Message Frames to Increase Participation in a Conservation and Sustainability Initiative Using QR Code Tracking: A Pilot Study

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Introduction

Conservation and sustainability practices can improve food production efficiency and resilience of farming systems. They can lower the risk of food insecurity (Lipper et al., 2014) and serve as practical solutions for on-farm challenges like climate change (Wakweya, 2023). Climate-smart agriculture practices advance conservation and sustainability and fall under the larger category of smart agriculture with an emphasis on the environmental aspect through farm system optimization (Mizik, 2021). Despite benefits of these practices, prior research indicates that adoption of climate-smart practices among producers in developed countries remains limited (Rosenstock et al., 2016). Thus, there remains a critical need for extension education programs, training interventions, and outreach initiatives that foster understanding, participation, and adoption in climate-smart practices. The literature on effective recruitment strategies for climate-smart initiatives in a developed nation is still underdeveloped, hampering the development of effective communication messages to promote engagement. Digital trace analytics provides a valuable technological approach for measuring engagement and participation. Compared with traditional self-reported survey measures, analytics-based approaches offer a more data-driven, objective, and cost-effective solution. Decision-making research suggests individuals evaluate behaviors based on perceived benefits and risks (Rosenstock, 1974). Message framing that emphasizes economic benefits can increase adoption intentions when audiences are motivated by profitability, whereas environmental benefit framing appeals to sustainability gains (Lele et al., 2018; Ma et al., 2024). Consequently, the way environmental benefits are framed influences participation and adoption decisions in agricultural practice programs. In our study, we used postcards containing embedded QR codes to experimentally test message effectiveness while enabling tracking of engagement and enrollment behaviors. One research question guided the study: What is the effect of environmental or economic benefit message frames on engagement?

Theoretical Framework

Message framing theory refers to how the presentation of the information can affect individual's attitudes and behavioral intentions (Erving Goffman, 1974). In agricultural communications, framing the benefit, such as environmental gains or economic returns, can shape people's decision-making processes (Ma et al., 2024).

Methods

The Texas Climate-Smart Initiative (TCSI) was designed to promote climate-smart practices while creating market opportunities for agricultural commodities in Texas. The pilot study, part of a large study design to understand recruitment and engagement strategies for the project, aimed to engage Texas farmers, ranchers, and small forest owners through two stages. In Stage 1, postcards with a recruitment message and a link (QR code and URL) directed to the project's website were randomly distributed to 12 program ambassadors across Texas who served as the delivery channel. In Stage 2, ambassadors distributed postcards to interested producers. A quasi-experimental design was employed to compare three message conditions—two treatments and one control. Four ambassadors were assigned to the economic-benefits framing condition (treatment group one), four ambassadors were assigned to the environmental-benefits framing condition (treatment group two), and four were assigned to the control condition (control group),

which included only program access information and website links without persuasive framing messages. The front of each postcard displayed the framed message and a QR code. The back included program information using the noted frame with a place for ambassadors to mail to producers if they chose. The QR code was created using Flowcode, which provides scanning analytics, and was linked to the program website. Engagement was measured using unique QR code scans (i.e., unique participants identified) and other digital footprint data. We identified the engagement pattern based on the QR code analytics through descriptive statistics and examined group differences through a chi-square test.

Results

The control condition (n=30) generated the highest level of engagement (e.g., unique scan) with the economic-benefits framing condition (n=19) and environmental-benefits framing condition (n=10) following. A chi-square goodness-of-fit test indicated that engagement differed significantly across framing conditions ($\chi^2(2) = 10.20$, $p < .01$, $N = 59$), indicating participants were more likely to scan the control QR code. Scanning activity occurred between January and May 2025. Distribution of the postcards was halted mid-April 2025 because the project was suspended by the funding agency. Table 1 presents the detailed engagement characteristics.

Table 1: Summary of Engagement Across Conditions

	Environmental	Economic	Control
Unique scans	10	19	30
Total scans	12	22	34
iOS device	100%	70.6%	80.8%
Android	0%	29.4%	19.2%
Frequent times	9 am, 2 pm, 3 pm	9 am, 1 pm, 3 pm	9 am, 12 pm
Frequent days	Tues, Thurs	Wed, Thurs	Fri

Conclusions and Implications

While prior research highlights the effectiveness of economic or environmental benefit framing (Lele et al., 2018; Ma et al., 2024), our results diverge from this pattern, as the control group exhibited greater engagement than either treatment condition. The results indicate that the selected treatment messages were not as effective as hypothesized. This may be related to the two-stage delivery design. Because the research team did not directly interact with producers, ambassadors served as the primary delivery channel. Thus, ambassador characteristics (i.e., personality, schedule, level of activity, time invested in outreach), likely influenced access to the target audience and participation outcomes. The variation in most common day of the week across conditions may also reflect differences in ambassador activity. Therefore, the observed outcomes likely represent message effects and delivery-channel effect. Future research could use a nested-design strategy to control for ambassador activity levels or use more standardized distribution procedures (i.e., direct mailings) to isolate message framing effects. Across all groups, 9 a.m. was the most frequent scanning time, suggesting morning hours may be optimal for future outreach. Additionally, the economic framing condition generated more scans and participation than the environmental framing condition, indicating that economic appeals may be comparatively more effective in encouraging program engagement within this context. Future research should duplicate the study with larger sample size to validate the message effects. Future research can explore other measures of engagement other than QR code scans.

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