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National Policy Roundtable of the Program of Accompanying Research for Agricultural Innovation (PARI)

ETHIOPIA'S NATIONAL POLICY ROUNDTABLE REPORT

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Program of Accompanying Research for Agricultural Innovation

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Executive summary

Fifty-three agricultural innovation stakeholders from the Ethiopian government ministries, education, extension, and research institutions; development organisations, farmers cooperatives, private sector organisations; and from the regional and international research institutes like the Forum for Agricultural Research in Africa (FARA) and ZEF; AGRODEP/IFPRI; gathered together in Capital Hotel and SPA (Addis Ababa), to ground-truth PARI study results, and prepare the political ground necessary for scaling agricultural innovations, job creation and food security in Ethiopia on 12th and 13th October, 2017. GIZ/GIC – Ethiopia's representatives also participated to this policy dialogue.

The meeting consisted mainly of presentations of PARI study results by researchers from Ethiopian Development Research Institute (EDRI), Centre for Development Research (ZEF, of University of Bonn), Agricultural Growth and Development Policy Modelling Consortium (AGRODEP/IFPRI); and group and panel discussions.
The study results presented related mainly to overview of PARI research and outputs in Ethiopia; understanding the role of agricultural information in adoption of technologies and crop productivity in Ethiopia; production constraints, efficiency, productivity and innovation in the wheat and Fava bean value chains; Ethiopian eAtlas as a tool for prioritization and typology development; model on potential for crop technology innovation in Ethiopia; economic modelling of technology options in Ethiopia; and farmers innovations with potential for scaling in Ethiopia.

Discussions suggested that the ways to bring data generators to generate reliable data should be explored; studies and models should use most reliable data sources and address significant targets and scales such as to ease buy-in by policy makers; policy and other decision makers should be taken along agricultural research and innovation processes also to secure buy-in.

Participants proposed that further PARI research activities be addressed in an inter/trans-disciplinary way such as oil crops; food and nutrition security; sustainable scaling of agricultural innovations (with attention to small and medium scale industrialisation and market linkage); validation of farmers' innovations for scale dissemination; risk assessment and management; experimental validation of crop, technology and economic models generated by PARI studies; and enabling environment or incentives necessary for bringing key stakeholders (policy-makers included) together for agricultural innovations and growth, and food and nutrition security.

Introduction

Being aware that large scale influence of agricultural innovation processes and food and nutrition security can only take place in a country mainly with high level support of policy makers, the Program of Accompanying Research for Agricultural Innovation (PARI) partners, put in its 2017 work plan, the implementation of studies to understand factors affecting engagement of policy makers in agricultural innovation processes and results, and the organization of policy dialogues among key agricultural innovation stakeholders. The policy dialogues are aimed at truth-grounding research findings and preparing the grounds for political buying-in of PARI study results. This report presents and discusses the process and the results of the policy dialogue held at Capital Hotel in Addis-Ababa (Ethiopia) on 12th and 13th October 2017. More specifically, this report recalls the objectives of the policy dialogue; summarizes contents and discussions related to study results presented by PARI partners on Ethiopia; and discusses group and panel discussion results.

Roundtable objectives and methodology

The National Policy Roundtable of the Program of Accompanying Research for Agricultural Innovation (PARI) in Ethiopia addressed the following three objectives:

- Present preliminary research findings of relevance to key stakeholders engaged in national agricultural innovation processes in Ethiopia;
- Ground-truth the findings with local expertise and receive guidance on further research; and,
- Jointly identify policy implications of the research, especially scope for promising innovations that would serve agricultural development, jobs and food security.

From methodological point of view, the PARI policy dialogue in Ethiopia consisted essentially of 2 day interaction among agricultural innovation stakeholders of Ethiopia. It started with introductory speeches from representatives of key organizations participating in the meeting. The introductory speeches were followed by plenary discussion of PARI research results related to Ethiopia. The second day of the meeting was used for group and panel discussions, and closing remarks.

Speeches and study findings presented by PARI partners during the dialogue and discussions are summarized as follow.

Summary of opening speeches

The opening remarks to the Ethiopia policy dialogue have been made by five representatives of the key institutions involved in the organization of the meeting. They were Dr. Tadesse Kuma from EDRI representing the program Director of EDRI; Dr. Tadesse Getaw representing the Director of IFPRI Africa; Dr. Oluwole Fatunbi representing the Executive Director of FARA; Dr. Oliver Kirui representing the Director of ZEF, and Dr. Tigabu Degu representing his Excellence, the Director of EDRI. In general, these representatives welcomed all participants; recalled the objectives and initiatives taken by PARI, contributions from PARI partners, and the context and

objectives of the policy dialogue; and wished fruitful deliberations for the meeting. More specifically, the opening session panelists highlighted the importance of agriculture for African countries' development, and the important role, science, innovation, and fruitful partnerships have to play for African agriculture development.

Efforts of researchers from EDRI, IFPRI, and ZEF, and the coordination and financial supports from ZEF, FARA, and the German Government have also been acknowledged by the panelists.

Summary of presentations and discussions

In total, nine study results were presented in four subsequent sessions on the first day of the policy dialogue.

Session 1 presentations and discussions

Overview of PARI (by Oliver Kirui, from ZEF)

Dr. Oliver Kirui provided participants with an overview of PARI countries, research themes, activities, and outlooks. From his presentation, one could understand that thirteen African countries and India are engaged with PARI project. Research themes addressed relate to stock-taking on innovation environment and promising innovations; analyses of innovation potentials; and improving the framework conditions for innovations. Dr. Kirui emphasized that job creation for improved food security; focus on rural development instead of value chains; learning across countries and continents; integration of research findings; strategies for scaling innovations; mechanization development; digitalization; land use and water; and input and output markets will probably be part of PARI focus for the next two years.

Adoption of technologies and crop productivity in Ethiopia: The role of agricultural information (by Mr. Getachew Ahmed, from ESSP/IFPRI)

This presentation addressed the role of agricultural information in the adoption of technologies and crop productivity in Ethiopia. Building on data from the Central Stastistic Agency (CSA), this presentation highlighted that productivity has been steadily improving since many years, but the performance is still short compared to the target to reach small holder agriculture transformation in Ethiopia. Coverage and quality of implementation of agricultural extension was pointed as one of the major factors affecting the performance of agriculture in Ethiopia. Despite efforts made on research and development (R&D), input supply and extension, adoption rate of improved seeds (5%), pesticides (20%) and fertilisers (17-35%) is still low. Major sources of information were: meetings (organized by government, agricultural cooperatives, NGOs and others); extension (by extension agents), media and visits. Improved seeds, fertilisers, crop rotation, pesticides, agroforestry, soil conservation, and other topics were found as main agricultural information provided to farmers. Mr. Getachew also highlighted that participation to meetings and advice from extension had significant influence on the use of chemical fertilisers on Wheat and Barley; while only meetings and media influence significantly the use of improved wheat and Barley seeds. Consequently chemical fertilizers, chemicals (pesticides, fungicides,

etc.) and improved seeds have positive but small and significant effects on wheat and barley yields.

