Effectiveness of Advisory Videos in Educating Tea Smallholders in Sri Lanka

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Abstract. The use of advisory videos is becoming prominent in agricultural extension, particularly for reaching small-scale farmers with timely and targeted information. This study was conducted to test the effectiveness of video-based advisories in enhancing the knowledge of tea smallholders in Sri Lanka, focusing on three key areas: nursery management, foliar fertilizer application, and labour wage issues. According to the farmers' perspective, some problems were associated with the access to the updated and valid sources of information. A design-based research approach was adopted. The research process comprised three stages: audience analysis, advisory video development, and video evaluation. This study was conducted during the period of December 2024 – March 2025. Based on the audience analysis results, ten short video clips (4– 8 minutes) were developed using documentary and interview-style formats. A pre-test and post-test design was implemented with 30 smallholders, randomly assigned to two groups to assess knowledge levels before and after viewing the videos. Data were analyzed using the paired sample t-test. The results indicated significant knowledge improvement after watching videos across the selected topics ($t = 5.19$, $p < 0.005$). Hence, the video-based extension can have a significant impact on the knowledge level improvement of tea smallholders, and it can serve as a valuable supplement to traditional agricultural training. Also, the learning outcomes of the tea smallholders varied significantly with the variations of educational background and digital media literacy. This study recommends further research on long-term knowledge retention, technology access, knowledge improvement, and farmer adoption rates.

Keywords: Advisory videos, Tea smallholders, Design-based research, Video-based learning, Digital media

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1 Introduction

Tea [*Camellia sinensis* (L.) O. Kuntze] is an important crop to Sri Lanka regarding land use, foreign exchange earnings, and employment generation. It plays a vital role in the economy, in 2024, Sri Lanka's tea exports generated $1.43 billion, according to the Central Bank of Sri Lanka (Central Bank of Sri Lanka, 2024). The total made tea production of Sri Lanka was recorded as 262.16 million kg in 2024 (TEA, 2025). Approximately 10% of the population of Sri Lanka is engaged in the tea industry as a livelihood (Jayasinghe and Kumar, 2019). Tea smallholdings own less than 10 acres (4 ha) of land, and they hold over 60 percent of the tea lands in Sri Lanka. Also, tea smallholders play a significant role in the Sri Lankan tea industry, contributing over 75 percent of the total production (Progress Report 2024, Ministry of Plantation and community Infrastructure).

Videos combine visuals, audio, and text to deliver information effectively, and they enhance farmers' access to information while influencing behavioral change in farming practices (Gunapala et al., 2022). Also, videos significantly enhance awareness, knowledge acquisition, and uptake of innovations among farmers (Karubanga et al., 2017). Video-based learning can be a cost-effective way to reach a large number of farmers and empower them with the knowledge and skills they need to improve their productivity, profitability, and sustainability. Moreover, videos can be easily shared through various digital channels, including mobile phones, social media platforms, and community-based video screenings. The rise of online video platforms and social media has created new opportunities for video-based extension, allowing extension officers to easily share videos with farmers.

Design-Based Research (DBR) is a research approach that emphasizes the link between research and practice. It aims to address real-world problems through iterative cycles of design, implementation, analysis, and redesign. DBR emphasizes collaboration between researchers, educators, and practitioners to identify and resolve problems by generating both practical solutions and theoretical insights (Vaezi et al., 2019). According to McKenney and Reeves (2012), DBR involves three main phases, including analysis, design and, evaluation (Fig.1.).

