Agroecological TRANSITIONS Programme

Use of digital tools in sustainable rice production in the Mekong Delta, Vietnam

Barnard, J. J.
Cuong, O.Q.
Trang, V.H.
Nelson, K.M.

TRANSITIONS

DeSIRA PARTNERSHIPS FOR INNOVATION
IFAD Investing in rural people
Alliance Bioversity & CIAT
CIFOR
World Agroforestry
IRRI
THE UNIVERSITY OF VERMONT GUND INSTITUTE FOR ENVIRONMENT
Agroecology TPP

Correct citation
Barnard, J., Cuong. O.Q., Vu, H.T., Nelson, K.M., 2023. Use of digital tools in sustainable rice production in the Mekong Delta, Vietnam. Agroecological TRANSITIONS: *Inclusive Digital Tools to Enable Climate-informed Agroecological Transitions* (ATDT). Hanoi, Vietnam: International Rice Research Institute (IRRI).

Project Donor Acknowledgement
The *Agroecological transitions for building resilient and inclusive agricultural and food systems (*TRANSITIONS) program is funded by the European Union through its DeSIRA initiative and managed by the International Fund for Agricultural Development (IFAD). This publication was produced by the *Inclusive Digital Tools to Enable Climate-informed Agroecological Transitions* (ATDT) Project under the European Commission grant agreement No. 2000003773. The ATDT project is led by the International Center for Tropical Agriculture (CIAT), part of the Alliance of Bioversity International and CIAT, and regional work in Vietnam is implemented by the International Rice Research Institute (IRRI), which are carried out with support from the CGIAR Trust Fund and through bilateral funding agreements. For more information, please visit https://ccafs.cgiar.org/donors.

Disclaimer
The contents and opinions expressed in this publication are not peer reviewed and are the sole responsibility of the authors. They do not necessarily reflect the views of the European Union, IFAD or affiliated organizations.

Contact
Sadie Shelton [s.shelton@cgiar.org]
Communications Officer
University of Vermont, VT, USA
Alliance of Bioversity & CIAT

Photos
Cover photo: International Rice Research Institute (IRRI)
Back cover: ©2016 Neil Palmer (CIAT)

Executive Summary

This report summarizes findings from a study on digital tool use among rice farmers for the Inclusive Digital Tools Project (ATDT) of the "Agroecological transitions for building resilient and inclusive agricultural and food systems (TRANSITIONS)" program, which is funded by the European Commission through its Development of Smart Innovation through Research in Agriculture (DeSIRA) initiative and managed by the International Fund for Agricultural Development (IFAD). The ATDT regional work in Vietnam focuses on research and engagement with digital tools for technical advice and performance assessment in sustainable rice production in the Mekong River Delta due to the high climate change impacts, mitigation potentials, and sustainability challenges.

This report focuses on the learnings from the study conducted in the Mekong Delta on farming practices and digital tool use by rice farmers. Farmers were randomly sampled, and quantitative data was collected through a survey with 181 farmers and 30 field agents in Thoi Lai, Vinh Thanh, and Co Do districts of Can Tho Province in October and November 2022. The findings are summarized below.

Farmers

- The most common digital tool in use by farmers to access information on rice farming are TV and radio (80%); phone calls (65%); messaging apps such as Viber, Facebook Messenger, and Zalo (45%); social media apps (29%); and video imaging (24%). It is important to note that only 3.3% of farmers use apps specifically designed for agriculture.
- One-hundred and sixteen farmers (64%) have recorded their practices. However, 36% currently do not keep records of their farming practices. Of those that report recorded data to another party (e.g., rice companies, cooperatives, etc.), when asked about the frequency of reporting the practices, 7% said they report daily, 10% weekly, 16% 1-2 times a month, and 67% report 1-2 times per season.
- When the 116 farmers that record their practices were asked about the method they use, 108 farmers (93%) use paper logbooks, 57 farmers (49%) said the input seller keeps their record in the paper purchase diary, eight farmers (7%) said a field agent (local extension or

technicians for a company) records the practice, and two respondents (2%) use mobile apps for recording practices.

Field agents

- Field agents predominantly use mobile phones to work with farmers in the field. Eighty-seven percent have internet access always (70%) or sometimes (17%).
- Only 4% of the field agents report using agriculture-specific apps as a tool to support technical advice or performance assessment.
- The most common use of digital tools is for messaging (e.g., Zalo, Viber, and FB Messenger).
- The frequency of field visits to farmers is very high; 67% of the field agents visit at least once a week, and 33% visit one to three times per month.
- The methods of communication for providing technical advice included digital methods (e.g., telephone) with a mean of 18 times a month, verbal face-to-face during field visits had a mean of 10 times a month, verbal face-to-face during training had a mean of four times a month, and materials (e.g., flyers or books) had a mean of 2.4 times a month.
- There was a significant expression of interest in the use of mobile apps to support technical advice and performance assessment.

Rice standards alignment with agroecology

- The sustainability package "1 Must Do, 5 reductions" (1M5R) was specifically designed for conditions in the Mekong Delta of Vietnam and was certified by the Vietnam government in 2013 as a national approach to promoting the best management practices in lowland rice cultivation.
- 1M5R aligns well with agroecology principles based on FAO's 10 Elements of Agroecology.
- The Sustainable Rice Platform (SRP) standard is the first and only globally accepted standard specific to rice production.
- SRP aligns well with agroecology principles based on FAO's 10 Elements of Agroecology.

Keywords

Sustainable Rice; Digital tools; Inclusion; Mekong Delta; Agroecology; Climate Change

About the authors

Jennifer Barnard (jenjbarnard@gmail.com) is a Sustainable Finance Expert at the International Rice Research Institute in Hanoi, Vietnam

Dr. Ong Quoc Cuong (O.Cuong@irri.org), is a Senior Associate Climate Change Scientist at the International Rice Research Institute in Can Tho, Vietnam

Trang Vu (t.h.vu@irri.org) is an Associate Scientist at the International Rice Research Institute in Hanoi, Vietnam

Dr. Katherine Nelson (k.nelson@irri.org) is a Climate Change Scientist at the International Rice Research Institute in Hanoi, Vietnam

Acknowledgements

This work was implemented with funding from the European Union through its DeSIRA initiative and managed by the International Fund for Agricultural Development (IFAD). The ATDT regional work in Vietnam is implemented by the International Rice Research Institute, funded by the CGIAR. The views expressed in this document cannot be taken to reflect the official opinions of these organizations. We thank all the representatives of Sub-department of Crop Production and Plant Protection, Can Tho City and the farmers for their assistance and support in collecting data.

