Co-design of Socio Technical Innovation Bundles – Concept and application to Sustainable Intensification of Mixed Farming Systems

WP2 and WP5 Sustainable Intensification of Mixed Farming Systems (SI-MFS) teams

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Background
SI-MFS CGIAR initiative on mixed farming systems

- SI-MFS, beyond disciplinary research for development

- SI-MFS promises to take a systems approach for the co-design, implementation, evaluation and scaling of socio-technical bundles of innovations that ensure the sustainable intensification of mixed farming systems.

- Internal “levelling the field” on concepts. A quick survey among SI-MFS colleagues.
Background
High demand for more information about most of the concepts

About which concept/domain would you like to get more information?
40 responses

- **Sustainable Intensification**: 13 (32.5%)
- **Mixed Farming System**: 14 (35%)
- **Socio-technical bundles of innovation**: 23 (57.5%)
- **System Analysis**: 26 (65%)
- **System Design**: 20 (50%)
- **Trade-off Analysis**: 23 (57.5%)
- **Farm Typology**: 16 (40%)
- **Co-Design**: 25 (62.5%)
- **Agri-food systems modelling capacity**: 1 (2.5%)
- **Transdisciplinary, multidisciplinary...**: 1 (2.5%)
- **Practical implementation**: 1 (2.5%)
Terminology (1)

**Mixed Farming Systems (MFS)** are complex systems where multiple components (e.g. livestock, trees, subsistence and cash crops, horticultural crops, fisheries, value adding activities) are tightly interlinked and the whole system is managed towards the satisfaction of multiple productivity, economic, environmental and societal goals (e.g. food security, income generation, risk management, resource conservation, preservation of cultural values and traditions).

**Socio-technical innovation bundles (STIBs)** are contextualized combinations of interrelated technical advances and social, organizational and policy/institutional enablers that are packaged for impactful implementation and scaling.

**Systems analysis** allows understanding the characteristics, dynamics, and interconnectedness of different components in the system (as well as multiple actors), and their role on the overall system’s performance. It also relates to the set of interrelations amongst system components and external (and internal) drivers of change. Systems analysis can be quantitative and qualitative and can be used for ex-post and ex-ante studies.
**Terminology (2)**

**Systems Design** means to define, conceive, implement and assess an improved system with regards to:

- A set of **pre-defined objectives** (e.g. sustainability, resilience, climate-smart, social inclusion) and
- A set of **constraints imposed by the context** (e.g. soil types, rainfall distribution, labour availability, market price, policy).

The design of system can be operationalise at different scales, from a component of a farming system (e.g. a crop or livestock enterprise, a crop rotation), the integrated farming system (e.g. a forage-based crop-livestock system) and its integration into a value chain (e.g. a new crop into an environmental certification scheme) or a landscape (e.g. crop landscape mosaics with pest suppressive or water saving objectives).

**Co-Designing** implies the engagement of stakeholders (i.e. farmers, farmer representatives, value chain actors, policy makers, development organization and civil society) along the whole design process including the **definition of the system, identification of objectives and constraints**, the **development and testing of innovations** as well as in their **assessment, adaptation and promotion**.
Describe MFS, their diversity, main constraints for SI. Define objectives and constraints in the co-design process and the criteria of success.

Tools: Secondary data and regional documents, stakeholders’ consultations and focus groups, surveys and descriptive statistics

Co-learning
Farmers and farmer representatives, extension systems and advisory services, local experts, value chain actors, scientists, policy makers, donors

Design
Re-design farming systems and step by step design of trajectories for systems change

Tools: System experiments, farming systems modelling, trade-off analysis, serious games, prototyping

Explore
Explore technological and socio-institutional innovations, assess their potential for SI and select Socio-Technical Innovation Bundles (STIB). Generate knowledge products on STIB

Tools: Quantitative and qualitative scenario analysis, trade-off analysis, choice experiments, focus groups and semi-structured interviews

Explain
Generate understanding of main processes that influence MFS performance. Select components and interactions of MFS to improve and locally relevant indicators for each criteria of success.

Tools: Focus groups, primary data generation and analysis, conceptual and mathematical models, indicator frameworks, focus groups and semi-structured interviews

Describe
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The DEED cycle
Two main pathways for co-designing socio-technical innovation bundles

“De-novo”: Transform the system into a better one or even change it to a totally new and desirable system.

“ ‘De novo’ design aims at designing cropping or farming systems that break away from existing systems. It involves opening the field of possibilities, without submitting to any restraint” (Meynard et al. 2012)

Modeling approaches often used to explore various possibilities of system changes and assess their consequences. Stakeholders are engaged on the definition of the desired state and choice of system components to re-design, on the assessment of alternative systems, and on the delineation of possible pathways for systems transformation.

“Step-by-step”: Incremental changes are embraced, and the aim is to change the system one step at a time, implementing approaches for system change as understanding of the system and system interventions continues.

“ Step-by-step design, the aim is not to create a break, but to organise a progressive transition towards innovative system” (Meynard et al. 2012)

Stakeholders participate on joint assessment of current systems, definitions of the desired state of and visions for system changes, identification of entry points and identification/generation of innovations, deployment, monitoring, evaluation and reflection of innovations and continue the cycle for the next level system improvement. Modeling approaches often used to assess the potential impact of innovations on systems performance.
The DEED cycle

Describe MFS and the socio-technical innovations
(Scaling readiness – core and complementary innovations)

Understand how MFS and innovations perform

Describe

Co-learning Farmers and farmer representatives, extension systems and advisory services, local experts, value chain actors, scientists, policy makers, donors

Design

Explore bundling socio-technical innovations for improved performance and smooth trade-offs

Explore

Re-design farming systems based on socio-technical innovation bundles
Two main pathways for co-designing socio-technical innovation bundles

“De-novo”: Transform the system into a better one or even change it to a totally new and desirable system.

“Step-by-step”: Incremental changes are embraced, and the aim is to change the system one step at a time, implementing approaches for system change as understanding of the system and system interventions continues.

To capitalize on previous research and development investments, and because of the complexity of implementing interventions across farm components, a step-by-step approach is most often followed. But at the same time considered “conservative” towards transforming systems. De-novo design “opens the field of possibilities, giving free rein of inventiveness, and can in this way provide a source of inspiration” for incremental, step-by-step, approach.

A combination of both pathways (incremental/step-by-step and transformational/de-novo), in close interaction with stakeholders all along the whole process of co-design, can provide the basis for developing socio-technical innovation bundles for truly transformation of MFS towards their sustainable intensification.
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Thank You