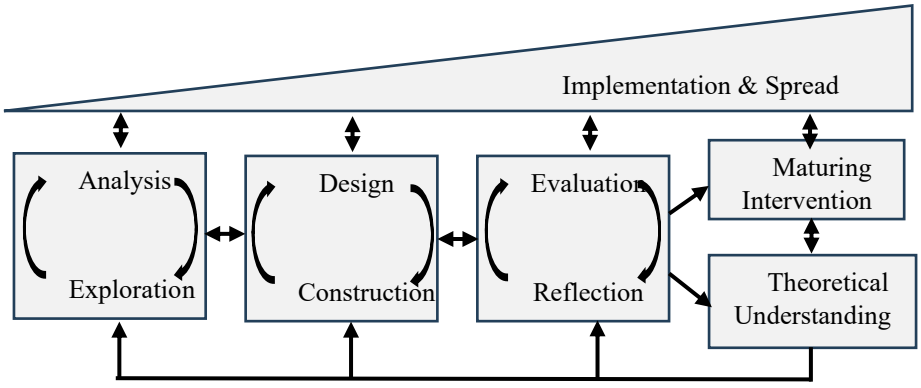

Fig. 1. A Design-based research model (Source: McKenney and Reeves, 2012)

Under the diverse information needs of tea growers, the current knowledge dissemination system faces several problems due to inadequate extension staff, a lack of qualified extension officers, and insufficient monitoring and evaluation mechanisms in extension channels. Therefore, traditional extension methods such as individual field visits and group training are inadequate to fulfill the information needs in the Sri Lankan tea sector (Gunapala et al., 2022). Also, traditional agricultural extension methods often struggle to reach all tea smallholders due to geographical limitation, and resource constraints (Weththasinghe and Dissanayeke, 2024). This can result in low adoption of new technologies among tea growers and finally affect overall tea production in Sri Lanka. Hence, there is an urgent need for innovative extension approaches that can effectively disseminate information and promote sustainable practices among tea smallholders.

2 Methodology

Information and Communication Technology (ICT) based approaches are becoming vital tools for agricultural extension, especially in regions with limited access to traditional advisory services (Xu et al., 2023). ICTs can overcome geographical barriers and deliver timely-relevant information to farmers, empowering them to make informed decisions and improve their agricultural practices (Weththasinghe and Dissanayeke, 2024). The integration of ICTs in agricultural extension can also enhance the efficiency and effectiveness of extension staff, enabling them to access and share information more easily (Singh, 2011). Among different types of ICT-based approaches, video-based extension offers the ability to reach a wider audience, deliver consistent information, and provide visual demonstration of complex agricultural practices with real-life applications while serving as a bridge between traditional and digital extension models.

Traditional agricultural extension systems are becoming inadequate in addressing the diverse and location-specific information needs of tea smallholders, due to limited personnel, geographic constraints, and lack of customized advisory services. With the rise of digital technologies, video-based advisories offer a scalable, cost-effective, and engaging alternative for knowledge dissemination. However, there is limited empirical evidence on their actual effectiveness in enhancing smallholders' knowledge and the contextual factors influencing their learning outcomes.

Therefore, this study aims to explain how advisory videos impact the knowledge acquisition of tea smallholders in the Mid-country and Uva regions. Furthermore, it aimed to address the lack of access media on knowledge sources in tea sector. This study also identified three key areas of information needs namely tea nursery management, foliar fertilizer application, and labour wage issues among tea smallholders.

This study targeted tea smallholders, defined here as those managing landholdings of less than 10 acres, in the Mid-country and Uva tea-growing regions, considering the

limited research carried out to explain information seeking behaviours of tea smallholders in these areas.

The study adapted a Design based research model (DBR) proposed by McKenney and Reeves (2012) to analyze the audience, design and, evaluate a series of advisory videos. The model was selected to ensure that video-based advisory intervention was designed with contextual relevance and educational value in mind, allowing for continuous improvement based on actual field experiences.

A mixed-methods applied research design was adopted for the data collection. Quantitative methods (e.g., pre- and post-tests) were used to measure knowledge improvement, while qualitative methods (e.g., semi-structured interviews) were employed to explore information needs, learning behaviors, and media access.

A multi-stage sampling procedure was employed to ensure a representative and practical selection of tea smallholders from the two regions:

Stage 1: Two major tea-growing regions—Mid-country and Uva—were selected due to their high concentration of smallholder tea cultivation and the availability of operational support from the Tea Research Institute (TRI).