Contents

Acronyms

1M5R	One must do, five reductions
ATDT	Agroecological TRANSITIONS: Inclusive Digital Tools Project
CO_2e	Carbon dioxide equivalent
DeSIRA	Development of Smart Innovation through Research in Agriculture
FB	Facebook
GDP	Gross domestic product
GHG	Greenhouse Gas
IFAD	International Fund for Agricultural Development
IRRI	International Rice Research Institute
SRP	Sustainable Rice Platform

Introduction

Background

This report summarizes findings from a digital tools survey performed as part of the Inclusive Digital Tools Project of the "Agroecological transitions for building resilient and inclusive agricultural and food systems (TRANSITIONS)" program, which is funded by the European Commission through its Development of Smart Innovation through Research in Agriculture (DeSIRA) initiative and managed by the International Fund for Agricultural Development (IFAD). The ATDT regional work in Vietnam focuses on research and engagement with digital tools for technical advice and performance assessment in sustainable rice production in the Mekong River Delta due to the high climate change impacts, climate change mitigation potentials, and sustainability challenges.

Vietnam is the fourth-largest rice producer and the world's second-largest rice exporter. Rice production contributes 3% to Vietnam's GDP, as the country sells around 8 million tons of milled rice, accounting for one-fifth of worldwide trade volume (US$4 billion in rice export) (Tivet and Boulakia, 2017). The delta encompasses over 40,500 square kilometers across 13 provinces (Renaud and Kunzer, 2012). The Mekong Delta is the country's largest source of rice. It accounts for up to 50% of overall rice output and more than 95% of total milled rice exports in Vietnam. Since the late 1990s, rice production in the Mekong Delta has intensified rapidly, resulting in an overreliance on agrochemicals to achieve higher yields, rising production costs and environmental unsustainability (Umetsu, 2021).

Compared to other agricultural countries in the region, Vietnam ranked second (430 kg ha^{-1}) after China (503 kg ha^{-1}) in terms of fertilizer consumption, while other countries, such as India (166 kg ha^{-1}), Thailand (162 kg ha^{-1}), and the Philippines (157 kg ha^{-1}), consume relatively low amounts of fertilizers per hectare of arable land (Tu, 2017). Each year over 10 million tons of fertilizer are consumed in Vietnam, 80% of which are supplied by domestic factories. Approximately 61% of this amount is used to cultivate rice, and the rest to cultivate maize, coffee, sugarcane, fruits, and vegetables (IFA, 2022). The Vietnamese agricultural sector also uses large amounts of pesticides, despite integrated pest management programs implemented for many years (Nguyen et al., 2019).

Rice production is responsible for 15% of the country's total greenhouse gas (GHG) emissions (MoNRE, 2020). In Vietnam, irrigated rice production emits 50% more carbon dioxide equivalent (CO_2e) than the entire transportation sector, including airplanes, ships, cars, buses, trains, and motorcycles.

To reduce the excessive use of chemical fertilizers and pesticides and to reduce GHG emissions from rice, the Vietnam Ministry of Agricultural and Rural Development (MARD) has encouraged farmers to apply a farming technology known as “1 Must Do, 5 Reductions” (1M5R). The “one must” is to use certified seeds, and the “five reductions” are to reduce the seed rate, use of fertilizers and pesticides, water use, and post-harvest losses. This package includes benefits such as reducing production costs, increasing paddy yield, improving rice grain quality, enhancing farm profit, saving water and natural resources, reducing GHG emissions, and protecting the community’s health (Phung et al., 2014).

The Sustainable Rice Platform (SRP) is the first and only globally recognized sustainability standard specific to rice production. SRP promotes resource-use efficiency and climate change resilience in rice systems (both on-farm and throughout value chains) and pursues voluntary market transformation initiatives through sustainable production standards, indicators, incentive mechanisms, and outreach mechanisms to boost the wide-scale adoption of sustainable best practices throughout rice value chains.

According to a recent study by the Mobile Marketing Association, Vietnam is a mobile-first market, with nearly all internet users owning a smartphone and seventy five percent using it as their preferred connection device. Mobile is also the primary digital platform in rural Vietnam. The market has over 51 million smartphones, representing over 80% of the population aged 15-years and older. Nearly 90% of the rural population in Vietnam own mobile phones. While nearly 70% of those are smartphones, their use may be hindered due to limited 3G and 4G connection. Therefore, rural users predominantly use smartphones at home. Smartphones are used for a variety of purposes in rural areas, including communication, entertainment, and commerce. It is reported that instant messaging apps are used 6-7 times per day (for average 20 minutes per session); particularly, 90% of people who are on the Zalo app use it every day. Interestingly, childless women are more likely to buy mobile data and seem more familiar with using a smartphone compared to women with children (Mobile Marketing Association, 2018). These statistics indicate that the ownership and use of smartphones in rural areas Vietnam is quite extensive and can create favorable conditions for scaling the use of digital tools.

Methodology

This report focuses on the learnings from this study conducted in the Mekong Delta on farming practices and digital tool use of rice farmers and field agents. Respondents were randomly sampled, and data was collected in October and November 2022 through a survey with 181 farmers and 30 field agents in Thoi Lai, Vinh Thanh, and Co Do districts.

Results: Data collection from farmers

Demographic and socio-economic information

For the survey of 181 farmers and 30 field agents, the farmer respondents were split evenly between three districts Thoi Lai (n=60), Vinh Thanh (n=61), and Co Do (n=60). The respondents were 93% Kinh and 7% Khmer which is in line with the ethnic demographics of the region. The respondents were 77% male and 23% female. The average age of the participants was 53 years, with the minimum being 25 years and the maximum being 79. They had been farming for an average of 29 years, though the minimum was one year and the maximum was 55 years. The average household had four members, with the minimum being one and the maximum being 11. Although, in many households, not all members worked on the farms, with the average being two, the minimum being one, and the maximum being five.

