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Agricultural Service Delivery During Turmoil: The State of Agricultural Extension and Crop Advisory Services in Myanmar

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ABSTRACT

Access to agricultural extension and crop advisory services can play a crucial role in ensuring widespread and appropriate use of new and improved agricultural technologies, but the delivery and use of such services is not well understood in Myanmar. We assess their use based on repeated large-scale and nationally representative farm surveys from 2020 onwards, as well as on insights from key informant interviews and secondary data. The major findings are the following:

1. **Agricultural extension use is low and declining.** Before the crisis years – due to COVID-19 and a military coup – agricultural extension provision and use in Myanmar was at much lower levels than in neighboring countries. There has been a further decline in use since. Forty-one percent of farmers reported to have received crop advice during the monsoon of 2020, but this share declined by 9 percentage points to 32 percent of farmers in the monsoon of 2022.

2. **In-person agricultural extension is more widely used than digital extension.** In the last dry season, 26 and 20 percent of the farmers relied on in-person and digital extension respectively.

3. **The private sector is the main provider of in-person agricultural extension.** During the last dry season, the main provider of in-person agricultural extension was the private sector (used by 18 percent of the farmers), followed by the public sector (13 percent of the farmers), and NGOs (6 percent). Previous seasons show similar shares.

4. **In-person agricultural extension has been declining since 2020.** In the last three years, there has been a significant decline in the provision of in-person extension services by all providers. In the case of the public sector in particular, the number of agricultural extension events in 2021/22 dropped by more than 50 percent compared to before the crisis years.

5. **Digital agricultural extension service provision increased rapidly before 2020.** Before the COVID-19 pandemic and the political crisis, the provision of digital extension services grew rapidly, linked to the rapid expansion of mobile cellphone networks and the spread of cheap smart phones. The total number of posts on Facebook by agricultural companies and organizations from July 2015 until November 2019 more than tripled. The biggest growth in posts was seen in 2018 and 2019, before the COVID-19 pandemic.

6. **Digital agricultural extension provision decreased immediately after the coup, but then expanded again in the years after. It was used by 20 percent of the farmers during the last dry season.** Most users started using digital agricultural extension since the COVID-19 pandemic and the political crisis. After the initial drop in 2021 - as the use of Facebook was banned and as there were severe communication blockages - there has been an increase in activity since, and this has occurred despite the persistent communication and internet problems and reduced mobile network access in the country.

7. **Digital agricultural extension is mostly provided through Facebook by agricultural input companies and social enterprises.** The most widely used services are provided through Facebook pages, that for a number of organizations and companies have millions of followers. An analysis of the posts on these Facebook pages shows they contain more technical information than product advertisements, even so for (almost) all commercial input retail companies. We also recently note the establishment of farmer extension groups – a more interactive model – and specific commodity focused groups on Facebook. There are also groups on other online platforms, including specialized agricultural apps and call centers. However, these platforms are less used. Digital extension services are almost exclusively provided by the private sector, including social businesses.

8. **Use of agricultural extension is non-inclusive, with less educated, more remote, female, and smaller farmers accessing them less, for digital as well as for in-person extension.** We also note an important difference by age, with older farmers relying more on in-person services and younger ones more on digital extension.

9. **Conflict-affected areas access agricultural extension services significantly less frequently.** Farmers residing in townships under martial law – 13 percent of the townships – use any extension (in-person or digital) service less (8 percent compared to townships not under martial law, often because they lack access to the internet in these townships). While farmers residing in the most insecure areas use in-person extension less (11 percent less), they are however able to rely on digital services to a similar extent as farmers in the more secure townships.

The findings of the study have a number of important implications.

1. **Scaling of digital extension.** Given the widespread insecurity and mobility constraints in the country, limiting in-person travel, alternative digital opportunities have recently emerged that can provide crop advisory services at scale, and especially in some – but not all – of the conflict-affected areas. The scaling-up of such services would be very much welcomed, given that currently only one out of five farmers in Myanmar are relying on such services.

2. **Leverage the experience of the private sector.** The private sector is most active in agricultural extension, in-person and digital. It has been leading the pivot from in-person to the provision of digital services – not only focusing on sales of their products, but very much being involved in crop advice overall – providing important opportunities to work with these initiatives to finetune and extend the reach of agronomic and other advice for farmers, especially as a large share of farmers is not yet reached by current agricultural extension models.

3. **Embrace innovations.** Innovations in digital agriculture are quickly emerging - such as chatbots and A.I. - but are not yet being used to their fullest extent in Myanmar. Further piloting, testing, and evaluating the impact of such innovations should be encouraged.

4. **Ensure internet access.** Access to the internet is problematic in Myanmar – more than 40 percent of all households in Myanmar reported in a recent national survey that they never or only occasionally use the internet - and further efforts to ensure access, especially in conflict-affected areas, as well as improve digital literacy should be encouraged.

5. **Assess impact of agricultural extension.** Despite the interest in the country, few rigorous assessments have been done on the impact of different modalities of extension on adoption of improved technologies and agricultural performance. This would be useful evidence to stimulate the scale-up of the most promising models.

1. INTRODUCTION

Rapid changes in the use of agricultural technologies have been seen worldwide. The provision of different agricultural extension and crop advisory services has been widely used towards stimulating the increased adoption and appropriate application of such new agricultural technologies in a large number of settings. However, an important debate exists on the impact and cost-effectiveness of different modalities - training and visits, demonstration plots, farmer field days, and field schools - to deliver these in-person services appropriately and most cost-effectively (Birkhaeuser et al. 1991, Anderson and Feder 2007, Davis et al. 2021).[1] Given the increasing spread of ownership of mobile phones and access to the internet in low and middle-income countries (LMIC), an alternative modality - digital agricultural extension – has been rapidly expanding. This is seen to hold substantial promise given its presumed better cost-effectiveness and reach than in-person extension services (Davis et al. 2021). As in the case of in-person agricultural extension, the impact of digital extension is still widely debated (e.g. Aker 2011, Nakasone et al. 2014, Spielman et al. 2021, Davis et al. 2021, Abate et al. 2023, Rajkhowa and Qaim 2021).[2]

There are also important questions about inclusiveness of agricultural extension service delivery (Birkhaeuser et al. 1991). Agricultural extension is often associated with higher agricultural potential areas, bigger farms, better educated farmers, and is generally found to be less geared to youth, women farmers, and disadvantaged groups (Davis et al. 2021). Location also matters. Remoteness is linked to lower access and less quality in agricultural extension (Abate et al. 2021) as well as less satisfaction by users (Brinkerhoff et al. 2018). This spatial exclusion is also noted for digital extension given lower telecommunication coverage in more remote rural areas in LMIC (Aker et al. 2016). While digital extension could possibly address some constraints of in-person extension, it seems in practice also hampered by similar exclusion patterns, leading to a digital divide.[3]

In this study, we examine the state of agricultural extension and crop advisory services in Myanmar. Myanmar underwent significant agricultural transformation during the 2010s - in which the private sector played a key role - due to a market-led agricultural policy reform (MAPSA 2023). However, the agricultural economy has faced large challenges to its further transformation since 2020 due to mobility restrictions caused by the COVID-19 pandemic and after a military coup in early 2021, which led to widespread violence, reduced economic activity, lower social service delivery because of a Civil Disobedience Movement (CDM), rapid exchange rate depreciations, and international trade restrictions (World Bank 2023). There have also been important constraints in the use of the mobile phone and the internet since 2021, linked to a lack of electricity, more stringent regulations, and higher costs, among other factors.

[1] For example, farmer-led demonstrations have been shown to have more lasting impacts than farmer field-days in Malawi (Maertens et al. 2021).

[2] A number of authors illustrate that digital extension can have important impacts (Abate et al. 2023) while others show limited effect (Fafchamps and Minten 2017, Oyinbo et al. 2022).

[3] The delivery of agricultural extension and crop advisory services in fragile settings in particular - such as Myanmar - has been the topic of limited research, despite the important agricultural issues emerging in these contexts, where agriculture is often an important source of resilience for especially the rural and poorer population. In contrast with agricultural services, social service delivery in the health and education sector in conflict-affected areas has received more attention (e.g. Justino 2016; Skovdal and Campbell 2015; Truppa et al. 2024; Garry and Checchi 2020). Researchers on agricultural extension have assessed methods of how agricultural extension systems can be built up after conflict has ended (Witinok-Huber et al. 2021; Menz 2018). In such situations, building on existing community or farmer-based approaches seems to be more sustainable post-conflict, as opposed to the imposition of solutions from outside.

To do this assessment on the state of agricultural extension and crop advisory services during this turbulent period, we rely on the analysis of unique nationally representative phone surveys of crop farmers and of secondary data, and on insights from key informant interviews.[4] We focus on the following research topics. First, we assess the spread and type of agricultural extension (public, private, and/or NGOs) used by crop farmers in Myanmar. Second, we look at changes in the use of agricultural extension during the crisis years and then focus in particular on the emergence of digital agricultural extension and crop advisory services in recent years. Third, we analyze inclusion patterns of crop farmers in the use of agricultural extension and crop advisory services.

We find that the share of farmers accessing agricultural extension was low before the crisis and that it further declined by 9 percentage points, from 41 to 32 percent of the farmers in the two years since the monsoon of 2020. We observe a decline in the delivery of in-person extension, while digital extension was more resilient and even increased in recent periods. However, in-person agricultural extension was still more widely used than digital extension. Agricultural extension is mostly obtained from the private sector, free of charge. Digital agricultural extension is mostly accessed through Facebook, from pages managed by agricultural input companies and social enterprises. Use of digital extension increased rapidly before 2020 (linked to the rapid expansion of mobile cellphone networks and the spread of cheap smart phones in Myanmar at the end of the 2010s), it decreased in 2021 - immediately after the coup - and then expanded in the years after again. It was used by 20 percent of the farmers during the last dry season.

The use of extension services is found to be non-inclusive - for in-person as well as digital extension - with better educated, less remote, and bigger farmers accessing them more frequently. We also note an important difference by age, with older farmers relying more on in-person services and younger ones more on digital extension. Conflict-affected areas access agricultural extension services also significantly less. Farmers residing in townships under martial law – 13 percent of the townships – use any extension service less (8 percent), in-person or digital (often because households lack access to the internet in these townships). While farmers residing in the most insecure areas use in-person extension less (11 percent less), they are however able to rely on digital services to a similar extent as farmers in more secure areas.

The rest of the paper is set up as follows. In section 2, we discuss data and methodology. Section 3 gives background information on Myanmar during this period of turmoil. The state of agricultural extension use is presented in Section 4. The emergence of digital extension is explored in more detail in Section 5. Associates of agricultural extension and crop advisory services are looked at in Section 6. We conclude in Section 7.