Stage 2: Within each region, key Divisional Secretariat areas with significant smallholder presence were identified in consultation with the Tea Small Holdings Development Authority (TSHDA).

Stage 3*:* From each selected division, a list of registered tea smallholders (owning less than 10 acres) was obtained. Using multistage sampling, 30 smallholders (15 from each region) were selected as the final study sample.

A total of 30 tea smallholders participated in the study. Data were collected in two phases namely i) audience analysis, and ii) video evaluations.

3 Research Process

The research process followed three stages aligned with the DBR framework proposed by McKenney and Reeves (2012). Accordingly, the study included three phases including audience analysis, advisory video development, and evaluation of the effectiveness of videos. Findings of each phase were used in planning and implementing the consecutive stages (Fig.2.).

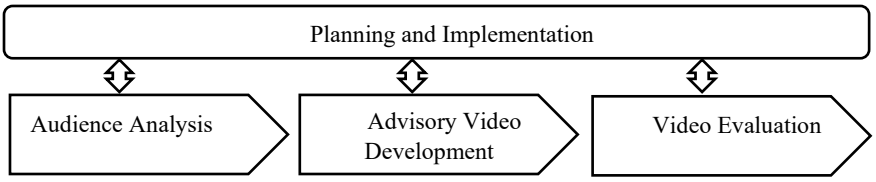

Fig. 2. Phases of Design-Based Research process

3.1 Phase 1: Audience Analysis

The audience analysis was conducted to identify the information needs, media access facilities, language preferences on advisory videos, and learning behaviour of the tea smallholders. Data were collected using semi-structured interviews, and a questionnaire survey. Data related to knowledge levels, preferred learning methods, and specific information needs of respondents were gathered. Also, the secondary data that was obtained from the TRI call center from 2021 to 2023 was reviewed to identify the area of frequent knowledge requirements of tea smallholders in Sri Lanka. Data were tabulated in Microsoft Excel and analyzed using the Statistical Package for Social Sciences (SPSS). Descriptive methods were used for the audience analysis to understand the information needs of the tea smallholders. Findings of the audience analysis were used in designing and developing advisory videos in the next phase.

3.2 Phase 2: Advisory Video Development

Key areas of the videos were identified based on the audience analysis. The video development process began with script writing. Video scripts were theoretically informed following the Constructivism learning theory (Vygotsky, 1978), Social Learning Theory (Bandura, 1977), Cognitive Load Theory (Sweller, 1988), and Multimedia Learning Theory (Mayer, 2001). Also, contents were designed in a way to make them regionally appropriate and easily accessible for the target audience with different literacy levels.

Visual elements and key demonstration points were outlined in the script to guide the production team during the filming process. The Subject Matter Experts (SMEs) from TRI were identified and interviewed in the interview-type videos. Moreover, all the videos were submitted to SMEs and extension staff of TRI to validate the videos based on their knowledge, practical insights, and experiences. Their practical insights and real-world experiences helped to enhance situated learning element and bring credibility and richness to the content, supporting learning construction (Vygotsky, 1978).

High-quality equipment was used for video recording to ensure clear visuals and audio content. The filming process included both interview-style and live-action demonstrations of technical facts in nursery management, foliar fertilizer application, and other key areas. Appropriate locations for each video were selected with the guidance of SMEs. The editing of videos involved enhancing the audio-visual quality. Background music and subtitles were added to enhance comprehension. In addition, on-screen text was added to emphasize important points and improve understanding. Adobe Premiere Pro and DaVinci Resolve software were used to edit the video clips.

Finalized videos were uploaded to the official YouTube channel of TRI <https://www.youtube.com/@Tea_Research_Institute/> to make them freely accessible to the public. However, all the videos were shared among the selected farmers through WhatsApp messenger forum.

3.3 Phase 3: Video Evaluation

To assess the educational effect of the videos, a pre-test and post-test evaluation was conducted. A validated questionnaire was used to assess the respondents' knowledge, with evaluations conducted both before and two days after viewing the videos. Data were analyzed using a paired sample t-test to compare knowledge of the tea smallholders before and after watching the videos.