The average total area of rice land cultivated by each household is two hectares, with the minimum being 0.3 hectares and the maximum being 11.5 hectares. The farmers were using a 5ariety of farming approaches, as shown in Figure 1. The most common approaches were conducting individual farming and selling directly to traders or millers (54%); cooperatives that have farming contracts with a company (30%); individual farmers contracted with a private company (15%); and cooperatives that do not have a farming contract with a company (1%).

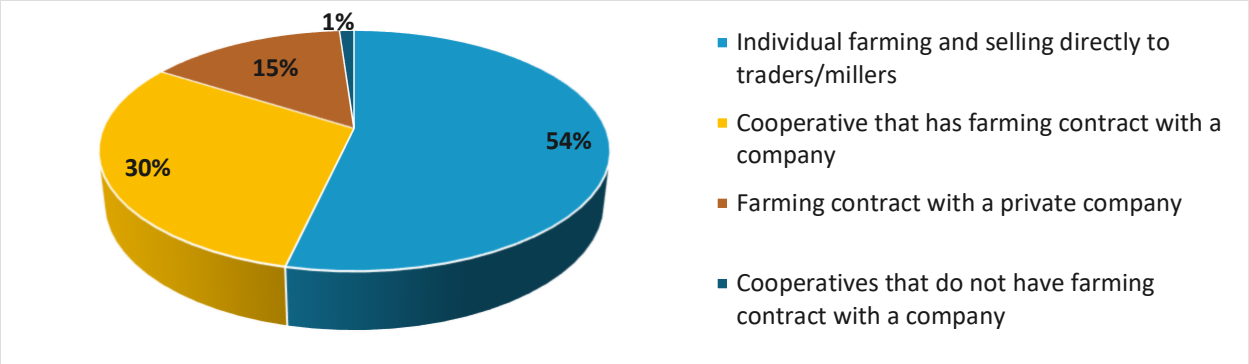

Figure 1. The model of rice farming used by participants

Rice record keeping practices

Farmers were asked about their rice record keeping practices. One-hundred and sixteen farmers (64%) said that they record their practices. When the 116 farmers that record their practices were asked the method they use (Figure 2), 108 farmers (93%) use paper logbook, 57 farmers (49%) said, 'the input seller keeps record in the purchase diary for me'; five farmers (4%) said 'a field agent of the company keeps the record for me'; three (3%) farmers said, 'the (public) extension/technician keeps the record for me'; and two respondents (2%) use mobile apps.

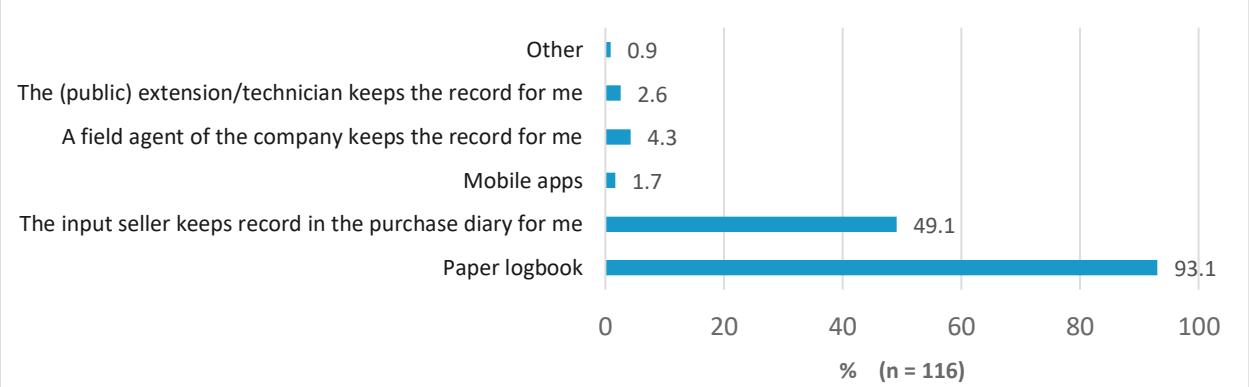

Figure 2. The method of recording farming practices for rice production

When asked about the practice of reporting farming practices, 120 farmers (66%) said they do not report their practices. Of those that do (n=61), 26 (43%) report to the extension agents; 23 (38%) report to a company, cooperative, or buyer; and 22 (36%) to other people, such as bookkeepers. The methods for reporting in Table 1 show that 89% report verbally during in-person meetings and 41% during phone calls. None of the farmers used emails, web-based systems, or mobile apps for reporting.

Table 1. The method of reporting farming practices

Method	Number	%
Verbally during in-person meetings	54	88.5
Phone calls	25	41.0
Emails	0	0.0
Submit on a web-based systems	0	0.0
Submit documents	10	16.4
Messages	2	3.3
Mobile apps	0	0.0
Other	1	1.6

Source: survey, 2022

Technical advice on rice farming practices

Farmers were asked about their demand for technical information related to rice production; Table 2 below shows the responses. The areas with the most demand were seeds, planting dates, fertilizer use, pesticide use, and market prices and buyers. The least demand was for financial support, and budgeting and planning.

Table 2. Evaluating the necessity and demand for information related to rice production on a Likert scale (1 being 'no demand' and 3 being 'high demand')

Information	Demand
Seeds/varieties	2.78
Land preparation	2.62
Planting dates	2.68
Fertilizer	2.66
Irrigation	2.32
Pesticide use	2.80
Harvest and post-harvest processing	2.48
Mechanization service schedule (including harvesting and land preparation services)	2.49
Market prices and buyers	2.77
Financial support (loans and crop insurance)	1.52
Weather	2.60
Budgeting and planning	1.96
Climate change mitigation and adaptation	2.25

Source: survey, 2022, the scale is from 1 to 3

Digital tools for technical advice and performance assessment in rice production

Use of digital tools for technical advice and performance assessment in rice production

As shown in Figure 3, the most common digital tools in use by farmers to access information on rice farming are TV and radio (80%); phone calls (65%); messaging apps such as Viber, Facebook (FB) messenger and Zalo (45%); social media (29%); and video imaging (24%). It is important to note that only 3% of farmers use agricultural apps to access technical advice for farming.