[4] A number of studies have looked at agricultural extension service delivery and use in Myanmar. Ekanayake et al. (2019) showed that agricultural extension access at the end of the 2010s trailed neighboring countries substantially. Other studies recently illustrated the quick take-off of online activities related to agriculture, showing how farmers and other agricultural stakeholders use social media to further agrarian commerce and knowledge (Faxon 2023). Some authors looked at the effect of digital extension in Myanmar, showing significant impact and potential (Goeb et al. 2023, Ragasa et al. 2023). However, understanding of the use of agricultural extension in Myanmar is still limited, especially in more recent times and at large-scale.

2. DATA AND METHODOLOGY

2.1 Data and Descriptives

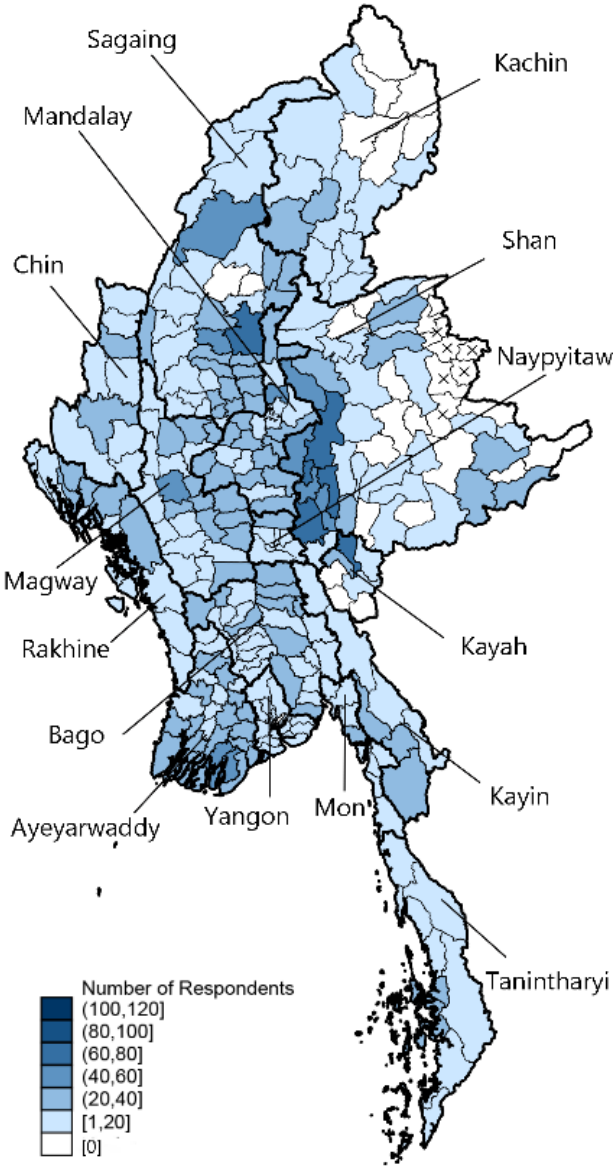
The Myanmar Agricultural Performance Survey (MAPS) is a sub-sample of households interviewed during the Myanmar Household Welfare Survey (MHWS).[5] In the MHWS, information was collected on the demographic background of households, welfare indicators, and livelihoods, among others. The follow-up MAPS focused on the agricultural activities of crop farmers. Four rounds of MAPS have been fielded and are used in this analysis. The last survey, during the dry season of 2023, covered most townships in the country (Figure 1). It was implemented from June 26th until July 25th, 2023. To assure that the interviewed crop farmers are representative of the crop farming population in their state or region, a weighting factor was calculated for the MAPS, building on the method used for the MHWS (for details, see Lambrecht et al. (2024)). The MAPS collects information on farm household characteristics, overall area cultivated, crops grown, input use and farm management practices, yields, sales, output prices, marketing behavior, and overall conditions in the community. To assess spatial differences, we divide the country into four major agro-ecological zones that are commonly used in Myanmar and present our results at this level.[6]

In the survey instrument of the latest MAPS, detailed questions were included on the use of agricultural extension and crop advisory services. Farmers were asked if they used in-person agricultural extension from the public or the private sector, as well as from NGOs, and digital agricultural extension, the sources of those, and if used, the year that they started using these digital services. Data from this farm survey were complemented with insights from key informant interviews of important stakeholders delivering these agricultural services – digitally or in-person – as well as with the analysis of secondary data - from Facebook, the Ministry of Agriculture, Livestock and Irrigation (MoALI), and the International Telecommunication Union.

[5] The last round of this MHWS was fielded in the second quarter of 2023.

[6] Delta (Ayeyarwady, Bago, Mon, Yangon); Coastal (Rakhine, Tanintharyi); Central Dry (Mandalay, Magway, Nay Pyi Taw, Sagaing); Hills and Mountains (Chin, Kachin, Kayah, Kayin, Shan).

Figure 1. Overview of MAPS Round 4 sample



Source: Authors' calculation based on MAPS.

Five thousand and one farmers were surveyed in MAPS in the latest round, of which 3,459 reported cultivating crops during the dry season. The average cultivated area by these farmers during the dry season was 4.2 acres (the median was 3.0 acres) (Table 1). The main management decision maker on these farms was male in 78 percent of the cases and 47 years old on average. Three percent of the agricultural decision makers had no education at all while 87 percent indicated that they had completed standard levels from 1 to 10. The number of household members working on the farm was on average 1.4. Travel times to the closest city of at least 50,000 people were, on average, 2.9 hours from the township (centroid) that the farmer resides in.[7] We also asked farmers during the survey to estimate the time it took to travel from their residence, by commonly used transport means, to the center of their township. That travel time was on average 0.7 hours (Table 1).

[7] See MAPSA (2023) for a discussion of the methodology that was used.

Table 1. Descriptives farmers

	Unit	Mean	Median	Standard Deviation
Total number of farmers surveyed	Number	5,001	-	-
Average size farm	Acres	4.2	3.0	4.6
Background of main farm management decision maker				
Age	Years	47.1	47.0	12.0
Gender	% male	77.6	-	-
Highest level of education achieved				
None	%	3.3	-	-
Standard 1–10	%	86.8	-	-
Bachelor	%	3.1	-	-
Other	%	6.9	-	-
Household members working regularly on the farm				
Adult male	Number	0.8	1.0	0.8
Adult female	Number	0.6	0.0	0.8
Children	Number	0.0	0.0	0.1
Total workers	Number	1.4	1.0	1.3
Remoteness				
Travel time to city of at least 50,000	Hours	2.9	2.3	2.1
Travel time to center township	Hours	0.7	0.5	0.5

Source: Authors' calculation based on MAPS.

2.2. Econometric Analysis

The econometric analysis focuses on the relationship between agricultural extension use by the farmer and some potentially important associates. We model the use of extension services of household *i* that resides in community *c* of township *w* (E_{icw}) as a function of household characteristics, location (remoteness measured by the farmers required travel time to the center of the township, the travel time to the nearest city of at least 50,000 people, and travel time to the border; agro-ecological zone, rural/urban residence), physical insecurity (perceived insecurity by the farmer, townships with martial law), and the type of crops grown:

$$E_{icw} = \beta_1 \boldsymbol{C}_{icw} + \beta_2 \boldsymbol{L}_{icw} + \beta_3 \boldsymbol{X}_{icw} + \beta_4 I_{icw} + \varepsilon_{icw},$$

Where $\boldsymbol{X}_{icw}$ is a vector of household characteristics, $\boldsymbol{L}_{icw}$ of location measures, $\boldsymbol{I}_{icw}$ of insecurity measures at the community and township level, and $\boldsymbol{C}_{icw}$ of dummies of crops grown. The error term is captured by ε_{icw}. The use of extension is expressed as use in-person, digital, or both, as well as for specific modalities used in each category. We report marginal effects of logit model regressions as well as results of a Poisson regression model for the use of multiple sources of in-person or digital crop information. We also test the significance of differences in associates in the use of in-person and digital extension to better understand their differential reach.

3. BACKGROUND

Given the importance of travel for in-person agricultural extension and for internet access for digital extension, we present some background information on both these topics. Changes in insecurity and mobility in recent years have had significant impacts on the extent to which in-person extension work could be done. At the national level, 20 percent of farmers indicated at the beginning of 2022 that they could not move around in their village without serious concern for security (Table 2). That situation worsened in the next two seasons before lessening again after the most recent dry season. However, 15 percent of farmers still reported concerns. The reported insecurity was especially high in the Dry Zone, where there has been a concentration of violence in recent years. We also asked farmers to report on their perceptions of insecurity in the community they resided in at the time of the survey. At the national level, 5 percent and 19 percent of farmers reported residing in a 'very insecure' or 'somewhat insecure' area, respectively, at that time. The reported levels of insecurity were highest in the Dry Zone, while farmers in the Delta reported the lowest levels of insecurity.

Table 2. Insecurity and mobility constraints, as reported by crop farmers

	Unit	National	Hills	Dry Zone	Delta	Coastal
Cannot move around without serious concern for security						
March 2022	%	20.3	22.0	23.4	16.7	14.7
August–September 2022	%	24.8	20.9	31.1	15.7	47.2
February-March 2023	%	22.8	20.0	29.4	18.0	20.6
June–July 2023	%	15.2	14.6	19.8	10.1	22.0
Perceptions of insecurity at time of survey (June–July 2023)						
Very insecure	%	5.4	5.0	8.9	2.2	6.7
Somewhat insecure	%	18.7	19.9	23.3	14.3	16.2
Secure	%	35.7	37.7	34.5	34.5	41.6
Very secure	%	39.9	36.9	32.8	48.9	34.9
Prefer not to answer	%	0.4	0.4	0.5	0.2	0.7
Total	%	100.0	100.0	100.0	100.0	100.0

Source: Authors' calculation based on MAPS.

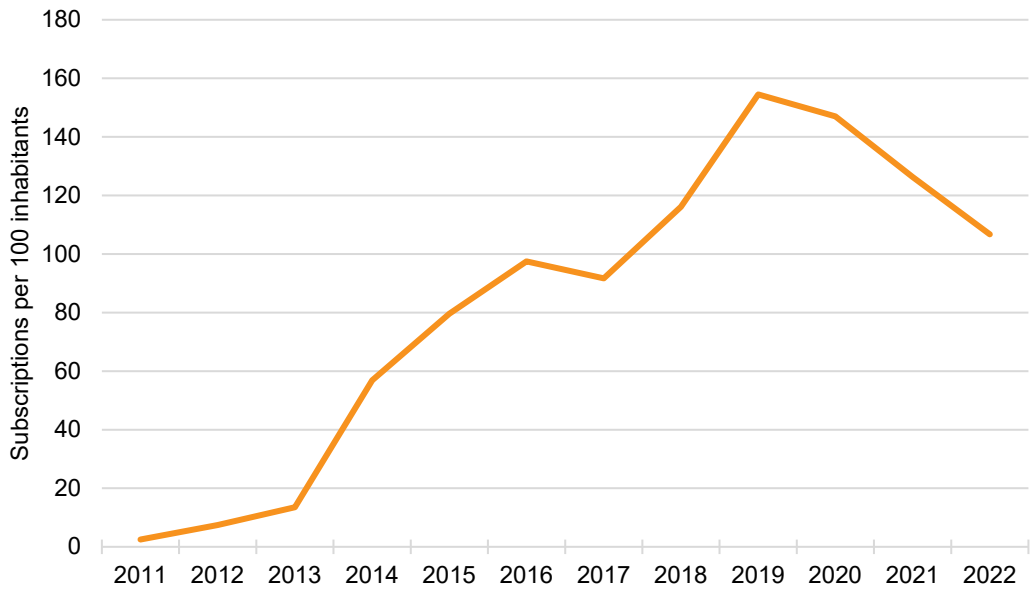
In response to strong resistance to the military take-over in a number of townships, the military government declared martial law in them. The imposition of martial law gives the military government broad powers – civilian administrators are replaced by military commanders – and persons arrested in such townships have no right to a defense or an appeal for convictions handed down by military tribunals, increasing insecurity and fear by the local civilian populations (Cheesman et al. 2016). In the aftermath of the military coup in 2021, 7 townships were put under martial law and in the beginning of 2023, 37 townships were added to that list. Forty-four townships were thus under martial law for most of 2023 (representing 13 percent of all townships in the country) (ISP 2023).

