Manual for Inter- and Trans-disciplinary Research methods: Relevance to Urban Transformation in Ethiopia and Mozambique.

GIRT-Project Team

Strengthening Research and Educational Competences of HEIs for Gender-Sensitive Urban (InfoRmal Settlement) Transformation (GIRT)

This manual is intended for academic staff and graduate students, practitioners who are dedicated to conducting research that actively involves societal stakeholders to address real-world problems. It is designed for individuals who are curious about innovative research approaches to collaboration and knowledge creation.

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Operational Definitions of Key Terms

Gender-sensitive Urban Transformation: A process of change in planning, development, and service delivery in urban areas that considers and responds to the differing needs, experiences, and challenges of all genders, particularly to reduce inequality and empower marginalised populations, including women living in informal settlements.

Informal settlement: An informal settlement refers to a residential area where housing has been built or occupied without formal planning approval, legal land tenure, or compliance with urban building regulations. These areas often emerge through self-construction by low-income households who cannot access formal housing markets due to high land prices, limited affordable housing supply, and rapid rural-urban migration.

Slum: A slum is a densely populated urban area characterized by substandard housing, overcrowding, inadequate access to basic services, and poor living conditions. The term is commonly used to describe settlements where residents experience multiple forms of basic deprivation in their living.

Knowledge Co-Production: The process of producing knowledge through the active engagement of research participants and other stakeholders - using interactive methods such as interviews - rather than merely passively gathering information.

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A special word of appreciation also goes to prof. Gabriele Bammer and Prof. Marianne Penker who are an external advisory board of the project providing us "friendly" expert input and advice to support the project particularly in designing the TDR framing and method selection over the years.

Acknowledgements are also due to the TDR workshops participants in Bahir Dar city who were invited from government offices and community representatives of informal settlement areas (from Woramit and Be'ata kebele).

SECTION A- INTRODUCTION

1.1. About the Manual

This manual is based on the relevance of inter- and trans-disciplinary research methods for science-practice collaboration in dealing with societal problems, particularly urban transformation in Ethiopia and Mozambique. The manual is developed under the project "Strengthening Research and Educational Competences of Higher Education Institutions for Gender sensitive Urban (InfoRmal Settlement) Transformation" (GIRT), funded by the Austrian Development Agency under the framework of Austrian Partnership Program in Higher Education and Research for Development (APPEAR). The project participants came from different higher education institutions (Universities) of Ethiopia, Austria and Mozambique. Our partnership not only required involving institutions of the South and the North, but it also brought together policy makers and various stakeholders from government and non-government organizations, where it became crucial to implement inter- and trans-disciplinary research methods in addressing problems of urban informalities.

The manual is one of the outcomes of the GIRT-project authors' desire to build on what they had learnt during the project process and their own experience of using inter- and trans-disciplinary research methods. Moreover, they have extensively tried to synthesize many relevant insight gained from their own reading. There are, of course, many excellent handbooks, manuals and websites providing introductions to inter- and trans-disciplinary research methods. The objective here is, therefore, to complement these more in-depth sources with an overview that introduces users to the topic and approach thereby practicing inter- and trans-disciplinary research methods to deal with complex real-world or societal problems.

1.2. Aim and objectives of the manual

The Purpose of this manual is to support the GIRT- project team members in HEIs in Ethiopia and Mozambique for the implementation of TDR. It offers basic information and guidance to academic researchers as well as graduate students in Higher Education Institutions who are committed to research that is socially relevant and engages societal actors in GIRT-project, which is concerned with Gender sensitive urban transition. We believe that the manual is also helpful for similar projects with other contexts and thematic settings to be familiar with the practices and challenges of TDR. In line with this, the specific objectives of this manual are:

- ✓ To equip students and researchers with knowledge to be able to select and use inter- and transdisciplinary research methods;
- ✓ To indicate means to researchers, policy makers and practitioners for co-production and integration of knowledge in addressing multifaceted societal problems.
- ✓ To enhance cross-disciplinary and cross-institutional communication and mutual learning among participants of the GIRT project to better deal with the problems of urban informalities.

1.3. The Target Audience /Beneficiaries

With the application of inter-and trans-disciplinary research approach, GIRT-project aimed to develop learning platforms and co-production of knowledge from academic researchers, policy makers and various stakeholders from governmental and non-governmental organizations.

This Manual primarily serves as a guide to GIRT- project team members and students, who are responsible to implement transdisciplinary research with heterogeneity of skills and expertise in problem-solving Transdisciplinarity researches. The manual also meant to be used for training purposes by partner higher education institutions to educate and train graduate students, staff members in the universities as well as for other research institutions. Finally, it provides an assurance to the international development and lending institutions that the funds provided to the states will be spent in a responsible and productive way.

We strongly believe that the benefit of using the manual can be enhanced through an interactive and collaborative learning with individuals having some level of knowledge, skill and experience of using TD research methods.

1.4. How to use the Manual?

This manual provides a step-by-step guide to the TDR designing and implementation process. It contains three sections- SECTION A, SECTION B and SECTION C.

SECTION A contains an introduction about the manual, aims and objectives of the manual, target beneficiary of the manual and how to use the manual.

As a second part, SECTION B outlines the first six modules containing concepts that differentiate disciplinary, multidisciplinary, inter- and trans-disciplinary research approaches. It also contains detailed discussion on the potential procedures and practical methods recommended from the literature and which will be needed throughout the process of formulation and designing TDR. SECTION C – contains the last two modules (module 7 and 8) illustrated the implementation of TDR from the case studies conducted in Ethiopia and Mozambique.

MODULE 1 INTRODUCTION TO TRANSDISCIPLINARY RESEARCH

1.1. Objectives of Module 1

1. Introduce participants to the fundamental principles and concepts of transdisciplinary research approaches.
2. Help participants distinguish between transdisciplinary, multidisciplinary, and interdisciplinary research approaches, and examine how these approaches intersect to support knowledge integration to tackle wicked problems.
3. Enable participants to recognize which types of research problems or projects are most suitable for a transdisciplinary approach.

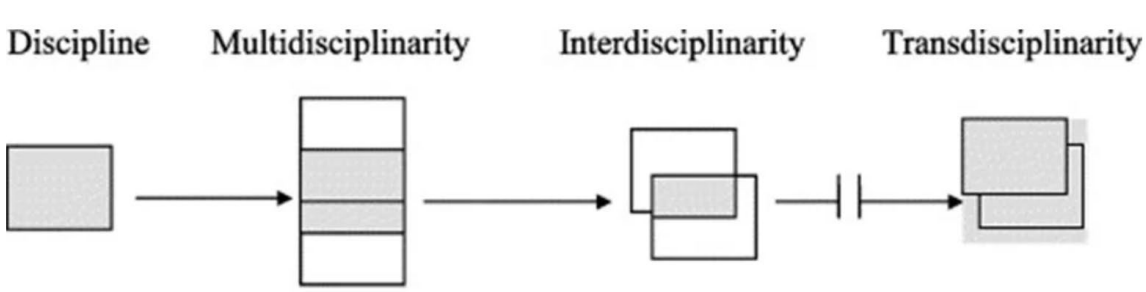
1.2.Approach

The approach to differentiate the concept of disciplinary, multidisciplinary, interdisciplinary and transdisciplinary is usually the level of integration or their collaboration and goal (Stember, 1991; George, 2025;). Higher education design education programs/ curricula that expose students to an array of disciplines, with the intent to create disciplinary based knowledge that keeps them within traditional boundaries and methodologies.

In practice, due to the interface between disciplines and their span across various disciplines, we poorly define terms and usually use them interchangeably. However, scholarly literature continues to define and raise distinctions between forms of disciplinary collaboration.

Literature review demonstrates that research approaches using a single discipline and common methodology, are unable to reflect the realities and not elicit the necessary information in the research field. This is mainly because; in using a single discipline only one lens is brought to understand the dynamics inherent in complexity. Multidisciplinary and inter-disciplinary researches, on the other hand, approach a problem from a number of different disciplines, exists in collaborations where researchers share expertise but continue to work from their own discipline-specific perspective. The research methodologies run parallel or sequentially to each other with a goal of combining results to solve a shared problem (Mcdonald, Bammer, & Deane, 2009; Morales, 2017).

The following sets of definitions therefore clarify their distinctions.



Terms	Descriptions

Disciplinary	Approach a problem from one academic discipline keeping within traditional boundaries and methodologies no cooperation with other disciplines.
Multidisciplinary	Approaches a problem from the perspectives of a number of various disciplines, but each works in a self-contained manner and no integration across disciplines.
Interdisciplinary	approach a problem from the perspectives of various disciplines and their contributions are formally integrated; to give a synergistic outcome where
Transdisciplinary	Involve the highest level of integration, which unites multiple disciplines, academic perspectives, and stakeholders (practitioners, community members) to address complex, real-world problems.

Table 1- Summary Table of Differences sources- compiled from

1.3.The need for Transdisciplinary Research

Transdisciplinary Research (TD) approach is clearly different from traditional research approaches (mono- and inter-disciplinary) that usually formulate research problems, research questions and methods from international literature that is, in isolation with societal and experiential knowledge of local communities (Mintzberg et al. 2013; Hirsch Hadorn et al.2008; Pohl and Hirsch Hadorn 2007; Breda and Swilling, 2018).

In different places of the world, a TD research process has been carried out to deal with complexity through inter- trans-boundary research partnerships from various disciplines (Robledo Abad, et al.2023). According to the reviewed literature, the ultimate characteristics of TDR process compared to the interdisciplinarity could be related to the problem being addressed; research process and knowledge integration, and the research outcomes (Mcdonald, Bammer, & Deane, 2009; Hernandez-Aguila, 2018).

The following are some of the reasons/ situations why we need TDR, (Pohl et. al. 2007),

- Concern about real-world problems, particularly a desire to engage with societal issues that do not primarily emerge from disciplinary journals or academic discourse alone.
- The knowledge about socially relevant problems is uncertain and the need to integrate knowledge from different perspectives.
- High stakes for the actors concerned with the problems
- To bring together theoretical and practical perspectives, as well as communities undertaking complementary
- Fostering reflectivity connected to a range of research interests and to connect across a range of fields.

Transdisciplinarity has therefore become a third mode (supplementing disciplinarity and interdisciplinary) of doing and utilizing science for dealing with challenging and complex real-world problems. In trans-disciplinarity, research integration is the process of improving the understanding of real-world problems by synthesizing relevant knowledge from diverse disciplines and stakeholders. It is a specific form of research setting in which varied actors from science

and society collaborate in the process of addressing complex real-world problems from diverse domains of knowledge, and facilitates capacity building and consensus formation (Wirth *et al*., 2014; Scholz & Steiner, 2015).).

