Pioneer-Positive Deviance: Applications for the agricultural extension system in Ethiopia

Guideline for practitioners

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Contents

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Cover photo: An adaptation pioneer household in North Shewa Zone, Ethiopia. Tenagne feeding her sheep homemade feed supplements (photo credit: Apollo Habtamu/ILRI).

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Adaptation pioneers: Tenagne Getaneh, Weldemariam T/mariam and Yewdiyanesh Kabtimer, Admassu Desta and Almaz Tadess, Kidane Ayele and Welete Kidane

The International Livestock Research Institute (ILRI) works for better lives through livestock in developing countries. ILRI is co-hosted by Kenya and Ethiopia, has 14 offices across Asia and Africa. ILRI is a CGIAR research center, a global research partnership for a food-secure future. CGIAR science is dedicated to reducing poverty, enhancing food and nutrition security, and improving natural resources and ecosystem services. Its research is carried out by 15 CGIAR centers in close collaboration with hundreds of partners, including national and regional research institutes, civil society organizations, academia, development organizations and the private sector.

Pioneer Positive Deviance (P-PD) is an approach developed by a team at ILRI to address issues of adaptation to climate change. It is an evolution of the original concept of positive deviance originating in public health research. It focuses on identifying and learning from individuals, groups or households who find unique, successful solutions to common challenges despite having no additional resources or advantages. By studying these “positive deviants”, communities can discover locally effective practices that can be adopted and scaled, making solutions more sustainable and tailored to specific needs. Positive deviance has been used in areas like public health, education, and social change to solve complex problems from within the community.

Abbreviations

APHs	Adaptation Pioneer Households
FFS	Farmer Field School
F-LI	Farmer-led innovation
F2F	Farmer to Farmer
F2F FDs	Farmer to Farmer Field Days
F2F SN	Farmer to Farmer Scaling Networks
LC	Livestock and Climate Initiative
MELIA	Monitoring, Impact, and Learning Impact Assessment
NARS	National Agricultural Research System
PCSL	Programme for Climate-Smart Livestock
PD	Positive Deviance/Deviants
P-PD	Pioneer-Positive Deviance

Glossary

Adaptation practices: implemented practices in response to the impact of climate change

Adaptation technologies: specific technologies that belong to a specific adaptation practice

Adaptation pioneer households are positive deviant households or family farms that are more effective at adapting to climate change than others in the same circumstances. In case they involve non-related household members such as laborers we use household rather than family as a term of reference.

Endogenous innovations: place-based innovations emerging from APHs

Farmer-led innovation: innovation as defined and led by farmers themselves

Farmer to farmer scaling networks: refers only to networks between farmers and farmers organization

Farmers: refers to smallholder farmers as well as forest dwellers, pastoralists, and fisherfolk

Knowledge networks: refers to the networks between APHs and other actors, farming, and non-farming

Summary

This guideline provides guidance on how to use approaches that look for solutions on the ground, rather than imposing them, and work with farmers in building on those in a genuine co-design process with equal collaboration of all. This approach is based on positive deviance theory, and identifies pioneer households for sustainable livestock solutions.

Chapter 1: Introduction to Pioneer-Positive Deviance

What is Pioneer-Positive Deviance?

Pioneer-Positive Deviance (P-PD) is an innovative approach trialed to support farmer-led innovation, particularly in vulnerable agricultural environments. Initially developed by a team at the International Livestock Research Institute (ILRI) between 2019 and 2024, P-PD was designed to enhance smallholder farmers' self-sustaining capacities in response to climate change. The core idea behind P-PD is based on the observation that in every community, certain individuals or households, known as “pioneers,” thrive where others in similar circumstances struggle.

Using P-PD as a guiding principle facilitates an in-depth understanding of farmers’ decisions regarding the adoption, continuation, or reconfiguration of adaptation practices in response to perceived effects of climate change. Originating in health and nutrition research, this approach emphasizes resilience as thriving in a hostile environment [1]. Rather than identifying failures and analyzing problems, positive deviance encourages an understanding of why some people succeed even when least expected [2, 3]. The concept helps to pinpoint adaptation pioneer households (APHs) that stand out because they have successfully implemented adaptation practices in response to perceived climate change effects, even under the same stress factors faced by others, who either did not implement adaptation practices or did so unsuccessfully.

Definitions of terms

Innovators: An innovator is a community member who independently develops or adapts practices, experimenting with context-specific solutions that may not yet be widely adopted. They exemplify local creativity and can provide valuable insights for co-design and testing. [4]

Pioneers: A pioneer is a farmer/farming household/farming family who, on their own initiative, experiments with and improves technologies on their farm to enhance productivity and build more sustainable livelihoods under climate change. What counts as "new" or "innovative" depends on context. Pioneers are often motivated by the perceived novelty and potential for broader livelihood gains, rather than external incentives. They typically are seen in their communities as different from others, thinking outside the box, willing to take risks, and testing practices others might avoid. [5]

Adaptation pioneers: Pioneers in adaptation to climate change, or “adaptation pioneers,” refer to positive deviant farmers who differ from the typical average farmer in their adaptation practices. Rather than viewing them as individual farmers, often perceived to be men, the emphasis is on households or families, depending on the context and the boundary of definition. Adaptation pioneer households (APHs) are positive deviant households that are more effective at adapting to climate change than others in the same circumstances.

Why Pioneer-Positive Deviance?

Unlike traditional approaches that begin by identifying what's going wrong, P-PD starts by asking: "What’s going right, how, and why?". It seeks to understand the behaviors, decisions, and practices of smallholder farmers who excel at adapting to climate change. These APHs often:

- Develop innovative on-farm solutions to climate-related challenges.
- Rely on experimentation and everyday knowledge.
- Make independent and proactive decisions, often without direct external support.
- Are highly observant, curious, and motivated to learn and share.
- Take calculated risks

These pioneers may not necessarily be the well-connected or officially recognized “model farmers” promoted by extension services. While some APHs may hold those titles, P-PD concentrates on endogenous innovation and self-motivated adaptation that emerges from within the household and is tailored to specific conditions and constraints.

For instance, in Tarmaber Kebele, Amhara Region, a couple named Kidane and Welete exemplified the P-PD approach by transforming poor-quality sheep into market-ready animals using their innovative feeding techniques and climate-adaptive housing for livestock.

A pioneer story from the highlands: Kidane and Welete, Tarmaber Kebele / Amhara Region

A pioneer story from the highlands: Kidane and Welete, Tarmaber Kebele / Amhara Region
Kidane and Welete focus on dairy cow and sheep production, including selling fresh milk, cheese, and butter. Kidane and Welete live in a high-altitude area, located at 3,500 meters above sea level. Crop production and livestock keeping are fraught with challenges. The climate is harsh and increasingly variable, with intense rainy seasons followed by months of extremely chilly weather with fog, hail, and frost. Following land reforms in Amhara region in 1998, Kidane lost a large chunk of his farmland. The land he was left with became overgrazed and unproductive, requiring high fertilizer input. At that time, he migrated to Arsi Province, where he learned a range of adaptation and effective land use practices. Having returned to Tarmaber, the couple are now putting these learnings into practice.

Kidane and Welete are focusing on sheep fattening using a zero-grazing system and sheltering the animals in a barn to protect them from intense conditions. “Our fattening animals shouldn’t stay in the sun for a long time,” said Kidane. “So, if the sun is hot, I make the shelter cold, and if the shelter is cold, I make it hot: in general, I try to make the barn an environment which is suitable for fattening.”
For sheep fattening, Kidane buys sheep from the market that have poor body condition, and he gives them the health treatments they need. Welete gives the sheep a type of feed she has developed, using crop residues that are ground and mixed with frushka (wheat bran) and fino (ground wheat), then soaked in water or fed as a cake. She also makes feed out of roasted barley, bean, and vetch, which she sometimes cooks and mixes with salt. These feed combinations speed up the fattening process and have a beneficial impact on the meat.
“As I get older, I want to do more sheep fattening and dairy cow production and change some of my cultivated land to forage development,” said Kidane. “I am harvesting crops for home consumption only, because in our village no-one has had any success with producing and selling surplus crops.”