Issues discussed

- Data presented relate to 2011 and 2013, and do not reflect current trend. Need to update.
    - What can be considered as innovation: Variety? Practices? Technologies?
- There are so many actors, how does PARI align with other initiatives in Ethiopia?
- Innovations exist. The missing piece relates to scaling. What is the scaling strategy of PARI?
- What is the impact of media on access to technologies?
- Different studies show different adoption rates on same regions and crops. This difference is due to difference in data collection perspectives and approaches of data collection organizations. For example, the Central Statistics Agency (CSA) considers a farmer as input user once s/he purchases the input from specific providers; what is different from other data collection organizations.
- Many actors are needed to solve innovation problems in Ethiopia and Africa.
- Incentives are needed for industrialization in rural areas.
- Open pollinated varieties (OPV) are better than hybrid varieties.
- Findings are not economically significant.
- How to control information from sampling technics: consideration of heterogeneity.
    - Answer: Heterogeneity is already considered.
- Improved seeds of Barley are scarce in research institutes.
- Some samples were taken from the Agricultural Growth Program (AGP).
- Think of combination done with sources of information.

Session 2 presentations and discussions

Production constraints, efficiency, productivity and innovation in the wheat and faba bean value chains (Dr. Yalemzewd Molla)

Building on 2013/2014 wheat and faba bean data from the Central Statistics Agency (CSA) of Ethiopia, on FAOSTAT time series data and the Ministry of Agriculture and Natural Resource (MoANR) data, Dr. Yalemzewd found that crop production in Ethiopia is constrained by climate, agroecology, access and use of technologies, infrastructure, marketing, and policy. From climate and agroecology perspectives, the presenter pointed out that rain shortage, excess of rainfall, and diseases, are major causes of about 35% and 38% damage respectively on wheat and faba beans in Ethiopia. Limitations in marketing and policy incentives were also highlighted as constraining for agricultural growth and efficiency in Ethiopia. From technological perspective, though studies have proven the positive effects of improved inputs (especially seeds and Diammonium phosphate [DAP]) on wheat and faba bean productivity, only about 0 to 12% of Ethiopian farmers respectively use improved wheat and faba bean seeds. However, more than 50% of wheat and faba bean producers apply chemical fertilizers and herbicides. Agroecology,

access to extension services and credit are found as the main reasons for the relatively poor adoption of improved inputs for wheat and faba beans production in Ethiopia.

Finally the study revealed that the efficiency of inputs depend on regions, and agro-ecologies. This study recommended therefore that further interventions consider comparative advantages of regions and agro-ecologies, and facilitate access to quality agricultural extension and credit.

The Green innovation centre (GIC) of Ethiopia (by Gerrit Qualitz, from GIZ)

According to Mr. Gerrit Qualitz from GIZ-Ethiopia, the GIC is part of the Natural Resource Management, Agriculture and Food security priority area of the German Development Cooperation in Ethiopia. More specifically, the GIC is implemented under the "Promoting Agricultural Productivity through Innovation" programme of GIZ–Ethiopia. It is funded by the Federal Ministry for Economic Cooperation and Development from Germany (BMZ) through the "One World No Hunger initiative" (SEWOH). The GIC activities have started in Ethiopia in 2015 and is planned to run up to 2021. These activities are concentrated on regions of Oromia State, and consist of introducing agricultural innovations to improve wheat and faba bean food supply chains, create jobs, and increase income generation opportunities for farmers. Mr. Gerrit stated that after two years interventions, the GIC activities have contributed to the distribution of innovative inputs to farmers; improvement of wheat and faba bean productivity and income of few farmers; training of thousands of farmers, development agents, experts and decision makers; the creation of five inputs and farm service provision centers; and the creation of hundreds of jobs.

Issues discussed

- Sample size to appreciate adoption of innovation cannot be 11.
- Why the choice of Arsi zone instead of other areas?
- Most agricultural inputs are inadequate, not accessed on time, etc.
- To what extent do we take technologies to farmers? Most of the time we do blanket recommendations.
- Innovative extension systems are needed. Missing points: supporting extensionists as professionals (MSc level at least); farmers training centres can be useful as well.
- Need to test results before concluding; comparison groups are necessary, etc.
- How to make sure that training of farmers and extensionists are effectively used (holistic capacity building may be needed).
- What are the services provided by service centres of the GICs?
- Does GIC/GIZ do anything relating to linkage to market and business development?
- How to ensure closer collaboration between GIC/GIZ and PARI?
- How are success areas used to bring others to learn?

Answers to issues

- Potentials exist for agricultural development but are not exploited.
- There is high fluctuation in positions of development agents: there is need for stabilization mechanism.
- Questionnaire administrated to check farmers' innovations needs.
- Quality inputs and training are provided by service centres of the GIC.
- GIZ looks forward to closer collaboration with PARI.
- Up-scaling of innovations can only happen through national structures.

Session 3 presentations and discussions

Targeting investments in agricultural innovation using typologies of micro-regions (Phoebe Anne Scollard):

Building on agroecological, farm level and inputs and market accessibility data from Ethiopian socio-economic survey wave 3, country briefing Ethiopia, and Diva-GIS, NASA and USGS, Madam Phoebe from the IFPRI team of Ethiopia estimated and mapped the agricultural potentials, agricultural efficiencies, unrealized potentials, inputs and markets accessibility, and poverty level of Ethiopian regions. This typology revealed high heterogeneity of agricultural potentials, efficiency and poverty across the country and suggests that further policies and investment (GIC investments included) for agricultural innovations need to consider this heterogeneity.

Ethiopia eAtlas: A tool for prioritization and typology development (Mohammed Ahid)

Mr. Mohammed Ahid from GIS group of AGRODEP/IFPRI–Dakar took participants through the eAtlas-Ethiopia (online), and provided them with an overview of data access and use possibilities offered by the atlas. He stated that the eAtlas can currently provide thematic interactive web-based Geographic Information Systems (GIS) on 23 African countries. This is a decision support tool that can ease typology and prioritization of intervention areas for all decision makers across Africa.