According to Morales (2017) transdisciplinary research can be characterized by four common elements:

1. It involves society in the research process. There is a communication and exchange of information between multiple disciplines, stakeholders, and actors associated with the problem, valuing both 'hard' and 'soft' science. Further, the complexity and interconnectedness of the problem is considered critical to the transdisciplinary understanding and it is not reduced to an exploration of its parts.
2. Problems are formulated at the beginning through dialog with a large number of actors and stakeholders who bring varied skills and expertise. The scope of a problem is not externally imposed on the research by a principal investigator (PI), but identified jointly by the transdisciplinary team, even when a PI is designated for securing grants or disseminating research communications.
3. Transdisciplinary research is carried out through the context of application and iteration. Problems are recognized as being situational; existing within the specific context surrounding the problem and the response must be tested within that context or deliberate variants.
4. The group maintains accountability and quality measures. Rigorous approaches from science and social sciences are integrated and the research team determines the validity of knowledge generation.

Based on the above explanation, please think of a case study as an example which demands TDR and fill it in Table 2 (column 4).

Types of problem/project	Descriptions	Key characteristics	**Example**
Sustainability Challenges	Complex environmental issues that require balancing ecological, economic, and social needs	High uncertainty, long-term impact, requires system, target, and transformation knowledge.	
Wicked Societal Problems	Issues with no clear definition or stopping rule, where stakeholders disagree on the cause and solution.	High contestation, urgent decision-making, requires stakeholder participation	

? From the above lesson and understanding, what do you perceive about the core principles of TDR?

- Should emphasis on societal problems,
- Trust and willingness to collaborate
- Symmetrical/balanced power relations

- Focusing on solution oriented knowledge creation and integration
- Enabling mutual learning among various disciplines and stakeholders

1.4. TD Practical challenges in the Global South

The practicality of transdisciplinary research faces many challenges. To help avoid potential pitfalls when getting involved in TDR processes, it is useful to generally be aware of some of the potential challenges. Lawrence *et al*. (2022), identified three categories of challenges that are expected in the process of TD research: (1) challenges related to the involvement of non-academic participants, (2) challenges around addressing normativity and bias, and (3) challenges of evaluating impacts and effectiveness.

Under the first category, i.e. challenges related to the involvement of non-academic participants, are: (i) a lack of awareness of the existence of a specific problem, or a lack of agreement over what exactly the problem is; (ii) unbalanced "Problem ownership", with a dominance of scientists driving the TDR process and limited involvement of non-academic actors in defining the project (including objectives); and (iii) a lack of legitimization of the team of researchers and actors, including underrepresentation of relevant actor groups.

Under the second category, i.e challenges around addressing normativity and bias are: (i) conflicting viewpoints over methodological standards, especially between academic and non-academic participants; (ii) challenges around various types of integration (knowledge types, social, organizational, communicative and technical) needed within TD research; (iii) barriers to maintaining extended periods of engagement of participants in TD research projects, both internal to the project and externally driven; (iv) the occasional tendency to keep the co-produced knowledge and results from TD research projects vague and ambiguous to gain approval by all process participants; (v) reversion to pre-packaged (technical) solutions, rather than exploring a range of solution options (due to the fear of failure).

Under the second category, i.e. challenge of evaluating impacts and effectiveness are: (i) a limited ability to generalize and scale up the results of specific case studies, as well as to transfer knowledge about the effectiveness of the applied Td research approach; (ii) a lack of clarity about what role TD research results could or should play in relation to formally legitimized (non-transdisciplinary) procedures and political processes; (iii) occasional distortion, misinterpretation, and misuse of results by projects partners who are dissatisfied with the outcomes and implications; (iv) difficulty with tracking the societal impacts (and sometimes the far-reaching scientific impacts) of TD research projects.

Taking into account the diversity of scientific and societal views on a particular societal problem (for example, informality), stakeholders' engagement and their integration (e.g., knowledge, interests, and values) is one of the expected challenges in the TD process. Matsumoto, Kasamatsu and Sakakibara (2022) noted three barriers to effective engagement stakeholders in Td research process:

From the outset stakeholders do not necessarily participate, in the process, with great interest because of their indifference to the problem- "***barriers of indifference***." So, in conducting TD research, it is necessary to surmount these "barriers of indifference."

Then, even if interest is generated across a diverse range of stakeholders, there is no guarantee that they will cooperate in creating new knowledge. Particularly problematic here is the task of developing collaboration among stakeholders beyond individual positions; i.e stakeholders do not collaborate within the TD processes due to internal differences in position- "***barriers of position***". Then, TD research must also overcome these "barriers of position."

Moreover, even if diverse stakeholders do collaborate, the question of how to sustain the collaboration must also be considered. This is particularly true for the period after academic researchers complete their research projects. Limited budgets and other constraints make it difficult for researchers to remain in the area on a permanent basis after their research is completed. If academic researchers assume the leading role in collaboration and knowledge creation while diverse stakeholders "cooperate" therewith, activities are likely to cease once the researchers leave, rendering the activities transient and the problems potentially unsolved- "***barriers of continuity***".

Reflective questions for Module 1

- How does TDR differ from multidisciplinary or interdisciplinary research practices in the global south?
  _____
  _____
  _____
  _____
  _____
- In what ways can local or indigenous knowledge be marginalized within transdisciplinary projects?
  _____
  _____
  _____
  _____

MODULE 2 TRAINING NEED ANALYSIS

As with any research, having a prior understanding of the current status of the TD team is critical to documenting changes in TD research and to being fully equipped with the actual and desired set of skills and capabilities of the team beforehand.

This module is designed to develop both methodological and technical skills, supported by a case study to demonstrate their application.

2.1. Objectives of Module 2

By the end of the module, participants will be able to

1. have the know-how of conducting a full-fledged training need assessment study that helps to identify gaps (individual and collective capabilities) of the TD team for effective undertaking of a TD research
2. Equip participants with the list of methods to document the baseline and change in capabilities before and after conducting the TD research
3. familiarise with the standard set of quality criteria for conducting the TD research by maintaining rigour throughout the TD research process

2.2. Approach:

- PowerPoint presentation and background notes
- Tool design exercise by the team
- Need assessment-Transdisciplinary: assessment of methods and capabilities of the GIRT project team members in four higher education institutions

Background Note:

What is a needs assessment?

As a background note, it is first important to define a needs assessment. A generic and widely used definition can be cited as:

Need assessment is a process for determining and addressing needs or "gaps" between current conditions and desired conditions, often used for improvement in individuals, education/training, organizations, or communities. Source Cite so.

2.3.Rationale for a TD Need Assessment

Any intervention demands a background of baseline information to fully capture the stakeholders from both academia and non-academic actors who need to work and collaborate to address complex societal problems.

To undertake this task, stakeholders should be equipped not only with the right know-how of methods and tools but also the skills and capabilities to undertake this type of research with a high standard and societal impact. In particular, higher education institutions need to capacitate themselves and reach out to other relevant actors in the research arena or topic to tackle current and future problems.

Assessing capacity and underlying capabilities is important because they both contribute to a broader evaluation of the complex and often non-quantifiable criteria of interactions between science and society in transdisciplinary research (Ernø-Kjølhede and Hansson 2011; van der Ploeg 2011).

Thus, rationales for this kind of need assessment are to assess the status of know-how about concepts, methods, and capabilities of the transdisciplinary research team(both from academia and non-academic actors before conducting the TD research, and to fill the capability gaps through a preplanned design beforehand.

Universities, of interest to this GIRT project, need to be equipped with human and institutional capacities to address complex societal problems with the twin objective of orienting conceptually and methodologically through the effort of knowledge generation, training, and communication of research findings.

2.4.Generic Steps for Conducting a Needs Assessment (include source)

1. Planning phase (team and resource)
2. Establish goals and objectives of the study
3. Conduct a literature review on the research topic (constructs, themes, parameters, etc)
4. Select data collection methods (quantitative/qualitative)
5. Determine sampling scheme
6. Gather and record data
7. Analyse data
8. Synthesise data and write a report
9. Tailor training and capacitate the team to fill the identified gaps

2.5.Possible list of tools(combinations) for conducting a needs assessment

1. Observation
2. Survey using Questionnaire
3. Focus group discussions
4. Key informant Interviews

2.6.Expected capabilities for transdisciplinary research

Transdisciplinary research promises to frame and address wicked problems as societal challenges that demand increasing transdisciplinary research capability and a platform for the development of capability development in three ways:

- through convening cognitive capabilities required for academic practice;
- cultivating informal tacit capabilities; and
- maintaining often unacknowledged backstage capabilities over durations that extend beyond the lifetime of individual projects(O'Donovan, Michalec, and Moon 2022)

A set of individual and collective capabilities for TD

Unlike conventional research, TD research team individual capabilities focus on social and political dimensions than simple cognitive ones, in particular, this is true as the TD involves particular set of skills, tacit knowledge, and experiential knowledge (Heckman and Corbin 2016) Such tacit individual capabilities are influenced by personal background and include often individualistic ambitions like the capability to have an identity as a researchers (Lau and Pasquini 2008).

The set of particular skills required for TD research resonates around three domains: some scientific, others technical, and others social skills and capabilities (Bozeman and Rogers 2001). Thus, equipping all team members with all the required capabilities and skills may not be feasible; a proper level of division of labour and sharing responsibilities and collective capabilities are critical.

The method to acquire these skills demands collective action as well as individual effort. Consecutive training and brainstorming sessions should be inculcated in the design of the project.

- A research group's capability set contains the aggregate of individual capabilities.
- The capability set also contains capabilities that are mutually held and not dividable to individual researchers.

According to O'Donovan et al. (2022), the list of collective capabilities set for the TD team includes but not limited to:

- capabilities for collaboration and coordination (Hohl, Knerr and Thompson 2019),

- capabilities to build and continuously maintain networks (Spaapen and van Drooge 2011; Hansson and Polk 2018) and
- interpersonal and intrapersonal learning

Activity for participants

Read carefully the abstract below and reflect on the objectives of the needs assessment, methods employed, findings, and conclusions.

> **Needs assessment for inter- and transdisciplinary training and research for the enhancement of rural transformation in the *AMHARA* region, Ethiopia**

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Abstract

Ethiopia is an agrarian country and agriculture is the backbone of its economy. Because of this fact, the government of Ethiopia has devised Agricultural Development Led Industrialization (ADLI) as the country's overall economic development policy and the country has been investing appreciably towards agricultural growth. Particularly for the last 15 years, public investment towards the expansion of higher education, research and extension in agriculture and natural resource management has been so enormous. These higher education and research institutions are expected in turn to play a great role in stimulating rural transformation. In reality, however, they are not sufficiently responsive to rural transformation especially in addressing problems and priorities of resource poor small-scale farmers. Thus, to assess the needs of training that are more responsive to rural transformation including inter-and trans-disciplinary training in higher education and research institutions is of paramount importance. To this effect, survey studies were conducted to collect primary information from focus group discussions and key informant interviews. Checklists and semi-structured questionnaires were also developed for respective groups of discussants and respondents. Stratified and purposive sampling technique was dominantly employed during the survey studies. Most respondents regardless of their backgrounds were unaware of the term inter-and trans-disciplinary. This was because different stakeholders used to work independently which they had no experience of how to integrate work into a common goal. So, awareness on inter- and trans-disciplinary training/research can be created by practically involving stakeholders how they are working within and across disciplines in which understandings change in response to the perspectives of others. Respondents who have awareness of the term inter- and trans-disciplinary training agreed with the relevance of inter- and trans-disciplinary training/research for addressing farmers' problems in stimulating rural transformation. Therefore, putting into practice and giving emphasis on inter- and trans-disciplinary training/research in each stakeholder will contribute to rural transformation.