Photo: Kidane and Welete feeding their animals a homemade feed supplement added to crop residues. (photo: Apollo Habtamu/ILRI).

From: *Adapting to a new normal: Stories of farmers navigating climate challenges*. https://hdl.handle.net/10568/134622.

When to use and when not to use P-PD

Building on several decades of experience with Positive Deviance (PD) [1],and its adaptation through ILRI’s research in Uganda, Kenya, Colombia, and Ethiopia since 2019 [6], we are now moving beyond the original concept. In the Pioneer Positive Deviance (P-PD) approach, we reverse the traditional flow of knowledge, drawing among others on the work of Prolinnova [7].

This shift recognizes and empowers farmers as knowledgeable actors. In doing so, we introduce several new dimensions to the approach, contributing meaningful value to the existing literature and advancing PD as a more participatory, farmer-led innovation framework.

Table 1: Differentiation of applicability of P-PD

When to use	When not to use
When there is a clear boundary to a well-defined challenge that is affecting a substantial number of people	When there is no clear boundary to a well-defined challenge
When the aim is to facilitate farmer-led changes	When the aim is to disseminate externally driven changes
When there are farmer-led innovations with potential for transformation	When there is no evidence of the successful implementation of the innovation by farmers
When the aim is to introduce/promote need-based innovations	When the aim is to introduce/promote recommended externally driven innovations
A challenge in HOW known practices are implemented, and scope for farmer-led adaptations is there, but not widely known	When the challenge is purely technical and cannot be addressed through farmer-led adaptations
When there is a commitment (resource, learnership, collaboration) for locally led solutions	When local challenges are structural and require external interventions
When there are local presence and commitment of key collaborators	When the objective is to drive quick and large-scale change driven by external actors

Adapted from: https://positivedeviance.org/

P-PD in Ethiopia: Farmer-led innovation generation and diffusion landscape

P-PD is an effective mechanism for generating and scaling farmer-led innovations. In Ethiopia, the application of this approach holds significant potential to enhance the agricultural extension system. The P-PD model can be championed by various organizations, either individually or collaboratively, including:

- **Research system/National Agricultural Research Systems (NARS) and universities**: Research institutions play a crucial role in facilitating innovation generation and the adoption of new practices.
- **Public extension system**: Government extension services can identify and promote farmer-led innovations and help extend them to broader communities.
- **Civil society**: Non-governmental organizations (NGOs) and community-based organizations (CBOs) can identify and promote farmer-led innovations in fragile environments

P-PD requires collaboration among multiple stakeholders, including farmers' organizations and value chain actors, to ensure the widespread adoption of innovations.

This guideline provides the background to set up and scale the P-PD approach where P-PD is deemed to be important and feasible to do. The guideline is developed based on the experience of the writing team on deploying the approach in a climate adaptation initiative in the livestock sector and the stakeholders' interest in mainstreaming the approach into the Ethiopian livestock extension system.

Objectives of the guideline

The guideline will enable readers to:

- Describe the importance of the P-PD approach for the identification and scaling of farmer-led innovations.
- Set up P-PD initiatives to identify and scale farmer-led innovations.
- Identify complementarities between P-PD and existing livestock extension systems in Ethiopia to systematize the identification and scaling of farmer-led innovations in Ethiopia’s public extension system.

Target audience of the guideline

This guideline is intended for the public research and extension system actors, the private sector, and development practitioners collaborating with smallholder farmers and promoting farmer-led innovation in Ethiopia. It aims to provide basic knowledge, approaches, and tools to apply the P-PD approach effectively in their work.

Figure 1: Stakeholder consultation on P-PD in Ethiopia (photo: ILRI).

Chapter 2: Ethiopian extension system and Pioneer-Positive Deviance

The Ethiopian extension system

One of the potential applications of the Pioneer Positive Deviance (P-PD) approach is within the extension system. Ethiopia's extension system has a long-standing tradition and a unique organizational structure. In this chapter, we explore how P-PD can play a supportive role across various extension approaches currently implemented in the country. We outline potential linkages with existing methods such as model farmers, Farmer Research and Extension Groups (FREGs), and Farmer Field Schools (FFS). Additionally, we identify the key actors who could serve as main proponents of P-PD in practice. As a knowledge- and learning-oriented tool, P-PD can complement extension by fostering a network of partners who support farmers in developing sustainable solutions for livestock management.

The Ethiopian Extension System emerged in its present-day form in the 1950s, with the first package approach emerging in the 1960s, and a change towards training and visit approach in 1985 [8]. In the 1990s extension started using demonstration plots, and after 2010 extension was built on a participatory extension approach, however the focus has always been on crops, with limited focus on livestock [8]. The interpretation of "participation" appears very broad, which has attracted criticism in the past [9-11]. Extension was built on the premise that packages are best built centrally, at the national level, and then delivered through development agents at Kebele level, one DA for livestock, one for crop, and one for natural resource management to the farmers, either to individuals, groups in FTCs, FFS, field days or demonstrations, or in mass through radio, TV, social media and mobile apps [8].

The Ethiopian Extension System has very specific opportunities, that other East African extension systems do not have, such as the high number of DAs and FTCs: these could be almost 70000 DAs and more than 14000 FTCs [12]. In terms of livestock, there is 1 livestock DA per 1440 farmers [8]. In comparison, in Kenya, the ratio of extension officer to farming household is 1:1093, also significantly higher than the Food and Agriculture Organization's recommended ratio of 1:400 [13], but it is not documented which ones are specifically for livestock. However, the numbers alone will not make the difference, especially if there are issues with motivation, infrastructure and general performance incentives [8].

While lead farmers, champion farmers and others exist in most conventional extension systems, in Ethiopia these farmers are usually called "model farmers": model farmers typically are better off than an average farmer and have access to inputs, such as improved breeds, veterinary care, and commercial feed [9, 14, 15]. However, this is not always the case. Some authors have expressed concerns that there is a risk that the model farmer approach may overlook local innovations and discourage widespread participation [9-11]. Ultimately, the quality of the model farmer approach depends largely on the individual development agent and how they are mobilizing model farmers. There is however an inherent risk in relying on a few individuals to pass on information, which may not be effective in reaching a wider audience [16].

A particular challenge for the Ethiopian Extension System is its high diversity in agro-ecology as well as in land use and farming systems from very high to the lowest possible altitudes, with mixed crop livestock system, agro-pastoral and pastoral systems, and increasingly urban and peri-urban farming systems [8]. Responding to this diversity through extension services is a complex task. Many farming and pastoral households cannot be easily reached by development agents, and many only on foot as neither road access nor means of transport are available. Through changes in mobility and digital access as well as global market dynamics and the impact of climate change, the environment of Ethiopian farmers is rapidly and constantly changing – therefore the extension system needs to adapt to this new situation, and the Ethiopian Government has recently responded in developing an extension strategy for livestock [8, 9]. The essence of this extension strategy is the pluralistic extension approach [8, 12], which will open up more space for private actors and involvement for NGOs in extension work [12].

What characterizes P-PD as a supporting tool for extension?

The P-PD approach has been tested in Ethiopia at a site in the Ethiopian Highlands, where it has shown that it is possible to achieve positive outcomes with small groups in a short time: it has enhanced feeding practices, farmer-led learning, and knowledge networks by emphasizing practical, replicable solutions that align with local realities at the research site [17]. Based on this experience, we have developed the P-PD approach that can offer support and strengthen the newly developed national livestock and fisheries extension system strategy, but also private and NGO based extension services (Figure 1).

