



Beyond the Smartphone: Bridging the Digital Divide for Young Farmers

Abhinandan Kumar Singh¹ and *Shubham Gaurav²

¹M.Sc. Research Scholar, Department of Agricultural Extension Education, Bihar Agricultural University, Sabour, Bihar-813210, India

²Ph.D. Research Scholar, Department of Agricultural Extension Education, Bihar Agricultural University, Sabour, Bihar-813210, India

*Corresponding Author's email: shubhamgaurav048@gmail.com

Picture a young farmer standing at the edge of a field, phone in hand. In theory, that phone can do a lot: pull up a weather forecast, check today's market prices, flag an early pest outbreak, process a digital payment, or connect to an agricultural advisory service. In practice, the screen is stuck loading. There's no reliable network out here. Or the data plan ran out three days ago and topping it up isn't cheap. Or the app that could help exists only in a language the farmer doesn't read comfortably. Or the farmer has the phone, has the data, and still isn't quite sure how to use the advisory service in a way that actually changes a farming decision. Is owning a smartphone enough to become a "digital farmer"? The honest answer is no. And understanding why not is the starting point for this article.

What Is the Digital Divide in Agriculture?

The digital divide in agriculture is usually described as the gap between farmers who can access and effectively use digital tools, and farmers who cannot - with smallholder and rural farmers disproportionately on the losing side of that gap (Panwar & Sahoo, 2025; Vavekanand & Dayanand, 2024). Notice the phrase "access and effectively use." That's important, because the digital divide in farming is not just about who owns a phone. It stacks up across several layers at once: access to a device, affordability of that device and its data, digital skills to use it well, the actual quality of the connection, whether the available content is relevant to the farmer's own crops and conditions, and finally, the ability to turn all of that into a real farming decision. Miss any one layer, and the chain breaks.

Young Does Not Always Mean Digitally Connected

There's a common assumption that younger farmers, having grown up around smartphones and social media, have essentially solved the digital divide for themselves. The evidence complicates that assumption rather than confirming it. Younger, educated farmers do adopt digital tools more readily than older farmers but they still confront structural barriers including connectivity, cost, and digital literacy gaps (Panwar & Sahoo, 2025; Malik & Ansari, 2024). In other words, willingness to use technology and ability to use technology effectively are two different things. A young farmer may be entirely comfortable scrolling social media, and still be locked out of the digital tools that matter most for farming decisions because the network isn't there, the cost is too high, or the training was never offered. Age changes attitude toward technology. It does not automatically remove the barriers standing between a farmer and that technology.

The First Barrier: "No Network, No Digital Agriculture"

Nothing digital works without a connection, and connection quality varies enormously by farm size and location. Only 24–37% of farms under one hectare are served by 3G or 4G

networks, compared to 74–80% of farms over 200 hectares, a gap that leaves many small-scale farmers disproportionately in food-insecure regions with poor service coverage (Mehrabi et al., 2020). That is a global-level estimate, and it should be read as showing a pattern of inequality by farm size rather than a fixed number for any one country. Zooming into specific places tells a similar story. In rural Wales, 19% of surveyed farmers had no broadband access at all, and slow connection speeds limited business growth and innovation for the rest (Bowen & Morris, 2019). In Cambodia, infrastructural barriers-high technology costs, poor internet connectivity, rising mobile data fees, and the absence of public Wi-Fi-statistically affected an estimated 83–88% of surveyed farmers (Hem et al., 2025). What does a statistic like "37% network coverage" actually mean for a young farmer trying to farm smarter? It means a digital advisory app is useless if it can't be downloaded. It means a weather warning is useless if it arrives after the storm has already passed. It means a market-price tool cannot help a farmer negotiate a better sale if the farmer can never actually connect to it. These are context-specific findings from particular countries and farm-size categories not a claim that every young farmer everywhere faces exactly these odds.

The Second Barrier: Can Young Farmers Afford Digital Agriculture?

Even where connectivity exists, cost is its own gatekeeper. Smartphones, ongoing internet subscriptions, mobile data, agricultural apps, and for those attempting more advanced precision farming sensors and specialized equipment all add up. For a smallholder operating on thin margins, "going digital" is not a one-time purchase; it's an ongoing expense. This is where the digital divide starts to look less like a technology gap and more like an economic one. It can separate small farms from large farms, and lower-income farmers from higher-income farmers, based simply on who can afford to purchase and maintain digital tools and who cannot (Bontsa et al., 2023). A young farmer's enthusiasm for a new app count for little if the monthly data cost competes directly with the household budget.