Potential for crop technology innovation in Ethiopia (Dr. Ehsan Eyshi Rezaei, from ZEF)

Dr. Rezaei built on literature, crop, climate, soil and management data, and SIMPLACE modeling platform to estimate maize and wheat yields, and to propose optimal production scenarios for Ethiopia. More specifically, he estimated maize yield under rain-fed or irrigated, new or current cultivars, and current or 100 Kg of Nitrogen per ha. The modeling results indicated that the highest yield of maize is reached with irrigation, new cultivar and 100kg of nitrogen per ha. Dr. Rezaei concluded that with changes in management strategies, crop yields can increase considerably in Ethiopia.

Issues discussed

- Ethiopia shows good potential. Is it based on crop, or water/rain; (no answer)
- Which market is concerned in Phoebe presentation?
- Regional level mapping is it possible? (For whole Africa).
- Rain-fed versus Irrigation: Is actual level of irrigation considered in rain-fed appreciation?
- Resolution of data on soil: region level or local level?
- What is the database used to produce the atlas?
- Atlas of different kinds produced for Ethiopia (Ethiopia map authorities; GSA; IFPRI). Are there similarities and/or convergence/concertation?
- How was eAtlas generate (data): => ArcGIS
- Are there any meta data in eAtlas versus attribute data in eAtlas?
- What is the role of GIS in policy making?
- Are the eAtlas data that reliable such as to be used for political decisions?
- Is the assumption of 100kg Nitrogen per ha realistic to make scenario
    - Answer: current dose is 9kg Nitrogen per ha in Africa
    - Plan of AU is 15kg Nitrogen per ha
- Typology: Future conditions; if system goes beyond reality, how is adaptation possible?

Answers to issues

- Rainfed conditions were simulated.
- There no region based information.
- Realistic nature of crop models: No under actual conditions, even global level use of nitrogen is low. 100kg is a target but results depend on other factors. However this is realistic for the next 20 years.
- Comparison among countries is not possible at the moment. Other research websites for comparing exist.
- Database: GIS database + others
- ArcGIS data: GIS satellite data used.
- The eAtlas data are generated with ArcGIS.
- There are no meta/transanalysis data now. This can be possible in the future.
- eAtlas is more interactive and can have different content compared to previous/other atlas.
- Markets considered by Phoebe = 20000 inhabitants markets.
- Potential = potential agricultural revenue.
- No rainfall in the model.
- Maps are based on contexts. Change of contexts may involve technological/map change.

Session 4 presentations and discussions

Economywide Effects of Agriculture Technology Innovations in Ethiopia (by Lulit Mitik Beyene, Ismael Fofana, and Fousseni Traore, from AGRODEP/IFPRI)

In their presentation, Drs. Beyene Lulit and Traore Fousseni explained how the AGRODEP/IFPRI team built on crop models (from ZEF), eAtlas (from GIS team of AGRODEP/IFPRI), typology of micro-regions (from AGRODEP/IFPRI – Ethiopia), Social Accounting Matrix (SAM) (from EDRI), and standard CGE models from IFPRI and PEP, to estimate the effects of investments in irrigation, nitrogen, and/or cultivars on GDP and farmers welfare in Ethiopia. Effects of the investments on GDP and welfare were estimated with a calibrated Computable General Equilibrium (CGE) model, applied to maize per agro-ecological zone of Ethiopia. This model suggested that by 2024/2025, with new/improved cultivars and 100Kg/ha of Nitrogen investments on maize, Ethiopian GDP will increase by 0.05% while its agricultural GDP will increase by 0.08%. In addition, the CGE model indicated that these investments improve the welfare and purchasing power of farmers. This AGRODEP/IFPRI team plans to extend the model to other crops, and to apply it to lower agro-ecological levels in the near future.

Identifying and scaling farmer innovations (by Dr. Tigabu Getahun, EDRI)

Here, Dr. Tigabu narrated the process of the innovation contest as it happened in Ethiopia. He mainly informed the participants that the contest took place in three districts randomly selected in the Arsi zone, which is an intervention area of the Green Innovation Centre (GIC/GIZ). The contest consisted of different phases:

- Preparation of the contest activities (identification of GIC zones; selection of contest zone and districts; selection and invitation of scouters and facilitators; design of advertisement message; selection of radios for publicity);
- Training of scouters and facilitators;
- Launch of radio publicities and scouting of farmers' innovations;
- Prescreening of the 153 farmers' applications received for all districts. 75 farmers' applications could qualify as valid innovations;
- Evaluation of the 75 valid applications and preselection of outstanding applications per youth, women, and men categories;
- Field visit to preselected winners for verification, and documentation; and,
- Information of final winners;
- Award and certificate delivery to winners.

Issues discussed

- Are the farmers' innovations yet commercialized?
- Are youth categories disaggregated per gender?

- Which district is more innovative than the others?
- What motivated the farmer innovation contest?
- What are conditions offered to farmers to do the innovations?
- What are main implications of the contest. What next?
- How often is the contest implemented?
- GIC may stimulate farmers' innovations.

Answers to issues

- Frequency of IC: once in a while. This is to stimulate the government and other actors to take over.
- The scope of impact of PARI can seem small. However, the objective is to show that investing in agriculture is worth stimulating growth.

Group discussion results

In order to deepen reflection on some key issues, participants were split into two groups. Group 1 reflected on "the key policy implications of the presented research and potential policy responses"; while group 2 focused on "the future research priorities related to agricultural innovation in Ethiopia". Outputs of the two group discussions are presented as follow:

Group 1: What are the key policy implications of the presented research and potential policy responses?

The fourteen members of this group discussed and suggested policy responses per research topics.