The hypothesis testing framework for this study was defined as follows:

H_0 (Null Hypothesis): There is no significant difference in the knowledge level of tea smallholders before and after watching the advisory videos.

H_1 (Alternative Hypothesis): There is a significant difference in the knowledge level of tea smallholders before and after watching the advisory videos.

3.4 Secondary Data Review:

Relevant data were obtained from journal articles, institutional publications, web-based sources, and unpublished records from government institutions, including the Tea Research Institute of Sri Lanka (TRI) and the Tea Small Holdings Development Authority (TSHDA).

4 Results and Discussion

4.1 Information Needs of Tea Smallholders

Key information needs were identified by analyzing TRI caller center data and during the farmer interviews. The farmer interviews highlighted significant knowledge gaps in several critical areas: nursery management, foliar fertilizer application, wage hike issues, pest and disease management, soil and water management, and market and business knowledge. Similarly, the secondary data analysis based on TRI call center data from 2021 to 2023 (Fig.3.) showed that the majority of the callers were required recommendations regarding the fertilizer (22%), requesting planting material (11%), and nursery management (9%).

Based on the above results of the audience analysis, there were major knowledge gaps in nursery management and foliar fertilizer application. Also, tea smallholders expressed interest in being aware of labor wage issues during interviews. Therefore, three key areas were identified to create advisory video clips, namely, nursery management in tea, wage hike issue, and labour management in tea cultivation and foliar fertilizer application.

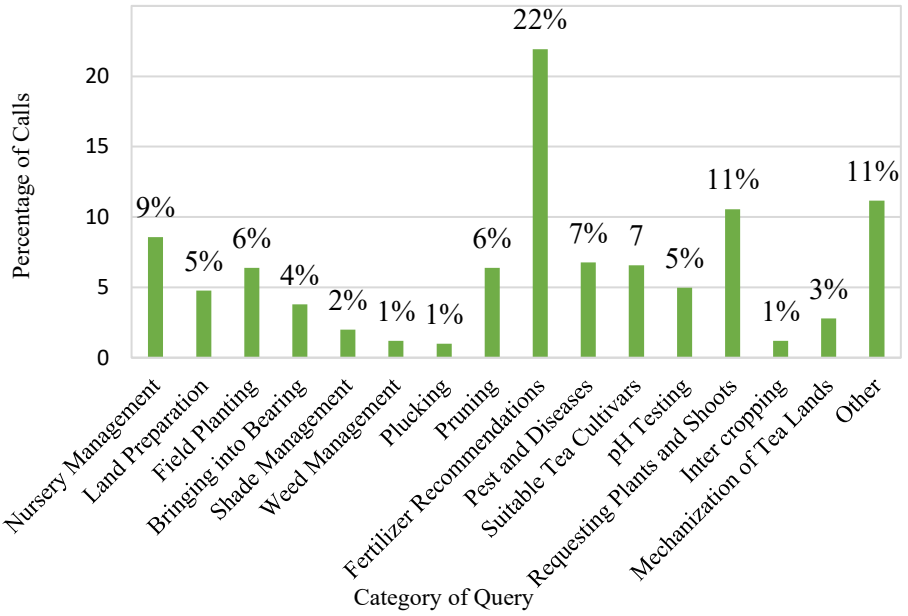

Fig.3. Frequently requested areas of information from TRI call center (2021-2023)

4.2 Advisory Videos

Based on the key areas identified during the audience analysis phase, a series of advisory videos with short durations (4 -8 minutes) were prepared under each thematic area, namely, nursery management in tea, wage hike issue, and labour management in tea cultivation and foliar fertilizer application (Table 1). Videos were produced in the Sinhala medium using a mix of documentary and interview formats to ensure the easy accessibility and reliability of the content. Moreover, the videos were uploaded to the YouTube channel as playlists based on the thematic areas.