Access to mobile phone connections and to the internet has also become more complicated since the political crisis. This stalled - and reversed - a rapid change in the decade before. Internet access expanded very quickly since the liberalization of the communication sector in the beginning of the 2010s. While fixed broadband subscriptions are still low in Myanmar – estimated at about 2 per 100 inhabitants in 2022 (ITU, 2023) - mobile-cellular subscriptions have been more commonly used, increasing rapidly over the 2010s (Figure 2).[8] A steep increase in those subscriptions is seen until 2019, especially in the period from 2013 to 2016 (with an average increase of 80 subscriptions per 100 inhabitants) and from 2017 to 2019 (an increase of 60). However, this was followed by a slight

[8] Mobile-cellular subscriptions indicate access to a sim-card or a phone service plan, but do not mean that these users have access to the internet.

drop during the year 2020 (the COVID-19 year) and then a strong decline in 2021 and 2022 (after the military coup), with overall levels in 2022 almost down to those of 2017. Internet access and mobile phone connections in conflict-affected areas have become more limited - or not possible at all - since 2021 (World Bank 2022). Moreover, the cost of use has gone up over time, reducing use of these services by the poorest of Myanmar's population.

Figure 2. Mobile-cellular subscriptions per 100 inhabitants in Myanmar



Source: International Telecommunication Union, dashboard[9].

4. AGRICULTURAL EXTENSION IN MYANMAR

Agricultural extension service delivery in Myanmar was limited in the 2010s. Although the Ministry of Agriculture, Livestock and Irrigation (MoALI) employed over 60,000 people at the end of the 2010s, only a small proportion of their employees were involved in agricultural extension activities. In the Department of Agriculture, one of the largest departments within MoALI, about 8,200 people were assigned to extension activities. While there were also a large number of private extension agents in the country, the total number of extension agents were still small compared to the total number of farmers and cultivated agricultural land in the country. At the end of the 2010s, it was estimated that extension agents in Myanmar were covering 4,135 farmers per agent, which is less than half the number in Vietnam and significantly lower than the number in Thailand, where extension agents covered 2,600 farmers on average (Ekanayake et al. 2019).

This situation did not improve in the 2020s because of mobility and communication constraints. Based on our phone surveys with crop farmers, we distinguish the use of agricultural extension and crop advisory services from different sources, i.e. the public sector, private sector, NGOs, and the internet during the previous agricultural season, be it the monsoon or the dry season – covering post- and pre-monsoon periods (Table 3). All sources of crop information combined, 41 percent of crop farmers reported receiving advice related to crop agriculture during the monsoon of 2020. A quarter of the crop farmers reported accessing private sector agents, four percentage points higher than the public sector. Sixteen percent indicated that they used the internet as a source of advisory services. During the dry season after (in 2021, with cultivation happening before and just after the coup), 37 percent of crop farmers used agricultural extension services.

[9] Downloaded from https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx, November 28th, 2023.

Since the military coup in the beginning of 2021, increased insecurity and reduced access to communication infrastructure have led to a worsening situation in the use of agricultural extension services in Myanmar. There has been a significant drop in its use, most steeply during the first monsoon season (2021) after the coup. While 41 percent of farmers used agricultural extension services during the monsoon of 2020 (already lower than in a normal year, due to the COVID-19 pandemic-related mobility constraints), this declined - significantly - to 34 percent a year later. Since that drop in the first year, use declined further, by 2 percentage points, in the monsoon a year later.

We see similar drops by extension modality. The percentage of crop farmers who accessed public extension agents during the monsoon declined from 21 percent to 15 percent between 2020 and 2021, while the percentage of those who accessed private sector agents and NGOs also dropped, by 6 and 5 percentage points, respectively. However, access to digital extension services did not show declines during that period and remained at almost similar levels as the previous year (at 15 percent of the farmers). The relative importance of digital extension has therefore increased over time: its share in extension services was 37 percent in 2020 but it increased to 45 percent in 2022.

When we look at access to any extension services during the dry season, no significant changes are seen over the years. However, there have been shifts in the modalities of extension provision, with most in-person services significantly declining over time while digital extension services have significantly expanded. Especially in the most recent year – the dry season of 2023 – an expansion in the use of digital extension services is noted, with an increase of 20 percent and 3 percentage points, while all other modalities of crop advisory services significantly declined compared to one and two years earlier (Table 3).

Table 3. Use of agricultural extension service providers, 2020–2023

		Monsoon			Significance of change	
	Unit	2020	2021	2022	2022 vs 2020	2022 vs 2021
Public sector	%	20.6	14.8	14.1	-9.19 ***	-1.40
Private sector	%	24.8	18.5	18.0	-9.26 ***	-1.71 *
NGO	%	12.7	8.8	9.5	-6.25 ***	0.06
Cellphone applications and internet	%	15.6	15.1	14.7	-3.22 ***	-2.59 ***
Any extension	%	41.3	34.4	32.4	-10.99 ***	-3.85 ***
Number of obs.		3,891	3,891	4,681		
		Dry Season				
	Unit	2021	2022	2023	2023 vs 2021	2023 vs 2022
Public sector	%	17.5	15.7	13.2	-5.84 ***	-2.44 **
Private sector	%	23.1	21.6	18.5	-5.66 ***	-3.74 ***
NGO	%	10.7	8.8	6.4	-6.98 ***	-4.88 ***
Cellphone applications and internet	%	13.8	14.9	18.2	+3.19 ***	+2.33 **
Any extension	%	37.4	36.9	37.6	+1.11	+0.26
Number of obs.		3,864	3,864	3,318		

Note: #: z-values; asterisks show significant differences at p-values: * p < 0.10, ** p < 0.05, *** p < 0.01; n.s.: not significant.
Source: Authors' calculation based on MAPS.

The reduction in the provision of extension services is confirmed by publicly available data of the Ministry of Agriculture, Livestock and Irrigation (MoALI). There are two main departments involved in providing agricultural extension at the Ministry, the Department of Agriculture (DoA) and the Agricultural Mechanization Department. MoALI reports for every fiscal year (October to September)

the number of extension events organized and the number of attendees to these events, indicating the importance of the DoA as a public extension provider (Table 4). In 2018/19, the DoA organized almost 4,000 events, with on average 16 attendees per event. While the number of events increased the year after, the number of attendees per event declined (10 attendees), likely because of fears of COVID-19 virus infections. We see a significant decline in events and attendees in 2020/21, likely due to the combined effects of COVID-19 and the disruption in public service delivery due to the coup. The number of events and attendees in the year 2021–22 was 41 and 66 percent, respectively of the level in the year 2018–19. We also note a significant decline in the number of pamphlets that were distributed in 2020–21 by 78 percent compared to two years earlier (Table 4).

Table 4. Extension activities by the Ministry of Agriculture, Livestock, and Irrigation

	Department of Agriculture			Agricultural Mechanization Department			
Year (Oct-Sep)	Events	Attendees	Attendees per event	Events	Attendees	Attendees per event	Distribution pamphlets
2018–19	3,908	63,727	16	149	4,698	32	110,433
2019–20	5,414	54,622	10	114	3,548	31	75,601
2020–21	1,853	43,680	24	13	379	29	23,764
2021–22	1,605	42,272	26				

Source: Authors' calculations based on MoALI.

We further asked farmers for details on the type of agricultural extension services accessed during the most recent dry season. We present the results at the national level and for the different agro-ecological zones in Table 5. In-person and digital agricultural extension services were used in the 2023 dry season by 26 percent and 20 percent of all crop farmers, respectively. The use was highest in the Delta region (43 percent; 30 percent and 24 percent for in-person and digital extension respectively), and lowest in the Hills and Mountains region (34 percent) and the Dry Zone (33 percent). In all agro-ecological zones, the share of farmers using digital extension is five to six percent lower than the share using in-person extension, an important gap but smaller than two or three years earlier. A significant number of farmers that use agricultural extension combine different sources. When we distinguish four modalities (in-person private, public, NGOs, and any digital), 24 percent of farmers report to only rely on one source while 13 percent rely on more than one.

Table 5. Use of in-person and digital agricultural extension services, by sector, dry season 2023

	Unit	National	Hills	Dry Zone	Delta	Coastal
Overall extension use						
Any extension	%	37.6	34.0	33.0	43.5	39.9
Any in-person extension	%	26.1	23.4	23.0	30.3	27.0
Any virtual extension	%	20.0	17.0	17.8	23.6	21.2
Combination of extension sources (in-person (public), in-person (private), in-person (NGOs), digital)						
None	%	62.4	66.0	67.0	56.5	60.1
One source	%	24.3	22.4	21.0	27.8	26.8
Two sources	%	9.3	8.4	8.5	10.6	8.7
More than two	%	4.1	3.2	3.5	5.1	4.4

Source: Authors' calculation based on MAPS.

5. THE RAPIDLY EMERGING DIGITAL AGRICULTURAL EXTENSION

To better understand this recent emergence of digital extension, we asked crop farmers detailed questions on how they used crop advisory services online (Table 5). It is to be noted that Facebook is the most important online social media platform used in Myanmar, enjoying an almost monopoly of social media usage (Deejay and Wells, 2021).[10] Farmers were asked if they followed a Facebook group of any firm or organization where information is shared on agricultural production and trade. Twelve percent of all crop farmers indicated that they did so. The most important Facebook groups that were reported to be followed were Ye Ta Khon – run by Proximity Design, a social enterprise – (54 percent of all Facebook group users) and the input suppliers Awba[11] (25 percent) and Wisarra (12 percent). Ye Ta Khon was especially important in the major agricultural zones of the country (the Delta and the Dry Zone with 60 and 56 percent respectively of Facebook group adherents following their page).

Farmers were also asked if they followed specific crop groups on Facebook. This practice was relatively less important. Three percent of the crop farmers reported that they did so. As expected, the most important crops followed were those most widely grown in the country, i.e., paddy, green gram, black gram, groundnuts, and sesame. Finally, non-Facebook groups (on Whatsapp, Viber or Telegram) were reported to be less important and were used by only 2.2 percent of all crop farmers in the country.

