Promoting Smart Agricultural Technologies using Social and Behaviour Change (SBC) Strategies

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What is SBC?

Social and Behavior Change (SBC) is the intentional, systematic process that seeks to understand and facilitate changes in behaviors, social norms, and the contexts that drive them. SBC needs to be theory-based and evidence-driven and rooted in a thorough understanding of the key factors that influence behaviour (CRS 2023). Knowledge alone is often not enough to drive behavior change. Behavior is shaped by multiple factors emotional, social, environmental, and motivational. To be effective, SBC interventions must pinpoint and address the key determinants influencing the specific behavior. When guided by proven SBC best practices; programs are more likely to achieve meaningful and lasting results. Understanding human behavior can be leveraged to improve food and nutrition policies (FAO.2021).

Social and Behavior Change Communication (SBCC)

Social and Behavior Change Communication (SBCC) is a comprehensive approach that tackles issues affecting individuals and communities both directly and indirectly, aiming to drive behavior change across individual, societal, national, and global levels. These issues span a wide range of areas, including health, environmental sustainability, economic resilience, disaster preparedness, and climate change, among other pressing social and developmental concerns. SBCC employs diverse communication strategies to confront barriers to essential human needs such as food security, safe shelter, clean water, clothing, basic education, healthcare, and personal safety. It also addresses broader social injustices and systemic inequalities that hinder equitable development and well-being. The UNICEF report, 2018, outlines SBCC as a holistic approach addressing behavioral drivers at multiple levels—individual, community, and systemic—and across development sectors such as health, environment, disaster response, and equity

Why is SBC needed?

Many development and humanitarian initiatives fall short of achieving meaningful, lasting

impact because they are based on inaccurate assumptions about human behavior. To design more effective interventions, it is important to keep in mind these fundamental truths about human behavior (Helvetas, 2017)

➢ Knowing what one *should* do does not guarantee that one *will* do it.

➢ Wanting to adopt a behavior does not ensure the ability or willingness to follow through.

➢ Fear of negative consequences does not always lead to preventive action.

➢ People often take steps to improve their lives for reasons that differ from the rational arguments typically used to promote those actions.

Shifting Perspectives on Behavior Change

In the past, it was commonly believed that behavior was primarily driven by an individual's knowledge or beliefs about what was best for them. As a result, programs focused mainly on delivering messages, assuming that simply providing information would be enough to prompt change.

Today's Social and Behavior Change (SBC) approaches recognize that behavior is influenced by a wide range of factors operating at multiple levels—individual, community, organizational, and societal. These behavioral determinants include diverse elements such as:

- Social norms

- Personal beliefs and aspirations

- Community relationships and power dynamics

- Government policies and economic access

- Social status and political affiliations

- Knowledge, trust, fear, and perceived self-efficacy or skills

The factors influencing farmers' decisions to adopt smart farm solutions—such as precision irrigation, mobile apps for weather and market forecasts, or sensor-based soil monitoring—differ based on their identity, context, motivation, and

readiness for change. What encourages one group of farmers to embrace these technologies may not apply to another. For example, in one village, farmers might be drawn to smart tools because they've experienced unpredictable weather patterns and see technology as a way to reduce crop losses (perceived positive outcomes). In another, using smart farming solutions may be associated with being progressive or gaining recognition as a successful, tech-savvy farmer (perceived social norms). Even within the same farming community, different sub-groups respond to different influences. Older farmers may be hesitant to adopt new technologies due to unfamiliarity or fear of technical complexity, while younger farmers may be more motivated by peer influence, exposure through social media, or aspirations to modernize farming and increase profits.

What are Behavioral Determinants?

Behavioral determinants are factors that influence whether or not a person adopts a specific behavior. These determinants can function as either barriers or drivers depending on how they affect the individual.

- When a determinant makes it harder for someone to adopt a behavior, it is referred to as a barrier.
- When a determinant supports or encourages the behavior, it may be called a driver, facilitator, motivator, or enabling factor.

In other words, the same determinant can either hinder or promote behavior change, depending on the context and the individual's perception. It is essential to understand the full range of behavioral determinants and to prioritize the most influential ones in order to effectively promote behavior change.

Common Behavioral Determinants

Table 1 provides a summary of common behavioral determinants. Many of these include the term "perceived" because behavior is shaped more by what individuals believe or feel to be true than by objective facts. Among these, the first three determinants—perceived self-efficacy/skills, perceived social norms, and perceived positive consequences—are frequently among the most influential and should be prioritized when designing behavior change strategies. The Behavioral determinants with respect to agricultural practices have also been explained in table1.