Keywords: Rural transformation; Need assessment; Awareness; Responsiveness.

Source: (Statistik 2014)For further readings, please refer https://www.researchgate.net/publication/342344749_Needs_assessment_for_inter-and_trans-disciplinary_training_and_research_for_the_enhancement_of_rural_transformation_in_the_Amhara_region_Ethiopia_1

Reflection Questions for Module 2

Based on what you have learned in Module 1 of this training module, which specific skills do you consider most essential for conducting transdisciplinary (TD) research? Please specify at least three.

_____

_____

_____

For which particular types of transdisciplinary projects would you say a training needs assessment is necessary as a prerequisite to conducting a full TD research process?

_____
_____
_____

What are the advantages and disadvantages of the different tools or methods available for carrying out a training needs assessment, particularly for a TD research? Select at least one method/tool and explain.

_____
_____
_____
_____

MODULE 3 Transdisciplinary research FRAMEWORKS AND DESIGN SELECTION

3.1. Objectives of Module 3

1. To provide participants with a foundational framework and a range of design options for planning a transdisciplinary (TD) research project.
2. To help participants develop the ability to integrate and contextualize these frameworks within their own research settings.
3. To prepare participants to navigate the complexity and inherent messiness of transdisciplinary designs and frameworks to fit the context for the global south

3.2.Approach

- Process-wise brainstorming sessions on frameworks &design by the GIRT project team members
- Process-wise reflection on the GIRT project experience
- Sharing questions posed for advisory board discussions as experiential learning for other similar projects
- Reflection on the discussion on short TD training courses by team members to spot common blurred concepts and steps
- Extracts from ebooks a learning case study

3.3.Frameworks and their importance for TD

Frameworks are deliberate simplifications of a phenomenon, process, or situation; they are often constructed by decontextualizing situated complexities into more generic overviews. (Regeer, Klaassen, and Broerse 2024). The same authors justified the importance of frameworks for transdisciplinary research as they help researchers and practitioners to design, monitor, and evaluate transdisciplinary processes.

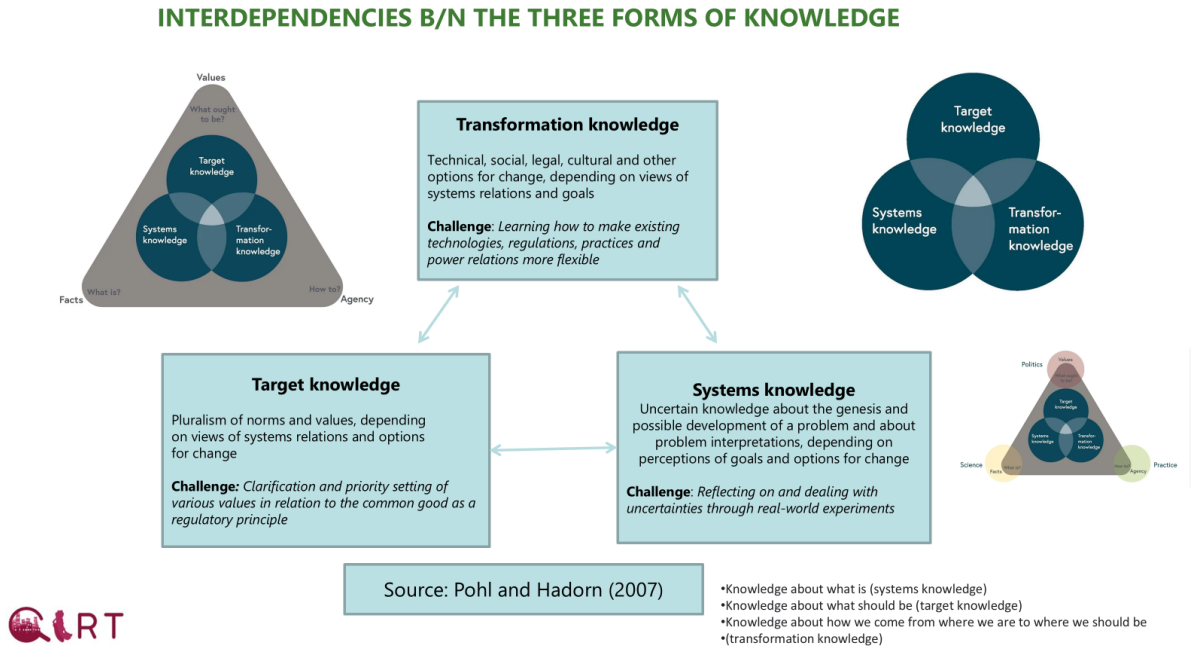
According to Polk (2015), in his proposed TD framework, five focal areas are given particular emphasis, namely (inclusion, collaboration, integration, usability, and reflexivity)framed in three research phases (Formulate, Generate, Evaluate), by linking the focal areas and research phases (see table…..).

They stimulated a high level of stakeholder participation and commitment to the research processes, and promoted knowledge integration and reflexive learning across diverse sectors and disciplines. The approach, however, came up against a number of practical barriers stemming primarily from institutional, organizational, and cognitive differences of the participating organizations. While TD co-production increased the usability of the results in terms of their relevance and accessibility, it paradoxically did not ensure their anchoring in respective institutional and political contexts where societal change occurs

3.4. Three types of knowledge in TD research

The agreed-upon design for the transdisciplinary research is the three knowledge pillar areas: system knowledge, target knowledge, and transformation knowledge. As a background note, hereunder is the definition of these knowledge areas and their interaction.

1. System knowledge
2. Target knowledge
3. Transformation knowledge



3.5 An overview of prominent sample TD frameworks from the literature

Context: In the process of selecting a TD framework, many scholars have suggested and come up with multiple bundles of choices with varied frameworks based on disciplinary background and function/rationale for use of the TD research (Cite sources)..

In particular, in the context of the global south, the choice is not simple due to the messiness of the research process and integration component. Thus, it poses a tremendous challenge for researchers to pick the right framework for the problem to be addressed. From a scholarly point of view, it is well appreciated that context-based options are available for researchers to experiment with varied frameworks proven to be functional in the global north that, of course, can be adapted and employed for use in the global south context.

One of the rationales for preparing this manual stemmed from the fact that the absence of clear and straightforward guidelines needs to be addressed to direct the TD research process in the right way, considering the objective of the choice of frameworks works for the research topic.

A thorough and detailed literature review has been conducted with the objective of coming up with a bundle of choices available and to choose for the GIRT project. Accordingly, around twelve TDR research process frameworks were identified and summarised as an initial phase of the research process.

As one of the project outputs, a clear criterion is crucial to select the right framework that guides the research process. Based on the review, the table below summarises the different frameworks, with sources, steps, and context for use. On the right side column, a remark is indicated to guide the choice for any kind of complex problem that the TD research aims to address, subject to possible improvements and improvisations. .

Table Summary of TD frameworks and steps compiled from different TD books and sources

Number	Framework initiator & prominent Author	Core Phases / Steps (Summarised)	Proposed methods and a combination of TD method aligned with the framework	Remark on the TD framework & step application in the context of the Global South
1	Swiss Academies Network for Transdisciplinary Research transdisciplinarity.ch(2025)	Phase 1: Jointly frame problems (identify understandings, stakeholders, team-building, match societal demand, define goals). Phase 2: Jointly conduct research (structured collaboration, co-production, integration of knowledge, adjust methods). Phase 3: Jointly explore impact (develop & test solutions, evaluate impact).	The website is use friendly and search is provided by key issues and/or by method (**td-net toolbox).**	
2	6-Step TD Research Process	1. Research vision & strategy. 2. Problem exploration/structuring. 3. System understanding. 4. Search & compare solutions. 5. Decide & prepare for application. 6. Synthesis & feedback into overall strategy.		
3	Scholz et al. 2006 TD Case Study Methodology	Forward: (1) Goal specification (2) System analysis (3) Scenario construction (4) Multi-criteria assessment (5) Action orientation. Backward: (6–10) Case faceting, system model characteristics, scenario characteristics, assessment criteria, goal formulation.		

Number	Framework initiator & prominent Author	Core Phases / Steps (Summarised)	Proposed methods and a combination of TD method aligned with the framework	Remark on the TD framework & step application in the context of the Global South
4	Hirsch Hadorn / Pohl & Hadorn TD Approach	1. Problem identification & structuring. 2. Problem analysis. 3. Bringing results to fruition (application).		
5	Jahn et al. (2012) TD Conceptual Model	Phase 1: Problem transformation (framing → boundary object → epistemic objects). Phase 2: Interdisciplinary integration (role clarification, integration concept design & implementation). Phase 3: TD integration (assessment, assembly of products for science & society).		
6	Lang et al. (2012) Ideal–typical TD Process	1. Problem framing & team building. 2. Co-creation of solution-oriented & transferable knowledge. 3. Re-integrating and applying TD knowledge.		
7	TD Case Study Design – 20 Steps (Td Summer School, 2022)	Steps include: define case, societal problem, context, knowledge gaps, scientific relevance, actors, power relations, roles, joint research question, objectives, knowledge needs, contributions, methods, timing, communication &		

Number	Framework initiator & prominent Author	Core Phases / Steps (Summarised)	Proposed methods and a combination of TD method aligned with the framework	Remark on the TD framework & step application in the context of the Global South
		implementation of results.		
8	Four-phase TD Research Model	1. Development. 2. Conceptualization. 3. Implementation. 4. Translation (with iterative feedback loops).		
9	Co-production of Knowledge in TD Doctoral Theses	1. Problem history. 2. Problem identification & structuring. 3. Research design & methods. 4. Data collection. 5. Data analysis (triangulation). 6. Reflection & synthesis. 7. Dissemination.		
10	Polk, Kain & Holmberg – Phases of TD Co-production	Formulate: Joint problem formulation, project design. Generate: Information collection, joint analysis, implementation & communication. Evaluate: Process reflection, impact assessment.		
11	Bergmann et al. (2005)	1. Actors, project construction, project formulation. 2. Project execution & methodology. 3. Results, products, publications ("creating value").		

Number	Framework initiator & prominent Author	Core Phases / Steps (Summarised)	Proposed methods and a combination of TD method aligned with the framework	Remark on the TD framework & step application in the context of the Global South
12	TDR Phase Model (Large, Multi-Level Framework)	Phase 1 – TDR initiation: Skills, stakeholder identification, problematization. Phase 2 – TDR management: Boundary management, co-planning, conceptual refinement, and evaluation. Phase 3 – Knowledge exchange: Public engagement, knowledge integration, dissemination & training.		