Table 1. Features of prepared advisory videos

No.	Thematic Area	Subtopic	Duration	Format	Language
V1	Nursery management	Site selection, fumigation and bag filling	7.03 minutes	Documentary	Sinhala
V2	Foliar fertilizer application	What are foliar Fertilizers? What is the significance in	5.22 minutes	Interview	Sinhala

		modern agriculture?			
V3	Foliar fertilizer application	Application methods of foliar fertilizers	2.18 minutes	Interview	Sinhala
V4	Foliar fertilizer application	Timing and dosage of foliar fertilizers	7.44 minutes	Interview	Sinhala
V5	Foliar fertilizer application	What are the potential risks of using non-recommended foliar fertilizers?	6.04 minutes	Interview	Sinhala
V6	Foliar fertilizer application	Factors considered during foliar fertilizer application	4.07 minutes	Interview	Sinhala
V7	Foliar fertilizer application	What are the potential risks can arise from the excessive application?	5.19 minutes	Interview	Sinhala
V8	Wage hike issues and labor management	What is the significance of Estate workers in the tea sector?	3.55 minutes	Interview	Sinhala
V9	Wage hike issues and labor management	What are the factors affecting the wage issues?	4.19 minutes	Interview	Sinhala
V10	Wage hike issues and labor management	How does an increase in estate workers, wages influence the overall cost of sustainability of tea cultivation?	6.34 minutes	Interview	Sinhala
V11	Wage hike issues and labor management	What strategies can be implemented to minimize the impact of wage hike?	7.39 minutes	Interview	Sinhala

4.3 Effectiveness of Advisory Videos

The effectiveness of the videos was evaluated based on both the knowledge gain of the participants and the quality of the videos. To assess knowledge improvement among tea smallholders, a pre-test and post-test design was employed. The evaluation was conducted using a self-developed assessment tool, in which each correct answer was awarded one point. The tests were designed to measure the participants' understanding of selected key topics before and after viewing the advisory videos.

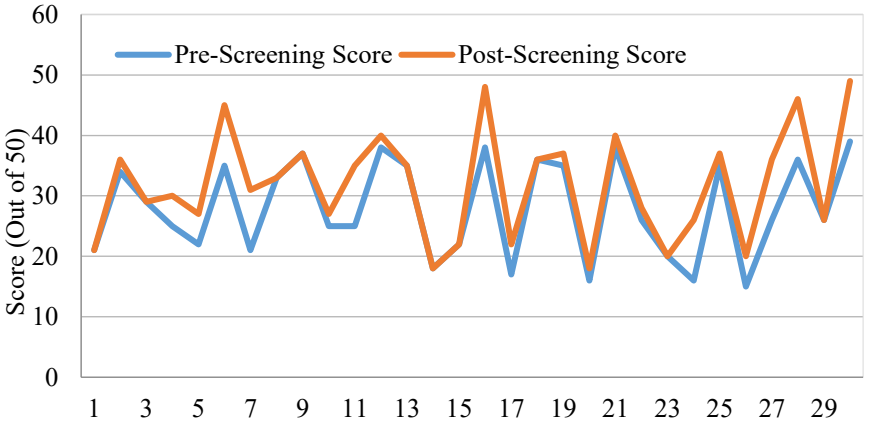

Fig.4. Pre-screening and post-screening scores of respondents

According to Fig.4., the pre-screening and post-screening marks of the respondents. It indicates that there is a significant increase in post-screening score than the pre-screening score of most respondents. Some respondents showed a substantial improvement of up to 10 points, suggesting strong engagement and learning. In contrast, others exhibited no change at all, indicating that the videos may not have been equally effective for every viewer. This variability highlights the importance of considering individual learning preferences, pre-existing knowledge, and possibly the need for more personalized or supplementary extension approaches.

