Pre test	Post test
1	Food production was increased	97.78	97.78
2	Farmers income was not increased	77.78	80.00
3	Value addition improves off-farm employment	88.89	91.11
4	Shelf life remains same	72.22	75.56
5	The market is not the key to success	80.00	78.89
6	High value for high volume	70.00	77.78
7	Avoidance of post-harvest losses	83.33	86.67
8	No reduction in food wastage	72.22	76.67
9	Not changing only for consumption	87.78	90.00
10	Value addition starts from post-harvesting operations	58.89	63.33
11	Value addition may be merely a form of an agricultural product	51.11	64.44
12	Fortification can harm health	64.44	75.56
13	Agro-processing improves value-addition opportunities	94.44	96.67
14	India's dietary patterns have been changing	90.00	91.11
15	The brand brings consistent and assured quality	86.67	85.56
16	Buying good brands and high quality food	76.67	82.22
17	Branding will not offer the most value addition	80.00	85.56
18	Branding will assure greater returns	58.89	66.67
19	Marketers must articulate the voice of the customer	73.33	84.44
20	The 4 Ps of marketing	47.78	64.44
21	The 4Ps present the marketing mix elements from the buyer's perspective	54.44	65.56
22	The 4Cs present the marketing mix elements from the buyer's perspective	75.56	78.89
23	Quality is not the key to marketing success	72.22	78.89
24	The farmer gets maximum value when selling directly to the consumer	83.33	90.00
25	Advertisements are necessary for the sale of value-added agri-products	92.22	93.33
26	Social media enhances the efficiency of agricultural marketing	93.33	95.56
27	No possibility of value addition of farm produce	71.11	72.22
28	Cooperatives cannot help farmers move up the value chain through ownership	67.78	82.22
29	Inadequate technological knowledge hinders value addition	88.89	92.22
30	India's geographical situation does not give an advantage for the export of value added products	63.33	77.78
31	Technology transfer and capacity building are not linked	75.56	86.67
32	Published or documented success stories on value addition	80.00	75.56
33	Will not publish or document success stories on value addition	76.67	84.44

The data represents the outcomes of a training program designed to enhance agricultural value addition, analyzed through the pre-test and post-test percentages of trainees' responses. Significant improvements were observed across various aspects, reflecting the positive impact of the training. This indicates that the program effectively enhanced participants' understanding and awareness of value addition practices in agriculture.

The most notable increase was observed in the understanding that value addition can be merely a form of an agricultural product, which rose from 51.11% to 64.44%. Additionally, the perception of the 4Ps of marketing saw a substantial improvement, with scores increasing from 47.78% to 64.44%. Recognition of the fact that India's geographical situation does not provide an advantage for the export of value-added products grew from 63.33% to 77.78%. Moreover, insights into the lack of linkage between technology transfer and capacity building improved significantly, with scores rising from 75.56% to 86.67%. These results highlight the positive impact of the training program on participants' understanding of various aspects of agricultural value addition.

Understanding of branding for greater returns increased from 58.89% to 66.67%, while awareness of the importance of high-value production for high volume rose from 70.00% to 77.78%. Additionally, trainees' perception of post-harvest operations as the starting point for value addition improved from 58.89% to 63.33%. These improvements reflect a deeper grasp

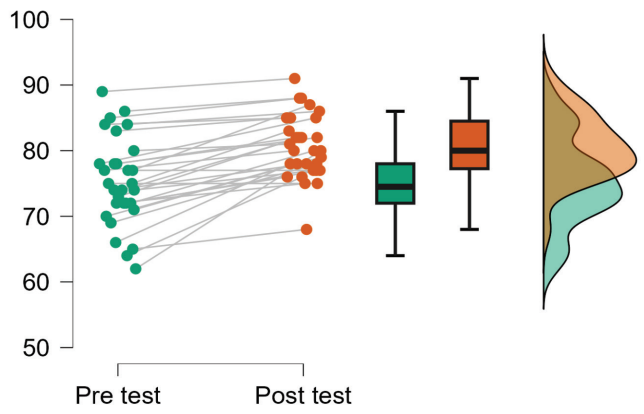

Fig. 1. Raincloud plot of pre and post-tests

of key concepts related to value addition as a result of the training program.

Despite these positive outcomes, certain areas, such as food production and market roles, demonstrated minimal change, indicating that these topics may need more in-depth or specialized training. Additionally, the slight decrease in the perception of consistent quality through branding underscores the need for continued emphasis on quality assurance in branding strategies. Overall, the findings highlight the importance of multifaceted training programs that integrate technology, marketing, and practical skills to drive sustained improvements in agricultural value addition and marketing effectiveness.

The graph clearly illustrates an increase in post-test scores compared to pre-test scores, indicating an improvement in participants' performance following the training program. Additionally, the distribution pattern of scores shows variation, reflecting a positive shift in participants' understanding of the subject matter as a result of the intervention.

Table 3. Result of Wilcoxon signed rank test

	N	Mean	Z value	P value
Pre-test	30	75.20	-4.623	*< 0.001*
Post-test	30	80.63		

The results indicate a significant difference between the mean values of the pre-test (75.20) and post-test (80.63). The Wilcoxon signed-rank test further confirms that these differences are highly significant, highlighting the effectiveness of the training program in enhancing participants' understanding and performance.

CONCLUSION

The training program effectively enhanced the trainees' understanding and perceptions of various aspects of agricultural value addition, as evidenced by the post-test results. Notable improvements were observed in areas such as farmers' income, off-farm employment, and the reduction of post-harvest losses, demonstrating the program's success in these domains. Significant gains in knowledge about high-value production, value addition processes, and modern marketing strategies, including the 4 Ps and the role of social media, highlight the comprehensive impact of the training. However, minimal changes in food production and market roles suggest a need for more focused training in these areas. Additionally, the slight decrease in perceived quality through branding highlights the importance of maintaining consistent quality assurance. To address these findings, policy implications include developing specialized training modules for food production and market roles, implementing robust quality assurance policies, promoting advanced technologies and social media in agricultural marketing, supporting high-value production and value addition processes, and investing in capacity-building initiatives to equip farmers with essential skills and knowledge.

Authors' contribution

Conceptualization and designing of the research work (MV); Execution of field/lab experiments and data collection (MV); Data Analysis and interpretation (VPHD, AL, AM, KP); Preparation of manuscript (MV, VPHD, AL, AM, KP, CGB).

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