Source: indicate the source for this compilation

Summary of the 9 frameworks Bammer (2017)

Framework name #	Scope	Primary focus	Key concepts	Remark on the framework for application in global south
Principles for Designing Transdisciplinary	whole process	Guiding principles across 3 phases	3 knowledge types (systems, target, transformation | Problem identification and implementation	
Model for the Transdisciplinary Research	whole process	Linking societal problems to scientific problems	3 tasks (problem constitution, integration, participation); 2 epistemic ends |	
Outcome Spaces	whole process	Designing	3 outcome spaces	

(Mitchell, Fam & Cordell)		backward from desired future outcomes	(improving situation, knowledge stocks/flows, learning)	
Four Building Blocks of Systems Thinking, visual modeling language (Plectica)	part of process	making systems thinking explict	DSRP (Distinctions, Systems, Relationships, Perspectives) | ; mixing patterns (R+D, P+S+R+D) | visual modeling language (Plectica)	
Knowledge Co-Production (Muhar & Penker Most detailed actor & knowledge typology; addresses problem history	coproduction	analyzing who contributes what knowledge when and why	WHO (3 actor levels), WHEN (phases), WHY objectives | Most detailed actor & knowledge typology; WHAT (knowledge: scale, function, epistemology)	
Context in Research-Government Policy Sole focus on policy institutions institutions & political Interaction (Weyrauch & Echt)	Part of process, policy context?	Identifying entry points/barriers in policy, institutions	6 dimensions (macro context, relationships, culture capacity management resources)	
Ten Essentials for Transformational Change | Part of process | Contributing to transformative (not just | 10 essentials (focus on transformations, | Most action-oriented; critiques incremental				

(Fazey) | (transformational | incremental) change | solution processes, practical knowledge, | approaches; lists alternative researcher roles				

Toolbox for design

3.6. Proposed Methodological Steps for Developing a Transdisciplinary (TD) Research Framework (Initiation level design).

1. **Formulation of Guiding Research Questions**
   Convene a structured brainstorming workshop involving TD leads, project coordinators, and the full interdisciplinary research team, and if possible the TD team with participation of both academic and non-academic stakeholders.

   Develop one, or at most three, clearly defined guiding research questions to focus the TD inquiry.

2. **Identification of Knowledge Requirements**
   Systematically assess whether the guiding questions necessitate
   - systems knowledge (understanding the problem context &functional interactions),
   - target knowledge (defining desired outcomes and common visions), and/or
   - transformative knowledge (pathways for change).
   -
   - Evaluate the extent to which integration across
     i. these knowledge types is required.
     ii. scientific and experiential knowledge
     iii. gap between knowledge and practice
3. **Justification for a Transdisciplinary Approach**
   Critically examine the rationale for adopting a TD approach, including:
   - the limitations of purely disciplinary & interdisciplinary responses,
   - the role of engaging non-academic actors in the co-production of knowledge,
   - existing gaps between science and society, and
   - the urgency and relevance of need for mutual learning and consensus-building.
4. Use this assessment to further refine the guiding question.
5. **Systematic Literature Review**
   Conduct a systematic and methodologically transparent review of existing transdisciplinary studies and comparable cases to generate theoretical and empirical insights that inform not only the framework/design but also the guiding research question. .
6. **Reflection session:** Convene a miniworkshop on reflection of application of different TD frameworks (9) proposed by Td experts from the literature compiled and analysed in step 4).
7. **Expert Validation and Review**
   Engage high-level experts (e.g., advisory boards, steering committees, etc)) to validate the conceptual boundary, rigour and completeness of the proposed framework.

8. **Operationalisation of the Framework/Design**
   Translate the conceptual framework into clearly defined, actionable research procedures, ensuring that abstract concepts are converted into implementable steps.
9. **Design of Data Collection and Analytical Strategies**
   For each knowledge type (systems, target, and transformative), develop appropriate data collection methods and corresponding analytical frameworks, ensuring methodological alignment with the research questions.
10. **Development of a Detailed Research Roadmap**
    Based on the preceding steps, prepare a comprehensive roadmap outlining the processes for generating target and transformative knowledge, including timelines, roles, and expected outputs based on Step 7.
11. **Assessment of Rigor and Cross-Context Comparability**
    Establish criteria and mechanisms to ensure methodological rigor and comparability across different research sites, with particular attention to the research object, implementation processes, and desired/expected societal impacts.

Case study: Summary of reflection on justifications on selection of TD framework

Based on the criteria set above, each partner institution reflected on the parameters, namely, each framework was assessed for whether it can be applied to GIRT, reasons for its selection, how and in what context it can be applied, and its potential to merge with other frameworks.

1st framework: Principles for designing transdisciplinary research.

Four partner institutions (UOM, BDU, AAU) reported that the 1st framework, from the University of Mekele (UoM) & Bahir Dar University (BDU),

It can be phases that help identify problems, challenges, & the type of knowledge needed. Application involves clearly identifying the research question, mapping stakeholders, & identifying knowledge types.

Possibility to merge with other frameworks: This framework can merge with Framework No. 4, particularly for understanding stakeholder complexity, and with many other frameworks.

2nd framework: A model for the transdisciplinary research process.

Suggested by LU & BDU.

Rationale for selection:

It combines scientific & social knowledge.

can be applied during the research process without concern for specific stages.

Has advantage of academic rigour & to undertake conventiona(scientific) research following and adapting common research methods and analysis tools.

3rd framework: *Outcomes spaces: Designing for impact in transdisciplinary research*.

Prioritized by BDU,

Reason for selection: It can be applied depending on the outcome boundaries, whether for knowledge integration or learning purposes.

In this case a clear system boundary has to be set at the initation of the project and later at problem framing and reframing.

4th framework: What makes a researcher transdisciplinary? A framework to identify expertise.

It is considered a building block and is applicable to GIRT.

5th framework *Knowledge co-production*.

AAU, LU and BDU

Reasons for selection: it is not a one-way process; one can move between steps and needs field expertise. It serves as a building block. It can be applied when engaging with women and sectoral stakeholders, and if mistakes or gaps appear, the process can be restarted. Besides it aims for merging of academic and nonacademic knowledge for mutual learning and societal impact.

6th framework : Context in Interaction between Research and Government Policy*.

UoM and BDU.

It is a building block and applicable because understanding the policy level helps choose focus and initiate government-level change. It can be applied for analyzing and engaging sectoral stakeholders, and for mapping and designing interventions. It is described as part of a general framework.However, at the stage of drafting the project proposal, policy recommendation were sought but later stages the scale is narrowed down to the scaleable interventions.

7th framework *Ten essentials for contributing to transformational change*.

LU, UoM, and BDU,

Applicability varies: LU and UoM mark it as applicable, while BDU marks it as not applicable. It reminds researchers to be aware of neutrality and assumptions throughout the process, and to avoid personal and cultural influences. Transformation is the desired outcome. The framework is complementary to Framework No. 1 and can be integrated with it.

From AAU side, to capture the concept of urban transformation though at later stages transformation was concpetualised at lower levels of mindset and provoking the options for possible tangible changes in the subsystems.

8th framework What makes a researcher transdisciplinary? A framework to identify expertise

It is applicable depending on the research boundaries.

Project team capabilities and skills to fully undertake the TD research process and achieve the objectives of the Td project throughout the research process.

9th framework:*Grounded action design*.

Reflective questions

1. In what ways do you think framewokrs help to design TD reserach?
2. Can you list three TD frameworks and indicate the prons and cons of using them for a real and complex problem?
3. What is a guiding question for TD research design?
4. How can you easily design TD research question?

MODULE 4 STAKEHOLDER IDENTIFICATION AND ENGAGEMENT

4.1. Objectives of the module

1. To stress on the importance of engaging stakeholders/ partners in TDR while dealing with complex real-world problems;
2. To support readers/ researchers to develop stakeholder mapping skill and engagement strategies tailored to their context
3. To improve their understanding how their TDR process and outcomes builds legitimacy and trust by engaging stakeholders

4.2. Approach

4.3. Identification of stakeholders

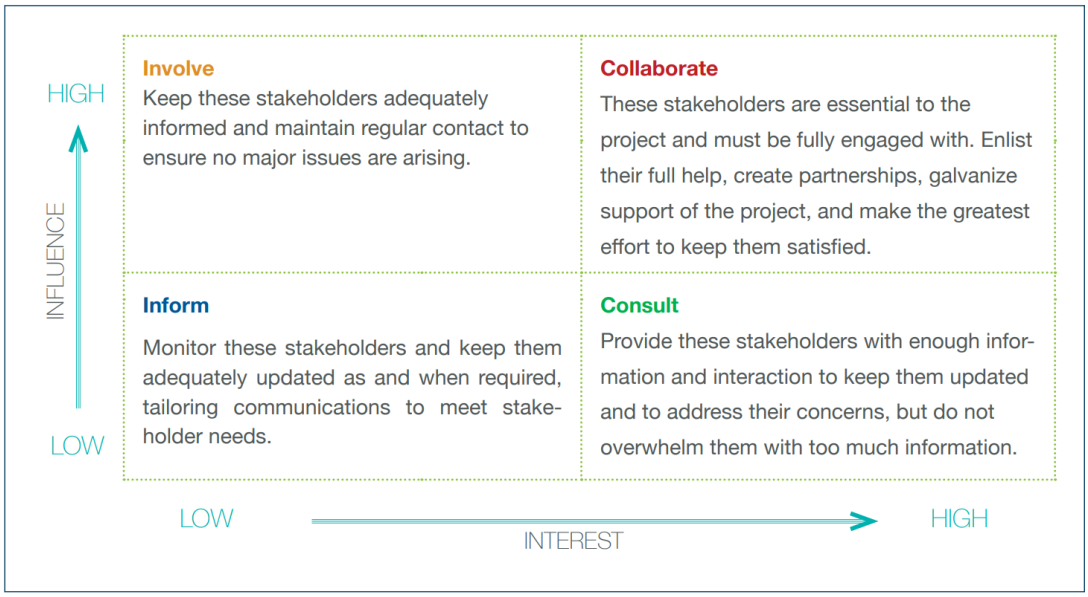
In TDR stakeholder engagement is not just a simple formality or procedural steps. Rather, it is central to how TDR actually works.It involves identifying individuals or groups affected or affected by the project/ problem under study, ranging from local actors to decision-makers. From the first Module, we understand that TDR brings and engages people from different disciplines and outside of academia- policy makers, communities, NGOs and others who have stakes. That means, we are not just studying a problem, we are working within a system of real-world interests, power dynamics and lived experience.

Stakeholder identification can be considered to have three stages: (Durham et. al. 2014)

Stage 1: who are your stakeholders? Identify all potential stakeholders and stakeholder groups.