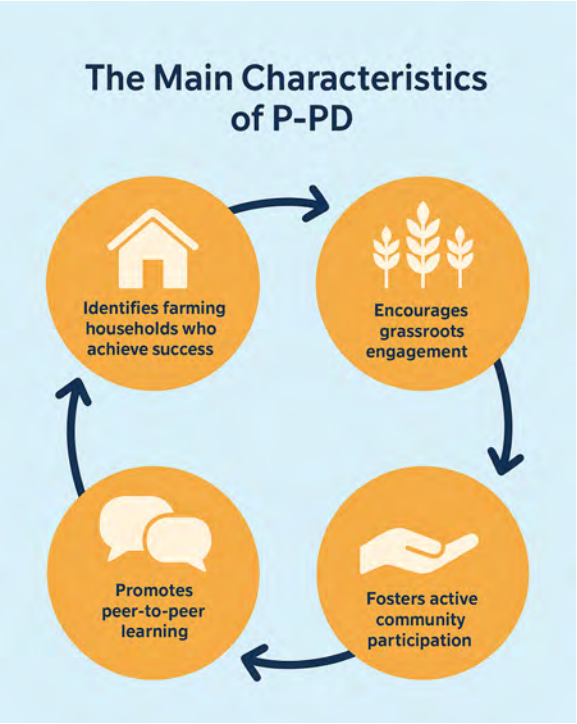
In a situation where challenges and opportunities, as well as the practices prioritized by innovative farmers are already known, a P-PD process starts by identifying farming households and/or family farms who achieve exceptional results using the same resources as their peers. For example, in livestock management, such positive deviant or pioneer households have developed innovative strategies to enhance breeding, livestock health, or optimize feed usage [18]. These strategies are often based on existing technologies, promoted by extension or different projects, but adapted by pioneer households in unique and effective ways. This is what makes it then

easier for other households to adopt, especially if the pioneers engage in a social learning process with their communities e.g. through farmer-to-farmer field days, or Farmer Field Schools.

The main characteristics of P-PD are:

- P-PD identifies farming households who achieve success with limited resources, providing solutions that can be more widely replicated by resource-constrained farmers within the community.
- P-PD encourages grassroots engagement, valuing the input of a broad range of farmers. This helps foster community-driven solutions and increases local ownership.
- P-PD promotes peer-to-peer learning and encourages multiple farmers to share their successes, thus creating more points of knowledge transfer within farming communities.
- P-PD fosters active community participation by empowering farmers to become change agents.

Figure 1: Main characteristics of P-PD.



Five components of P-PD's multilayered effectiveness

P-PD approach to change: Conventional thinking about how to achieve change in practices assumes that providing knowledge leads to changes in attitudes, which then inform practices [19, 20]. Positive deviance begins by observing successful practices already employed by individuals within the community [21]. Thus, positive deviance emphasizes a 'practice-attitude-knowledge' perspective, contrasting with the traditional 'knowledge-attitude-practice' model [19] (Figure 2).

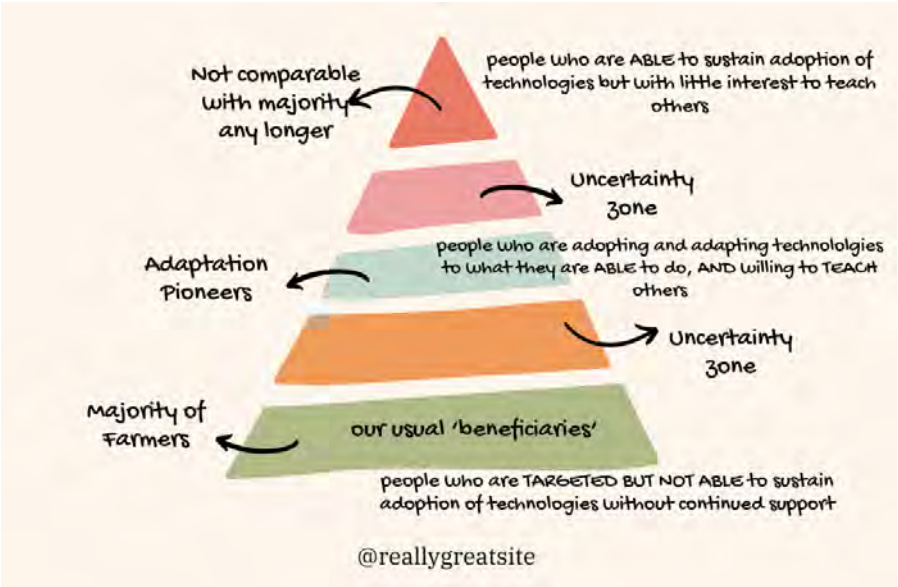
P-PD is built on farmer-led innovations: these are solutions that can be scaled up to benefit a broader population of farmers. These solutions complement existing approaches, they are often building on existing practices or technologies and adapting them in a way that makes them more suitable for their own environment. Farmer-led innovations complement an extension system by providing localized insights that government and other service providers would not have but can incorporate into their advisory services.

Figure 2: A new paradigm through Practice-Attitude-Knowledge, adapted from [19].

Peer Learning through Farmer-to-Farmer Networks: P-PD promotes learning from successful peers rather than relying solely on top-down information. Based on trust and observational learning, a peer-to-peer approach facilitates quicker and more sustainable adoption of practices already validated by peer farmers. The P-PD approach facilitates peer-to-peer sharing of best practices (e.g. during field days). Apart from its effectiveness in terms of uptake, it is also efficient in reducing the workload of development agents and other extensionists, who become coaches in the process rather than trainers themselves (Figure 3).

P-PD as a Household and/or Family-oriented Approach: Pioneers are households, not just individuals [22]. This means that the positive deviance approach involves the entire household and/or family, ensuring that successful practices are embedded within them. P-PD underscores that pioneering new practices is a responsibility shared by the entire household. This aligns with the household-based extension approach of the extension system [23].

Figure 3: A new hierarchy of diffusion, a work in progress. Graph adapted from @reallygreatsite.



P-PD and Scaling: The P-PD approach enables the identification and scaling of successful practices within communities and beyond. Adoption rates tend to be higher when farmers learn from other farmers, through observation and on-farm testing [24]. The practices for scaling are based on farmer-led innovations of pioneer households, and scaled through peer learning in F2F, field days, FFS, and other options. This can be actively supported through knowledge networks of multiple partners, as foreseen in the pluralistic extension approach.

How does P-PD contribute to the different pillars of the livestock extension system?

The table below summarizes how P-PD contributes to the four key pillars of the Ethiopian Livestock Extension system. Each pillar outlines its aim, how P-PD supports that aim, and the resulting effects (Table 2).

This helps clarify the role of P-PD in enabling farmer-led innovation, strengthening extension capacity, improving content relevance, and further modernizing delivery methods.

Table 2: Overview on contribution of P-PD to the four key pillars of the Ethiopian Livestock Extension system

Pillar	Aim	P-PD Contribution	Effect
Pillar 1: Knowledge Networks	Establish enabling environment for private sector integration and optimal governance structure in livestock extension.	Strengthens knowledge networks among diverse actors; pioneer households share localized livestock solutions.	Empowers farmers as change agents; supports scaling of solutions; strengthens pluralistic extension linkages.
Pillar 2: Human Capacity	Foster motivation and effectiveness in extension by addressing practical skill gaps in development agents (DAs).	Creates networks between pioneer households and DAs for practical knowledge exchange and on-demand training.	Transforms DAs into innovation facilitators/coaches; builds capacity through practical, relevant training.
Pillar 3: Content Relevance	Tailor extension content to needs of diverse systems, value chains, and skill levels.	Promotes farmer-proven, peer-validated content that is low-cost, low-risk, and easy to adopt.	Enables adaptive solutions across farmer types; builds trust; supports low-resource contexts effectively.
Pillar 4: Delivery Methods	Integrate digital and tailored delivery methods suited for each production system and community type.	Facilitates peer sharing via meetings and materials; uses accessible media; engages pioneers as mentors and data contributors.	Extends reach through inclusive formats; supports mobile services; engages youth; ensures sustained learning.