In relation with the role of information in adoption of agricultural innovations, group members suggested as policy responses:

1. The promotion of participatory extension;
2. The promotion of the use of mobile technology (an interactive communication means);
3. The promotion of access to information related to quality inputs, demand of agricultural products, market prices, and markets for products;
4. The promotion of market demand studies to inform and support farmers;
5. The creation and operationalization of quality information exchange platforms;
6. Supporting research on best/relevant extension approaches;
7. Promoting multiple (combined) approaches and methods for agricultural extension (farmer to farmer approach + combined sources of information to farmers + mass media for awareness raising; etc.);
8. The promotion of all kinds and sources (endogenous as well as non-endogenous) of technologies relevant to improve agricultural productivity; and,

9. Promoting and strengthening training capacities of farmers and extension agents' training centres.

On efficiency and productivity of agricultural productions, the group recommended that policy makers:

1. Promote quality data generation and database management strategies for the country;
2. Promote quality and economically advantageous inputs and varieties;
3. Develop strategies for agricultural risks' management, such as insurance, credit, etc.
4. Develop strategies to improve access of farmers to local, regional and international markets, through dissemination of information on market prices, and demands for instance;
5. Promote engagement of private companies (big exporters) in agricultural products marketing;
6. Improve agricultural products' storage capacities of farmers;
7. Promote research on diseases, and productivity;

Pertaining to crop modeling, the group members advised policy makers to support researchers for the development of realistic agricultural production scenarios for Ethiopia.

Group 2: What are the future research priorities related to agricultural innovation in Ethiopia?

To respond to this question, the sixteen members of this group first discussed few issues, before suggesting research topics, promising agricultural value chains to focus on, and research approaches to adopt.

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Issues discussed related essentially to:

1. Policy relevance
2. Subsidies for nitrogen and fertilization
3. Nitrogen increase on maize: was disagreed. People suggested a combination of inputs needed, not only nitrogen. Other factors also need to be brought to optimal levels.
4. Resarch on information/data management.
5. Research on incentives for innovators.
6. Inclusiveness of researchers group: all stakeholders needed for policy acceptance.
7. System for verifying economic benefit of innovations (research)
8. Linkage research – extension
9. Market system = source of innovation as well (research needed)

10. Risk management system to be put in place even to stimulate innovation, insurance included.
11. Interdisciplinarity already followed in PARI.
12. Agronomists need to be brought on board in Ethiopia PARI research team.
13. Proper incentives to generate agricultural innovations at farmer level (3 triggers of policy makers support).
14. Action researcher needed.
15. Scaling of farmers innovation may not happen because some people do not believe in farmers innovations: public research in innovation is needed.
16. Farmers innovations sought because of concern for transdisciplinarity: action research needed.
17. Research on input/output market
18. Production/Productivity (research)
19. Quality (research)
20. Public private (research)
21. Vocational training (research)

Following the discussion of the above subject matters, the group members suggested that further research topics focus on:

1. Quality of crops. e.g. Why and how to address poor quality problems of sesamia?
2. Identifying the existing main problems that the agriculture is currently facing, the challenges and potentials Ethiopia faces in terms of human capacity, and eco-system diversity.
3. The markets for agricultural products: risks, challenges, incentives and prices.
4. Identifying the effective seed demand, seed control/management system and seed recycling rate data for major crops including for self-pollinating crops.
5. Mechanization (small scale): what is the strategic approach; training of farmers about mechanization and value chains.
6. Post-harvest: processing and storage. How much and why the farmers are losing wealth and how to reduce it?
7. Pest and weed management system: how to stop introduction of pests that come with seeds. E.g., Lake Tana case
8. Quality and level of pesticides: how effective are they and are there fake pesticides? Research shows that 35% of medicine are fake and we may have the same problem in pesticides. Similarly, while Developed Countries are promoting reduction of chemical fertilizer and pesticide use, we are planning to use more. Why don't we also focus on organic agriculture?

9. Linkage between agriculture with other sectors, e.g. industry sector.
10. Capacity building: farmers, school, and University levels: Comparison of the effectiveness of different ways of disseminating agricultural information to farmers. Agriculture education at school level that some African countries are doing versus the Ethiopian case of development agents (Das)and farmer-training centers. How to implement agriculture related courses at school? Formal and informal way – e-g. Short training to students by Das. Building on examples/experiences from different countries. Examining the performance/effectiveness of farmer-training centers in Ethiopia. There are already some studies. Malawi case study: women empowerment and effectiveness of the trainings. The effectiveness of farmer training centers in disseminating the goals.
11. Public-private partnership
12. Innovation: financing sources, incentives to boost innovation and how to scale up innovation e.g. using ADS. Does the land policy in Ethiopia affect farmers' innovation?
13. On improving overall productivity, supply and value chain of Agricultural products.
14. Identify the relevant and specific technologies and innovations to achieve the potentials.

Further research/agricultural value chains PARI may address are:

1. Applied research involving stakeholders, primary farmers
2. Selecting crops that cope with climate such as sorghum including new ones such as quinoa, urban-rural context, crop variety;
3. Oil seeds in addition to pulses (for export), and,
4. Major crops

The PARI team of Ethiopia had also been suggested to:

1. Take into consideration Ethiopia's diverse agro-ecosystem and human capital
2. Adopt trans- and multi-disciplinary approach in terms of researchers involvement in the research teams; and,

3. Finding partners with win-win approach including local ones such as cooperatives, and commodity exchange markets.

After discussing deliberations from group discussions, seven (7) experts/panelists from various agricultural research institutions were invited to opine on a specific topic.

Panel discussion

Panelists were asked to share with participants, their reflections on "outcomes and future of PARI agenda". Discussions in this session were facilitated by Dr. Alemu.

On the outcome and future of PARI agenda, each of the panelists responded based on their perspectives. While some of them responded directly to the questions, others extended their responses to other issues they perceived as important for the participants. The transcripts of responses are presented below (for information). In all, the panelists highlighted that the PARI research approach in Ethiopia had not integrated as many disciplines as agricultural innovation studies would require. Researchers from agronomy background for instance felt that they had not been associated to the PARI activities. Panelists observed also that the PARI research focused more on economics, econometrics/modeling, inputs adoption, and very few crops at small scales (non-representative local levels in general) using non-experimental and sometimes non-actual and non-reliable data sources. Given the concern of PARI for large scale influence of agricultural innovation in Ethiopia and Africa, the panelists suggest PARI extends its research activities/focuses to more crops, whole value chains, cross cutting issues like food and nutrition security, and build on most reliable and significant/nationwide data. Aspects of value chains stressed as very important are: capacity/skills building of stakeholders; access to quality inputs and information; small and medium scales industrialization; study and creation of relevant conditions for the marketing of agricultural products. Some of the panelists strongly emphasized the necessity to address mechanism to commit stakeholders to effective agricultural innovation and development. The following boxes restitute the main thoughts of the panelists.

Box 1: Capacity and skills development of farmers and extension agents are keys.