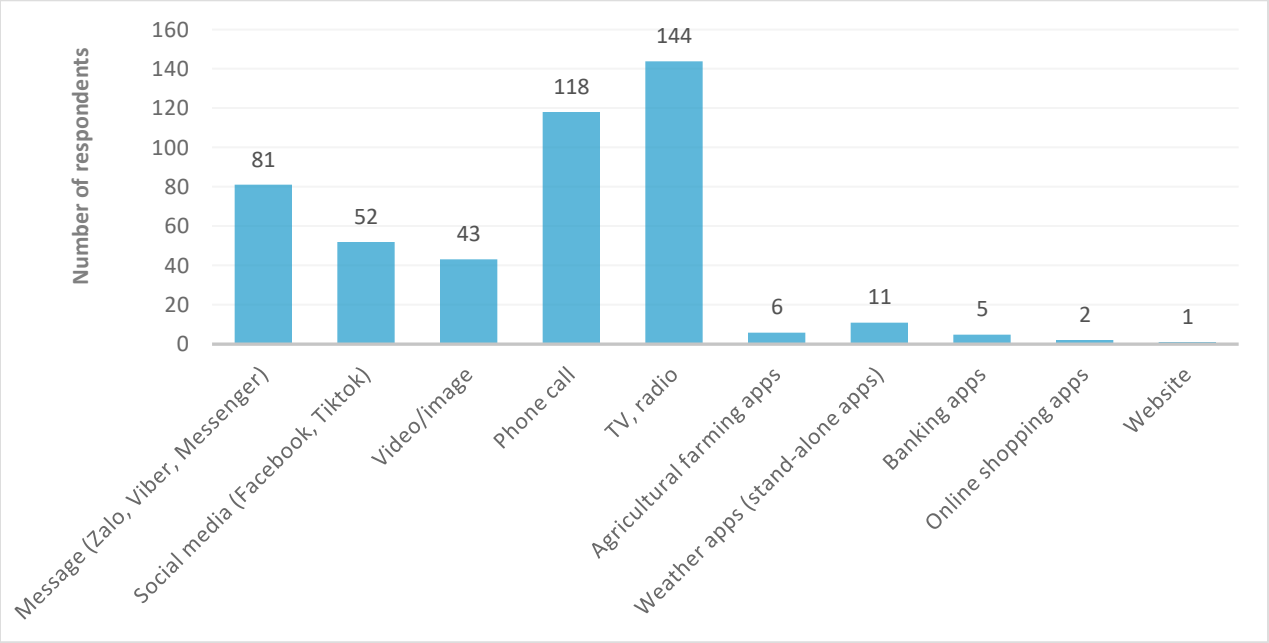

Figure 3. The type of digital tools used to access information on rice farming (n= 181)

Although phone, TV, and radio had the highest percentage of engagement, these mediums are generally not considered in the "digital" farm revolution. Therefore, we focus more on engagement with messaging apps and social media since these were the next two most frequently accessed types of media. It should, however, be noted that phone calls had the highest rate of inclusive engagement, with 23% of farmers confirming that they provided feedback about the information they received before, during, or after the call. The other mediums had at most 12% of farmers that had ever provided feedback.

Of the participants, 81 farmers used messages (Zalo, Viber, and FB Messenger), of which 98% used them to access advice and farming information. Of those farmers, the most common types of information to

access were rice variety (83%); land preparation (72%); fertilizer application (75%); irrigation and drainage (52%); pest warning, pest identification, and pesticide application (61%); and climate change mitigation/adaptation (12%) (see Figure 4). Forty-two percent of farmers were using a messaging platform once a week or more, 33% were using them only when needed, and the rest were using on one to three times a week (15%), every two months (7%), or one to five times a year (2%). Eighty-eight percent of farmers feel comfortable or very comfortable using this form of digital tool.

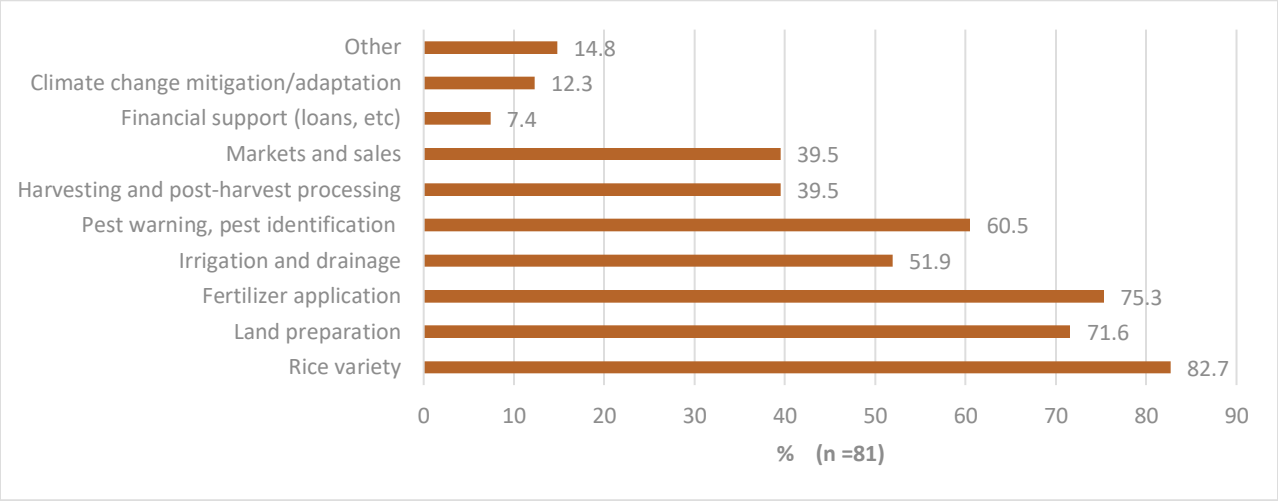

Figure 4. Types of information accessed on messaging apps

Fifty-two (52) farmers use social media (e.g., FB, Tiktok, Zing) to access information or advice on rice farming. Figure 5 shows that the most accessed information on social media is for rice varieties, fertilizer application, pest info, and market prices. About a quarter of the farmers order inputs using social media, and 6% use social media to report practices. Eighty-seven percent of the participants who use social media said they are comfortable or very comfortable with using these apps.