P-PD and existing extension methods and approaches for farmer-to-farmer learning

Model farmer approach

The model farmer approach has long served as a cornerstone of Ethiopia's extension system, showcasing individuals who successfully adopt and demonstrate recommended technologies. These farmers often benefit from strong social capital and economic flexibility, enabling them to take on the risks associated with early adoption. Their role in promoting visibility and credibility of new practices remains vital.

However, the Pioneer Positive Deviance (P-PD) approach offers a valuable complement. While model farmers typically adopt externally introduced innovations, positive deviants are those who, despite facing similar constraints as their peers, devise locally adapted, resource-efficient solutions that work within their specific contexts. These pioneers may or may not be model farmers, but their strength lies in endogenous innovation - making the most of what they have to improve outcomes. Rather than following a linear path of technology transfer, the P-PD approach emphasizes social learning, experimentation, and adaptation. It encourages peer-to-peer discovery and builds on existing community knowledge. This circular, participatory process can enrich the extension system by uncovering hidden innovations and fostering broader ownership.

Farmer Field School (FFS)

The Farmer Field School (FFS) is an innovative, participatory, and interactive learning approach [25]. FFSs bring together groups of farmers with a shared interest who meet regularly to explore the "how and why" of agricultural practices through hands-on experimentation and observation [26].

As a widely adopted education and extension method, FFS emphasizes experiential learning and group-based decision-making to equip farmers with the skills to solve problems and adopt new technologies [27]. In Ethiopia, FFS plays a significant role within the agricultural extension system by fostering knowledge exchange, encouraging innovation, and improving farmers' ability to adapt to local challenges through peer-to-peer learning and practical engagement [28].

P-PD has supported FFS for example through inclusion of pioneer farmers as trainers in FFS. However, there are different pathways for P-PD to support FFS.

1. The **FFS curriculum** can be based on the innovations of pioneer households.
2. Pioneer households support **FFS as trainers** with practical session on their farmer-led innovations.

3. In a larger set of **FFS groups,** through comparison positive deviant groups can be found. Understanding what makes them different, will help to more effectively support the other groups to reach their level.

4. The **FFS group** can be composed of **pioneer households,** preselected following the P-PD process. FFS sessions always take place on their farms, and their innovations are at the core of the curriculum. Through the involvement of the entire household, the curriculum addresses the farm holistically, in a more systemic way, including innovations that matter to men, women and youth, even though they may be different ones for all of them. This enables a more socially inclusive and gender-sensitive implementation of FFS, where women and youth often struggle to make their voices heard [29, 30]. Additional inputs from other farmers and external trainers or extension officers will be added on demand, and this has to be decided by the group after the first few sessions together.

5. Through the FFS, **pioneers form a group** that follows up with F2F extension after the FFS, or with a business-oriented start up on either the innovation or the training process.

Leading FFS empowers pioneer households to become key contributors in farmer-led solutions, and in sharing their knowledge with others, as well as building an expanded social network and ideally also form a group to remain active beyond the FFS.

Farmer Research Extension Groups (FREGs)

FREG aims at research outcomes aligning with community needs and priorities and encourages enhancement of knowledge sharing and learning among members of FREGs [31, 32]. P-PD can be integrated into FREGs in different ways:

Understanding practices: FREGs provide an opportunity for farmers to study farmer-led innovations together with pioneer households. The practices can be studied by men, women and youth, depending on their interests that may not always overlap. This ensures that practices will be studied that are also manageable by households and do not lead to disadvantages to some household members. The practices to focus on will be selected by pioneer households in consultation with other farmers and extension. Then they can be studied in practical ways, on the farms of pioneer households, either through experimentation or documentation of the effectiveness of these practices.

Citizen science: The documentation of farmer-led innovation is best done through citizen science. This requires a straightforward data recording tool, that can be either analogue or digital, depending on the options available and the preference of the farmers. The collected data have to be analyzed and discussed together; transparency is very important. Some farmers may have concerns about data protection; trust really matters when providing such insights into livestock (and farm) management.

Improving practice through dialogue: Farmer-to-Farmer field days or group meetings to discuss the practices, the farmer-led innovations, and what they have learned from the record keeping and analysis (Citizen Science) are essential. These can also involve outside experts such as researchers, if required by the group.

Co-design of extension materials: the knowledge collected above by the group together with extension, and researchers, can result in co-designed extension materials, in appealing and easily understandable formats, in local language, such as farmer handbooks and posters. If there are many illiterate people in the area, then an audiobook as recording compatible with simple mobile phones will be essential for people to benefit from the materials.

The P-PD approach encourages farmer-driven research and the exploration of farmer-led solutions in FREGs activities. Additionally, it facilitates farmer-to-farmer extension, in combination with the Citizen Science approach that P-PD is implementing, both digital and analogue data collection. Reporting tools can supplement FREGs in documenting and learning.

Chapter 3: Approaching P-PD step by step for farmer-led innovation

This chapter outlines a systematic yet flexible process for applying the Positive Deviance (P-PD) approach to farmer-led innovation. The six-step approach (Figure 4) is designed to support extension systems and development practitioners in identifying, nurturing, and scaling locally rooted innovations in livestock management, particularly in the context of climate change adaptation. While the approach is framed around livestock systems, it is equally applicable to other areas of farmer-led innovation. Importantly, the framework is investigative rather than prescriptive - intended to guide inquiry and adaptation rather than impose a fixed sequence. Practitioners are encouraged to tailor the entry point and progression of steps to suit their specific local context.

Figure 4: The six steps of Pioneer-Positive Deviance (graphic adapted by Urban Gruenfelder).

Six-step Positive Deviance (P-PD) process for farmer-led innovation

This step-by-step approach supports practitioners in identifying and scaling innovative practices in climate adaptation, particularly in livestock systems. While structured, the approach is intended to be flexible and responsive to context.

Step 1: Find positive deviance in adaptation practices

Action

The implementation of this step may vary depending on your starting point. If steps A to C are already sufficiently known and understood in the given context (e.g., through prior projects, assessments, or existing knowledge), teams may proceed directly to Step D.

A. Assess feasibility and context:

✅ Conduct a situational assessment to determine whether the conditions are conducive for applying the P-PD approach.

✅ Understand local agricultural dynamics, including environmental, institutional, and socioeconomic factors.

✅ Align with existing initiatives (e.g., livestock feed programs, veterinary services, breeding projects) to avoid duplication and enhance synergy.

To avoid redundancies, identify necessary data sources (e.g., extension office databases, NGO reports, local institutions), and use available data where possible and identify gaps that require new collection through methods such as group discussions and key informant interviews.

B. Engage stakeholders: Facilitate early and meaningful engagement with farmers, cooperatives, extension agents, government offices, NGOs, and research institutions. This is crucial to ensure that the process is inclusive across gender, age and resource groups to reflect the diversity of farmer experiences and needs.

C. Identify adaptation challenges and opportunities: If the focus is on adaptation, then work with stakeholders to define pressing adaptation challenges (e.g., drought resilience, livestock productivity, fodder availability). It is important that practices under review are aligned with real needs and locally endorsed as priorities. To ensure this it is crucial to establish clear practice selection criteria.

D. Define positive deviance success indicators: Identify measurable indicators that distinguish outperforming farmers from others in similar conditions.

Outcome: Site and practice specific indicators for positive deviance

✅ **Checklist – Step 1: Find positive deviance in adaptation practices**

A. Feasibility and context assessment

- Has a situational analysis of the target area been conducted?
- Have key environmental, institutional, and socioeconomic conditions been reviewed?
- Have existing agricultural development initiatives (e.g., feed, breeding, health, market programs) been mapped?
- Have existing data sources been reviewed (e.g., extension databases, NGO/research reports)?
- Have data gaps been identified and methods for additional information collection (e.g., group discussions, interviews with stakeholders) been planned?

B. Stakeholder engagement

- Have all relevant stakeholder groups been identified (farmers, cooperatives, extension agents, NGOs, research centers, etc.)?
- Have consultations been conducted across gender, age, and resource groups?
- Have initial meetings or workshops been held to share the P-PD concept and gain early feedback?