According to Bammer (2021), an inclusive stakeholder identification process ensures no key voices are missed and captures diverse perspectives, even those with differing or opposing views to better understand and address the problem.

Stage 2: **Assess and prioritise the stakeholders-** Stakeholders are often analyzed by grouping them into categories. The most common method classifies them based on their level of interest and their level of influence or relevance.



Initial actions to prioritise stakeholders usually are the following:

- Creating a list of stakeholders
- Identifying their interests and roles in relation to the project
- Prioritising them according to their importance to, and influence over, the project.

Stage 3: Develop an understanding of your stakeholders.

According to Durham et al 2014) the project team should consider the following key points when understanding relevant stakeholders:

> Assess existing relationships between the project and stakeholders, and among stakeholders themselves.
> Identify relevant knowledge and expertise stakeholders bring.
> Understand stakeholders' likely perceptions of the project (positive or negative).
> Anticipate potential conflicts between stakeholders or with the project.

Four approaches can be used—individually or together—to identify and reach stakeholders.

- Approach 1. Interrogating the problem and the research
- Approach 2. Using networks
- Approach 3. Using a checklist of stakeholder categories
- Approach 4. Building a mind map

Each starts from a different perspective and uncover who can contribute to understanding the problem and supporting action, with some overlap between them.

 As an example please see the following table and develop your own for your problem/project at hand.

Example of stakeholder identification, categorisation, reasons for engagement, and potential stakeholder benefits for engaging. A template of this matrix can be downloaded from http://www.biodiversa.org/577.

STAKEHOLDER	CATEGORY (E.G. GOVERNMENT DEPT., GENERAL PUBLIC, NGO, POTENTIAL PARTNER)	REASONS TO INVOLVE THE STAKEHOLDER(S)	WHY THE STAKEHOLDER MAY WANT TO BE INVOLVED (BENEFITS)
Local authority	*Government policy maker*	Strengthen science-policy interface and ensure relevance of research outputs.	Opportunity to develop better policies based upon rigorous scientific knowledge. Better transparency of decisions made.
Local business	*Private sector businesses*	Sharing technical expertise and potential contribution of resources to project.	Possibility of networking with potential new customers through the engagement process. Publicity and Corporate Social Responsibility opportunities. Improving efficiency and profitability of operations.
Environmental charity	*NGO*	Better access to available data, potential contribution of resources and expertise to project.	Interest in using the new data produced. Increased local publicity through engagement. Opportunities for partnering in future projects.

See the details- Durham E., Baker H., Smith M., Moore E. & Morgan V. (2014). The BiodivERsA Stakeholder Engagement Handbook. BiodivERsA.

 Dear readers, do you think that all stakeholders should engage at all levels of the project?

Stakeholder engagement varies throughout a project, with most participating only at specific stages rather than continuously. Involving all stakeholders from start to end would require significant time and resources, making it impractical. Therefore, thinking and planning the timing and role of the engagement, and ultimately which methods of engagement are important (See Durham et al. 2014).

 In order to maximise the benefits of stakeholder engagement, at which stage of your project cycle selected stakeholders should be engaged? At any or all of the stages? think also about their roles and contributions?

_____

_____

MODULE 5 CO-PRODUCTION OF KNOWLEDGE AND MUTUAL LEARNING (KNOWLEDGE INTEGRATION (ACADEMIA & PRACTITIONERS)

Overview

- **Target Audience:** Academic practitioners and researchers in Higher Education Institutions in Ethiopia (AAU, BDU, MU) and Mozambique (LU).
- **Estimated Time:** 3.5 Hours (Half-Day Workshop)
  - *Part 1: Theory, Glossary, & Epistemic Monocultures (45 mins)*
  - *Part 2: The TDR Lifecycle, Power Mapping & Functional-Dynamic TDR (45 mins)*
  - *Part 3: Layered Contexts Lecture (30 mins)*
  - *Part 4: Narrative Sense-Making Roleplay (45 mins)*
  - *Part 5: Assessment & Commitment (45 mins)*
- **Materials Required:** Flip-charts, markers, sticky notes, printed photographs from GiRT fieldwork (e.g., Tabia Debri or Dingur settlements), "Commitment Cards" (index cards).

FACILITATOR NOTES: GROUND RULES FOR THE GLOBAL SOUTH

- ✓ **Low-Tech Resiliency:** Assume unstable electricity and internet. All activities must be fully executable offline using physical flip-charts and printed photos.
- ✓ **Psychological and Political Safety:** Researching evictions or post-war contexts can be triggering or politically sensitive. Explicitly establish **Chatham House Rules** at the start: *Participants may use the information received, but neither the identity nor the affiliation of the speaker(s) may be revealed.*
- ✓ **Language Bridging:** Do not assume English academic terms translate perfectly. Dedicate time to translating concepts like "tenure security" into local colloquialisms (Amharic, Tigrinya, Portuguese/Macua) used by the women in the settlements.

As mentioned by Jahn (2008) there are three dimensions of integration:
(i) Social-organisational- referring to the management of the research process and team leadership with diverse perspectives as well as the whole in mind supports collaboration between different groups of actors (Bammer et al., 2020).
(ii) cognitive-epistemic- It involves recognizing and connecting different types of knowledge-scientific knowledge from various disciplines as well as practical knowledge. Effective integration happens when people can recognize, communicate, and share their knowledge, leading to mutual learning and better understanding through communication (Pohl, 2011; Bammer et al., 2020);
(iii)Communicative- communicate knowledge linguistically and/or symbolically, using a common language, avoidance of scientific terms that improves integration.

Module Framing and Objectives

5.1. Why This Module Matters: Bridging Contextual Gaps in TDR

Standard Transdisciplinary Research (TDR) frameworks often assume a level playing field, democratic trust, stable institutional environments, and the safety of all participants (Scholz & Steiner, 2015). However, as experienced throughout the **GiRT (Gender-sensitive Urban Informal Settlement Transformation) project**, these theoretical assumptions frequently fail when applied in the Global South.

The GiRT project's fieldwork revealed a critical capacity gap: while researchers are highly skilled in their disciplines, they face profound challenges in "narrowing the hierarchy," managing expectations amidst political volatility, and navigating rigid municipal bureaucracies.

This module draws upon the collaborative lessons of the GiRT consortium. It redefines "Knowledge Integration" not just as a structural process, but as a **Transformative Transdisciplinary (TTDR)** practice. The ultimate goal is to empower researchers to co-produce knowledge that addresses the "female face of urban informality" utilizing context-tested methods like Narrative Action Research, without exposing vulnerable women to political or tenure-related risks.

Learning Objectives

By the end of this module, participants will be able to:

- **Overcome Epistemic Monocultures** by recognizing disciplinary biases and fostering true "Cognitive Justice" with marginalized communities.
- **Navigate the TDR Lifecycle**, mapping power dynamics from Phase 0 (initiation) through Phase 3 (impact exploration).
- **Apply a Functional-Dynamic Approach** to TDR, actively managing the *Intensities of Interaction* (from informing to co-producing) based on local safety.
- **Utilize Narrative Action Research (NAR)** to safely co-produce and integrate knowledge through storytelling and actionable sense-making.

GLOSSARY OF KEY TERMS

A. **Cognitive Justice & Epistemic Monocultures:** The understanding that academic disciplines often act as closed "monocultures." Cognitive justice requires breaking these open to treat the tacit, lived knowledge of marginalized women with the exact same validity as municipal or scientific expertise.
B. **Narrative Action Research (NAR):** A method of Transformative Transdisciplinary Research (TTDR) that relies on eliciting, reading, analyzing, and returning stories from the community to generate actionable insights, rather than relying on extractive, rigid interviews (van Breda, 2023).
C. **Trauma-Informed TDR:** An approach to knowledge integration that explicitly recognizes the psychological impact of conflict or eviction threats on participants, prioritizing their emotional safety during data collection and co-production (UoM Qualitative Report, 2025).
D. **Analytic Mediation:** A strategy to lower the defensiveness of local authorities by framing research findings not as critiques of the government, but as "city-wide benefits."

Subtopic 1: Co-Production and Epistemic Monocultures

Co-production is an interactive process bringing together academic scientists, practitioners, and civil society to produce context-specific knowledge. However, the GiRT experience teaches us that simply putting people in a room does not equal co-production.

To engage in interdisciplinary co-production, researchers must accept that their disciplines are "epistemic monocultures" (Darbellay, 2015). To integrate knowledge about urban informality, we must practice intercultural dialogue. This means the technical engineering perspective on water infrastructure must be actively reconciled with the daily survival strategies of a single mother.

Subtopic 2: The TDR Lifecycle, Power Mapping, and Functional-Dynamic Interaction

To move from isolated academic disciplines to fully integrated knowledge, researchers must navigate a defined lifecycle. Drawing on the Swiss Academies of Arts and Sciences and GiRT project phases, knowledge integration spans four distinct stages:

i. **Phase 0 (Before the Beginning):** Establishing initial trust, defining the "operating space," and mapping "invisible stakeholders."
ii. **Phase 1 (Jointly Framing):** Collaboratively defining problems, matching societal knowledge demands with research questions, and building the team.
iii. **Phase 2 (Jointly Conducting Research):** Generating knowledge by bridging differing interests through dynamic interaction and travelling concepts.
iv. **Phase 3 (Jointly Exploring Impact):** Feeding co-produced knowledge back into society by developing and testing actionable solutions and small-scale interventions.

5.3. The Missing Link: Power and Stakeholder Mapping

Before engaging in Phase 2, researchers must explicitly connect their recognition of biases to a real-world assessment

of authority. The GiRT Needs Assessment highlighted that researchers often struggle with "challenging power" and "narrowing the hierarchy."

Before deciding *how intensely* to interact with an official or a resident, researchers must first identify who holds the power and who is vulnerable. In highly bureaucratic contexts (like Mozambique, where formal *Despachos* govern access) or hierarchical ones (like Ethiopia), mapping out who holds formal versus informal power is a mandatory step. Using tools like the **Influence and Interest Matrix** allows teams to visualize these dynamics, ensuring vulnerable participants are not prematurely exposed to dominant political actors.

A critical lesson from the GiRT project is that Phase 2 collaboration is a **functional-dynamic process**. 'Jointly conducting research' does not mean all participants carry out all steps together at the highest intensity. Once power is mapped, researchers must continuously calibrate the intensity of stakeholder involvement:

- **Level 1-2 (Informing):** One-way communication. Used when political volatility is too high to risk exposing participants.
- **Level 3-4 (Consulting):** Exchanging knowledge packets. Often, the most realistic level in highly hierarchical environments where true power-sharing is impossible.
- **Level 5-6 (Co-Producing):** Deep social learning. Used when trust is established, and participant safety is guaranteed.