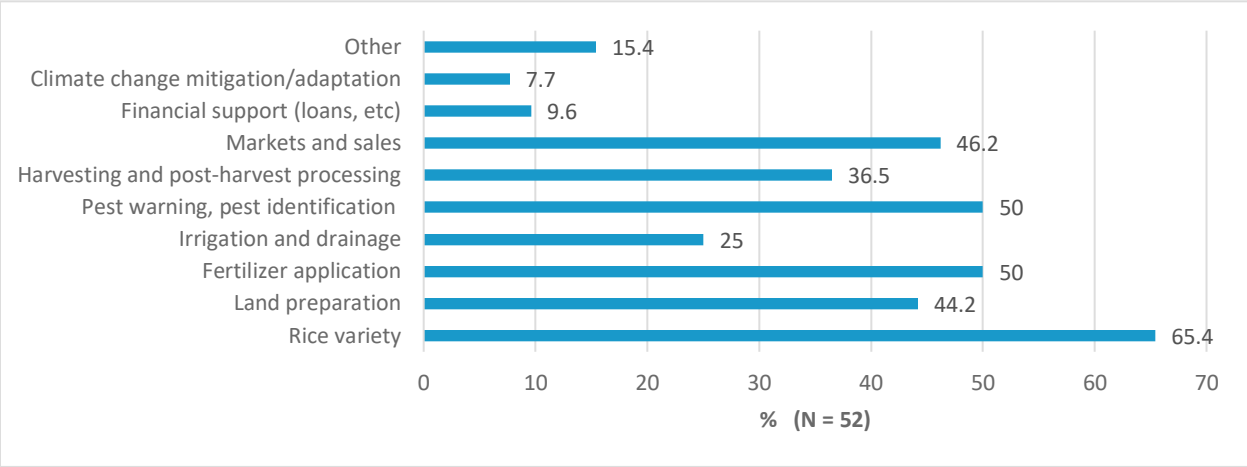

Figure 5. Types of information accessed on social media

Demand for digital tools for technical advice and performance assessment in rice production

Farmers were asked on a scale of one to five (1 being 'not willing' and 5 being 'strongly willing') their likelihood of using mobile apps for rice production. The mean response was 4.07, indicating a willingness to use mobile apps for farming needs. Figure 6 shows the likelihood of using digital tools for rice production, with 50% being 'strongly willing' and 25% 'willing'.

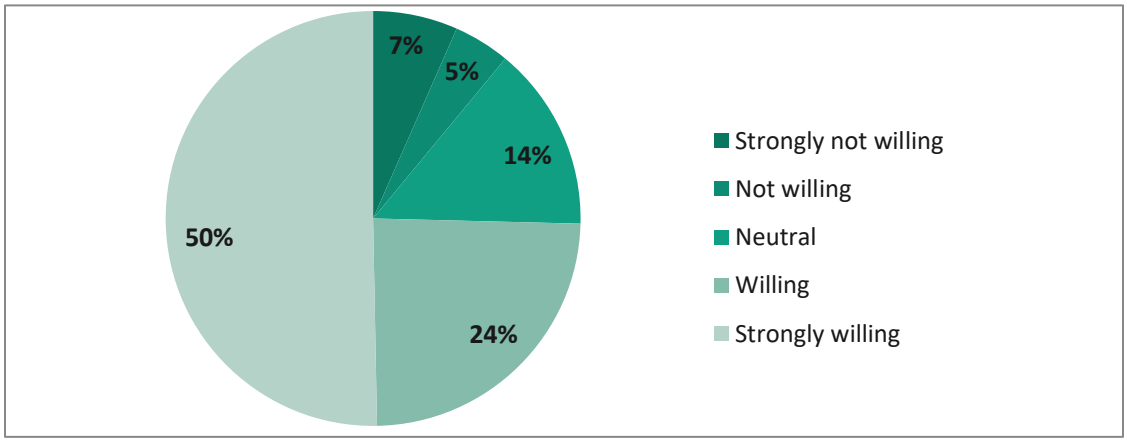

Figure 6. The likelihood of using digital tools for rice production

Table 3 below shows the farmers' responses, using a scale of 1-5 (1 meaning 'completely disagree' and 5 meaning 'completely agree'), to evaluate statements related to the use of mobile apps in rice production. This shows that farmers generally agree that mobile apps are a good source of information and connection to others that can help improve their production outcomes. Farmers were less convinced that mobile apps can help increase income or provide support when needed. Ease of use is a

concern for many farmers. It is particularly evident that farmers disagree with mobile apps replacing face-to-face time with field technicians.

Table 3. Evaluating the statements related to applying mobile apps in rice production

Statement	Mean
Mobile apps provide access to more information on rice production	4.09
Mobile apps enable me to talk to more people about rice production	4.03
Mobile apps enable access to information that can improve rice yield	4.06
Mobile apps can be used to increase income from rice farming	3.97
Mobile apps can help me get support when I have problems or questions about rice farming	3.99
Mobile apps are easy to use to get farming support	3.56
Use of mobile apps means I will spend less face-to-face time with technicians	3.24
I would prefer to use Mobile apps instead of face-to-face visits with a field agent	2.87

Source: survey, 2022

Results: Data collection from field agents

Demographics of the field agents

The extension agents worked in Thoi Lai (n=10), Vinh Thanh (n=10), and Co Do (n=10) with a gender distribution of male (n=17) and female (n=13). Table 4 shows the years of experience of the field agents and the number of farmers they work with. On average, one field agent works with over 200 farmers.