Table 6. Use of digital extension and crop advisory services

	Unit	National	Hills	Dry Zone	Delta	Coastal
1. Facebook						
Follows Facebook group of firm/organization		12.0	9.5	10.9	15.9	10.0
Share of followers of Facebook using						
i. Awba	%	24.7	27.6	19.1	26.2	33.8
ii. Wisarra	%	12.3	15.0	7.5	13.5	19.8
iii. Ye Ta Khon	%	53.8	43.5	55.9	60.5	33.6
iv. Other	%	41.4	36.5	43.4	38.4	64.9
Follow Facebook of specific crop						
Share of farmers using	%	3.5	3.7	3.0	4.2	2.3
Crops being followed (most important ones)						
i. Paddy	%	47.0	32.2	35.9	65.7	58.8
ii. Green gram	%	12.7	0.0	7.3	28.6	0.0
iii. Black gram	%	12.4	0.0	3.2	31.2	0.0
iv. Groundnut	%	11.5	6.0	23.6	4.9	17.1
v. Sesame	%	10.0	0.9	25.1	5.6	0.0
vi. Onion	%	6.0	8.4	9.2	0.0	17.1
vii. Tomato	%	5.5	11.2	7.8	0.0	0.0
viii. Betel Leaves	%	5.2	0.0	9.8	6.1	0.0
ix. Chili (fresh)	%	5.2	3.9	7.1	1.0	30.3
x. Maize	%	4.8	17.2	0.0	0.0	0.0
2. Non-Facebook group						
Share of farmers using	%	2.2	2.3	2.5	2.0	1.9

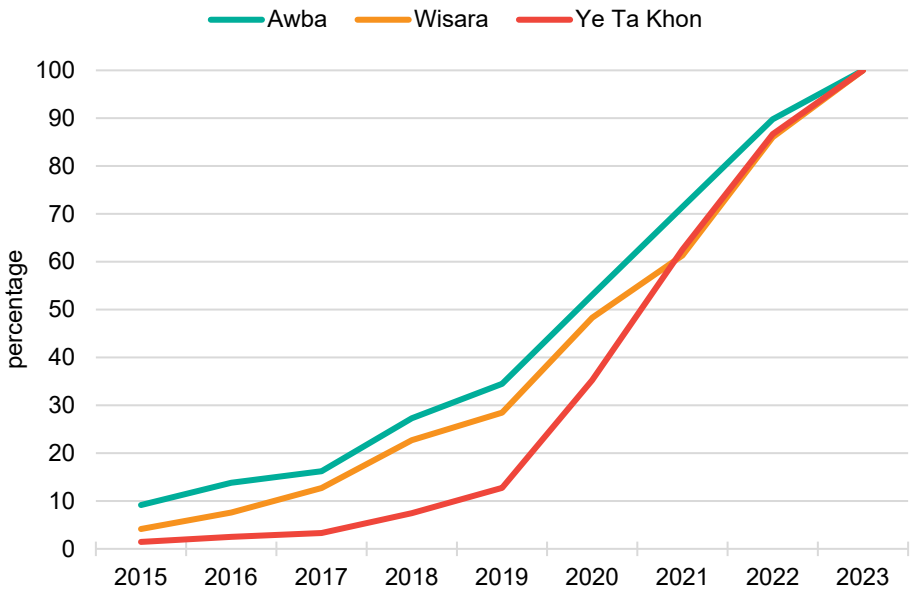
Source: Authors' calculation based on MAPS.

[10] In our sample, approximately 60 percent of the farmers reported to use Facebook.

[11] The Awba group is one of the biggest agricultural groups active in the country. They are involved in the distribution – and production - of most agricultural inputs (crop protection products – herbicides, fungicides, as well as insecticides), fertilizers, and seeds), finance, and agricultural extension. They reported to employ more than 1,500 agronomists before the start of the crisis (https://awba-group.com/sustainability/our-approach/) but reduced them to about 1,100 in the beginning of 2024 (personal communication).

If farmers were using agricultural Facebook pages, a follow-up question was asked on when they started following pages of particular firms or organizations. Figure 3 shows the results for three of the most important Facebook pages/groups related to agriculture in the country. It illustrates that the use of these Facebook pages and/or groups for agricultural information by crop farmers is very recent. Of all current users, less than 40 percent reported that they were already using them before the crisis years, indicating the important expansion that has happened since. Thirty-five percent and 28 percent of Awba and Wisarra Facebook users, respectively, started following the pages before 2020, but the large majority of users started following these Facebook pages since the COVID-19 pandemic and the political crisis. This recent start is even more pronounced for Ye Ta Khon, where 87 percent of users reported to be following their Facebook pages only since 2020 or more recently.[12]

Figure 3. Start of use, cumulative percentage of farmers following Facebook pages/groups

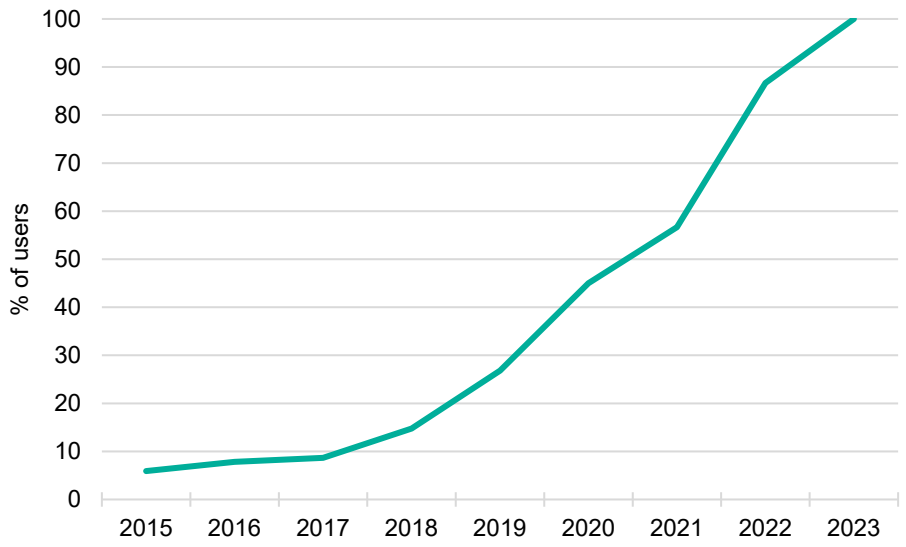


Source: Authors' calculation based on MAPS

We asked a similar question on participation in alternative online platforms (excluding Facebook) with information sharing on agricultural production and trade, such as WhatsApp, Telegram, and Viber. Participation in such groups is again shown to be a very recent phenomenon (Figure 4). Seventy-three percent of crop farmers who were participating in such groups only started doing so since 2020. Forty-three percent of participants joined online platforms after the major political problems in the country started at the beginning of 2021.

[12] Representatives of Proximity Design indicated that they had 0.5 million Facebook followers in 2019 and that this number quadrupled to 2 million users by the end of 2022. At that point, they also had more than 3,000 and 4,000 followers on Telegram and Viber respectively.

Figure 4. Start of participation in an online group (Whatsapp, Telegram, Viber) where information is shared on agricultural production and trade (excluding Facebook) (cumulative percentage)



Source: Authors' calculation based on MAPS

More detailed information was collected on the different activities by the most important organizations and firms with an important digital agricultural presence in the country. Information was obtained from the Facebook webpage of the relevant organization as well as from interviews with representatives of the relevant organizations themselves. We focus on the status of activities during the month of November 2023 (at the end of the monsoon and the beginning of dry season cultivation). Table 7 illustrates the number of followers and members of these different webpages as well as the type of information posted. While most of these companies and organizations are active with other social media modalities, we only report numbers on Facebook because of its importance (Table 9).

We distinguish between Facebook page followers (Table 7) and Facebook extension groups (Table 9). Confirming the results of the MAPS, Ye Ta Khon was the Facebook group that had the most page followers (3 million) with the Awba group coming second with 1.7 million followers. All other Facebook pages, though still substantial, have a level of followers that is substantially lower. For example, Greenway – a successful agricultural media organization - has 430,000 followers on Facebook, 14 percent of the level of followers of Ye Ta Khon. We further assess the frequency of the posts on these Facebook pages as well as the type of information posted, distinguishing between technical information and product advertisements, during the month of November.[13] We see a large variation in the number of posts on a Facebook page, ranging from 12 per month for Myanmar Kaung Thu Kah to 153 for Village Link.[14] More posts contain technical information than product advertisements, even so for (almost) all commercial input retail companies.[15] In the case of the agro-

[13] In the case of MoALI, the news posted on Facebook pages are mostly reports of departmental activities, events, news, and announcements. Technical information mostly involves water level of rivers, dams, lakes, weather, rainfall, commodity prices and on-farm technical guides.

[14] We did a similar assessment for the month of July 2023 and saw few changes in the frequency of posting as well as in the share of advertisement versus technical information.

[15] Technical information posted by private companies mostly involves weather, commodity prices and related news, detailed technical information on input use, cultivation practices, and post-harvest technologies. The information often takes into account the seasonality of the crop cultivation. Product advertisements promote awareness of firms' brands, products, use, and services.

chemical company Awba, 64 percent of posts concerns technical information.[16] Village Link only posts technical information.

We further assess to what extent an average post – for the last five posts for each company/organization during the month of November 2023 – was "liked" (an option within Facebook), commented on, and shared with other users. We add these numbers to assess the total interactions of different Facebook group users with these pages. We find that the commercial firms have the most interactions. For every post, Awba got over 13,000 interactions, almost double the level of the next Facebook page – Wisarra. While Ye Ta Khon has the largest number of followers, they were only 6th in the number of interactions, at 3,433 on average per post.[17] Combining interactions per post with the monthly number of posts gives an alternative overall measure of activity during the month of November. In this case, we see the large importance of Awba, having more interactions on a monthly basis than all others combined (except Wisarra). Wisarra is a close second, despite having a much lower number of followers, significantly below Awba. Table 7 also shows that MoALI, despite its importance for in-person extension, has had little successful digital presence online, highlighting that most of the digital agricultural extension activity in Myanmar is done by the private sector.