5.4.Narrative Action Research and the Push to Phase 3 (Impact & Transformation)

Integrating knowledge from highly marginalized groups often requires abandoning traditional questionnaires. **Narrative Action Research (NAR)** allows researchers to safely navigate Phase 2 and successfully transition into Phase 3. The process follows three steps:

- **Elicit Stories (Phase 2):** Allow women to share their lived experiences of informality organically.
- **Sense-Making (Phase 2):** Jointly read and debate these stories with the community to identify patterns (e.g., coping mechanisms during COVID-19 or post-war recovery).
- **Returning Stories as Actionable Insights (Phase 3):** Transdisciplinary research is supposed to be solution-oriented. The end goal of TTDR is not just to collect stories, but to co-produce **"context-relevant small-scale change interventions."** For example, a narrative about the daily dangers of collecting water should be translated into a targeted, actionable proposal for a safe, community-managed water tap. This step bridges the gap between observation and impact, ensuring research leads to tangible urban transformation.

Contextual Realities: Applying the Dynamic Approach in GiRT

FACILITATOR PROMPT: *Ask the room: "Think of a recent meeting with a local official. Were you acting as a Reflective Scientist or an Intermediary? Did you achieve Cognitive Justice?"*

Context is not a static, generalized backdrop; it is a fluid set of location- and time-specific factors. The challenges encountered in any given site, such as armed conflict, sudden waves of eviction, or rapid institutional turnover, are temporal. Therefore, a successful TDR process demands that researchers continuously frame and redefine the context to adapt their integration strategies over time. The following cases from the GiRT project serve as analytical demonstrations of why knowledge integration requires an agile approach:

Addis Ababa (Temporal Pressures of Redevelopment & Safety Limits)

At this specific moment in time, rapid top-down redevelopment rhetoric in Addis Ababa strongly clashes with the lived realities of informal settlements. Because of the current political climate surrounding land value, pushing for "Level 6 Co-production" with both authorities and residents in the same room poses severe, immediate safety risks to the residents (eviction targeting). **GiRT Lesson:** TDR here must be highly functional-dynamic to respond to present threats. Researchers must adopt the role of **Intermediary**, using separate forums and Narrative Action Research to gather data

safely until the political environment allows for closer integration.

Mekelle / Dingur Settlement (Post-Conflict Trauma-Informed Integration)

In the immediate aftermath of the Tigray civil war, the temporal reality of informal settlements like Dingur and Tabia Debri involves severe psychosocial trauma and an administrative vacuum due to looted formal land documentation. While this paralysis is not permanent, it completely dictates the current TDR rules of engagement. **GiRT Lesson:** Knowledge integration at this specific time cannot rely purely on economic or spatial planning. It demands a **Trauma-Informed TDR** approach. Researchers must act as Facilitators, utilizing stories of resilience to co-validate informal tenure claims and advocate for holistic support systems until formal governance structures are re-established (UoM Qualitative Report, 2025).

Nampula / Namutequeliua (Navigating Specific Bureaucratic Hurdles)

In Mozambique's current operating environment, researchers face profound, location-specific bureaucratic hurdles, such as securing formal "Despachos" (authorizations) from the Municipal Council before engaging with community authorities. **GiRT Lesson:** In contexts heavily shaped by inherited colonial administrative cultures, "Phase 0" (Before the Beginning) requires immense patience and ongoing negotiation. Researchers must continuously master the formal language of the state to secure and maintain the "operating space" necessary for later co-production, adjusting their strategies as local leadership and bureaucratic requirements shift (LU Qualitative Report, 2025).

5.5. ACTIVITIES (PRACTICAL APPLICATION)

Activity 1: The "Phase 0/1 Reset" and the Give-and-Take Matrix

1. **Goal:** Practice power mapping, defining researcher roles, and formalizing integration during a complete institutional disruption (resetting from Phase 2 back to Phase 0).
2. **Format:** Small groups (4-5 people). 45 minutes.
3. **Scenario Framework:** *You are researching in Bahir Dar and were preparing to enter Phase 2. However, a sudden political shift has led to 100% turnover among local municipal practitioners. Your project is now forced into a **Reset to Phase 0/Phase 1**.*
4. **Step 1 (15 mins):** Use an *Influence and Interest Matrix* to map who holds the real power in this new environment. Decide as a group: Will you approach the new officials as an *Intermediary*, an *Honest Broker*, or a *Reflective Scientist*?
5. **Step 2 (15 mins):** Draft a simple **Give-and-Take Matrix** on your flip-chart. List one specific output you can *give* the new official (e.g., a demographic map) and one input you must *take* (e.g., a permit for a community meeting).
6. **Step 3 (15 mins):** Group presentations and peer feedback.

Activity 2: Narrative Sense-Making "Stress Test" (Roleplay)

- **Goal:** Practice *Analytic Mediation* using Narrative Action Research to push towards Phase 3 (Actionable Insights).
- **Format:** Triads (Groups of 3). 45 minutes.
- **Preparation:** Facilitator hands each group a printed photograph of a demolished building next to a temporary shelter (from the Tabia Debri settlement), along with a short, one-paragraph transcribed "story" from a female resident about her daily struggle for water.
- **Step 1: Assign Roles:**
  - *Person A:* Academic Researcher.
  - *Person B:* Capital City Municipal Official (views the temporary shelters as illegal).
  - *Person C:* Observer/Timekeeper.
- **Step 2: The Negotiation (15 mins):** The Researcher must use the resident's "story" to advocate for a temporary water access point (a concrete Phase 3 intervention). Person A must use *Analytic Mediation*, translating the woman's emotional narrative into a bureaucratic logic that Person B can accept without triggering a debate over land legality.
- **Step 3: Debrief (15 mins):** The Observer reports on how successfully the "story" was returned as an "actionable insight" (van Breda, 2023). *Metric for Observer: Did the official dismiss the story as "anecdotal," or was the*

researcher successful in enforcing Cognitive Justice?

MODULE ASSESSMENT & COMMITMENT

The Commitment Card Exercise (30 mins)

To evaluate the translation of theory into practice, the facilitator distributes blank index cards.

- **Prompt:** Based on the functional-dynamic approach and narrative methods discussed today, write down **ONE specific methodological change** you commit to making in your next stakeholder engagement to bridge Phase 2 research with Phase 3 impact.
- *(Examples: "I will use Narrative Action Research instead of structured questionnaires to reduce trauma." OR "I will consciously map formal vs. informal power before deciding my intensity of interaction with the municipality.")*
- **Action:** Participants read their cards aloud, and the facilitator collects them to review the immediate impact of the training.

MODULE 6 TOOLS AND METHODS (CRITERIA FOR SELECTION, LIST OF METHODS

6.1.Objectives of the module

1. acquaint participants with the list of TD methods and tools to undertake TD research
2. equip participants with the knowledge and skill to select right methods to their contexts
3. to aware readers about the possible criterion to select methods and tools to their context.
4. improve ability to connect knowledge integration with appropriate method and tool selection.

6.2. Approach

Working with multistakeholder groups in transdisciplinary research (TDR) lacks a standardized set of tools tailored to different phases and to the integration of diverse forms of knowledge. Nevertheless, researchers are expected to employ a wide range of methods and approaches, as reliance on a limited methodological toolkit may constrain the ability to adequately frame complex problems and integrate knowledge (Jahn et al., 2012; Pohl et al., 2021). Expanding the diversity of methods can enhance both the efficiency and effectiveness of transdisciplinary research, while also improving the communication of its findings to the scientific community and the broader public (Brandt et al., 2013).

As a criteria we can consider the suitability of methods and tools to bridge various knowledge and the ability of the methods and tools to promote common understanding and ways of thinking.

6.3. Typical TD tools and methods (Toolbox)

Depending on the users' interests, there are multiple ways to engage with these transdisciplinary (TD) methods and tools.

On one hand, this part of the module provides a comprehensive overview of a unique compilation of TD methods and tools—particularly useful for those seeking to understand both the epistemological and practical foundations. In other words, it focuses on theoretical aspects, helping deepen the knowledge base for research activities. Meanwhile, trainees interested in a specific TD method may choose to focus on particular sections, depending on the goals of their TD research project.

Thus, the descriptions of TD methods and tools in this module are based on two key assumptions:

Universality: First, the methods and tools are presented in a way that makes them applicable across different transdisciplinary research projects—regardless of the problem field or the scientific disciplines involved. In other words, they hold context-independent, general value (cite source).

Contextualising: In similar fashion, it is equally important not to overlook the context-dependent nature of transdisciplinary research. Insights gained from concrete applications—such as how a method works within a specific research project, with its unique problem context and disciplinary mix—can greatly benefit research practice as well (cf. Krohn 2008).

Two major sources were employed to prepare this module, one is "The Swiss Academies of Arts and Sciences" Network for Transdisciplinary Research, have compiled a major list of TD tools and methods, organized in a user-friendly structure as indicated below:

- - Definition of the method
- - Reason for application
- - Timing of application
- - Procedural steps
- - Bridging of thought styles
- - Outputs and outcomes
- - Roles of team members
- - Preparatory steps and prerequisites
- - Additional sources

This presentation reflects the current state of knowledge and experience in transdisciplinary research, both generally and in relation to specific TD methods.

The second source as a complementary resource focuses on the overall general framework to undertake TD research with illustrative case studies.

Eventhough it is highly recommend to refer details are indicated above, only definitions are summarised as to give a brief overview of the TD methods/tools.

6.4. The table below summarises the methods/tools of TD research

Method/Tool	Description
Actor Constellation	A role-play method where scientific and societal actors are positioned around a central research question. Their distance indicates relevance to the project and to each other.
Constellation Analysis (CA)	A method to map relationships among heterogeneous elements (social, natural, technical, symbols). Focuses on their interrelations, involving experts to create a shared understanding of reality.
Delphi Method	A multi-round expert polling process combining surveys and feedback. Experts respond to questions, evaluate others' answers, and refine their views over successive rounds.
Design Thinking	A collaborative problem-solving approach that connects human needs with expert insights, encourages innovation, and uses visualization, storytelling, and prototyping.
Emancipatory Boundary Critique	A reflective method using questions to help non-experts reveal assumptions behind expert solutions and assess their social and ecological implications (based on Critical Systems Heuristics).
Functional-Dynamic Stakeholder Involvement	A structured approach defining which stakeholders are involved, why, when, and how. Visualized along a timeline with levels of engagement (inform, consult, collaborate).
Give-and-Take Matrix	A structured process helping interdisciplinary teams link different research components or subprojects.
Most Significant Change (MSC)	A participatory evaluation method using stories to identify important outcomes and reflect on their significance through stakeholder discussions.
Multi-Stakeholder Discussion Group	A facilitated platform bringing together representatives from science, civil society, private and public sectors for collaborative project development and implementation.