C. Identification of adaptation challenges and practice selection criteria

- Have the key adaptation challenges (e.g., drought resilience, livestock productivity, fodder access) been defined by stakeholders?
- Have practice selection criteria been co-developed and agreed upon?
    - Relevance to local needs
    - Feasibility and cost-effectiveness
    - Social and cultural acceptability
    - Sustainability (environmental/institutional)
    - Scalability

D. Definition of positive deviance indicators

- Have measurable indicators of positive deviance been defined?
    - Productivity (e.g., milk yield, birth rates)
    - Profitability (e.g., cost-benefit, income sustainability)
    - Social learning (e.g., peer teaching, adoption by others)
    - Endogenous innovation (e.g., local modifications, self-developed solutions)
- Has baseline data collection for indicators been planned or initiated?
- Have positive deviants (if any are already known) been involved in this indicator development?

Final check before proceeding

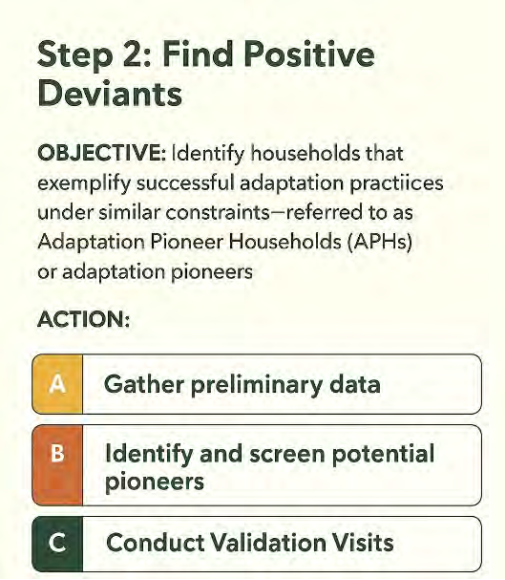
- Are A to C sufficiently understood and documented for the target area?

If yes, you may proceed directly to Step D and continue to Step 2.

Step 2: Find positive deviants

Action

This step aims to confirm the presence of positive deviance and to build a shortlist of pioneer households for learning and scaling purposes. Use the positive deviance indicators defined in Step 1 to identify and validate APHs. This involves combining preliminary data collection, screening, and field validation visits to ensure the households consistently demonstrate superior adaptation outcomes.



A. Gather preliminary data: Use a combination of quantitative surveys (e.g., household questionnaires) and qualitative methods (e.g., Group Discussions, interviews with stakeholders) to gather information on farmer practices. Choose your data collection method based on available resources and context:

✅ Use existing databases if basic household data is already available through the extension office or partners.

✅ Conduct new group discussions, interviews with stakeholders, if deeper or updated insights are needed.

B. Identify and screen potential pioneers: From the initial data, compile a list of farmers who appear to outperform peers in adaptation outcomes. Factor in both data findings and community recognition or recommendations.

✅ Develop a checklist based on the Step 1 indicators (e.g., productivity, profitability, innovation). Use this checklist to systematically evaluate the preliminary list of potential APHs.

✅ Conduct new group discussions, interviews with stakeholders if deeper or updated insights are needed.

✅ Shortlist Candidates: Select approximately 30% of the initially screened farmers as candidates for validation. This subset should represent the most promising cases of potential positive deviance.

C. Conduct validation visits: Visit each shortlisted farmer to observe practices firsthand. Use the checklist during visits to assess whether the farmer meets the criteria for positive deviance.

✅ Validate the presence of adaptation success through direct observation, discussion, and triangulation with community insights.

✅ Narrow the list down to approximately 10–15%, the typical rate for confirmed positive deviants.

✅ Document agreements: Record the specific practices and innovations observed that contribute to the farmer's success, where possible, initiate discussions with the farmer about participating in the next steps of the P-PD process.

Outcome: A validated list of positive deviant farmers (APHs) who exhibit superior adaptation practices. These pioneers will become central actors in the learning, sharing, and scaling steps of the P-PD process.

✅ **Checklist – Step 2: Find positive deviants**

1. Preliminary data collection

- Has a review of existing farmer databases (e.g., from extension offices or NGOs) been conducted?
- If data is incomplete or outdated, have group discussions, interviews with stakeholders been planned or conducted?
- Has both qualitative and quantitative data on farmer practices and outcomes been gathered?

2. Identification of potential candidates

- Has an initial list of farmers showing signs of positive deviance been compiled?
- Have community recommendations or peer nominations been included in the selection?

3. Screening using indicators

- Has a checklist based on Step 1 indicators (e.g., productivity, profitability, innovation, social learning) been developed?
- Have all farmers on the initial list been screened using this checklist?
- Have clear thresholds or scoring criteria been applied?

4. Shortlisting for validation

- Has the list been narrowed down to ~30% of the screened farmers?
- Does the shortlist represent diverse household types (gender, size, location, etc.)?

5. Validation visits

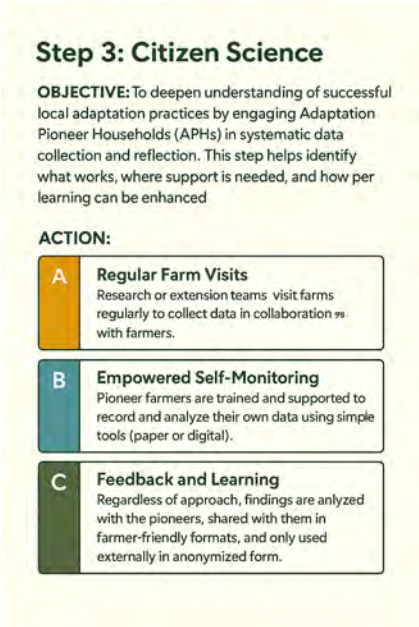
- Have farm visits been conducted with practices directly observed and discussed with each shortlisted farmer?
- Was the positive deviance checklist used during the visit?
- Has the final list of validated APHs (approx. 10–15% of original pool) been completed?

6. Documentation and engagement

- Have successful practices and innovations been documented for each validated APH?
- Has willingness to participate in future P-PD steps (e.g., sharing, training) been discussed?
- Have agreements or next steps been recorded?

Step 3: Citizen science

Action



Citizen science empowers pioneer farmers to document their own practices, outcomes, and challenges, through self-led record-keeping or with external facilitation. It builds ownership of evidence and reinforces communication between farmers and other experts.

Co-design record-keeping forms:

Engage APHs in designing simple, practice-specific forms during a group session.

Choose record-keeping methods:

Let farmers choose between paper-based or digital tools (e.g., Open Data Kit/ODK apps), based on their skills and available devices.

Determine recording intervals:

Agree on the frequency of recording and/or sampling based on the practice being tracked (e.g., weekly milk yields, monthly feed records).

Plan for sample collection and analysis (if feasible):

Include optional collection of feed, milk, or other relevant samples, aligned with lab availability (e.g., Lactoscan).

Train farmers in data collection and sampling:

- Use of smartphones, tablets, and paper forms
- Sample collection and handling (e.g., milk, feed)
- Measurements (e.g., heart girth, body weight, ear tagging or livestock photography)

Ensure farmer data access and feedback:

Guarantee that all APHs have access to their own data. Provide regular feedback through visual summaries, verbal discussions, or group meetings.