Table 7. Facebook page activities of major agricultural firms/organizations, November 2023

Name of company		Type of business	No. of Facebook page followers - '000s	Posts November '23			Interactions per post*				Total combined ('000)
				Product ads.	Tech-nical info.	Total	Likes	Comm-ent	Share	Total	
	Awba	Agrochemical	1,700	18	32	50	12,476	176	375	13,027	651
	Wisarra	Agrochemical	367	15	56	71	5,335	176	488	5,999	426
Awba group	Myanmar Kaung Thu Kha	Agrochemical	227	6	6	12	6,213	80	234	6,527	78
	Myanma Awba- Comet	Fertilizer	437	11	15	26	5,406	49	284	5,739	149
	Htwet Toe (Village Link)	Digital media and service	424	0	153	153	321	2	166	489	75
Greenway		Digital media and service	430	0	81	81	353	8	53	414	34
Armo-Aventine		Agrochemical + Fertilizer	201	25	65	90	307	17	14	338	30
Marlarmyaing Group		Agrochemical + Fertilizer	361	14	3	17	3,556	154	200	3,910	66
Myanmar Shwe Nagar		Agrochemical + Fertilizer	264	14	0	14	1,100	24	54	1,178	16
Proximity Designs		Service + consulting	3,000	8	6	14	2,991	232	210	3,433	48
	DOA Farmer channel (2016–2021) (2021–2023)	Public sector	12	25	7	32	60	0	10	70	2
MoALI	Farming Knowledge News	Public sector	129	46	0	46	88	2	7	97	4
	MoALI	Public sector	57	1	0	1	65	1	17	83	0

Note: MoALI has 91,000 followers on Facebook on their Call Center Page and 7,400 on their Young Scientists Initiative; there were no activities in November 2023. *: Average of last 5 posts in November '23.
Source: Authors.

[16] Admittedly, the term technical information covers a wide amalgam of topics. A detailed analysis for the months of April to September in the case of one large firm shows the following shares: technical knowledge 11 percent, commodity market overview 26 percent, meteorology information 9 percent, price information 24 percent, advertisements 26 percent, quizzes and best wishes for festivals 3 percent. Chat boxes were used on average 50 times per day during that period.

[17] Ye Ta Khon reported to only use Facebook as a communication tool. It set up a chatbot system that they use as their main platform to share farming techniques and crop diagnosis with farmers. On March 26, 2024, they had 2.6 million subscribers to their chatbot system. During the month of November, they reported 1,920 inquiries (1,035 farming practices; 399 pest/diseases diagnosis).

We analyzed the content shared by major agricultural firms and organizations on their Facebook pages during the month of November 2023 (Table 8). The information was categorized into four types: agronomic advice, weather information, commodity prices, and other agricultural news. Of all the technical information posted, weather updates and commodity price information constituted 15 and 9 percent respectively. Other agricultural news accounted for 23 percent of the posts. The most prevalent type of information was agronomic advice, which includes guidance on planting times, crop care, cultivation practices, etc. This category made up more than half of the technical information posts.

Table 8. Technical information contained in technical information posts on Facebook pages of major agricultural firms/organizations, November 2023

	Agronomic advice	Weather	Commodity price	Other agricultural news	Total
Awba	18	4	-	10	32
Wisarra	16	8	21	11	56
Myanmar Kaung Thu Kha	3	3	-	-	6
Myanma Awba- Comet	11	4	-	-	15
Htwet Toe (Village Link)	101	19	2	31	153
Greenway	41	11	3	26	81
Armo-Aventine	25	8	14	18	65
Marlarmyaing Group	3	-	-	-	3
Proximity Designs	6	-	-	-	6
DOA Farmer channel	1	5	-	1	7
Total	225	62	40	97	424
Share (%)	53.1	14.6	9.4	22.9	100.0

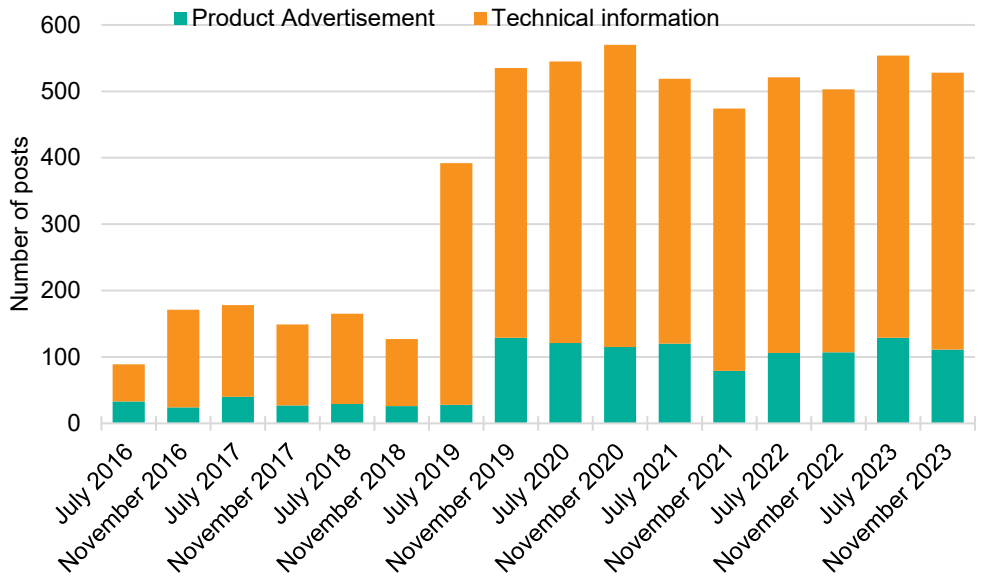
Source: Authors.

We assess next how the number of postings has changed in recent years for the different Facebook pages of these companies combined. We do so for two periods in the year, July (in the beginning of the monsoon) and November (in the beginning of the dry season), and for the period 2016 to 2023 (Figure 5). We distinguish again between product advertisements and technical information. Since 2016, we note a significant growth in the total number of posts in 2019 – more than a tripling - and mostly a stabilization since. We see a small growth over the period of COVID-19 in 2020, with 7 percent more posts in November 2020 than a year earlier[18] and then a reduction in the first year after the military coup (17 percent less posts in November 2021 compared to November 2020). We then see a continuous – but small - increase since. We also note a seasonal pattern with posts higher at the beginning of the monsoon compared to the dry season (four percent higher), partly reflecting the importance of these seasons in total agricultural output in the country.[19]

[18] An increase in agricultural activity online has been noted worldwide during the COVID-19 pandemic (Swinnen and McDermott 2021).

[19] The company Greenway posts most frequently. Almost half of the posts in July 2017 were from their site. However, that share had declined to 30 percent in November 2023, due to other companies coming up and sharing more frequent posts, e.g. Wisarra shared in July 2019 28 posts, but that number increased to 71 in November 2023.

Figure 5. Number of posts on agricultural topics by major Facebook groups of firms/organizations, 2017–2023



Source: Authors.

Facebook extension groups play a different role in digital extension as the member farmers share experience about their farms, can post questions, and often the agronomists from the hosting companies and organizations (as well as other members of these farm extension groups) try to answer questions that farmers posed. These groups have been started up rather recently (Table 9). The oldest ones are the ones set up by Wisarra (started in November 2016), Greenway (in June 2018) and Awba (in October 2018). The Armo-Aventine group only started their group in the beginning of 2022. The oldest and biggest ones are those of Wisarra and Awba with approximately 302,000 and 222,000 members respectively. The number of posts in these groups during the month of November were respectively 940 and 362. In addition to Facebook, a number of firms are active on other online platforms, such as Viber, WhatsApp, Telegram, and Youtube. However, these platforms seem to typically have less followers than Facebook (See Table 10 for an overview of Telegram).[20]

Table 9. Facebook extension groups activities of major agricultural firms/organizations, November 2023

Name of company		Facebook extension groups			
		Generally discussed topics	Created date	No. of group members - '000s	No. of group posts in Nov. '23
	Awba	Farming	Oct-18	222.0	362
Awba group	Wisarra	Farming	Nov-16	302.0	940
	Myanmar Kaung Thu Kha	Farming	Dec-20	4.7	36
Armo-Aventine		Farming	Jan-22	8.7	20
Marlarmyaing Group		Farming	Feb-20	47.0	27
Proximity Designs		Farming	Jul-19	15.4	14

Source: Authors.

[20] Village Link reports more than 30,000 followers on their Youtube and Viber channels.

Some firms also have developed their own apps which farmers can download (Table 10). The most widely used are those of Greenway and Village Link, started in 2016 and 2018, respectively. The apps of Village Link and Greenway are more general than other apps and have a multitude of objectives (Table 10). Greenway developed an app specifically designed for Myanmar. Their app was downloaded by 311,000 users, from 329 townships in the country, and was reported to be weekly used by approximately 12,000 to 15,000 farmers in the beginning of 2024.[21] Their app shares knowledge and information on agriculture, livestock and fishery, weather forecasts, prices, and has built-in tools such as an input calculator. They also provide cropping guidelines and give farmers opportunities to ask questions in the app (more than 20,000 questions were asked at the end of 2023). The app developed by Village Link was reported by them to have been downloaded 850,000 times between 2018 and November 2023 (a lower number is reported in Table 10 as it reflects only those downloads reported by Google Play Store).[22] Their app provides information on daily crop/fish prices, weather advisories (e.g. indicating if the weather is good for the application of fertilizer), daily, weekly, and seasonal weather forecasts, news, articles and videos. They have also developed tools for farmers to assess appropriate fish feeds as well as a crop suitability tool. Within this app, there are also options to ask questions. Since their start, they have reported to have solved 162,000 farm inquiries.[23]

A number of organizations also had active call centers, with agronomists assisting farmers. An overview of organizations that have such call-centers in Myanmar are shown in Table 10. Village Link reported that they had on average between 10 to 30 calls per day and since their start in 2018 have had 25,000 calls. In our survey, no specific questions were asked on the use of call-centers. In our assessment, we also did not include agricultural extension messages that some organizations and firms have been doing through radio and TV.

[21] Since its start, 8,000 articles were posted and there were 21,000 Q&A interactions.

[22] We have no data on the number of active users.

[23] They also connect farmers to micro-finance Institutions and help in providing pre-credit scoring.