Table 1 Common Behavioral Determinants

Determinant & Definition	Agriculture-Related Examples
Perceived self-efficacy / skills Belief in one's ability to perform a behavior	➢ I don't know how to apply organic compost properly ➢ It's too difficult to explain new planting methods to older farmers. ➢ I want to try intercropping, but I'm not confident I'll do it correctly.
Perceived social norms Perception of how important others approve/disapprove of a behavior	➢ My father believes traditional plowing methods are best, so I still use oxen. ➢ My neighbors don't use cover crops, so they think I'm wasting time. ➢ The community expects us to burn crop residues after harvest.
Perceived positive consequences Expected benefits from the behavior	➢ Since I started using compost, my crop yields have improved. ➢ My neighbor uses water-harvesting trenches and irrigates less. ➢ Crop rotation reduced pests on my farm.
Perceived negative consequences Expected drawbacks of the behavior	➢ If I stop using chemical fertilizer, my harvest might drop. ➢ Switching to no-till farming takes too much time. ➢ Organic inputs are expensive and not worth it.
Perceived action efficacy Belief the behavior will solve the problem	➢ I don't think mulching will improve soil fertility. ➢ Drip irrigation won't help due to unreliable water supply. ➢ Composting won't stop erosion on my land.
(Perceived) Access Availability of tools, services, or resources	➢ I want to attend climate-smart training, but it's too far. ➢ I can't buy certified seeds—no agro-dealer nearby. ➢ I want to build a fish pond, but I lack materials and support.

Cue to action / reminders Memory of when or how to act	➢ I forgot the pest control spray date. ➢ I lose track of planting schedules for fertilizer application. ➢ I forget how to make the bio-pesticide without reminders.
Perceived susceptibility / vulnerability Feeling at risk of a problem	➢ Erosion affects hillside farms, not my flat land. ➢ Pests are a problem only for large farms. ➢ My livestock are healthy, so I don't need to vaccinate.
Perceived severity How serious the problem is believed to be	➢ Climate change doesn't affect my farm yet. ➢ Losing some topsoil isn't a big deal. ➢ Fall armyworm is just a seasonal nuisance.
Perceived divine will Religious beliefs about outcomes	➢ Rainfall is in God's hands, so I don't conserve water. ➢ Crop success depends on divine will. ➢ Our faith teaches land respect, so we avoid chemicals.
Policy Rules or regulations influencing behavior	➢ Only large farmers qualify for improved seed subsidies. ➢ I need to be in a cooperative to get extension support. ➢ Land policy discourages fallowing.
Culture Shared traditions, beliefs, and values	➢ Women don't farm in our culture. ➢ We've always planted maize the same way. ➢ We don't grow or eat certain crops for cultural reasons.
Social relationships Influence of roles, networks, and hierarchy	➢ I follow my uncle's farming practices—he's respected. ➢ Our cooperative leader recommends new methods, so we follow. ➢ I use manure because my neighbors do.
Emotion Spontaneous feelings that affect decisions	➢ I was embarrassed when composting failed. ➢ I'm proud my farm is a demonstration site. ➢ I'm afraid of being mocked if new methods fail.
Collective self-efficacy Group confidence in joint action	➢ We believe we can build shared storage. ➢ Our group can negotiate better input prices. ➢ Our co-op is working to restore rangelands.
Community capacity Shared skills and resources for change	➢ Our irrigation committee ensures fair access. ➢ Our farmer group shares tools and organizes trainings. ➢ The seed bank helps us manage poor seasons.

Adapted from CRS' social and behavior change guide 2023

Core principles and best practices for SBC an extension worker can use

Decades of research and field experience have led to a global consensus on key principles that underpin effective Social and Behavior Change (SBC) interventions. The steps in this guide are designed to support the development of thoughtful, evidence-based SBC strategies. The following best practices and examples can guide an extension worker to apply each SBC core principle to promote behavior change among farmers for adoption of smart farm technologies.

1. Integrate SBC across the project: When introducing a climate-smart irrigation system, ensure the training, input distribution, field trials, and monitoring all include messages and methods to promote sustained behavior change in water use.

2. Ensure appropriate staffing: Assign a trained field agent or "digital agriculture champion" to lead smart farming demonstrations and help farmers troubleshoot mobile apps or sensor installations.

3. Engage local stakeholders meaningfully: Co-design a mobile pest alert system with local farmers and agro-dealers, including women and smallholders, ensuring the app addresses their actual field challenges and preferred languages.

4. Build on existing programs and systems: Integrate smart farming tools into existing government-led agriculture extension programs or farmer field schools, rather than launching them as standalone initiatives.

5. Ground your work in theory: Use the Theory of Planned Behavior to design interventions encouraging farmers to use AI-based advisory apps—

targeting their attitudes, social norms, and self-efficacy.

6. Work at multiple levels: Pair field-level demonstrations of soil sensors with policy-level advocacy for digital subsidies and community meetings about shared technology access.

7. Use a mix of strategies and channels: Promote drone services using: SMS reminders, demonstration days, farmer WhatsApp groups, and radio testimonials from early adopters.

8. Apply participatory, people-centered methods: Use participatory learning and action (PLA) tools to let farmers map challenges and choose smart technologies they feel confident using (e.g., voice-based advisory vs. text-based).

9. Focus on a few key behaviours: Promote just **two high-impact behaviors**:

- Regular use of mobile weather forecasts, and
- Timely use of smart irrigation systems, rather than overwhelming farmers with all features of digital farming platforms.