Dr. Fisseha Teshome, Development Partners Linkage Senior Expert, from MoANR

… My reflections on the panel discussion are that: we have to focus on capacity building because our problems are nowadays that from federal to kabalele level, there is a capacity gap; knowledge and skills gap. Only after we solve this problem, we can transform our agriculture. To change this agriculture, we need experienced and well trained extension agents. As you know, students trained in our universities mainly have knowledge but no practical skills. Therefore, we need to address this. Next, we have to focus on export commodities. As we know, agriculture is the backbone of the country, and different sectors depend on agriculture. Therefore, we need to increase production and productivity. Research can address horticulture, postharvest losses, pesticides usage, chemicals application and chemical residues in crops. Research should orient towards problems' solving and actions. Econometrics cannot bring change, even if we have to do quantitative research. We have also to think of cross-cutting issues like nutrition, gender, etc.

Box 2: Incentives are keys for agricultural innovation, and need to be addressed by PARI and policy makers

Dr. Simane Belay, from Addis Ababa University, CDS

We all know that the agricultural sector is challenged by a number of stresses. And to overcome all these challenges, innovation can be a useful tool. Therefore, innovation has a high potential for increasing agricultural productivity, food security, sustainability and consequently the reduction of poverty in the country. Now, the question is: what is agricultural innovation about? I am sure you had a serious discussion about it. But for me, innovation is about product, knowledge, technology, environment, etc. Therefore, which one is considered in this project as innovation should be well understood? From my experience, I take innovation at least as a product, not a technology, and as a system. In a system, individuals, organisations, and entreprises engage to bring in new products under incentives. Therefore, how to incentivize stakeholders to work together towards innovation, food and nutrition security, since no one individual, no one farmer, or no one scientist can develop an innovation?

If we consider technology as an innovation, it has to contribute to economic development at household and country levels, it has also to contribute to sustainable natural resource management of the country and the ecosystem. Therefore, I presume that we need tireless research and development workers working together, we need also significant capital investment for technological innovation.

The other thing is that most of our scientists in Africa are lacking forward looking leadership complemented by enabling policy environment for successful innovation generation and dissemination. In this regard, looking into the different activities and efforts that we are doing, we work so much individually, but we are disconnected. So, with a system approach, the extension service, the education system, the private sector, and the government leadership, should be better connected than now if we want to have real innovation to come. With regards to enabling environment for innovation, I am sure that most of us in Africa, working for western institutions and countries, we are very successful and contributing to their economy, to the science and to the advancement of technology in the respective countries. However the big question is, why do we become clumsy when we work back here? This has to be really thought of. Therefore we need:

- a very enabling environment, an environment with a functional and legal regime which gives credit to innovators;
- a very sound administration and flexible policy making processes in the respective institutions;
- the stakeholders at the start of the innovation processes should be aware of potential benefits, especially the leadership and policy makers should be well aware of these processes;
- the political commitment to innovation, and to the advancement of technologies and sciences, is also critical. In most of our African countries, many leaders and policy makers tend to assimilate the political commitment they have their inactive policies, legal regimes, and others. But that is not the commitment we need. Political commitment should come in addition to the policy framework with the allocation of the right person and the right resources, and also with incentive mechanisms.
- Adequate technical capacity is also important to consider in the PARI project. In each project, relevant skills are needed. As example, Ethiopian partners may need to be also skilled with scenario planning.

Finally, financial support to the local innovators and institutions that are the future of potential innovations, is also highly important for advancing innovation in Ethiopia.

Box 3: Interdisciplinarity, organic farming, and food security need to be addressed

Dr. Degefa Tollosa, from College of Development Studies, of Addis Ababa University

I found the papers and the outputs of the research work yesterday and this morning, to be relevant, high quality, educative and insightful. We learnt about PARI from the point of view of Bonn, agricultural innovations, innovation opportunities and the like, and also about the technologies that showed us promising regions for innovation in Ethiopia.

When I come to my own reflections, most of the previous work appears to relate only to one discipline (economics). To me, innovation is about a number of things, like the other analytic indicators. It is about social, economic, environment, institution, culture, technology, education, etc. So, this multifaceted issue should be addressed, understood, documented, and communicated from the point of view of different fields. Bonn people and PARI are telling us that they have moved beyond interdisciplinary and are now into multidisciplinary approach which should be there. Most presentations actually focused on chemicals. We miss works on organic farming which is a main issue in Germany and other western European countries. Apart from advancing our knowledge and understanding of chemicals, it will also be good to know about organic farming already practiced by many western countries. The project also focuses on top-down scientific innovations. Although the aim was to reach food security and poverty reduction, we missed some of the issues that focus on food security. My suggestion for future research: 1) look at innovation through interdisciplinary approach by bringing on board experts of other fields which could allow us to have comprehensive, holistic understanding of the issue; 2) innovations related to organic farming is important; 3) endogenous knowledge based innovations can also attract attention, and we need to balance between endogenous and scientific knowledge based innovations in the project; 4) food security impact of the green innovation centres.

My college is an interdisciplinary centre where we have diverse experts who can contribute to the objectives of PARI project if needed. Our PhD and Master students can help undertake basic research activities.

Box 4: PARI promotes partnership and cross learning, but needs to cover more aspects of value chains and food and nutrition security, and to engage with more partners

Dr. Oliver Kirui, from Centre for Development Research (ZEF)

… SEWOH "one world – no hunger" initiative by the German government has different things that are involved. One of them is the green innovation centre run by the GIZ, and PARI led by ZEF and FARA. Through FARA, PARI covers twelve African countries. The key message for me is: there is opportunity for all of us to do what we call cross learning. There is a lot to do for learning from other countries, other departments, and from different disciplines as well. I do not want to let out the point of multidisciplinary, interdisciplinary and transdisciplinary research. These are our objectives and I am happy that we are doing this together with you. We also need to learn a lot from the cross demography. There are many people here that have been involved into research for quite a number of years, and they have some stock of knowledge that young researchers like me would benefit a lot through interactions. This is not beyond the project that is dealing with food security in Ethiopia and the other PARI countries. There is also opportunity for us to learn from those projects and programmes where possible we need to develop linkages, because, we cannot benefit from reinventing the wheel. We need to join with people and see what they have done over time and where the pitfalls are and success points that we can pick and continue from where Ethiopia has reached these years.

My point number three is that when people talk about food security, the other important aspects of nutrition and security, they did not feature in our presentations here, and we need to move into that direction as well. So for our work plan for the coming years, if possible, let us insure that we include nutrition and security. One more thing, we need to go beyond production and productivity, and think of how to improve participation of smallholder farmers in value chains. We talked yesterday of agro-processing industries in rural areas, skills development. Ending hunger, reducing food insecurity in rural areas will not be solved by productivity alone. We need much more than this. When we talk for instance about issues of finance, how do we improve access to finance for smallholder farmers, capacity to access markets.