Table 4. Number of years of experience as a field agent and the number of farmers field agents work with

Content	N	Minimum	Maximum	Mean	Std. Deviation
Number of years of experience	30	1.0	27.0	9.7	6.4
Number of farmers that field agents work	30	50.0	630.0	205.3	136.2

Source: survey, 2022

Farmer access and demand for technical advice and performance assessment

Table 5 shows the frequency of contact by the field agents to provide technical advice or collect data on farming practices to assess their performance. Sixty-seven percent of field agents visit farmers weekly, and 33% visit farmers one to three times a month. The most used method to provide technical advice to farmers was through messaging apps and phone calls (mean of 17.8 times/month), followed by face-to-

face meetings during field visits (mean of 10 times/month). These are also the most used methods for assessing farmers' performance, 22.5 times/month and 13 times/month, respectively. The most frequently provided technical advice is for plant protection, rice varieties, and fertilizer application (Table 5).

Table 5. The type and frequency of technical advice provided to farmers (times/month)

Advice	N	Mean
Rice varieties	28	3.89
Land preparation	26	2.73
Planting/sowing calendar	30	2.70
Fertilizer application	29	3.55
Irrigation and drainage	26	2.77
Plant protection	30	4.57
Harvest and post-harvest processing	28	1.71
Mechanization service schedule	22	1.45
Market price, buyers	25	2.04
Financial support	2	1.00
Weather forecasting	22	2.86
Budgeting and planning	8	1.13
Climate change mitigation, adaptation	21	1.76

Source: survey, 2022

Twenty-seven (27) field agents support the farmers in their record keeping or collect data on farmers' farming practices (Table 6). All field agents reported providing farmers with feedback on their farming practices during or after the field visits. Twenty (20) extension agents (67%) store information in a digital format (Excel, Word, email, Zalo), and 10 of the extension agents store information on paper. Figure 7 shows field agents' main method to record the farmers' practices is on blank paper or books (87%).

Table 6. The method for supporting farmers in record keeping or collecting data on farmers' farming practices (N = 27)

Content	%
Write in the farmer logbook	59.3
Transcribing notes from farmer logbook to field logbook	51.9
Ask farmers	66.7
Provide guidance to farmers on record keeping	63.0
Other	3.7

Source: survey, 2022

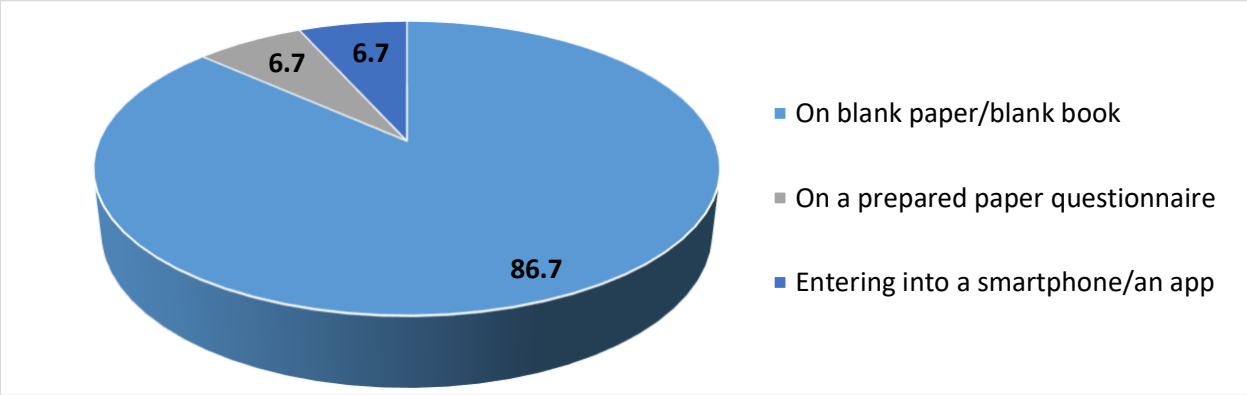

Figure 7. Method of collecting farmers' practices

Use of, and demand for digital tools for technical advice and performance assessment

Of the 30 extension agents, 100% use a smartphone when in the field with farmers, one uses a laptop, and none of the agents use a tablet. Seventy percent have internet access in the field, 17% sometimes have internet access, and 13% don't have internet access in the field. Communicating with colleagues (87%), communicating with farmers (73%), searching for technical advice (73%), and information searching (70%) are the main reasons for using these devices in the field (Table 7).

Table 7. The purpose of using the device in the field

Content	%
Communicating with farmers	73.3
Communicating with colleagues	86.7
Map	30.0
Information search	70.0
Searching technical advice	73.3
Recording data into an apps/software	33.3
Taking notes	36.7
Other: taking the picture	23.3

Source: survey, 2022

Through the evaluation of field agents, messages (92%) and phone calls (92%) are the most popular apps that farmers use (Table 8). These are followed by TV and radio, video/image, and social media.

Table 8. The types of apps that farmers use through the evaluation of field agents (N = 26)

Digital tool	%
Message (Zalo, Viber, Messenger)	92.3
Social media (Facebook, Tiktok, Zing)	57.7
Video/image	69.2
Phone call	92.3
Television, radio	76.9
Agricultural farming apps	3.8
Weather apps	19.2
Banking apps	3.8
Online shopping apps	15.4
Website	7.7
Software	0.0
Email	3.8

Source: survey, 2022

Table 9 shows the field agent's responses, using a scale of one to five (one meaning 'completely disagree' and five meaning 'completely agree'), with evaluating statements related to the use of mobile apps in rice production. Similar to farmers' responses to this question, field agents also generally disagree with using mobile apps to replace face-to-face meetings with farmers.