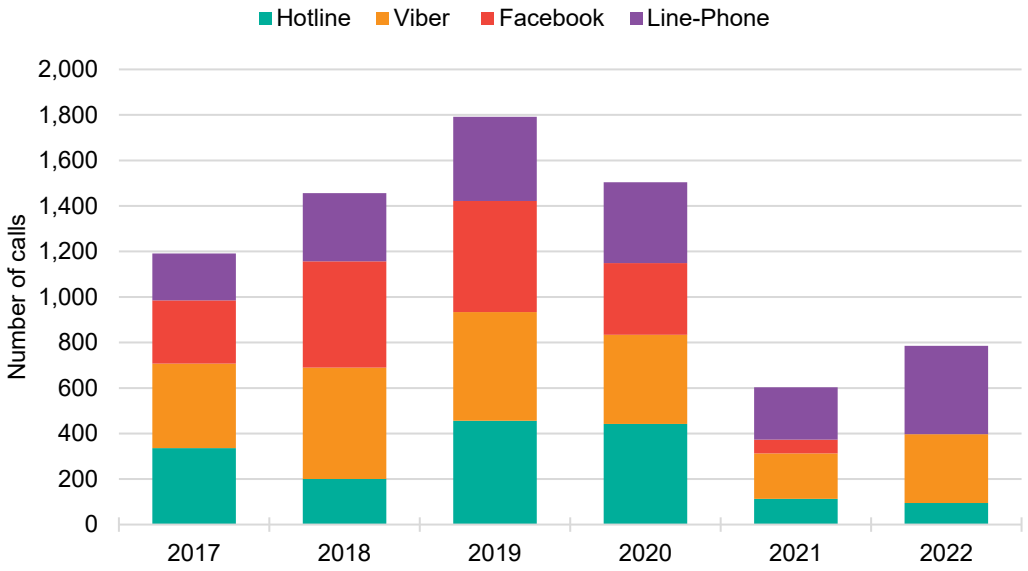
Table 10. Major non-Facebook platforms and call centers, November 2023

Name of company		Telegram members	Own app: Name	Own app: Type of information	Own app: Downloads ('000) on Google Play Store#	Own app: Start-up year	Call center
	Awba	638					Yes
	Wisarra	730					Yes
Awba group	Myanmar Kaung Thu Kha	-					-
	Myanma Awba-Comet	638					-
	Htwet Toe (Village Link)	3,849	Htwet Toe (Village Link)	Extension, farm advisory, news, articles, commodity prices, marketplace, community networking	410	2018	Yes
Greenovator		1743	Greenway	Extension, farm advisory, news, articles, commodity prices, marketplace, community networking	320	2016	-
Armo-Aventine		162	Armo farmer	News, articles, commodity prices	16	2018	Yes
Marlarmyaing Group		217					-
Proximity Designs		-					Yes
Myanma ShweNagar		-	Shwe Nagar	Marketplace for own products	1	2023	-
WWF Myanmar		-	Site Da Lae	Agricultural education	16	2022	-
TPT Yeeshin		-	TPT Agri	Marketplace for agricultural machinery	4	2020	-
MoALI		-	Quality Seeds	One-stop service for MoALI seeds	11	2019	-
		-	AMD	One-stop service for MoALI machinery	12	2017	-
Thu Ta Myay		-	Thu Ta Myay	News, articles, commodity prices	41	2018	-

#: Apps have been downloaded more often, through other links than Google Play Store
Source: Authors – download data based on ApkGK.Com, data are according to Google Play Store, as of March 2024.

The public sector, i.e. the Ministry of Agriculture, Livestock, and Irrigation (MoALI), also started providing online and mobile phone services since the middle of the 2010s, trying to reach farmers through a number of means (a phone hotline and regular phones, Viber, as well as Facebook). These different channels have been equally important in their reach of farmers (Figure 6). While overall reach before the military takeover was relatively low (1,800 calls in 2019), there was, however, a growing trend over time, e.g., there were 50 percent more calls in 2019 compared to 2017 (Figure 6). However, the number of their digital extension activities have seen a significant drop-off since the military takeover in the beginning of 2021. The number of calls in 2021 dropped to 40 percent of the level of 2020 and recovered only slightly since (Figure 6). MoALI has also developed apps that would allow farmers to send applications for machinery rentals, purchase, repair, and training as well as an app related to accessing seeds that allows farmers to order seeds and to connect seed producers and farmers. These apps were downloaded more than 11,000 and 12,000 times respectively by March 2024 (Table 10).

Figure 6. Provision of digital extension services by the Ministry of Agriculture, Livestock, and Irrigation



Source: Authors' calculation based on MoALI data.

6. ASSOCIATES OF AGRICULTURAL EXTENSION USE

In this section, we explore associates in farmers' use of agricultural extension. We look at associates with different sources of in-person and digital agricultural extension used by farmers (Figures 7 and 8 respectively), a comparison of in-person with digital extension (Table 11), and any type of agricultural extension as well as the sources of crop information services combined (different sources of in-person extension (public, private, and NGO) as well as virtual extension) (Table 12). We find a number of important significant associates for farmers accessing agricultural extension, shown by the results from logit/Poisson regressions.

First, the age of the main farm management decision maker is not shown to have an important relation with accessing agricultural extension overall (as shown by an insignificant sign in the logit regression of Table 12), although older farmers seem to combine extension from different sources more (as seen by the Poisson regression). However, the modalities of extension used by age group differ importantly. Older decision makers rely significantly more on in-person extension – an increase in the age of the farmer by 10 years increases the likelihood of using in-person extension by three percent – while younger decision makers rely significantly more on digital extension.

Second, agricultural extension is significantly less accessed by farmers that have lower levels of education. Farmers who only have primary education or less are 10 percent less likely to use any agricultural extension (Table 12). They are also less likely to combine different sources of agricultural extension. The marginal effects of only having primary education are smaller in size for in-person extension (but are still significant) compared to digital extension where they are much larger, as literacy is obviously required for the latter which lower educated farmers might not have. In the case of in-person extension, we note large effects for the public sector and lower ones for NGOs, seemingly indicating more targeting by the latter for these groups.

Third, male decision makers are much more likely to use extension. They are eight percent more likely to access any form of agricultural extension compared to female decision makers (Table 12). The difference is significant for in-person and digital agricultural extension use as well. Note that we control for the education of the decision makers – while the literacy gap between adult men and

women is relatively small overall, and it widens as people get older (GoM and UNFPA 2017) - thus reflecting a gender bias.

Fourth, the area of land owned is a significant associate of using agricultural extension. A doubling of area owned leads to an eight percent higher likelihood of using any form of agricultural extension and a significantly higher likelihood of using different sources of agricultural extension. Bigger farmers use both in-person and digital extension more than smaller farms, ceteris paribus (Table 11). Significant effects show up in all specifications, except for NGOs' in-person extension, possibly indicating their efforts to target smallholders in their extension activities, which other organizations might have less incentive to do.

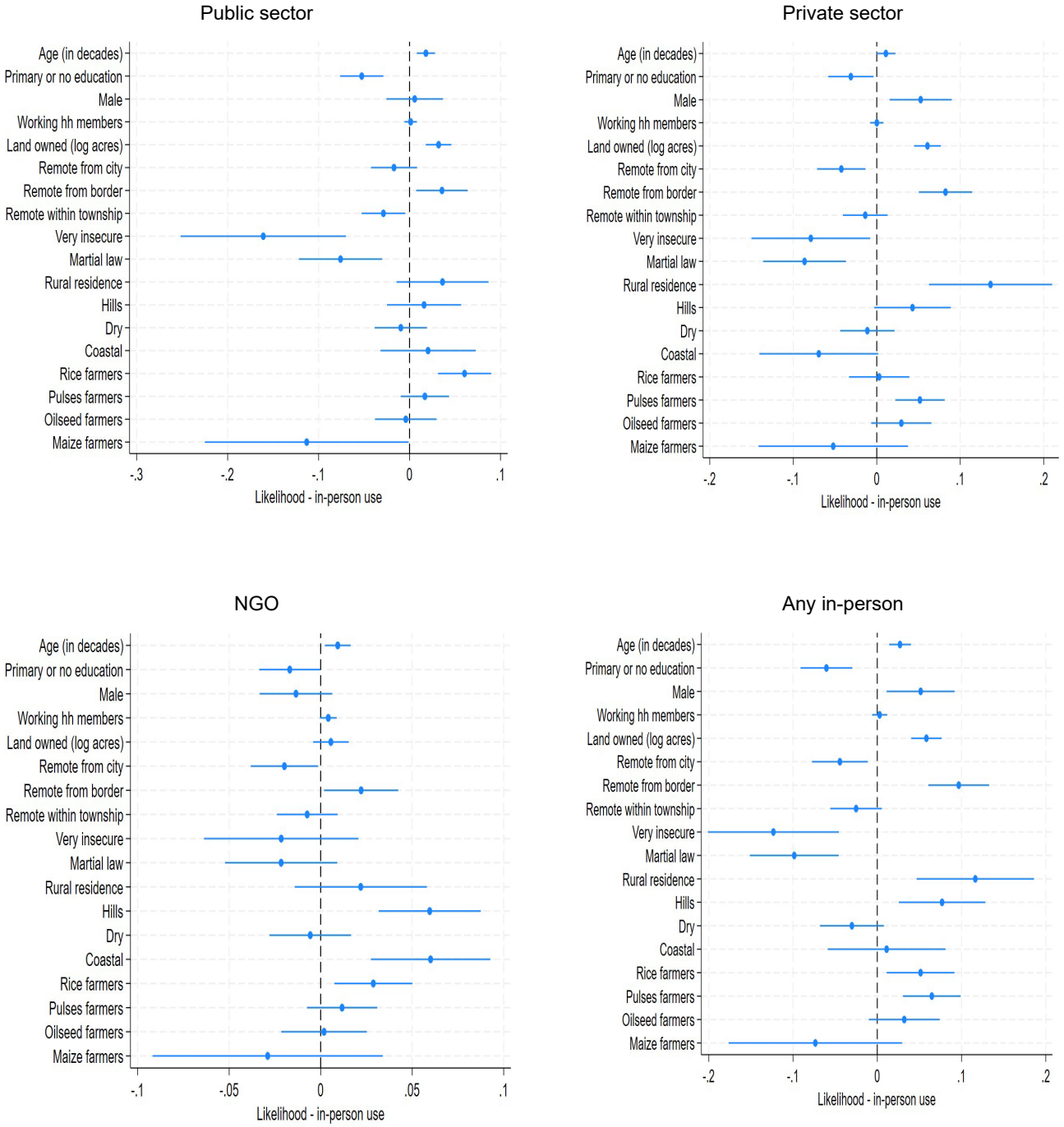
Fifth, location also shows an important association in accessing agricultural extension, as seen in other settings (Abate et al. 2021). Farmers that are located further away from a big city – of 50,000 people or more – are seven percent less likely to access any form of agricultural extension. The association is of equal size in the case of in-person and digital extension, indicating that digital extension currently does not make up for some of the problems of accessing these more remote areas for in-person extension. We also note that farmers living close to a land border are more likely to have significantly less access to agricultural extension, possibly because of more severe accessibility problems (partly due to lower population density, less infrastructure, and more insecurity). Remoteness within townships is not associated with extension use, ceteris paribus.

The location of farms in rural or urban areas is not associated with a difference in accessing extension overall. However, rural and urban farmers access extension services differently. Rural areas rely more on in-person extension, and less on digital extension. Compared to the Delta, farmers in the Hills and Mountains zone access agricultural extension relatively more, while farmers in the Dry Zone have less access to in-person as well as digital extension.

Sixth, insecurity is importantly associated with the use of agricultural extension services. Farmers in townships under martial law are using agricultural extension services, in-person or digital, significantly less than in more secure areas. Farmers in these townships are 10 percent less likely to access any form of agricultural extension (Table 12), but in-person access is most affected. They are also less likely to combine different sources of extension. The most insecure areas also rely significantly less on agricultural extension. This is mostly due to accessing less in-person extension as digital access is not significantly different in insecure areas than in secure areas, ceteris paribus.