Table 2. Results of paired sample t-test

Pair	Mean Difference	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pre-Screening - Post-Screening	-3.7	4.1	0.74	-5.19	29	0.000015

This shows that the advisory videos were effective in enhancing the tea smallholders' understanding of the selected subject areas. Equally, [11] highlighted the role of videos as educational tools in agriculture with significant knowledge gains among farmers after viewing the advisory videos. Also, a study revealed that farmers exposed to the videos demonstrated higher adoption rates of farming practices, leading to an increase in production (Alalade et al., 2022). However, the little or no change of knowledge gain highlighted that the influence of factors such as prior knowledge, digital literacy, and learning preferences is affecting to enhancement of knowledge of tea smallholders by watching advisory videos. Similarly, Mittal and Mehar (2012) found that digital literacy is critical for effective use of ICT-based advisories.

According to the feedback of respondents on content clarity and understandability, 80% of participants reported that the explanations were clear and easy to follow. However, 15% noted that some technical terms could benefit from simpler language, and 5% suggested that more visual demonstrations would enhance comprehension. Also, feedback on visual and audio quality was generally positive, with 75% rating the visuals as clear and effective. Still, 20% recommended adding captions or subtitles to improve accessibility, and 5% reported difficulty hearing due to background noise in a few segments (Fig.5.). Further, Chivers et al. (2021) highlighted that videos should be short, concise, easily accessible, high quality, practical, and should use farmer-friendly language, and be created by someone whom farmers respect.

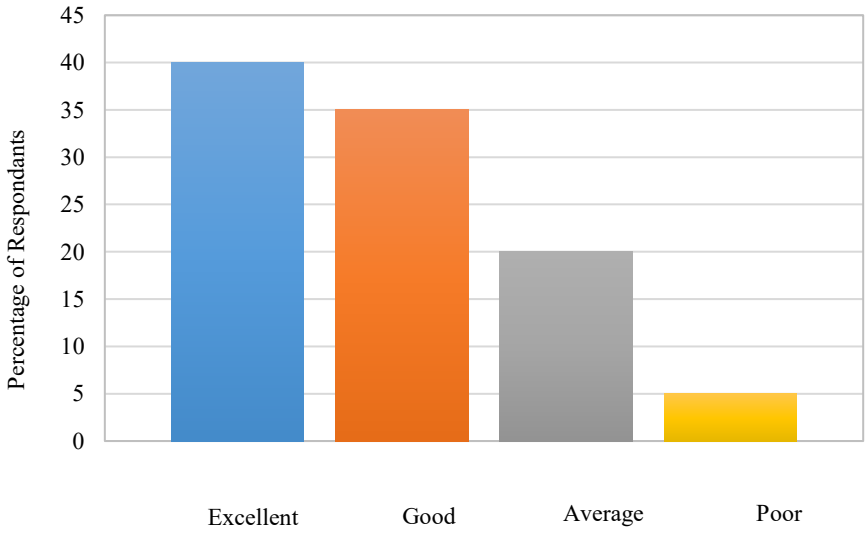

Fig.5. Pre-Screening and Post-Screening scores of respondents

Overall, while the videos were well-received, the feedback pointed out that it is needed to consider on potential improvements in future advisory content more inclusive, accessible, and engaging.

5 Conclusions and Recommendations

The results of the study concluded that video-based extension can have a significant impact on the tea smallholders' knowledge level and improve the knowledge level significantly. Therefore, video-based extension services can serve as a valuable supplement to traditional agricultural training. Also, the learning outcomes of the smallholders can also vary significantly with the impact of variations in other factors like educational background and knowledge of the usage of digital media. Further, it is needed to focus on interactive content, regional customization, and integration with other extension activities for greater impact. Moreover, sharing advisory videos via different digital platforms such as WhatsApp, YouTube, and Facebook can increase the accessibility and visibility of the content. These platforms also provide opportunities for peer-to-peer learning through farmer groups and discussion forums where growers can ask questions and share experiences. Finally, collaborating with government agencies, research institutions, and extension officers is vital to institutionalize video-based learning within official extension programs and ensuring its long-term sustainability. However, further studies are needed to assess long-term knowledge retention among tea smallholders in the Uva and Mid-country regions.

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