Provide on-demand training and support:

- Address knowledge or skill gaps in farm practices
- Train pioneers in accurate record-keeping and interpretation

Monitor and accompany the process:

- Maintain regular contact to answer questions
- Ensure data quality and motivation
- Use field notes and informal observations (e.g., Contact Summary Forms)

Resources

Tools and equipment

- Smartphones or tablets with ODK/KoboToolbox
- Paper forms and notebooks
- Digital audio recorders
- Cameras (or phones) for livestock documentation
- Mazicans (standard milk measuring jugs)
- Kitchen scales and spring balances
- Rondo (heart girth) tapes and slings
- Sample bottles (milk, feed)
- Cooler boxes and cool packs (if sampling)
- Body weight scale for small ruminants

Materials for Identification and measurement

- Ear tags (or photographic alternatives)
- Tagging kits (applicators, cotton wool, spirit, marker pens)
- Feed and milk sampling sheets

Incentives and engagement

- Modest compensation (e.g., feed, dewormers, acaricides), agreed and coordinated transparently

Templates for data entry and result presentation

Data entry templates

Sample collection (milk/feed)

Date	Sample type	Sample ID	Collector name	Storage conditions	Transport date	Lab received date	Comments
DD-MM-YYY	Milk/feed						

Daily milk yield record (paper or digital)

Date	Animal ID	Morning yield (liters)	Evening yield (liters)	Total yield (liters)	Notes (health, feed, weather)
DD-MM-YYY					

Weekly feed record

Week starting	Feed type	Quantity offered (kg)	Quantity consumed (kg)	Source (own farm/market)	Notes (quality, availability)
DD-MM-YYY					

Livestock health & condition record (monthly)

Date	Animal ID	Weight (kg)	Body condition Score (1–5)	Signs of illness (Y/N)	Treatments given	Notes
DD-MM-YYY						

Result presentation templates

Group farmer feedback summary

Indicator	Average value (last period)	Previous period value	Trend (Up/down/stable)	Farmer comments/actions taken
Daily milk yield	5.2 liters	4.8 liters	Up	Increased feed improved yields.
Feed quantity	3.5 kg	3.8 kg	Down	Market food was scarce last week.
Body condition	3.8 (score)	3.6	Up	Animals look healthier after treatment.

Individual farmer progress report

Farmer name	Period covered	Key indicators	Progress notes	Recommendations
Name	MM-YYYY	Milk yield increased, Feed stable	Improved yield with new fodder storage	Try supplement feeding in the dry season

Outcome: Farmers have acquired skills in measuring their animals and productivity, they are used to record keeping and have a better understanding about their practices. This shifts farmers from passive beneficiaries to active knowledge producers, setting the stage for meaningful, peer-led scaling of proven practices.

✅ Checklist – Step 3: Citizen Science

1. Regular farm visits and farmer engagement

- Have farmers been informed about the purpose and benefits of citizen science?
- Have regular farm visits been scheduled and initiated?

2. Record-keeping tools and methods

- Have record-keeping templates/forms been co-designed with farmers?
- Has each pioneer selected their preferred method (paper or digital)?
- Are tools for data entry (smartphones, ODK, notebooks) available and in use?

3. Sampling and measurement (if applicable)

- Has a sampling plan been agreed upon (e.g., milk, feed)?
- Are materials for sampling and measurement available (e.g., scales, tapes, bottles)?
- Have measurements (e.g., weight, heart girth) been taken and recorded accurately?

4. Farmer training and support

- Have farmers been trained in record-keeping, sampling, and measurement?
- Are support materials (manuals, demos) accessible to APHs?
- Has additional support been provided on demand?

5. Data access and feedback

- Do farmers have access to their data in usable formats?
- Has feedback been provided (group or individual) based on recorded data?
- Is data shared externally only in anonymized format?

6. Monitoring and quality control

- Is there a routine for checking data quality and resolving issues?
- Are observation notes and informal feedback being documented?
- Is participation maintained and encouraged?

7. Equipment and logistics

- Are agreed-upon incentives provided in a timely and fair manner?

Final check before proceeding

- Are all deliverables (records, samples, feedback) completed and organized?
- Have the lessons from data collection been documented and discussed with APHs?

Step 4: F2F learning and knowledge sharing

Action

In this step we explain which methods we recommend for F2F learning and knowledge sharing and how we can assess their effectiveness. The main tool implemented in P-PD are F2F Field Days:

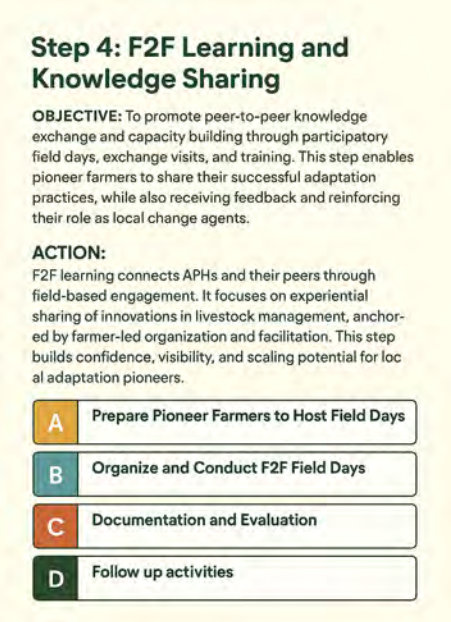
A. Prepare pioneer farmers to host field days: Clarify the purpose of field days (farmer-led knowledge sharing, not external demonstration). APHs will decide on:

✅ when and how often to organize field days,

✅ how to identify and invite peer participants,

✅ the agenda (farm tours, Q&A, demonstrations, sharing of citizen science results).

They will be advised on effective facilitation skills.



B. Organize and conduct F2F field days: F2F field days can be held individually or in clusters of APHs, depending on local logistics and interest. Pioneers decide what to demonstrate (e.g., barn setup, feed storage, improved breeds) and lead all presentations. For the first field days it is advisable **to limit groups initially to around 20 participants** to allow quality exchange. In this way pioneer households can also gain confidence for this engagement that will be new for them. In terms of invitations, it is important to remind pioneer households not to invite just immediate family and/or neighbors, nor just men, rather they should invite a **diverse group of different ages, and both men and women**. It is preferable if they invite others who are equally curious, interested in implementing the practices, and able to share knowledge forward. **Keep external input minimal** unless requested by farmers (e.g., extension or veterinary experts).

C. Documentation and evaluation

✅ Use structured contact forms to document discussions, feedback, demonstrations, and participation from your own perspective.

✅ In terms of understanding how well the F2F field days went, **group discussions** at the end of each field day are useful for peer reflection.

✅ Another way of documenting impact is to do **follow-up interviews** with hosts and participants to assess uptake and outcomes a few months after the field days.

✅ Remember to hold **team reflections** among researchers to adapt subsequent sessions.

Follow up activities:

✅ **Plan and implement a second field day**: Use feedback from the first event and new data or seasonal insights. It is best to involve same but also new participants using the original criteria. Include additional experts on demand (e.g., animal health officers), and repeat the demonstration-feedback cycle with refined content.

✅ **Complement field days with exchange visits and trainings:**

- Facilitate **pioneer-to-pioneer visits** across regions or sites.
- Offer **training sessions** to build technical and facilitation skills among pioneers and other interested farmers.
- Distribute **co-designed materials** or samples to reinforce learning.

Resources

- Field day preparation checklist and invitation criteria
- Contact forms and group discussion templates
- Equipment for demonstration (e.g., feed samples, barn materials, planting cuttings)
- Recording materials (e.g., notebooks, tablets, audio recorders)
- Feedback and evaluation tools (e.g., follow-up interview guides)
- Visual aids and co-designed learning materials
- Optional incentives (e.g., refreshments, printed materials)

Outcome: F2F (farmer-to-farmer) learning and knowledge sharing is the peer-led dissemination and contextual validation of successful adaptation practices through participatory exchange. This step transforms pioneers from individual innovators into facilitators of change.

✅ **Checklist – Step 4: F2F learning and knowledge sharing through F2F Field Days**

A. Prepare pioneer farmers to host field days

- Have pioneers been oriented on the purpose and value of field days?
- Has training been conducted on:
  - Field day scheduling and timing
  - Selecting and inviting suitable participants
  - Designing a clear program with demos, Q&A, and sharing sessions
  - Presentation skills and confidence building
- Are materials and logistics in place (transport, seating, refreshments, supplies)?