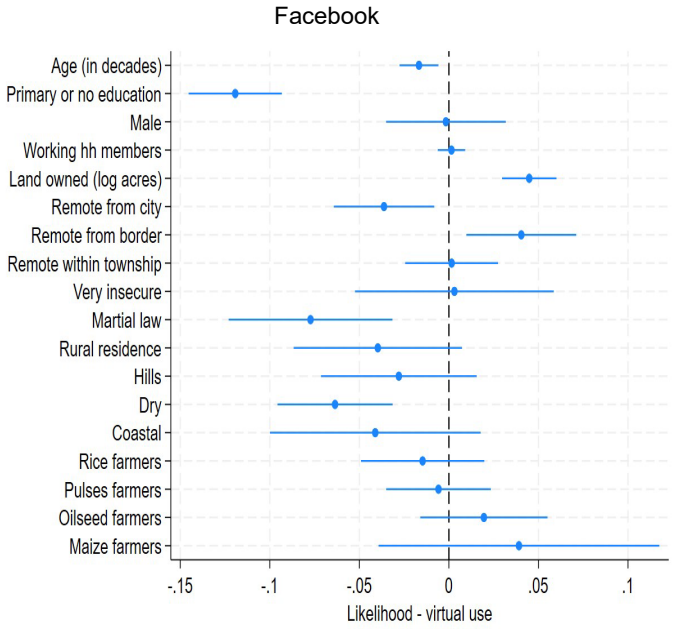
Finally, we note a significant difference with respect to the type of crops grown by farmers. Rice and pulses farmers are significantly more likely to use agricultural extension than other farmers (Table 12). The focus on rice is most stark for the public sector, which traditionally has focused more on this sector, as also shown in preferential public provision of agricultural credit for input use in rice cultivation.

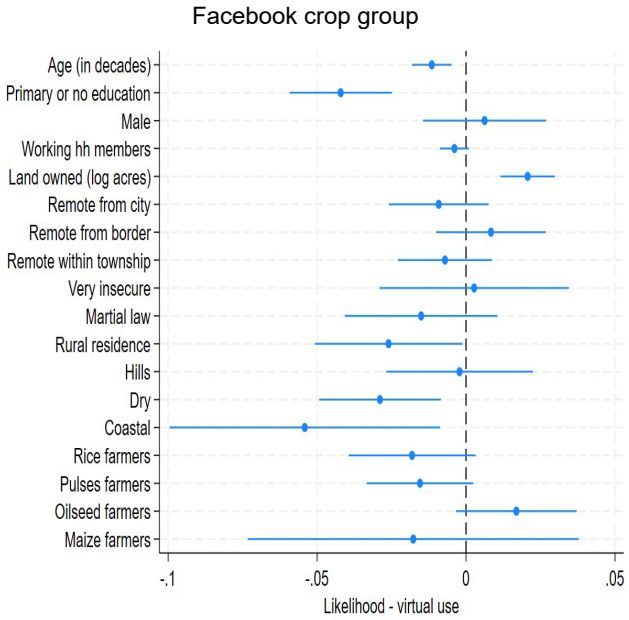
Figure 7. Associates of use of in-person extension – marginal effects with 95 percent confidence intervals from logit models

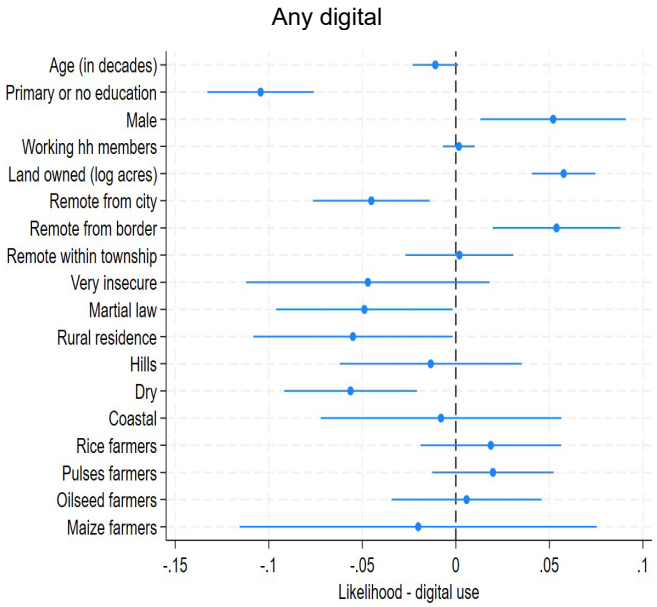


Source: Authors' calculations based on MAPS.

Figure 8. Associates of use of digital extension – marginal effects with 95 percent confidence intervals from logit models







Source: Authors' calculations based on MAPS.

Table 11. Associates of use of any in-person and digital extension

Variables	Unit	(1) In-person Logit - marginal effects	(2) Digital Logit - marginal effects	(3) Test Equality coeff. - z-value
Age	In decades	0.027***	-0.011*	0.213***
		(0.007)	(0.006)	(0.048)
Manager of farm has primary education or less	Yes=1	-0.060***	-0.104***	0.315***
		(0.016)	(0.015)	(0.114)
Male	Yes=1	0.052**	0.052***	-0.041
		(0.021)	(0.020)	(0.150)
Working household members	Number	0.003	0.002	0.005
		(0.005)	(0.004)	(0.032)
Agricultural area owned (log acres)	Log (acres)	0.058***	0.058***	-0.039
		(0.009)	(0.009)	(0.070)
Remote farmer compared to a city of 50,000 people	Yes=1	-0.044***	-0.045***	0.037
		(0.017)	(0.016)	(0.120)
Remote farmer compared to the border	Yes=1	0.097***	0.054***	0.193
		(0.018)	(0.017)	(0.133)
Remote farmer within the township	Yes=1	-0.025	0.002	-0.148
		(0.016)	(0.015)	(0.115)
Very insecure	Yes=1	-0.123***	-0.047	-0.379
		(0.040)	(0.033)	(0.272)
Martial law	Yes=1	-0.099***	-0.049**	-0.233
		(0.027)	(0.024)	(0.193)
Rural residence	Yes=1	0.116***	-0.055**	0.968***
		(0.036)	(0.027)	(0.230)
Hills	Yes=1	0.077***	-0.013	0.499***
		(0.026)	(0.025)	(0.188)
Dry	Yes=1	-0.030	-0.056***	0.183
		(0.019)	(0.018)	(0.142)
Coastal	Yes=1	0.011	-0.008	0.109
		(0.036)	(0.033)	(0.253)
Rice farmers	Yes=1	0.051**	0.019	0.163
		(0.021)	(0.019)	(0.150)
Pulses farmers	Yes=1	0.065***	0.020	0.229*
		(0.017)	(0.017)	(0.128)
Oilseed farmers	Yes=1	0.032	0.006	0.138
		(0.021)	(0.020)	(0.152)
Maize farmers	Yes=1	-0.073	-0.020	-0.274
		(0.053)	(0.049)	(0.390)
Observations		3,299	3,299	
Pseudo-R2		0.0662	0.0597	

Source: Authors' calculations based on MAPS.

Table 12. Associates of use of extension

Variables	Unit	(1) Any extension (in-person or digital) Logit - marginal effects	(2) Combination of sources of extension# Poisson
Age	In decades	0.009	0.027**
		(0.007)	(0.012)
Manager of farm has primary education or less	Yes=1	-0.104***	-0.208***
		(0.017)	(0.029)
Male	Yes=1	0.081***	0.098**
		(0.022)	(0.039)
Working household members	Number	0.001	0.007
		(0.005)	(0.008)
Agricultural area owned (log acres)	Log (acres)	0.080***	0.155***
		(0.010)	(0.017)
Remote farmer compared to a city of 50,000 people	Yes=1	-0.072***	-0.124***
		(0.018)	(0.031)
Remote farmer compared to the border	Yes=1	0.118***	0.199***
		(0.020)	(0.035)
Remote farmer within the township	Yes=1	-0.010	-0.047
		(0.017)	(0.029)
Very insecure	Yes=1	-0.113***	-0.288***
		(0.038)	(0.078)
Martial law	Yes=1	-0.096***	-0.244***
		(0.027)	(0.053)
Rural residence	Yes=1	0.031	0.097
		(0.034)	(0.061)
Hills	Yes=1	0.049*	0.116**
		(0.028)	(0.049)
Dry	Yes=1	-0.061***	-0.080**
		(0.021)	(0.035)
Coastal	Yes=1	0.006	0.029
		(0.038)	(0.065)
Rice farmers	Yes=1	0.050**	0.113***
		(0.023)	(0.036)
Pulses farmers	Yes=1	0.055***	0.105***
		(0.019)	(0.032)
Oilseed farmers	Yes=1	0.003	0.035
		(0.024)	(0.039)
Maize farmers	Yes=1	-0.058	-0.196*
		(0.056)	(0.103)
Observations		3,299	3,299
Pseudo-R2		0.0710	0.0589

Note: Standard errors in parentheses; #: combination of in-person (public, private, NGO), and virtual; *** p<0.01, ** p<0.05, * p<0.1
Source: Authors' calculation based on MAPS.

7. CONCLUSIONS AND IMPLICATIONS

Access to agricultural extension and crop advisory services, whether public or private, in-person or digital, can play a crucial role in ensuring widespread and appropriate use of new and improved agricultural technologies. However, the delivery and use of such services is not well understood in fragile settings. In this study, we examine the case of Myanmar, which experienced significant upheaval over a four-year crisis period, first due to mobility restrictions because of the COVID-19 pandemic in 2020, and then due to the consequences of a military coup in early 2021, leading to increased conflict, a reduction in public sector employment, and more limited and costly internet and mobile phone access. Using a mixed-method approach, relying on unique farm data as well as insights from key informant interviews and secondary data, we investigate the state of agricultural extension use by crop farmers during this volatile period.

Based on a large-scale nationally representative farm survey, we find that the share of farmers accessing agricultural extension was low before the crisis, with only 41 percent of farmers receiving crop advice during the monsoon of 2020. This share further declined by 9 percentage points to 32 percent of farmers in the monsoon of 2022. While there was a decline in the use of in-person extension services provided by both the public and private sectors, digital extension services remained resilient and even increased in recent periods. We also find that in-person agricultural extension services are not inclusive, with better-educated, least remote, bigger, and male farmers accessing them more frequently. Digital agricultural extension services suffer from these exclusion patterns as well. Farmers residing in conflict-affected areas are more excluded from accessing extension and crop advisory services. Farmers residing in townships under martial law use any extension service less, in-person or digital (often because they lack access to the internet). Farmers residing in the most insecure areas use less in-person extension as well, but still use digital extension services to a similar extent than in secure areas, illustrating opportunities to provide crop advisory services to conflict-affected areas in this manner.

The study has several important implications. First, despite the widespread insecurity in the country limiting in-person travel, there are now substantial digital opportunities available to provide crop advisory services in conflict-affected areas. The scaling-up of such services would likely be welcomed by farmers, given that currently only one out of five farmers in Myanmar are relying on such services. Second, the private sector has been leading the pivot to the provision of such digital services. They have not only been focusing on sales of their products but have also been involved in providing crop advice overall, providing opportunities to leverage these initiatives to finetune, and reach of, agronomic advice. Third, innovations in digital agriculture are quickly emerging and further testing, piloting, and evaluating the impact of such innovations would be useful. Fourth, access to internet is problematic in Myanmar and further efforts to ensure access – especially in conflict-affected areas – should be encouraged.