One thing I want to mention is, PARI is an accompanying research project, not an implementation project. We work hand in hand with green innovation centres which are on implementation side. Therefore, we need to be careful about our score. There are many things we can do and talk about. However, there is a limit for what we can do as a research programme. We accompany what green innovation centres do with research. We are not impact evaluators for green innovation centres, they have their mechanisms to do that. Let us collaborate with other projects, programmes, and other initiatives, and bring in the private sector. After developing a very good technology for instance high yield seed variety, we need to push this to the private sector so that there is implication, there are gains not only for the breeders, the agronomists, but also for the communities as well.

Finally, when I look at us, there is a lot of hope because we discuss very positive things, and when we talk about challenges we are going to meet in the coming years, I hope we are going to work together to build a team better than the one we have now so that we can meet again for another policy dialogue, a roundtable to be able to talk about much more good output we would have generated together.

Box 5: All sources of innovation, holistic national figures, and investment in research are important for large scale promotion of agricultural innovations

Dr. Getaw Tadesse, from IFPRI - Ethiopia

I want to put forward my reflections on three issues. The first one is on farmer innovations. I was very much impressed by the collection and all the things related to farmers innovation. This is a major contribution from the PARI project. We need to first understand this farmers' agricultural innovation as not much an innovation per se. The idea behind, the objectives, and the way they are implemented, we can learn from farmers' innovation. There has been a lot of discussion in the Ethiopian agricultural research system around late 1990s about how much we should rely on endogenous knowledge, how much we should really depend on farmers' innovations. Some people were saying, endogenous knowledge has been there for centuries but farmers are still producing very low. Therefore, how much should we rely on this knowledge. The other side is, when we say endogenous or farmers' innovations, it does not mean that we can expand them, but we have to learn ideas so that we can use them as input for developing new innovations and new technologies that can be more applicable and more useful for the farmers.

The other reflection is on prioritization and targeting public investments. IFPRI has been dealing with this modeling issue. The issue is not just to have the government identifying areas for public investments like for research and development has to me made. It is an interdisciplinary work that led to the economic models. This is one of the strongest results achieved by the project. However, the crop modeling requires some experimental data. So, if in the future PARI can manage to generate and use some experimental data, this would add value to the models. The other thing relates to adoption studies. We have a lot of adoption studies in Ethiopia. Some of them are case studies at district level, regional level, etc. My suggestion is to make the adoption studies nationwide because policy makers need holistic national figures, and very specific information. We need to focus on policy relevance matters in our adoption studies.

Other suggestion and issues relate to the exploration and documentation of innovations generated by the private sector; scaling up, and the size of investment in agricultural research and development. IFPRI has accessed the amount of money governments have been allocating for research and development in agriculture in several countries. If you look at the data of Ethiopia, it is sharply declining. The percentage of money allocated to agricultural research for development (AR4D) per agricultural GDP is sharply declining. It is one of the lowest in East-Africa. In terms of number of researchers, Ethiopia has the highest number of researchers in agriculture, but when you look at it, you can notice that expenditure in agricultural research is declining despite high growth in agriculture. The question is this: why this trend and how to improve? PARI can assess this and advise for the future.

Box 6: Farmers need to access information they can use, and markets; oil crops should also be addressed

Mr. Gezahegne Serbesa, Senior Economic Analysis Expert, Ethiopian Commodity Exchange Authority,

My first position relates to the establishment of modern community marketing system.

My reflection on the programme is that many papers have been presented but they missed basics of production from risk and market sides. Production involves risks, especially technological risks, and marketing risks. Whatever we produce, we have to send to the market. If you do not have the market, you may not produce. If you do not have buyers, you may not increase production. Therefore, we recommend that PARI programme focuses on the development of markets which can provide risk management tools. There are a lot of tools to manage risks. Whenever we think of production, we should also think of market. We should develop markets farmers can access. We should also link farmers to the markets. Trading skills also need to be developed at all suppliers' level. We need to make sure that farmers access information, and know how to use information. Most presentations focused on cereals, we may also need to address oil crops, and their marketing.

Box 7: Relevant technologies need to be developed and scaled, and industries and markets need to be created to boost agricultural development

Dr. Fatunbi Oluwole, from FARA

I just want every one of us to reflect a bit with me, because all the panelists here have come up with bit and pieces of the entire problem. We have also reflected on what we have done in the last 20 to 30 years. Some of the problems we have mentioned in the last one and half days are the same we have been mentioning in the last forty years. So, we need to reflect about where we are missing it...

With my seventeen years active experience working on African agriculture and trying to learn from other developed agriculture to adapt to Africa, I discovered that the best development model will be industrial pooled agricultural development. If industry pools demands, you will see that we will automatically boost up production. And this is what happens in most countries in the West and in Europe. Therefore, we need to give incentives to small and medium scale enterprises and industries to develop as it happened in the developed countries. But for them to develop, there are a few things, but those things are not as important as them making the demand. Today, if you ask our farmers, they will tell you that once they have the demand source or market, they will definitely produce to meet the market demands.

My second point relates to market, the most important of all the variables. Market is even most important than technology. For example, in West Africa, people do not eat cocoa, but the day they discovered that there is market for cocoa, they began producing cocoa in mass even at lost, but, eventually they began to produce to have profit. It has become major export commodity for many countries in that place because there is market. Therefore, farmers will produce, once there is market, and we need to think carefully about that.

My last point is, when there is market, for it to be profitable, we need to think along together about technology generation to meet the needs. Today, we are generating different technologies, and we say no one is adopting. I listen to some of the stories yesterday, adoption of 12%, adoption of 14%, then, if that is all we will be getting, it will be better for us not to generate anymore technology. But I tell you, if we generate technologies that are demanded, we will be having 100% adoption, because there is need already. So, we need to look at these three issues: industrial pool, getting the market confines right, and developing technologies that are needed. Someone said yesterday that we have technologies, but we need to bring them to scale. I want to say that we need to quickly do that and do it with all our energy. But we must do it in a sustainable way. Good technologies will never stay on the shelves; they will jump the fence because users will themselves run after them.

Let me take us to this point, we need to develop or industrialize our agriculture from where we are, the smallholder systems. It appears that Africa system is unique but not as unique as such because India is also full of smallholder farmers. We need to find out how India runs its agriculture such as to generate green revolution, blue revolution, and white revolution today from a smallholder system.