Table 9. Evaluating the statements related to mobile apps

Statement	Mean
Mobile apps provide access to more information on rice production	4.80
Mobile apps enable me to talk to more people about rice production	4.77
Mobile apps enable access to information that can improve rice yield	4.50
Mobile apps can be used to increase income from rice farming	4.37
Mobile apps can help me get support when I have problems or questions about rice farming	4.67
Mobile apps are easy to use to get farming support	4.43
Use of a mobile apps means I will spend less face-to-face time with farmers	3.30
I prefer using mobile apps to talk to farmers than a face-to-face meeting	2.63

Source: survey, 2022, the scale is from 1 to 5

Rice sustainability standards: alignment with agroecological principles

Vietnam has been supportive of a transition to sustainable rice production in the Mekong Delta for nearly two decades. In 2003, the program "Three Reductions, Three Gains" was launched to reduce the use of seeds, fertilizers, and pesticides. The proponents of this campaign built their implementation by distilling sound scientific evidence into a simple heuristic, testing the "3 Reductions, 3 Gains" message through participatory farmer research. A message design workshop developed materials for billboards, posters, and leaflets. This led to the development of a mass media approach to scale out this sustainability package. In parallel with these activities, there was innovative field research on water management, ecologically based rodent management, and improved post-harvest management of rice. There was also evidence that many farmers were not using good-quality seeds. This led to an initiative to extend the success of "3 Reductions, 3 Gains" to embrace a broader set of best management practices for irrigated rice production. A committee was formed of international experts from the International Rice Research Institute (IRRI) and national experts with two initial tasks. One was to capture the best management practices in the written guidelines that initially targeted extension specialists. The second was to develop a simple heuristic to aid the promotion of the extended set of best practices. Thus, the standard for "1 Must Do, 5 Reductions" (1M5R) was developed. The "1 Must do" regards the use of certified rice seed. The "5 Reductions" pertain to reducing seed rate, water usage, fertilizer and pesticide use, and post-harvest losses. This standard has been embraced at the national level as the sustainability strategy for Vietnam to transition to high-value, low-emission rice.

In Table 12, we scored the 1M5R standard according to the 10 agroecological principles established by FAO (FAO, 2018). All ten of the principles are met by the 1M5R standard. Although not all of the principles are equally represented across the set of six practices, we can conclude that the standard does represent an agroecological approach to rice farming. Recently, the government of Vietnam has embarked on a mission to convert 1 million hectares of rice in the Mekong Delta to high value, low-emission rice through the 1M5R program. We intend to engage closely with the government of Vietnam through the Transitions ATDT project to develop an appropriate digital tool for assessing performance and progress of the agroecological transition.

Table 10. Overall alignment of 1M5R practices with agroecological principles (Based on the FAO's 10 Elements of Agroecology)

1M5R standard		Agroecological principles										Total
		Diversity	Co-creation & sharing of knowledge	Synergies	Efficiency	Recycling	Resilience	Human & social values	Culture & food traditions	Responsible governance	Circular & solidarity economy	
Farm Management												
1	**Use certified seed**	X		X	X			X	X			
2	**Reduce seed rate**		X	X	X		X	X				
3	**Reduce fertilizer**		X		X	X	X	X		X	X	
4	**Reduce pesticide**	X	X		X		X	X	X	X	X	
5	**Reduce water use**		X		X	X	X	X		X	X	
6	**Reduce post-harvest losses**				X		X	X			X	

Level scoring 1-3=low; 4-6=fair; 7-10=significant

Significant	
Fair	
Low	

SRP practices are aligned with the agroecological principles in Table 13, based on the FAO's 10 Elements of Agroecology. All ten principles are met through the SRP standard practices. Although not every requirement fulfills all agroecological components, the combination of requirements that make up the standard meet all components. Generally, the issue with the SRP standard is that it has not been nationally adapted to the local conditions in Vietnam, and despite considerable effort by the national government and international research and NGOs, the market for SRP rice is still limited. This has led to many farmers being trained in the standards, but with little incentive for farmers to continue keeping records or aiming for full compliance because the benefits to farmers currently do not outweigh the costs.

Table 11. Overall alignment of SRP practices with agroecological principles (Based on the FAO's -10 Elements of Agroecology)

SRP standards		Agroecological principles										Total
		Diversity	Co-creation & sharing of knowledge	Synergies	Efficiency	Recycling	Resilience	Human & social values	Culture & food traditions	Responsible governance	Circular & solidarity economy	
Farm Management												
1	Crop calendar		X	X	X		X	X		X	X	
2	Record keeping		X	X	X			X		X	X	
3	Training		X		X		X	X		X	X	
Pre-planting												
4	Heavy metals				X			X		X		
5	Soil salinity		X	X	X		X			X		
6	Land conversion and biodiversity	X	X	X	X	X	X	x		X	X	
7	Invasive species	X	X	X	X		X		X	X		
8	Leveling			X	X		X					
9	Pure seed quality			X	X				X			
Water use												
10	Water management		X	X	X	X	X			X	X	
11	Irrigation system at community level		X	X	X	X	X			X	X	
12	Inbound water quality		X	X	X		X	X		X	X	
13	Groundwater extraction			X	X	X				X	X	
14	Drainage			X	X	X				X		
Nutrient management												
15	Nutrient mgmt (inorganic and/or organic)	X	X	X	X	X	X	X	X	X	X	
16	Organic fertilizer choice	X		X	X	X	X	X	X	X	X	
17	Inorganic fertilizer choice		X	X	X		X	X		X	X	
Integrated pest management												
18	Integrated pest management (ipm)	X	X	X	X	X	X	X	X	X	X	
Harvest and Post-Harvest												
19	Timing of harvest		X	X	X		X				X	
20	Harvest equipment	X		X	X		X			X		
21	Drying time		X	X	X		X					
22	Drying technique		X		X		X		X			
23	Rice storage	X	X		X		X		X	X	X	
24	Rice stubble		X	X	X	X	X		X		X	
25	Rice straw	X	X	X	X	X	X			X	X	
Health and Safety												
26	Safety instruction and first aid		X		X			X	X	X		
27	Tools and equipment		X		X	X	X	X		X	X	
28	Training of pesticide applicator		X	X	X			X	X	X	X	
29	Personal protective equipment		X		X	X	X	X		X	X	
30	Washing and changing				X		X	X		X	X	
31	Applicator restriction		X		X			X	X	X		
32	Re-entry time		X		X		X	X		X		
33	Pesticide and chemical storage		X	X			X	X	X	X		

34	Pesticide disposal	X	X	X			X	X	X	X		
Labor rights												
35	Child labor		X					X		X		
36	Hazardous work		X					X		X		
37	Education		X					X		X		
38	Forced labor		X					X		X		
39	Discrimination		X					X		X		
40	Freedom of association		X					X		X	X	
41	Wages		X					X		X	X	
Overall level												

Level scoring 1-3=low; 4-6=fair; 7-10=significant

Significant	
Fair	
Low	

Some key takeaways

A review of the digital ecosystem in the rice value chain in Vietnam conducted by IRRI reports that there are a few, although not many, digital tools focused on rice production in Vietnam that provide a variety of functions including technical advisory, record keeping, and performance assessment (Barnard et al., 2022). A small proportion of the surveyed farmers use agriculture-specific digital apps for rice farming. However, 75% are willing or strongly willing to use mobile apps for farming needs indicates that either (i) farmers have limited access to rice apps, (ii) there is a gap between farmers' needs and what the tools are offering, or (iii) the existing apps are not in the form that farmers are comfortable to use.