Our study also suggests further areas of inquiry. First, we have studied the associates of farmers using agricultural extension and crop advisory services. We have however not analyzed the impact of having access to agricultural information on the adoption of improved technologies and agricultural performance. That should best be explored in further work. Second, while we have looked at the aggregate use of in-person and digital extension, more in-depth assessments of modalities of agricultural extension and types of digital extension accessed and used would be useful for the understanding of the demand for agricultural extension, and for further suggestions for opportunities for growth.

REFERENCES

Abate, G., Dereje, M., Hirvonen, K., Minten, B. 2021. Geography of public service delivery in rural Ethiopia. World Development. 136: 105133.

Abate, G.T., Bernard, T., Makhija, S. and Spielman, D.J. 2023. Accelerating technical change through ICT: Evidence from a video-mediated extension experiment in Ethiopia. World Development, 161, p.106089.

Abate, G.T., Abay, K.A., Chamberlin, J., Kassim, Y., Spielman, D.J. and Tabe-Ojong, M.P.J. 2023. Digital tools and agricultural market transformation in Africa: Why are they not at scale yet, and what will it take to get there?. Food Policy, 116, p.102439.

Aker, J.C. 2011. Dial "A" for agriculture: a review of information and communication technologies for agricultural extension in developing countries. Agricultural economics, 42(6), pp.631-647.

Aker J. C., Ghosh I., Burrell J. 2016. The promise (and pitfalls) of ICT for agriculture initiatives. Agricultural Economics, 47(S1), 35-48.

Anderson, J. R., and Feder. G. 2007. Agricultural Extension. In Handbook of Agricultural Economics, Vol 3, ed. Robert Evenson and Prabhu Pingali, 2343–78. Amsterdam, Netherlands: Elsevier.

Birkhaeuser, D., Evenson, R.E., and Feder, G. 1991. The Economic Impact of Agricultural Extension: A Review. Economic Development and Cultural Change 39(3): 607–50.

Brinkerhoff, D. W., Wetterberg, A., and Wibbels, E. 2018. Distance, services, and citizen perceptions of the state in rural Africa. Governance, 31(1), 103–124.

Cheesman, N., D'Costa, B. and Haberkorn, T. 2016. Anticipating the struggle against everyday impunity in Myanmar through accounts from Bangladesh and Thailand. Asia & the Pacific Policy Studies, 3(1), pp.48-61.

Davis, K.E., Makhija, S. and Spielman, D.J. 2021. Agricultural extension and rural advisory services: What have we learned? What's next?. PIM Synthesis Brief. Washington DC: International Food Policy Research Institute

Deejay, A., and Wells, T. 2021. How activists are using Facebook in Myanmar for democratic ends, but Facebook itself also facilitated hate speech, Melbourne Asia Review, 7. doi:10.37839/mar2652-550x7.1

Ekanayake, I.J., Ambrosio Albala, M. and Jaffee, S.M. 2019. Benchmarking of Myanmar's Food Systems: Evidence and Strategic Directions. The World Bank.

Fafchamps, M., and Minten B. 2012. Impact of Sms-based agricultural information on Indian farmers, World Bank Economic Review, 26(3): 383-414

Faxon, H.O. 2023. Small farmers, big tech: agrarian commerce and knowledge on Myanmar Facebook, Agricultural and Human Values, https://doi.org/10.1007/s10460-023-10446-2

Garry, S. and Checchi, F. 2020. Armed conflict and public health: into the 21st century. Journal of Public Health, 42(3), pp.e287-e298.

Goeb, J., Maredia, M.K., Herrington, C. and Zu, A.M. 2023. Agricultural extension in times of crisis and emergent threats: Effectiveness of a fall armyworm information intervention in Myanmar. MAPSA Working paper 36. International Food Policy Research Institute

GoM (Government of Myanmar) and UNFPA. 2017. The 2014 Myanmar Population and Housing Census: Thematic report on education. Naypyitaw: Ministry of Immigration and Population, Department of Population.

ISP. 2023. ISP on Point. Number 12, February 9, 2023. Accessed on December 12th, 2023, at https://ispmyanmar.com/community.

Justino, P. 2016. Supply and demand restrictions to education in conflict-affected countries: New research and future agendas. International Journal of Educational Development, 47, pp.76-85.

Lambrecht, I. van Asselt, J., Headey, D., Minten, B., Meza, P., Sabai, M., Sun, T., S., and Ei Win, H. 2024. Can phone surveys be representative in low- and middle-income countries? An application to Myanmar. Plos One. Forthcoming.

Maertens, A., Michelson, H. and Nourani, V. 2021. How do farmers learn from extension services? Evidence from Malawi. American Journal of Agricultural Economics, 103(2), pp.569-595.

MAPSA (Myanmar Agriculture Policy Support Activity). 2023. The continuous rise – during economic growth, the COVID-19 pandemic, and conflict - in the adoption of labor-saving agricultural technologies in Myanmar. Myanmar Strategy Support Program Working Paper 43. Washington, DC: IFPRI (International Food Policy Research Institute).

McDermott, J. and Swinnen, J. eds., 2022. COVID-19 and global food security: Two years later. International Food Policy Research Institute.

Menz, K. 2018. "Agricultural Extension, Community-Based Development, and Conflict." Banwa 12A: art-001S.

Nakasone, E., Torero, M., Minten, B. 2014. The power of information: The ICT revolution in agricultural development, Annual Review of Resource Economics, 6:533-550

Oyinbo, O., Chamberlin, J., Abdoulaye, T. and Maertens, M. 2022. Digital extension, price risk, and farm performance: experimental evidence from Nigeria. American Journal of Agricultural Economics, 104(2), pp.831-852.

Rajkhowa, P., and Qaim M. 2021. Personalized digital extension services and agricultural performance: Evidence from smallholder farmers in India. PLoS ONE 16(10): e0259319.

Ragasa, C., Lambrecht, I., Mahrt, K. and Aung, Z.W. 2023. Empowering rural women through gender and nutrition education amid the COVID-19 crisis: Evidence from Myanmar's Central Dry Zone. Journal of Rural Studies, 103, p.103134.

Skovdal, M. and Campbell, C. 2015. Beyond education: What role can schools play in the support and protection of children in extreme settings?. International Journal of Educational Development, 41, pp.175-183.

Spielman, D., Lecoutere, E., Makhija, S. and Van Campenhout, B. 2021. Information and communications technology (ICT) and agricultural extension in developing countries. Annual review of resource economics, 13, pp.177-201.

Stads, G., Nin Pratt, A., Omot, N., Pham, M.T. 2020. A cross-country analysis of resource allocation, performance and impact on productivity. Washington DC: International Food Policy Research Institute.

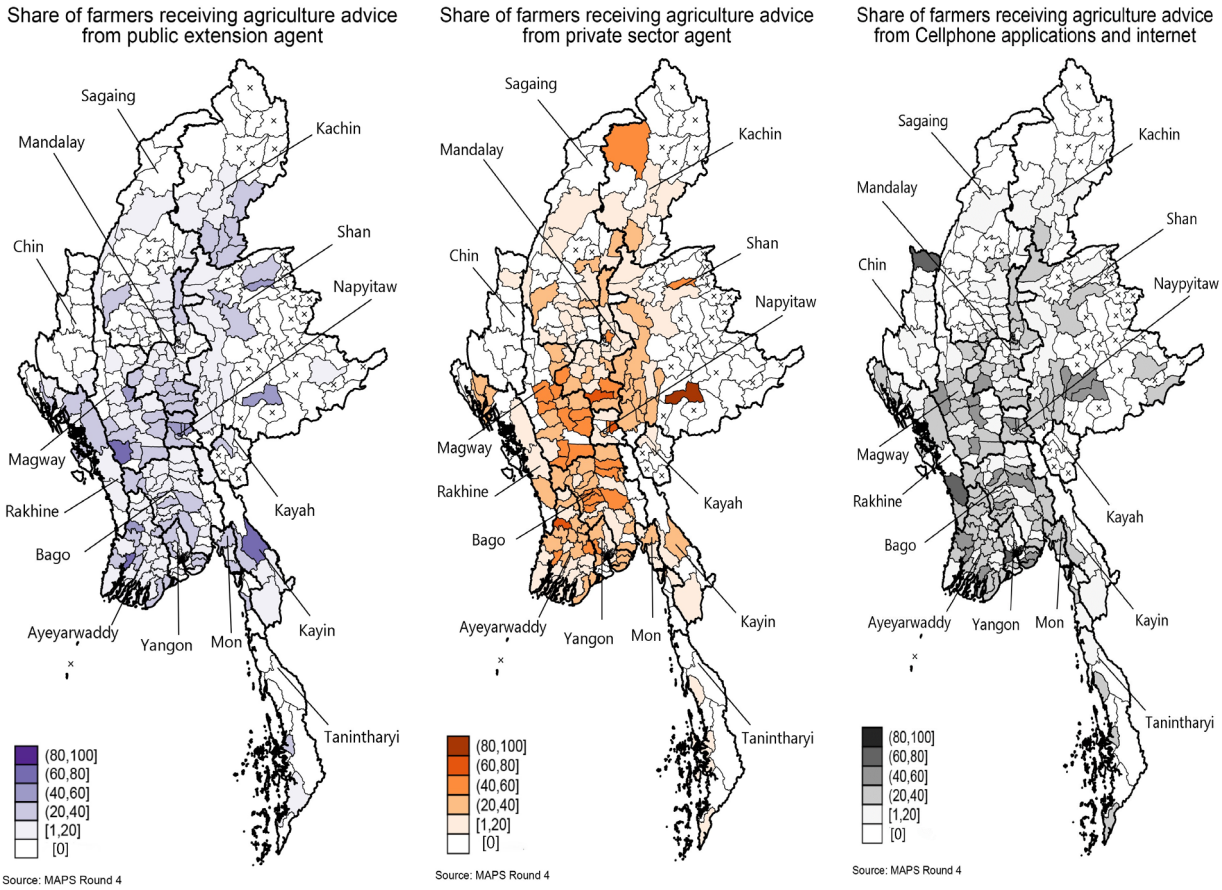
Truppa, C., Yaacoub, S., Valente, M., Celentano, G., Ragazzoni, L. and Saulnier, D. 2024. Health systems resilience in fragile and conflict-affected settings: a systematic scoping review. Conflict and health, 18(1), p.2.

Witinok-Huber, R., Radil, S., Sarathchandra, D. and Nyaplue-Daywhea, C. 2021. Gender, place, and agricultural extension: a mixed-methods approach to understand farmer needs in Liberia. The Journal of Agricultural Education and Extension, 27(4), pp.553-572.

World Bank. 2022. Myanmar Economic Monitor: Contending with constraints. June 2022. Washington DC: World Bank.

APPENDIX

Figure A.1 Use of agricultural extension, dry season 2023



Note: “x” are townships that have not been surveyed.

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