B. Conduct F2F field days and exchange visits

- Have pioneers selected and prepared what to demonstrate (e.g., feed innovation, housing)?
- Are field days farmer-led with minimal external facilitation?
- Has attendance been limited to ~15 people to ensure quality interaction?
- Have criteria for participants been applied (no close relatives, active learners)?
- Are follow-up exchange visits or knowledge networks being considered?

C. Document and Evaluate

- Have participant contact forms and attendance sheets been completed?
- Was a group discussion facilitated at the end of the event to reflect on learning?
- Have follow-up interviews been conducted with:
  - The pioneer host (to assess experience and learning)
  - The participants (to assess knowledge application)
- Has a team reflection session been held to identify lessons for future events?

Optional enhancements

- Were expert guests (e.g., vets, extension staff) invited on request only?
- Were learning materials or inputs distributed (e.g., cuttings, visual guides)?
- Were phone-based follow-ups planned (calls, SMS, WhatsApp groups)?
- Are any groups forming around shared interests or practice areas?

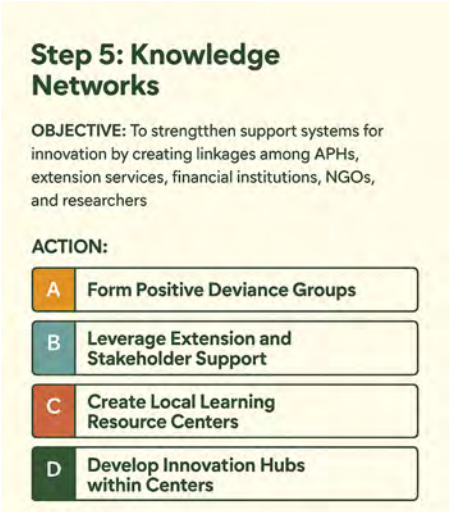
Final check before proceeding

- Has a second field day been planned based on participant feedback?
- Have insights from this step been shared within the wider research or extension program?

Step 5: Knowledge networks

Action

During Step 4, knowledge networks begin to extend beyond APHs. These networks are shaped by participatory field experience, exchange on results of on-farm data collection, and shared insights. Anchoring them in the research and extension system fosters institutional support and long-term collaboration for scaling local innovations.



A. Form Positive Deviance (PD) groups

- Encourage APHs to form or formalize small groups or cooperatives.
- Focus these groups on collective learning, mutual problem-solving, resource exchange, and joint action (e.g., bulking feed, accessing inputs).

Guide to form APHs groups/cooperatives

Step	What to do	Key output
Engage	Inform and invite them	Confirmed participants (10-15)
Define	Co-create purpose	Group name + purpose
Plan	Agree on roles/activities	Activity calendar
Organize	Choose roles or rotate	Simple leadership
Support	Link with mentors, tools	Communication system
Celebrate	Share success, motivate	Recognition & storytelling

B. Leverage extension and stakeholder support

- Establish linkages: Connect APHs with:
  - Government extension officers
  - NGOs and civil society groups
  - Financial institutions (e.g., microfinance, SACCOs)
  - Research and academic institutions
- Facilitate networking: Encourage regular group meetings, joint planning, and collaborative events.
- Strengthen partnerships: Where partnerships already exist (e.g., universities or programs), facilitate integration of PD groups into those ecosystems.

C. Create local learning resource centers

- Establish community-level hubs (e.g., at the kebele or ward level).
- These hubs serve as spaces to:
  - Access educational resources (videos, posters, brochures)
  - Share tools, planting materials, or innovations
  - Host events and cross-community exchange

- Anchor P-PD with existing structures like FTCs/PTCs to ensure sustainability: Integrate P-PD practices, groups, and knowledge-sharing mechanisms into the formal agricultural extension and learning system.
- Use FTCs/PTCs as Innovation Hubs to host PD group meetings, field days, and exhibitions.
- Integrate P-PD approaches (peer learning, local innovations) into regular training schedules.
- Showcase APHs innovations as real-life case studies in training
- Showcase local tools and practices developed by APHs

D. Develop innovation hubs within centers

- Use the centers as social learning centers for APHs and their peers.
- Showcase local innovations for visiting farmers, partners, and youth.
- Support self-organized events and peer-driven content creation (e.g., short learning videos or exhibitions).

Outcome: Knowledge Networks move beyond individual pioneers to embed their knowledge and practices within broader systems of support and learning. This shifts the P-PD process from individual and community levels to systemic change, building the structures and partnerships needed to sustain and expand farmer-led adaptation over time.

✅ **Checklist – Step 5: Knowledge networks**

A. Form pioneer groups

- Have APHs been encouraged and supported to form or formalize small groups?
- Do the groups have a clear purpose (e.g., learning, joint problem-solving)?
- Are the groups engaging in collaborative actions (e.g., input access, bulk buying)?

B. Leverage extension and stakeholder support

- Have key stakeholders been mapped and engaged (e.g., extension, NGOs, financial institutions, research)?
- Are connections between APHs and these stakeholders operational (e.g., meetings held, activities planned)?
- Are regular group meetings, forums, or planning sessions taking place?
- Have partnerships with existing programs or institutions been established or formalized?

C. Create local learning resource centers

- Has a physical or virtual space been established for farmer learning (e.g., community hall, school, or office)?
- Are resources available at the center (e.g., brochures, posters, videos)?
- Is the center accessible and used by APHs and peer farmers?
- Are training materials or demonstration kits present?

D. Develop innovation hubs within centers

- Are successful local innovations documented and displayed?
- Have pioneers contributed to the setup (e.g., tools, videos, examples)?
- Are peer-led or community events being hosted at the hub?
- Are other communities/kebeles using the hub for learning?

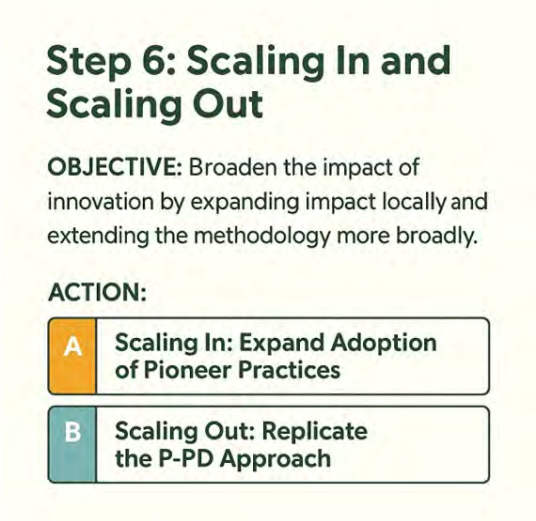
Final check before proceeding

- Are all PD groups active and linked to key support actors?
- Are learning and innovation centers operational and well-utilized?
- Are there documented examples of collaborative innovation or scaling across sites?

Step 6: Scaling in and scaling out

Action

This step consolidates the gains of earlier stages by deepening impact locally and extending the methodology more broadly. It involves facilitating adoption among nearby farmers and promoting the P-PD approach through strategic partnerships, documentation, and outreach.



A. Scaling in: Expand adoption of pioneer practices

✅**Demonstration**
Successful pioneer households (APHs) act as live demonstration models during field days and peer visits.

✅**Peer learning and mentorship**
Facilitate structured learning exchanges, group visits, and informal mentorship between pioneers and other farmers.

✅**Tailored training**
Organize hands-on, locally adapted training sessions focusing on specific pioneer practices proven effective through citizen science and field validation.

B. Scaling out: Replicate the P-PD approach

✅**Build strategic partnerships**
Collaborate with government departments, NGOs, research organizations, and local institutions to embed the P-PD approach in other programs and geographies.

✅**Document and share the approach**
Capture processes and outcomes in accessible formats - booklets, videos, posters - to support replication. Ensure materials are tailored for different audiences (e.g., community groups, extension services, policymakers).

✅**Support adaptation to new contexts**
Guide new users of the P-PD approach in adapting the process to their own social, ecological, or institutional settings.