Nomadic Concepts	A heuristic and analytical tool for interdisciplinary communication by comparing and translating concepts across disciplines and cultures.
Outcome Spaces Framework	A framework categorizing project outcomes into three areas: situation improvement, knowledge generation, and mutual/transformational learning.
Research Marketplace	A platform for dynamic idea exchange and feedback among interdisciplinary research teams and societal actors.
Scenario Integration	A tool combining qualitative and quantitative scenario planning to explore possible future developments of societal challenges in a workshop setting.
Soft Systems Methodology	A methodology for structuring complex problems and identifying feasible changes while accommodating diverse perspectives or worldviews.
Storywal	A storytelling method using a timeline to reflect collectively o

6.5. Selection criteria and brainstorming steps

- Relevance to the research object or topic – how well the method aligns with and is appropriate for the specific subject of study
- Ease or difficulty of use – the method's simplicity or complexity in practical application
- Compatibility with other combination of methods at the ontological and epistemological levels to keep coherence and …… – how well the method's assumptions about the nature of reality and knowledge align with those of other approaches
- Type of knowledge produced – the nature of the insights or findings the method generates (e.g., system, target and transformation knowledge)
- Desired or expected degree of knowledge integration– the level at which the method helps combine or synthesize different forms or sources of knowledge namely academic vs nonacademic, across disciplines.
- Tiers of outcome-from the individual and community levels, through academic and practice-based (intervention) spheres, up to policy-level change

SECTION C: TRANSDISCIPLINARY RESEARCH APPLIED TO THREE CASE STUDIES IN ETHIOPIA AND MOZAMBIQUE

MODULE 7- PLANNING TO CONDUCT TDR AND APPLICATION TO CASE STUDY

7.1.Objectives of the module

1. to answer the question why TDR as a right approach for GIRT project
2. to share state of the art or TDR in GIRT project
3. challenges, and potentials from GIRT- project.

7.2. Approach

With the support of relevant literature, the fundamental features of TDR process have been outlined so far (Modules 1-module 6). Based on them, this module addresses the immediate steps/phases that take place in four TDR-case studies from informal settlements and slum areas under GIRT-project (2022-2026). Through the process, TDR approach was co-designed and applied to co-produce three types of knowledge: system knowledge, target knowledge, and transformative knowledge. Together, these contribute to advancing gender-sensitive urban transformation. In line with this, TDR implementation process is structurally organized into the following key phases: Problem and project goal framing; TDR implementation (Data collection and analysis) and Synthesis and reflection (see Fig-1)

GIRT- project (Strengthening Research and Educational Competences of HEIs for Gender sensitive Urban (InfoRmal Settlement) Transformation, involving three universities from Ethiopia (Addis Ababa University, Bahir Dar University and Mekele University) and Lurió University from Mozambique. The project is coordinated by the University of Continuing Education Krems (UWK), Austria, from the project duration May,2022- April 2026.

7.3. Why TDR as a Right Approach for GIRT Project? The context

Many urban areas of the world are experiencing rapid transformation, resulting in vast changes in land use with diverse and complex real-world/societal problems. Despite significant local differences, suburban regions or urban peripheries are characterized by both ecological and socio-economic problems (Wirth *et al*., 2014); among others is the expansion of (informal) settlements. Understanding the diverse and complex socio-economic and environmental issues and the inherent nature of urban transformation and informal settlements as well as the possible future development of the urban fabric demands new methodological approaches. The use of trans-disciplinary research methods is justifiable for the following reasons:

- Firstly, the problem is described as wicked, since informality lacks conceptual definitions that demands integration of concepts and issues. Different groups may have their own understanding and polarized view of informality, problems associated with informality and the solution to the problems.
- Secondly, informality has been getting deep-rooted and interwoven because of multifaceted drivers that interact in a sophisticated manner, which demands system perspective.
- Thirdly, informality has structural, functional and actor orientation drivers that demand critical integration of knowledge; i.e. researchers as well as actors/practitioners perceive informality, its causal factors as well as its consequences in different ways.

- Fourthly, with the current rate of urbanization, informality is and seems to become one of the major problems in policy circles that urge collective actions in research, policy and practice.
- Societal actors who are affected by a problem must be drawn into the research process; and the problem must be turned into a scientifically valid question in the course of an exchange between concerned societal actors and scientific actors

☞ *The core steps and tools involved in applying the TDR approach in \GIRT project are organized into three main research phases (see Figure 1 and the details in the next Boxes in the tables as categorized by different phases).*

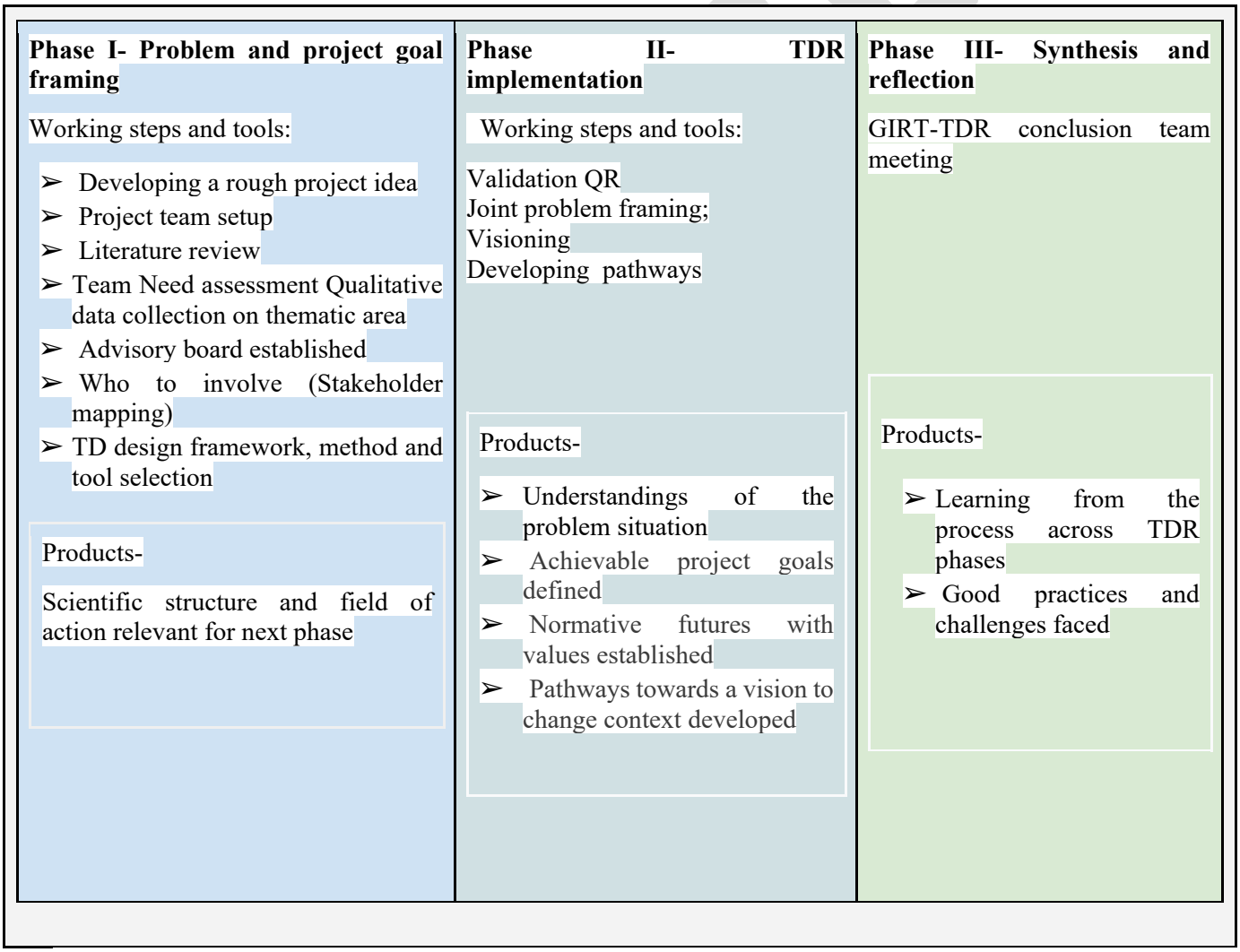
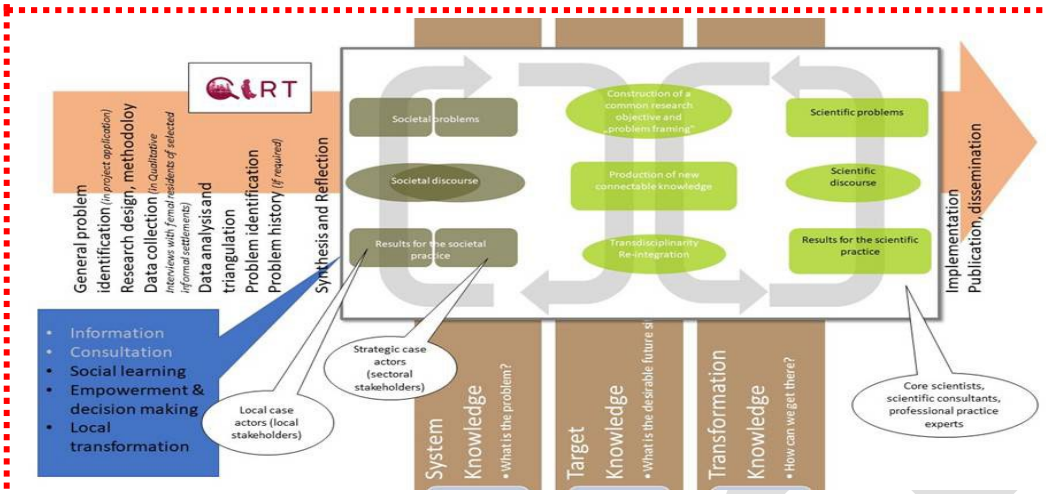
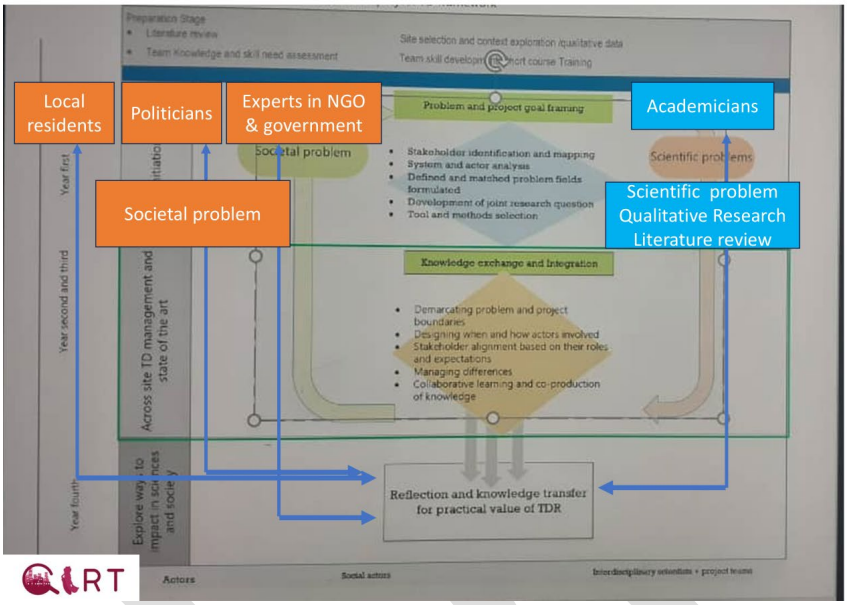


Fig 1- GIRT- TDR life stages phases lessons from the literature (Module 3), Two TDR design frameworks developed and shared: draws together the Process and Outcomes to tackle the problem.