The Third Barrier: A Smartphone Does Not Create Digital Literacy

Here's a distinction worth sitting with: owning a smartphone is not the same as knowing how to use digital technology productively for farming. A farmer can be entirely fluent in WhatsApp, YouTube, and social media, and still struggle to interpret a weather advisory correctly, evaluate whether an online farming tip is trustworthy, operate a precision-farming tool, make sense of a digital market platform, or tell reliable agricultural information apart from misinformation. Researchers sometimes describe this as a "second-level" digital divide the gap not in who has access, but in who can actually use that access well. Insufficient digital literacy, technology complexity, inadequate training, and lack of support from agricultural organizations continue to impede adoption, and low digital confidence and limited access to formal training have specifically hindered wider adoption of precision farming technologies among smallholder paddy farmers in Malaysia (Hem et al., 2025; Baharin et al., 2025). There is also evidence of a shift in the nature of the divide itself from a simple question of internet access toward what some researchers call a "bandwidth divide," separating those who can afford high-speed services from those who cannot (Mollet et al., 2025). And research on digital-village development has found an inverted U-shaped relationship between this second-level, literacy-based divide and rural digital development a reminder that pouring in infrastructure alone, without investing in literacy, has diminishing returns (Chen et al., 2024). As one study puts it plainly, the "ability gap" tends to lag behind the "access gap" meaning simply getting devices and connections into farmers' hands does not close the divide; digital literacy programs are needed alongside that infrastructure (Meng et al., 2023).

The Language Problem: What If the Technology Doesn't Speak Your Language?

A digital tool that a farmer cannot read or understand is not much of a tool at all. When agricultural apps and platforms are built only in dominant national or international languages,

farmers who speak regional or local languages are effectively locked out regardless of how good their internet connection is. This is a documented barrier, not a hypothetical one: the absence of Khmer-language interfaces has been identified as a specific factor limiting technology adoption in Cambodia, alongside broader language barriers reported elsewhere (Hem et al., 2025; Smidt & Jokonya, 2021). The underlying principle extends well beyond any one country: digital agriculture has to speak the farmer's language, literally and culturally covering local crops, local farming practices, and locally relevant advice, not generic content translated from somewhere else.

Electricity: The Overlooked Digital Barrier

It's easy to focus on phones and data plans and forget the most basic requirement underneath all of it: power. A smartphone with a full data plan is still just a dead weight in a farmer's pocket if there's nowhere reliable to charge it. Electricity access remains a real constraint in some rural areas, and where it is unreliable, farmers face additional costs whether that's paying to charge a device elsewhere or traveling to a location that has both power and network service (Mollel et al., 2025). It is one of the least glamorous barriers in the digital divide conversation, but for the farmers actually facing it, it can be one of the most decisive.

Poverty and the Digital Divide Are Connected

Poverty and digital exclusion tend to reinforce each other. One study from East Java found that internet users were 2.72 times more likely to be classified as non-poor than non-users — while also noting that digital literacy and internet utilization remained very low specifically among poorer farmers (Satria & Natalia, 2025). That finding deserves a careful reading. It is a study-specific result from one region, and it should not be interpreted as proof that simply handing a farmer internet access will lift them out of poverty. What it does suggest is a two-way relationship: poverty makes it harder to adopt digital tools in the first place — through the cost of devices, data, and training — while a lack of digital access can, in turn, limit the economic opportunities that might have helped a farmer out of poverty. Compounding disadvantages from illiteracy, poverty, and a lack of relevant localized content have been noted particularly among young farmers in developing economies (Smidt & Jokonya, 2021; Khanal et al., 2021).

Social and Cultural Barriers

Technology adoption on a farm is rarely a purely individual decision. It happens or doesn't within a community. Cultural resistance and a lack of community-level usage can deter adoption even where access exists, and gender inequality further limits access for women farmers (Panwar & Sahoo, 2025). People generally adopt new technology when others around them are already using it, when the benefits are visible nearby, when they have social support for trying something new, when they trust the tool, and when there's someone to learn from. A young farmer surrounded by skeptical neighbors, or without a peer network to lean on, faces a steeper climb than the connectivity and cost statistics alone would suggest.