Another key finding from the surveys is that face-to-face interactions with field agents remain the most common and trusted methods for technical advice and performance assessment for farmers. While digital messaging tools assist these processes, they only complement and should not replace person-to-person exchange.

Information flows in digital formats are strongest for weather, crop variety, and market-related topics (47%, 30%, and 30% of farmers, respectively), followed by topics of plant protection (including pesticide use), fertilizer, climate change, and land preparation (24% - 28% for each topic). The topics of irrigation

and drainage, harvest and post-harvest, and financial support are exchanged the least frequently (3% - 19% for each topic).

It is noteworthy that the majority of farmers who can access agricultural applications are male (more than 90%) because men are typically the ones who directly engage in rice farming in Mekong provinces. This suggests that an analysis of gender roles in agriculture production may be necessary to identify the areas where women are more involved to advise the development of gender-inclusive digital tools.

Next steps

This information supports the ongoing implementation of the Agroecological TRANSITIONS program and ATDT project. The ATDT regional work in Vietnam will focus on research and engagement with digital tools for technical advice and performance assessment in sustainable rice production in the Mekong River Delta.

The ATDT Vietnam team has built relationships with key app developers in the area of SRP in the Mekong Delta. The next steps will be to:

- **Work with a digital tool** developer **in climate change and agroecology.** Test and improve their tool with input from farmers and field agents in the Mekong Delta to ensure increased inclusivity and accessibility for farmers to transition to agroecological practices. Work with field agents to test the digital tool for use in a performance assessment of SRP. Design research studies on incentives for farmers to improve agroecological practices and to simulate market and non-market incentives.
- **Develop knowledge products and conduct training workshops** with key stakeholders such as extension workers, government agents, and private sector actors. To enable more inclusive use of digital tools for climate-informed agroecological performance assessment to support farmer outcome assessment and co-design of practices (including farmer-to-farmer knowledge sharing) in Mekong sites for rice supply chains.

References

FAO. 2018. The 10 elements of agroecology: Guiding the transition to sustainable food and agricultural systems. Rome, Italy: Food and Agriculture Organization of the United Nations (FAO). Available at https://www.fao.org/agroecology/overview/overview10elements/en/

IFA. 2022. Fertilizer use by crop and country for the 2017-2018 period. Paris, France: International Fertilizer Association (IFA). Available at https://www.ifastat.org/consumption/fertilizeruse-by-crop

Linh, T. B., Nam, T. S., Điệp, N. T. H., & Hậu, L. V. (2021). Đánh giá hiện trạng canh tác và hiệu quả tài chính của canh tác lúa trong và ngoài đê bao ở huyện Tri Tôn và Tịnh Biên - tỉnh An Giang. Tạp chí Khoa học Đại học cần Thơ, 57(CĐ Môi trường & Biến đổi khí hậu), 41-51. https://doi.org/10.22144/ctu.jsi.2021.048

Mobile Marketing Association. 2018. The State of Mobile in Rural Vietnam. Available at https://www.thinkwithgoogle.com/_qs/documents/7268/The_State_of_Mobile_in_Rural_Vietnam_Report.pdf

MONRE. 2020. Vietnam Third Biennial Updated Report to the United Nations Framework Convention on Climate Change. Hanoi, Vietnam: Ministry of Natural Resources and Environment (MONRE).

Nguyen H.Q., Korbee D., Ho H.L., Weger J., Hoa P.T.T., Duyen N.T.T., Luan P.D.M.H., Luu T.T., Thao D.H.P., Trang N.T.T., Hermans L., Eversh J., Wyatt A., Nguyen X.Q.C., Phi H.L. 2019. Farmer adoptability for livelihood transformations in the Mekong Delta: a case in Ben Tre province. Journal of Environmental Planning and Management, Vol. 62, No. 9, 16031618. https://doi.org/10.1080/09640568.2019.156

Phung, N.T.M., Du, P.V., Singleton, G. 2014. One Must Do, Five Reductions (1M5R): Best Management Practices for Lowland Irrigated Rice in the Mekong Delta. Ministry of Agricultural and Rural Development: Vietnam and International Rice Research Institute, Philippines.

Renaud, F. G., Kunzer, C. 2012.The Mekong Delta System: Interdisciplinary Analyses of a River Delta. Dordrecht: Springer.

Tivet, F., Boulakia, S. 2017. Climate smart rice cropping systems in Vietnam. State of knowledge and prospects. Montpellier, France: CIRAD, 41 p.

Tu, V.H. 2017. Resource use efficiency and economic losses: implications for sustainable rice production in Vietnam. Environment, development and sustainability, 19, pp.285-300.

Umetsu, C. 2021. “One must do, five reductions” technical practice and the economic performance of rice smallholders in the Vietnamese Mekong delta. *Sustainable Production and Consumption*, *28*, pp.1040-1049.

Agroecological TRANSITIONS Programme

The Program on Agroecological Transitions for Building Resilient, Inclusive, Agricultural and Food Systems (TRANSITIONS) aims to enable climate-informed agroecological transitions by farmers in low- and middle-income countries through the development and adoption of holistic metrics for food and agricultural systems performance, inclusive digital tools, and transparent private sector engagement. The *Inclusive Digital Tools to Enable Climate-informed Agroecological Transitions* (ATDT) aims to scale agroecological practices by enabling smallholder farmers to participate in co-design of digital tools and farming practices. Learn more about ATDT here.

It is led by:

TRANSITIONS is financed by:

And managed by: