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Identifying technology innovations for marginalized smallholders-A conceptual approach

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ABSTRACT

This paper adds a contribution in the existing literature in terms of theoretical and conceptual background for the identification of idle potentials of marginal rural areas and people by means of technological and institutional innovations. The approach follows ex-ante assessment for identifying suitable technology and institutional innovations for marginalized smallholders in marginal areas-divided into three main parts (mapping, surveying and evaluating) and several steps. Finally, it contributes to the inclusion of marginalized smallholders by an improved way of understanding the interactions between technology needs, farming systems, ecological resources and poverty characteristics in the different segments of the poor, and to link these insights with productivity enhancing technologies.

1. Introduction

The first Green Revolution (GR1) was just one aspect of a much larger transformation of global agriculture in the developing world during the 20th century [22]. The success of surprising crop productivity growth was caused mainly by the technological development of crops through the combination of high rates of investment in crop research, infrastructure, and market development and appropriate policy support [39]. Although GR1 impacted positively to productivity improvement, fall in real food prices, poverty reduction and food security, it was not always the right answer for solving the numerous problems of poverty, food security, and nutrition facing the poor. GR1 was very often criticized for its uneven social and spatial distribution effects.[1] Benefits have been widespread only in favorable areas but not in unfavorable marginal and less favored areas[2] (LFAs)in Africa and Asia (hereinafter we will use only the term “marginal areas”), the potential impacts on economic growth, poverty and self-sustaining development have not yet been brought out [39, 12, 13, 28]. In last decade, in the context of rising food prices and growing population, the global community including donors, governments, philanthropists have begun to refocus attention on agriculture [6]. Thus, it is assumed that the marginal areas continue to rely on agricultural productivity as an engine of growth and hunger reduction [52,24].

The traditional ‘pipeline’ approach, in which researchers develop new technologies and pass them to extension agents who in turn are meant to persuade farmers to adopt them, was abandoned in favor of a more inclusive and holistic approach applying to individuals and institutions at all levels. Because of the passive role of the end-users the pipeline approach for agricultural technology innovations has produced less than satisfactory returns on considerable investment for sub-Saharan Africa [25]. In response to those insights, the international development partners, for example, the International Fund for Agricultural Development (IFAD) and the World Bank are following the innovation systems approach that has no formal innovation pipeline or standard criteria for selecting or identifying innovations [40, 41]. In such

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[1] For, example, today the average farmer in Sub-Saharan Africa gets just over a ton of cereal per acre, while the average Indian farmer gets about twice that, the average Chinese farmer about five times that, and the average American farmer about seven times that amount [6].

[2] See[45, 47] for review about poverty, productivity and production environment relationship in the less favored/marginal/laggard areas.

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approaches, the poor small holders (SHs) are not only as integral part of the innovation system but as valuable source of the innovation process [19]. Some other innovative thinking relating to business solution and the use of ICT in agriculture have been pursued for the last decades. Jugannd or frugal innovation [42], social innovation and entrepreneurship for the poor, rural communities and business at bottom of the pyramid (BOP) with appropriate marketing practices are promising examples.

However, the development approach is not necessarily being holistic or sustainable. The need for continued investments in agricultural innovation and productivity growth is as important today as it was in the early years of the GR1. Unfortunately, investment in agriculture dropped off dramatically into the mid-2000s [23] in [39]. Since the mid-2000s and heightened after the 2008 food price hikes, there has been continued interest in agricultural investment, and there are repeated calls for GR2 type activities [5, 9]. Building on the lessons learnt from the GR1, international development partners, for example, AGRA aims at a strategy to transform today's rural poverty into tomorrow's prosperity by sustainably and significantly increasing the productivity of SHs [4,48].

Despite progress in agricultural productivity and poverty reduction, still some 40% of rural population of developing countries are estimated to live in marginalized conditions [26, 27, 38]. After the GR1, it was soon realized that “one size does not fit all” did not benefit the marginalized poor. A better targeted approach was required to exploit the potentials of particular segments of poor households and communities [46, 47] in their particular ecological and institutional environments. For that reason, [49], for example, advocated for government strategies to be tailored to different strata of farmers at hinterland zones. To that date, however, a comprehensive assessment approach was lacking. The marginality perspective [50] helped to refocus attention on the nexus of poverty, exclusion and ecology and thereby better recognize the systemic links between agro-ecological potentials and human capabilities which can be triggered for productivity growth by technological and institutional adjustments. Thus, there are three main innovative aspects to the ex-ante analysis we propose here, which to the best of our knowledge, are not addressed in any other ex-ante assessment for productivity growth in agriculture:

1. The combination of ecological, technological and institutional dimensions in the assessment,
2. The inclusion of marginalized SHs and marginalized land areas, and
3. The targeted approach towards different segments of the marginalized poor.

In our approach, identifying marginalized land areas which could be brought into agricultural production is a straightforward objective of ex-ante assessments which aim at agricultural productivity growth. Suitable land for growing crops is obviously a critical production factor. Identifying those areas is however of little value to the aim of increasing productivity and income of marginalized SHs, if they do not have access to the land and are not provided an enabling institutional and technological environment to benefit from cultivating the land. In fact, those ecological, technological and institutional constraints prevent the marginalized poor from developing their capabilities.

The ex-ante assessment we propose here is not something to be discovered through evaluative research rather it creates a thorough understanding of the interactions between technology needs, farming systems, ecological resources, institutional and poverty characteristics in the different segments of the poor. The insights can be used to guide action to overcome current barriers to technology access and adoption for the policy makers and practitioners working for improvement in productivity growth of the marginalized SHs in marginal areas. A manual has been published which describes the detailed step-by-step approach of the assessment [29] and examples of applying core elements of the ex-ante assessment from India, Ghana and Bangladesh are presented in [14, 17, 33] and [31].

The next section reviews the theory of change and the common approach of the assessment. Section 3 elaborates on each of the steps of the assessment and the final section summarizes the approach and concludes.

2. Conceptual framework and theory of change

The conceptual framework and theory of change (Fig. 1) borrows from the Institutions of Sustainability (IoS) framework of [20, 21] and the Institutional Analysis and Development (IAD) framework of [35, 36, 37]. It explains how actors with specific characteristics engage in different types of transactions. Action situations are constrained or enabled by institutions and governance structures and the outputs can influence the institutional framing conditions [15].

In our framework, the poor (actors) are in action situations which are characterized by 1) particular types of transactions, 2) the actor characteristics and assets, 3) institutions which formally or informally rule behavior and define use and access to resources, especially property rights, and 4) governance structures. The configuration and effects of these four factors determine whether they work as barriers to innovation towards productivity growth, or as enablers. All four factors can be used as drivers of change so that they function less as inhibitors and more as enablers for technological or institutional innovations.

For explaining barriers to change which prevent the unleashing of the potentials of the poor [34] refers to limited access (in contrast to open access) orders, [1] and [2] refer to extractive (in contrast to inclusive) institutions, and [21] refers to segregative (in contrast to integrative) institutions. Despite the different use of terms all theories contribute to explaining that the poor are locked in action situations defined by institutions[3] and governance structures which define the types of transactions the poor are engaged in and the conditions under which they live. From that perspective, it becomes obvious that poverty and marginality is to a large extent man-made. The institutions of marginality keep people marginalized and prevent them from making full use of their capabilities.

Both, physical and social dimensions of transactions are particularly relevant for the action situations the poor find themselves in: institutions and governance structures manifest existing types of transactions which do not set incentives for creative change, innovation, or competition. They make it too costly for the poor to change established types of behaviors. Although efforts to change towards productivity growth (e.g. by investing and saving) also require capital inputs [10, 44] argue that the poor have assets, but because of the prevailing institutions and governance structures, this, particularly land, is prevented from being used as capital, e.g. as collateral. Thereby the poor cannot make use of their “dead capital”.

[34] emphasizes the constraints that institutions and governance structures have on access to e.g. decision making in political markets, education and income opportunities, opportunities for

[3] Institutions are understood as different forms of rules at different levels of decision making (e.g. norms, conventions, laws, regulations, rights) which are put into play by governance structure, e.g. the market, the state, or particular arrangements to manage the land, like e.g. sharecropping.