Young Farmers: The Opportunity Side of the Story

None of this should be read as a story with no upside. Young farmers genuinely do represent a meaningful opportunity for digital agriculture the barriers above describe real obstacles, not a verdict on youth capability. Internet uptake among younger rural populations is moving fast in some contexts: 99% of Vijabiz youth groups in Kenya were found to use mobile phones to access the internet (Mollel et al., 2025), a striking figure for that particular initiative. Digital tools, social media, and mobile applications have also been linked to increased youth engagement and interest in progressive farming practices (Dhir & Mishra, 2025). And not all young farmers face the same odds those who farm full-time, have moderate-to-high incomes, and belong to farmer organizations tend to show more positive perceptions of digital technologies than their peers (Bontsa et al., 2023). There is an important nuance here too: network infrastructure investment has been found to help middle-aged and young rural residents cross the digital divide in general, but without the same measurable effect

specifically among people involved in agricultural work (Meng et al., 2023). That's a useful caution against assuming that general rural connectivity gains automatically translate into farming-specific digital gains.

From Digital Users to Digital Farmers

There's a meaningful difference between using digital tools casually and using them as a farmer. Watching agricultural videos, browsing social media, or occasionally checking a market-price app is one kind of engagement. Using digital tools for farm planning, systematic record-keeping, weather-informed decision-making, ongoing market intelligence, connecting directly with buyers, accessing advisory services, and learning new techniques is another kind entirely the kind that starts to genuinely change farm outcomes. Moving from the first kind of engagement to the second is not automatic. It typically requires exactly the ingredients this article has been describing: connectivity, affordability, digital literacy, relevant local content, and support.

The Role of Extension: Bridging the Youth Digital Divide

This is where agricultural extension has a clear part to play and it's a different part than simply pointing farmers toward an app. Extension support can include digital literacy training, hands-on demonstrations, content delivered in local languages, peer learning opportunities, farmer group activities, intergenerational learning between older and younger farmers, technical troubleshooting, and perhaps most underrated help evaluating which digital information is trustworthy. Peer-led training and intergenerational learning have specifically emerged as significant pathways for spreading digital knowledge among smallholder farmers (Baharin et al., 2025). The distinction that matters here: extension's job isn't to tell a young farmer "Use this app." It's to teach how to use it, how to interpret what it says, and when to trust it.

Peer-to-Peer Learning: Young Farmers as Digital Ambassadors

There's a promising, forward-looking angle in all of this. Digitally confident young farmers are well placed to help other farmers including older farmers, and farmers less comfortable with technology learn to use these same tools. That can happen through farmer-to-farmer learning, youth groups, farmer organizations, and community demonstrations, with confident young users acting as informal digital ambassadors within their own communities. It's worth being careful not to oversell this. It's a promising approach supported by the general finding that peer-led and intergenerational learning matter for knowledge dissemination — not a proven, universally effective solution on its own. Where it's supported by extension services and farmer organizations, it seems to work best.

What Would It Take to Close the Digital Divide?

- **Better connectivity:** Expanding rural broadband, reliable mobile networks, and public digital infrastructure, particularly for smaller farms that current data suggests are underserved relative to larger operations.
- **Affordable technology:** Working toward more affordable devices, lower-cost data plans, and digital services priced within reach of smallholder budgets.
- **Digital literacy:** Practical, ongoing training rather than one-off demonstrations, paired with farmer-friendly interfaces and continuous support rather than a single training session.
- **Local-language content:** Digital tools and advisories built around regional languages, local crops, and local farming conditions, not generic content translated as an afterthought.
- **Peer learning:** Strengthening farmer groups, youth organizations, and intergenerational knowledge-sharing as genuine channels for building digital skills.

- **Inclusive digital agriculture:** Deliberately extending reach to women farmers, smallholders, low-income farmers, and marginalized rural communities who are otherwise at greatest risk of being left behind.

A Vision for the Young Digital Farmer of the Future

Imagine a young farmer a few years from now. They receive weather information relevant to their own field and crop. They use a smartphone to keep farm records instead of a notebook. They learn new techniques through short videos in their own language. They can reach an extension professional through a message when something on the farm doesn't look right. They check market information before deciding where to sell. They belong to a farmer group that meets both in person and online. They pass on what they've learned to a neighbour who's still finding their feet with the technology. None of that future arrives automatically. It depends on connectivity reaching their village, devices and data being affordable, digital skills being taught and reinforced, content existing in a language and format they understand, and extension support being there when they need it.

Conclusion: The future is digital but it must also be inclusive

Young farmers may well be better positioned than older generations to lead agriculture into a more digital future. But technology cannot transform farming if access to it remains unequal split along lines of farm size, income, geography, gender, and language. The goal, in the end, should not simply be to put a smartphone in every farmer's hand. The goal should be to ensure that every farmer who needs digital technology can access it, afford it, understand it, and use it meaningfully. A truly digital agriculture is not one where the technology is advanced; it is one where the farmer is empowered to use that technology.

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