Just seeing the big picture, these are the points I want us to clearly look at. For PARI, it will be great if you can conduct studies and inform the policy makers on steps to take to generate the right market, and show the policy makers how this will impact the economy and the quality of livelihood of smallholder farmers. Ethiopia is one of the countries where leaders are responding very well to the needs of people, Ethiopia being the fastest growing country of Africa. If the PARI team of Ethiopia can also put together scaling strategies that will be sustainable and show policy makers that if we can just tweak policy in the direction of this strategy, if we can come up with technology categorization, and indicating that this technology is suitable to this area, and we can do appropriate linkage and show with empirical evidence to policy makers, then you would have justified the objective of PARI.

Issues discussed

- Innovations need to be validated in Ethiopia system before scale adoption.

- Which one of investment in agricultural technologies or in innovation is more important than the other for agricultural development in Africa?
- Advanced technologies can only be applied on big lands while smallholder farmers mainly own small lands. Do/can farmer cooperatives work in Ethiopia?
- Which mechanism can be used to commit stakeholders to agricultural development?
- To what extent do you perceive indigenous knowledge as important for innovation?
- Necessity to elaborate on a bit on indigenous knowledge

Answers to issues

Mr. Gezahegne: Process price depends on the market, and the commodity. A study will be needed to determine process price for farmers.

Dr. Degefa: Everybody is aware that we have a large number of indigenous knowledge system related to agriculture, food system, natural resource management, and the likes. If we disregard this indigenous knowledge system and simply focus on scientific knowledge system, we will not reach anywhere in my view. It is therefore very important to value indigenous knowledge systems separately and or to hybrid them with scientific knowledge and local wisdom that exist in the societies for decades, centuries and the like.

Dr. Simane: Commitment is the engine in the heart of innovation. And when we are talking about commitment, there are three or four pillars to be researched and recommended. The first one is right, policy and institutional arrangement with leadership capacity. The second one is the leadership itself. The third one is having the right budget and physical facilities for innovation. And the final one is having a stick and carrot system, or innovation rewarding system. These are the components of commitment mechanism.

Dr. Fatunbi: to the question related to investment in technology generation or innovation, I would respond that the right investment should be in innovation. Because, implicit in innovation is the issue of knowledge, technology and invention. The mistake we have made over time is that we single out and invest in technologies without complementary issues that will translate technologies into socioeconomic benefits. And an alignment of all these issues at a go and holistic approach to them is what will generate the type of sustainable development that we envisage for Ethiopia and Africa.

Concerning the issue of cooperative and linkages, grouping of stakeholders together, from the development sector I have seen in the other parts of the world and that works, what we want to achieve cannot be so when you have farmers groups operating separately from marketers groups, and researchers groups. There must be a way for them to link together in such a way that they jointly identify problems, jointly source solutions, jointly implementing solutions, learn lessons and work in such a way that there will be a win-win scenario at the end of the day. What we want to achieve from grouping will be

economy of scale. There is no way we can achieve sustainable development without forming a formidable group that works together on innovation.

On issue of benefit allocations for farmers along the value chain, I have conducted studies on this and I developed a model called quantitative value chain analysis. Every scenario that the model has been used to test allowed to discover that farmers do not get more than 10% of the total and final cost of the commodities, and it will be difficult to change this fair figure. Because the farmer uses his land and input to produce as a primary producer. If you look at investments of industrialists in the value chains, you will discover at the end of the day that after paying salaries, fuel, equipment, etc., huge investments the farmers do not make, they end up with a maximum of 4 – 5%. This model helps from day one of an innovation platform to say that this is fair, and this is what we should get or not. Therefore, we cannot afford to do naïve assessment and say that because farmer production is 10 dollars, and they sell at 130 dollars, then they will gain more than 10% after deducting all expenses.

Dr. Oliver: On this last point of Wole, I tend to disagree with him somehow and say that the benefits accrue along the value chain and are queued against farmers most of the time, and this has been a fact. And many studies have been conducted to show that the benefits are disproportionate because of the other people not the farmers. And a lot of mechanisms have been developed to try to increase the benefits of farmers. Some of these mechanisms include contract farming for exports, supply of supermarkets, etc., for instance when you try to limit the number of actors in the chain who play against the benefits of farmers.

On the future of smallholder farmers in Africa, this has also been discussed the last 10 years. The smallholder farmers' agriculture is really feasible to feeding, supporting and meeting food security and reducing poverty in Africa. This has been debated a lot and there seems to be some arguments now that actually, this is not the right model for ending poverty. What we call the population growth with ever getting smaller size and pieces of land, we are now to produce but it is not enough to feed us. Actually, most of the lands where production tends to come from are marginal lands, the high potential lands seem exhausted. Someone has asked question about consolidated farms, cooperatives, union of farmers, this had worked in certain contexts but not yet in Africa, because we have attachment to our land. For property rights on land, for example land title deeds, different countries have different regimes. Who own or have certificate to the lands, what can we produce, who decide for what to produce on a particular land, is a huge debate that has not been concluded. I want to agree with you that the future of smallholder farming in Africa is going to be challenging. This is why PARI focuses on innovation that can allow for supporting our households. Finally, on the question of intellectual property rights, when our farmers generate innovation, one wonders who and who owns the innovation. There is a study going on six African countries farmers' preference for documenting and sharing

or not sharing of their innovation, and this revealed that 80% of farmers want to register their innovations and have patent in their own name.

Last, investment and innovation cannot be separated from each other. They work hand in hand, because before innovation takes place, there is necessarily basic investment. For instance, public investments are needed for basic infrastructure issues. We talked about innovation for market, meaning that we need physical markets where people will sell their stuff. You cannot use innovation without market infrastructure, and there should be public expenditure into markets. So market will be needed alongside innovation.

Dr. Getaw: On investment or innovation requirement for Africa, public investment in agricultural research or others have high returns. There are a lot studies about returns from agricultural research and technologies. But my understanding about innovation and technologies is that technologies are inputs for innovation. So, public investments should be focused on developing technologies in terms of infrastructure, new knowledge, etc. Simply we can take the example of a mobile phone which is an innovation. All technology inside is based on scientific research that has been done in universities and research centres. Technologies have to be changed into innovation by the private sector, the farmers, etc. So, basic infrastructure is required for countries. As recommendation for Africa, 1 percent of agricultural GDP should be invested in agricultural research. Ethiopia is still expending only 0.2% of its GDP on agricultural research. Other countries invest up to 0.8%.