Outcome: Step 6 marks the transition from localized success to scalable systems change, reinforcing farmer agency while building structures for sustained innovation across landscapes. It ensures that proven local innovations spread horizontally across communities and vertically through institutions.

✅ **Checklist – Step 6: Scaling in and scaling out**

A. Scaling in – Adoption of pioneer practices by neighboring farmers

- Have successful practices been selected for demonstration (based on validation in Steps 3–4)?
- Have field days or live demonstrations been held at pioneer farms for peer farmers?
- Are small peer learning groups or mentorship pairs in place?
- Have hands-on training sessions been provided to interested farmers?
- Are the practices being tailored to the needs and contexts of new adopters?
- Is there follow-up to track if peer farmers are applying the practices?

B. Scaling out – Replication of the P-PD Approach in new contexts

- Have partnerships been formed with external organizations (e.g., NGOs, government, research institutions)?
- Are there discussions or agreements to replicate the P-PD approach in new areas or sectors?
- Has the approach been documented (e.g., step-by-step guides, process notes, infographics)?
- Have communication materials (booklets, videos, job aids) been created and disseminated?
- Is support or orientation being provided to new actors adopting the P-PD approach?
- Are adaptations to the local context being supported and recorded?

Monitoring and reflection

- Is uptake of practices by peer farmers being monitored (e.g., surveys, follow-up visits)?
- Are new implementers of the P-PD approach being supported through coaching or documentation?
- Is feedback being collected from both new adopters and pioneer households?
- Are lessons and challenges from scaling efforts being captured for future learning?

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Appendices

Appendix I: Practical Example: Selection of Relevant Adaptation Practice in North Shewa Zone Ethiopia

Step1:

- Understanding situation and context, on-going activities
- Engage with the community, leaders, and different stakeholders in the area
- Participatory workshops for ranking suggested adaptation practices and the impact of climate change

Based on the above activity the following Adaptation practices were ranked by local innovators:

- Feeding straw
- Improved breeds
- Fattening

Step 2: Criteria for selecting relevant adaptation practices:

- Frequency in terms of implementation among local innovators
- Priority of adaptation practice for the local innovators
- Implementation of the practice by local innovators in place.

Based on the above selection criteria Sheep fattening in response to Climate change was selected as a relevant adaptation practice

Why: Because in the highlands of the North Shewa zone hail and morning frosts damage important cash crops.

Modern sheep fattening is relevant because it is:

- Affordable practice/replaces cash crops
- Sheep can be sold for mobilizing assets
- Alternative to dairy (cost, infrastructure)
- There is relatively easy Market access for sheep
- High demand for sheep during holidays
- Low risk
- Zero-grazing: reduces labor for herding
- Low investment
- With good management, high returns
- Good breeds, good feed… reduces turn-over to 3-4 months

Appendix II: Practical Example: Pioneers of adaptation in the Kenyan Highlands Semi-intensive dairy system

Option 1. Identification of Positive Deviants – qualitative indicators

1. Awareness of climate change
2. Adaptation practice of PD in:

- Livestock practice how?
- Fodder bought additionally y/n
- Feed & forage how?

3. Pioneering character

- Endogenous innovation rather than adoption
- Unique ways of knowing and learning
- Tries out new things, and also abandons failures

4. Willingness to engage in knowledge sharing with others

Option 2. Identification of Positive Deviants household survey followed by qualitative validation interview for identifying final list of pioneers

Step 1. Quantitative indicators (Household survey)

I. Performance in milk production:

- Milk yield, expressed in l per day per cow
- Calving interval, expressed in month
- Age at first calving, expressed in month

II. Livelihood, adaptation, and technology:

- Farm diversity, number of different crop, forage and livestock on farm
- Diversity of sources of income
- Number of (sub-)technologies applied
- Technology advice, cube root of the number of households helped
- Months of food shortages

Step 2. Short-listed pioneer household based on Household survey:

- The ideal adaptation pioneer household is a skilled smallholder cattle farm household, with a high milk yield, low age at first calving, and low calving interval.
- The pioneer household demonstrates high adaptation capacity, as seen by its high diversity of crops and livestock on the farm, and the high diversity of its income sources.
- The pioneer household applies various technologies on the farm and provides technological advice to the community.
- The resulting good production from the farm provides sufficient food for the household all year long without shortage.

Based on the above steps: A household survey was done with 1016 households in two counties. During farm visits validation interviews were conducted with 81 households in Nandi (44) and Bomet (37) Counties. 42 households out of 81 selected for the study, 16 in Bomet and 26 in Nandi.

Appendix III: Identification of positive deviants and validation

For both quantitative and qualitative validation, there are also questions to be included to assess whether the pioneer households is both suitable and willing to be part of the record-keeping and scaling activities. These refer to how well they are aware of the adaptation practices and their benefits, how they have acquired more knowledge about these, and to what extent they are willing to share knowledge with others and potentially have field days on their farms.

- Observe household conformity to the above description of a pioneer
- Is the household willing to share information with others
- Is the household willing to conduct citizen science data collection
- Is the household willing to conduct field data

Qualitative assessment: use selection criteria for validation. A list of validation criteria has to be agreed upon with stakeholders and then used for assessment during on-farm visits. After validation, a list of pioneer households will be compiled and those who are not conforming with the criteria will be excluded from the list.

Quantitative assessment: use selection criteria for validation. During quantitative assessments, there can be inaccurate representations, during on-farm visits this can be verified. If the survey data are older than 2 years, then the validation visits can also serve to update the survey data to ensure it is accurate.

Appendix IV: Example for pioneers applying citizen science

- Sample size: Five to eight pioneers per site
- Training of pioneers in record-keeping
- Maintenance of record sheet by pioneers and collection on a monthly basis, e.g. milk records
- Monthly data collection with Open Data Kit™ (ODK): questionnaire filled in by pioneer and research assistant together, either through a visit or over the phone
- Taking of observation notes
- Involvement in analysis and presentation of results

Material and input required:

Compensation for livestock owners' time and input in terms of 'incentives' such as feed packages, dewormers, or acaricides, depending on the site: this had to be negotiated at the beginning and coordinated with others working in the area, to avoid creating wrong precedents. However, whatever was agreed upon had to be kept to and delivered to maintain trust between the pioneers and the researchers from outside.

- Field materials:
  - Tablets for ODK survey
  - Digital recorders and notebooks
  - Smartphone for taking photographs
- Internet connectivity
- Materials for measuring:
  - Heart girth (cattle)
  - Weight (small ruminants)
  - Milk and feed samples, milk record-keeping. In this case, milk sampling was not done because there was no possibility of doing analysis with a lactoscan on site. However, the necessary materials are listed below.
  - Number of livestock (ear tags)

If livestock owners are not comfortable with ear-tagging, the best alternative method is to take photographs of the livestock.

Item	**Description**	**Quantity for 6 households**
Ear tags	10 tags per household	60
Ear tag applicator	Only used when tagging livestock	3
Cotton wool for disinfecting when ear-tagging		As needed
Marker pen for ear tags		2
Methylated spirit	500 ml	6
Heart girth tape	Rondo tape	6
Khaki bags	Size 8	12 dozen
Spring scale and sling for weighing		6
Notebook for farmers for record-keeping		6
Mazicans (locally known standardized containers for measuring milk)	Measuring milk	6
Kitchen scale	Weighing samples	6
In case of milk sampling:		

Milk sampling bottles	60ml	6 dozen
Cooler box	Milk sample transport	
Cool packs for the milk cooling		As needed

Deliverables:

- Record sheets for selected adaptation practice filled in at previously agreed intervals, collected monthly (ODK, or if not possible use paper-based forms)
- Data entered according to respondent coding list
- Ear tag /animal ID registration
- Milk records, milk samples, if applicable
- Feed sampling sheets and feed samples, if applicable
- Other on-farm records relevant for the adaptation practice
- Transcript of the notes on informal conversations/ observation notes in final formatting
- Photographs

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