10. Base everything on evidence: Conduct a rapid survey to understand which farmer groups are already using digital tools and what barriers they face—then design tech promotion strategies accordingly.

11. Address all relevant behavioral determinants: If farmers aren't using precision tools, explore social norms (e.g., "traditional methods are better"), fear of tech failure, or access to smartphones—not just knowledge gaps.

12. Identify and engage all relevant audiences: For a smart irrigation pilot, target:

- **Primary audience:** Farm owners,
- **Influencers:** Spouses, community leaders, and agri-dealers,
- **Secondary audience:** Youth who can assist with digital tools.

13. Pre-test and adapt tools and materials: Test a mobile app's interface with illiterate or semi-literate farmers to ensure that icons, voice commands, and language are intuitive and culturally appropriate.

14. Set clear objectives and monitor progress: Track weekly app usage stats and conduct monthly feedback sessions to see if farmers are applying smart weather advice to planting decisions.

15. Prioritize quality implementation: Train field agents in interpersonal skills to support sceptical or older farmers through hands-on practice sessions with drones or GPS-enabled sprayers.

Core Principles and Best Practices
For applying Smart farm technologies farmers

Social and Behavior Change Approaches for promoting smart farming technologies

Extension personnel and training institutions may use the following SBC approaches to promote smart farming technologies among the farmers. The approaches have been classified as enabling Environment Approaches, Community-Based Approaches, Communication (BCC) Approaches and Other Approaches (Mary Packard-Winkler et al.2024).

Enabling Environment Approaches

- **Advocacy:** Engaging policymakers to include smart farming tools (e.g., IoT devices, precision irrigation) in national agriculture schemes or subsidies.
- **Social Mobilization:** Organizing farmer associations to collectively invest in drone services or shared smart equipment.
- **Behavioral Economics:** Providing "first trial free" drone spraying services or discounted soil sensor kits to encourage initial adoption.
- **Capacity Building:** Training extension officers and lead farmers on how to operate and

maintain GPS-guided tractors or use farm management apps.

Community-Based Approaches

- **Community Outreach:** Field demonstrations of smart irrigation systems or drone applications in village centers.

- **Community Engagement:***:* Participatory workshops where farmers identify problems (e.g., poor irrigation) and co-explore smart solutions like moisture sensors.

- **Community Dialog:** Village discussions on myths and concerns about using AI-based apps or autonomous farm machines.

- **Education:** Conducting digital literacy sessions so farmers can confidently use mobile apps or data dashboards for crop management.

- **Community Mobilization:** Mobilizing youth groups to assist elders in using smartphones for agri-advisory platforms or weather apps.

- **Provision of Material/Inputs:** Distributing starter kits of solar-powered sensors or smartphone-based crop disease diagnostic tools with basic training.

Communication (BCC) Approaches

- **Interpersonal Communication (IPC):** Extension workers visiting farms to explain how smart weather stations can guide planting decisions.

- **Entertainment Education ("Edutainment"):***:* Radio dramas featuring farmer characters who successfully use mobile apps and drones to improve productivity.

- **Social Marketing:***:* Campaigns promoting affordable sensor kits or subscription-based drone services, highlighting ROI and time savings.

- **Mass Media:** National TV segments showing success stories of farmers using smart tractors or AI-based pest diagnosis apps.

- **Mid-media:** Roadshows or puppet theatre that explain how digital tools can help adapt to climate change.

- **Small Media***:* Posters or flipbooks demonstrating how to install and read a soil moisture sensor or use a mobile-based irrigation alert system.

- **Digital and Social Media:**Facebook or WhatsApp groups sharing video tutorials on smart farming tools, or Telegram channels providing updates on new technologies.

Other Approaches

- **Human-Centered Design (HCD):** Co-designing a mobile app for fertilizer recommendations by involving smallholder farmers in low-literacy regions, ensuring intuitive icons and offline usability.

Conclusion

Social and Behavior Change (SBC) offers a powerful, evidence-based framework for driving the adoption of smart farming technologies among farmers. Traditional knowledge-transfer models have often failed to achieve sustained behavioral shifts because they overlook the complex, multi-level factors that shape decisions. SBC, however, recognizes that behavior change is not merely about information it is about motivation, trust, norms, capability, access, and emotional drivers.By integrating SBC principles across all stages of agriculture interventions, planning, implementation, communication, monitoring, and adaptation extension workers and program designers can more effectively promote technologies such as climate-smart irrigation, mobile apps, drones, and AI-based advisory tools. Engaging stakeholders, grounding actions in behavioral theory, and working at multiple levels (individual, community, policy) ensure that innovations are not just introduced, but embraced.SBC approaches also encourage co-creation and participatory learning, which are critical for building trust, relevance, and long-term sustainability. Whether using community dialogues, mobile media, or behavioral nudges, these strategies place the farmer at the center of innovation—transforming them from passive recipients to active drivers of agricultural transformation.

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