About agricultural cooperatives we have more than 60,000 agricultural cooperatives in Ethiopia. How much productive and successful they are, the representatives of cooperatives can tell us. But the data I know mention that cooperatives do not have significant impact on the agricultural marketing system although there is return on farmers' activities.

On indigenous knowledge, they have been there, and I contributed to collecting them from farmers for 5 years, and we have tested them. They are effective. But the problem is that you cannot use them directly but they can serve as learning input for researchers.

Closing remarks

For closing remarks, Dr. Tigabu thanked the participants for the productive roundtable discussions. He said: "we draw very important and insightful lessons from the panelist and group discussions, and from the audience. We will take all the comments seriously and we will use them as inputs".

Dr. Tigabu reminded the participants that PARI is a research programme related to agricultural innovation along food security value chains (processing, marketing, conception of products, till table of consumers.) and does not aim to do everything. He stated that PARI already

works somehow in an interdisciplinary and a transdisciplinary way and aims among other things at identifying, refining, packaging and scaling promising agricultural innovations. To this end, anyone can request for uploading information about promising innovations on the PARI innovation website.

However, Dr. Tigabu mentioned that budget limitation is an issue for involving many other specialists/disciplines (like agronomists for example) in PARI research activities in Ethiopia. He finally wished safe journey back home to all participants.

Conclusion and ways forward

As planned, all the policy dialogue activities took place in Ethiopia. Research results have been presented, discussed, and deliberated on during plenary and group sessions. The quality of discussions and deliberation indicates that the policy dialogue initiative of PARI is relevant for truth-grounding of PARI research results and also for learning to improve on further research activities for more chance for large/nationwide scale influence of agricultural innovation policies. In all, it has been acknowledged that PARI may manage to involve more disciplines and stakeholders, and especially to take policy makers along its research processes, to ensure political buy-in. Also, PARI studies may manage to have nationwide significance/consistency to have more chance for buy-in by policymakers. The PARI research activities have also been seen as able to do well by addressing all key aspects of the agricultural value chains studied, with special attention to marketing of the commodities. Markets for commodities were found as key drivers to agricultural innovations, and productions, and hence food security and nutrition. Cross-cutting issues like food and nutrition security, that is the key target of PARI also needs to be addressed in further PARI research activities. Furthermore, the roundtable acknowledged the importance of incentives and recommended that PARI investigated on incentives to put in place to fruitfully accompany agricultural innovations in the PARI countries in Ethiopia and Africa.

Appendixes

Roundtable Programme

Time	Activity	Responsible Person	
08:00 – 09:00	Registration	CORAF/FARA/EDRI	
09:00 – 10:00	Opening Session		
	Welcome Remarks (Program Director of EDRI)	Dr. Gebrehiwot Ageba	
	Welcome Remarks (Director of ZEF, Germany)	Prof. Joachim von Braun	
	Welcome Remark (Executive Director of FARA)	Dr. Fatunbi Oluwole /Representing Dr. Yemi Akinbamijo	
	Welcome Remark (IFPRI)	Dr. Getaw Tadesse/representing Dr. Ousman Badiani	
	Opening Remarks and declare the meeting Open (EDRI Director)	H.E. Mr. Mekonen Manyazewal	
10:00 – 10:30	**Coffee Break & Group Photograph**		
Session 1: Agricultural innovation in Ethiopia – Setting the scene			
10:30 – 10:50	Overview of PARI (**ZEF**)	**Dr. Oliver Kiptoo Kirui, ZEF**	
11:00 – 11:20	Adoption of Technologies and Crop Productivity in Ethiopia: The Role of Agricultural Information	**Mr. Getachew Ahmed, IFPRI**	**Chair Dr. Tigabu Degu**
11:20 -11:50	Discussion		
Session 2*Innovation opportunities in the wheat and fava bean value chains*			
11:50 – 12:20	Production Constraint, Efficiency, Productivity and Innovation in the wheat and Fava bean value chains	**Dr. Yalemzewd Molla, EDRI**	
12:20 – 12:50	Presentation of the Green Innovation Centre	**Mr Gerrit Qualitz, GIZ**	
12:50 – 13:00	Discussion		
13:00 – 14:00	**Lunch**		
Session 3: Identifying promising regions and innovations for investment in Ethiopia			
14:00 – 14:30	Technology Development Domains & Typology in Ethiopia –	**Eduardo Maruyama, IFPRI**	**Chair Dr. Degnet Abebaw**
14:30 – 15:00	Ethiopia eAtlas: A Tool for Prioritization & Typology Development	**Abd Salam El Vilaly, IFPRI**	
15:00 – 15:30	Potential for Crop Technology Innovation in Ethiopia (ZEF)	**Ehsan Eyshi Rezaei, ZEF**	
15:30 – 16:00	**Coffee Break**		
16:00 – 16:30	Economic Modeling of Technology Options in Ethiopia (IFPRI)	**Fousseini Traore, IFPRI**	
16:30 – 17:00	Identifying and scaling farmer innovations –	**Dr. Tigabu Getahun, EDRI**	
17:00 – 17:30	Discussion		

End of Day One

Day Two

Time	Activity	Responsible Person	

Roundtable Discussion			
09:00 – 09:15	Summary of Day 1,	**Rapporteur :** **Dr. Augustine and Dr. Getaw Tadesse**	
Session 4: Group Discussion			
09:15 – 10:15	**Working group discussion:** **Group 1:** What are the key policy implications of the presented research and potential policy responses? **Group 2:** What is the future research priorities related to agricultural innovation in Ethiopia?	Moderator Prof. Workneh	
10:15 – 10:30	**Policy implications and research priorities** Reporting of working groups and plenary discussions	Moderator Prof. Workneh	
Session 5: Panel Discussion			
11:00 – 13:00	**Title:** Reflections on Outcomes & Future PARI Agenda **<u>Panelist</u>** - Government officer, MOANR (Keberu) - Dr. Belay Simane, AAU - Dr. Degefa Tollosa, AAU - Dr. Oliver Kirui, ZEF - Dr. Getaw Tadesse, IFPRI - Dr. Gebrehiowt Ageba, EDRI - Dr. Oluwole Fatunbi, FARA Closing Remarks– Dr. Gebrehiwot Ageba	Moderator Dr. Alemu Mekonen	
13:00 – 14:00	**Lunch**		

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Presentations (see PARI website)

Link to photographs