All four actors will be considered in four pathways and integration of knolwdge from them

Major steps undertaken to select a feasible TD framework & design

After developing the different frameworks, the team discussed each framework to identify the different advantages of that framework for the research context. The team considered the possible application of coming up with a combination of methods and frameworks to contextualise the framework for the intended objective.

The list of possible criteria for selection was identified in the form of a checklist for implementing partners to justify and come up with a refined working framework.

For this manual, the team has expanded the list for other similar uses as well.

- Reasons for selection
- Application for the context
- Possibility to merge with other frameworks
- Main emphasis/function of the framework
- Compatibility of the framework
- Extent of rigour as a research process
- Required resources (financial and human resources)
- Time frame of the project
- Number of stakeholders to be engaged
- Relevance for policy and intervention

Similar to the frameworks, the corresponding methods to be employed are also diverse and complex to select, though the toolbox suggested by the institutions and scholars seems straightforward, understanding the context is very critical, though actual implementation requires an in-depth and thorough analysis for selection.
As a guiding source, the book by Bergmann et al (2012 was used as a typical source for selection of a set of methods due to its scientific reliability for use. For further references and use, a PowerPoint presentation summary was prepared by the team for fruitful discussion and to reach a common framework and design for use. The methods discussion is further discussed in module 6 of this training manual.

7.4. Key steps and activities under the preparation TDR phase applied uniformly in the case studies across the four case studies.

Box 1- First Phase -Across site TDR Planning and preparation phase

A. Problem and project goal Framing-(Problem identification)

Interdisciplinary collaboration/ Team formation-A successful implementation of any project demands a team where each member has a specific role and accountability. In our TDR project a diverse and collaborative mix of academic researchers formed. The project team included: Social scientists, Environment and Development, Architects, GIS experts,

Define and framing the problem field as a focus area of GIRT- project

Contextualize the problem and case description-

Based on the international literature and project team members' experiences from their similar previous SES-project, informality in urban settlement was developed as a preliminary project idea for a common TD research objective which is relevant for science and society. Within a complex informal settlement system, we selected thematic areas for TDR study. It was not just about picking interesting topics, rather it was based on a system thinking lens. We focused on thematic areas that are relevant, researchable, and meaningful for practical impact. To approach it, we first analyse and discuss the purpose of the TDR (for both policies (governance) and people focused (improve women's living conditions) and also to contribute academically. Accordingly, eight core thematic areas identified- Housing and infrastructure, Livelihood, Land and Governance, social capital, Food and Health, and Gender. Each thematic area translated into a clear and context based research question. Field visit and qualitative interview in case study areas (compared with literature) applied to understand the social and environmental settings.

- **Need Assessment-** to bridging gaps on understanding TDR, a need assessment of research teams across the four higher institutions undertaken. The objective was to assess the status of know-how about concepts, methods, and capabilities of transdisciplinary research of project team members. After determining the needs, or 'gaps' of the project team, consecutive training sessions were provided and experiences were shared among the team members.

  ➢ **Capacity building-** Consecutive capacity building short-course training on qualitative research data collection on selected thematic areas, and Transdisciplinary research approach undertaken to bridging gaps in TDR knowledge through flexible and cost-effective online learning. (See the published version of the GIRT Manual for Qualitative data Interviewing: https://door.donau-uni.ac.at/detail/o:6276.

Stakeholder identification

Urban (gender sensitive) transformation represents a complex societal challenge that necessitates collaboration among diverse stakeholders. The research team identified and mapped relevant stakeholders systematically by assessing their potential influence and their level of interest in the problem system, the project team conducted a stakeholder analysis using a power–interest matrix.

Thereby, the project included representatives from government and non-government organizations with a vested interest in the project's problem domain.

Following the completion of the initial preparatory activities (Box 1), the research process advanced to a collaborative phase involving community representatives and key stakeholders (see Box 2 and Box 3).

These stages focused on the co-production and integration of knowledge to support gender-sensitive urban transformation, which was implemented at varying scales and intensities across all project case studies. As a result, the degree of progress and completion differed among the case studies.

For instance, the next phase of activities and the associated knowledge outputs from the Bahir Dar case study are presented in Box 2

Box 2- Core Phase (2nd Phase)- TDR implementation and Stakeholder engagement workshops

We, TDR team members from Bahir Dar University, conducted different workshops at different time schedules that provide us with knowledge and capacity for joint problem framing, project boundary-work and knowledge integration. (see BOX 2).

Workshop 1-Because of the sensitivity of the issue (informal settlement); power asymmetry, expectation difference among stakeholders the first workshop in this phase are consulted separately for the community representatives and regional experts	**workshop 1- with community members-** Validate qualitative results for Eight thematic area (confirm & fill knowledge gap) **workshop 1- with community members-** Mapping problem space with stakeholders- think and list the current priorities of the local community in the informal settlement settlement? (Stakeholders address conflicts and seek consensus on priority issues: Tenure insecurity; infrastructure; social services (e.g. education and health) considered by the participants. ★ summery- While TDR often focuses on co-producing knowledge and mutual learning to produce knowledge, separating groups (community members and practitioner) when addressing sensitive and highly contested issues in the initial phases,(in our case informal urban settlement) help us to manage power imbalances, to build trust for the next process, and ensure safety, particularly for community and women representatives.

Workshop-2-Combined stakeholders'workshop: Representatives from both groups (community members including women, and practitioners) come together to co- produce knowledge on the selected problems, compare narratives, and prioritize problems and jointly frame the problem. Then, together we developed the desired future of the neighbourhood. This approach maintains the TDR principle of integration while building trust.
This workshop is particularly designed

- to jointly frame the problem (from 8 thematic areas, jointly prioritize and select Tenure security, Infrastructure and Livelihood)
- commonly understand urban transformation
- Developed together desired future of the neighbourhood (focusing on women's life)

(Note- In the context of urban planning in Ethiopia, citywide structural plans are typically done with a ten-year planning horizon. Accordingly, ten years from now, ***the year 2036*** *is adopted as the target horizon for guiding the visioning exercise).*

"Looking ahead, ten years from now, how would you like the living conditions in your neighborhood to be?

Picture 1- Creating desired future workshop with community members.

Picture 2-Creating desired future workshop with practitioners

Methodological Options for developing Desired future:

- A day long workshop with community and stakeholders from government institutions
- Pathway development using guiding questions
- Discussion on the Normative Values of the Neighbourhood of the Future
- Does the future align with/ undermine women's life and how?

Methodological Options for developing Desired future:

- A day long workshop with community and stakeholders from government institutions
- Photo elicitation- Researcher takes photographs of urban changes and asks residents to comment on them. Participants interact to identify the perceived changes.
- Visioning exercise using Backcasting method- facilitated by group discussion
  Think about how you want the neighbourhood to be in 10 /2036 years? or what would you like to have? with respect to: Tenure insecurity and housing; Infrastructure, Livelihood and income source
- Language Amharic-ለወደፊት የትና ምን መስራት ትፈልጋለህ? የሰፈራ ቦታ/ መኖሪያ እንዴት ተለውጦ ማየት ትመኛለህ/ሽ? የማህበረሰብ አገ/ቶች ለምሳሌ- ውሃ፣ መንግድ.፤ መብራት?

Workshop 3- Pathway development. Gaining insights into the future paths of urban transformation requires an integrated, comprehensive and systematic method. In this context, Pathway development has evolved as a tool.	We help workshop participants to understand that not everything happens at once: the following questions help them What has already been done? And to be continued? discuss in group on the following question: 1. What has already been done in the past 5 years? 3 years?, 1 year? 2. What must start now? What's not working and the challenges? 3. Who should be involved?  Picture 3- pathways development discussion

MODULE 8 REFLECTION, LEARNING, AND EVALUATION

8.1. Objectives of the module

- Readers learn from reflection sessions from the GIRT-team focused on improving future TDR design and implementation through shared experience.
- Tools to monitor reflection learning and evaluation
- Review experiences and best practices and challenges in practical TDR project

8.2. Approach

The project -GIRT finally used an online Zoom meeting as a platform for reflection sessions from the project team members across the partner institutions. This online reflection session allows teams equal chances regardless of location. The session was structured in two days and facilitated by the project coordinator institution- UWK, Austria.

This last module is based on the reflections from the GIRT project team members to explore practical success and challenges of TDR.

The following Reflective questions are forwarded online for the GIRT project team who were involved in transdisciplinary research from the year May 2022-April 30 2026. The questions were not '' a kind of test questions'' with right and wrong answers. Simply they are discussion and reflection questions, allowing them to think about their experience in the project.

- ★ How has your understanding of transdisciplinary research been reflected in the TD training and in the engagement with stakeholders on inclusive, gender-sensitive urban transformation?
- ★ To what extent has your exposure to the transdisciplinary research process in the GIRT project given you a chance to enhance your skills and know-how on co-production and integration of knowledge, Clarification of the definition of inclusive urban transformation, Enhancement of mutual learning between the GIRT team and stakeholders,
- ★ Good practices: - did you achieve successful interactions between female residents and researchers and also stakeholders? Which kind of trust-building, briefing, or workshop facilitation is appropriate?

8.3. Best Practices

- Use female interviewers and facilitators
- Use simple, accessible language
- Organize separate group discussions for women
- Provide incentives where appropriate
- **Use of participatory and iterative methods-** Tools like stakeholder workshops, visioning exercises, and backcasting helped communities and researchers jointly define problems and future pathways. This made planning more grounded and future-oriented.
- **Skilled gained through the project life span**
  - ➢ Sharing and combining knowledge from different people
  - ➢ Understanding what "inclusive urban transformation" means
  - ➢ Connecting academic knowledge with real-world practice

- ➢ Learning together with stakeholders
- ➢ Defining and solving problems jointly


Major shift across all team was moving from isolated problem analysis to an interrelated urban system (system thinking)


Participatory and Gender-Sensitive methods strengthen trust and legitimacy


Flexibility and Adaptation- methods adjusted based on contextual realities and emerging challenges

8.4. Challenges reflected:

Main constraints were **scale, resources, and translation of insights into sustained implementation**:

Uneven depth across thematic areas- Because of limited time, staff, and resources, some thematic areas were explored only superficially, even though they were all initially included in the scope.
Coordination complexity in multi-country, multi-team settings
Scale mismatch between research and impact- while insights were rich, the actual scale of intervention limiting immediate policy influence or Translation gap between research and policy action.

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