
Editorial

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Dr Tugrul Temel is currently associated with the Food and Agriculture Organization of the United Nations (FAO). His most recent research concerns global food security and poverty. Prior to FAO, he worked at the International Service for National Agricultural Research, the Agricultural Economics and Rural Policy Group at Wageningen University, and the Center for World Food Studies at the Free University of Amsterdam in The Netherlands. He taught economics at Minnesota University and Rutgers University in the USA and at Wageningen University and Inholland University in the Netherlands, and has published in the *Journal of Economic Development, Agricultural Systems, Growth and Change* and *Health Policy* among others.

In a world that becomes increasingly interconnected, information flow does not recognise national boundaries on the one hand, whilst improved democratisation of societies promotes wider exchange of information among a large number of agents on the other. This makes it possible not only for innovations to take place but also to rapidly spread everywhere in society. In such an interconnected world, the linear model of innovations, which assumes science and technology to be the key source of innovations, can no more fully explain how innovations come about and how institutional changes promote or hinder the development of innovations. In this special issue, we have gathered a set of papers that seek to highlight the key characteristics of complex innovation and diffusion processes, institutional changes facilitating innovations and economic growth.

The first group of papers explores the main features of an effective innovation system, which in the literature is most commonly defined as a group of actors that jointly and/or individually contribute to the generation, diffusion and use of improved or new technological information and knowledge. Biggs argues in his paper that, compared to the linear pipeline model of R&D and extension, a holistic 'actor innovation systems' approach is a more useful framework for understanding past innovation and diffusion processes and for planning purposes. He discusses the merits of the innovations systems framework in identifying and understanding the already evolving pro-poor innovation processes. The diffusion of information and knowledge is essential if innovations are to take place. Cowan and Jonard model the diffusion as a barter process and show that the economy-wide knowledge diffusion takes place as a result of knowledge exchange among agents who repeatedly meet those with whom they have direct connections and trade, provided that mutually profitable exchanges exist. Their key finding is that the steady state level of average knowledge is maximal when the network structure is that of a small world. Cognisant of the critical role in the information diffusion of agents' capacities to

receive, learn and share information with others, Temel develops a conceptual framework that can be used to identify where and what type of capacities and institutional changes are needed to strengthen the information flow in innovation systems. With a case study from Nicaragua, Staver et al. present evidence that the improved learning capacity of research and field organisations is necessary to strengthen the agricultural innovation system. Participatory methods were applied to assess the degree of organisational capacity, particularly with respect to the individual routines of their professionals, the formal procedures of the organisation and the organisation's use of collaborative projects.

The second group of papers delves into the role of institutional changes designed to develop innovations and promote economic growth. In his paper, Ruttan draws on a substantial number of case studies that lend plausibility to the induced technical and institutional change hypothesis. He explores the process and impact of induced technical and institutional change in tropical agriculture and discusses the implications for the development of agricultural research systems in the tropics. Hartwich and Tola present an assessment of how public-private partnerships lead to the development of innovations through complementary resource use and joint learning by the participating parties. The theoretical conditions under which partnerships would be desirable are discussed and then the conditions compared with real partnership cases from Latin America. Evidence shows that partnerships are often formed based on unclear perceptions of the costs and the benefits and that both public and private sectors need to raise their profile in negotiating, designing and executing mutual partnerships. Gandarillas et al. present a case study of organisational innovation in Bolivia, exploring the emergence of a Foundation from a national agricultural research organisation. The Foundation, as a new type of organisation, widened and deepened links with other key actors, added value to the research and development process and appears to fit well with the innovation system approach. In the last paper of this special issue, Roe argues that agricultural policies in advanced countries are a major barrier to agricultural exports from poor countries and trade barriers, erected by advanced countries to the agricultural exports from poor countries, are a greater barrier to economic growth and development, as these barriers inhibit institutional reforms. With an empirical analysis of economic growth, he shows that sub-Saharan economies can repeat potential gains from increased trade that are larger when trade integration induces institutional reforms.

The review of the studies in this Special Edition of *IJARGE* calls attention to the need for future research on three key issues. The first critical issue that should be investigated further is the diffusion of formal information and knowledge within innovation networks. Poor diffusion of traditional agricultural technologies and, lately, of biotechnology methods, for example, has proven true that the real difficulty is to reach out to users of innovations. To date, advanced countries have established strong infrastructures for both information and communication technologies (ICTs) and intellectual property rights (IPRs), which are the key elements of technology diffusion. In these countries, the linkages between sources and users of innovations also have been quite successfully established. In poor countries, however, the infrastructures are underdeveloped and the linkages concerned are weak. In this connection, research should be conducted, especially in developing countries, to identify:

- critical areas for investment aimed to facilitate the growth of an enabling environment for information exchange and to create content for actual exchange of information, and
- dominant sources, intermediaries and users of innovations and the most effective and efficient pathways that would be instrumental in bringing about innovations.

As pointed out in several papers in this Special Edition, the development of information and knowledge absorption, assimilation and application capacities and matching the actors with compatible capacities are necessary for the effective diffusion of information and knowledge and hence bring about innovations. Regional information exchange networks that have most recently emerged in Africa, Asia and Latin America reflect the rising need for the development of such capacities. However, frameworks and guidelines are lacking that can be applied:

- to identify the critical areas for capacity development
- to develop mechanisms and strategies to promote the growth of capacities, and
- to facilitate the interaction of relevant actors with complementary capacities to strengthen the networks concerned.

A final remark is that the literature is rich in exploring institutional innovations, however, it is poor in the quantitative assessment of their impact on economic growth. Most studies in this area do not go beyond descriptive profiles of specific innovations and qualitative assessment of their impacts. This calls attention to the need for future research to concentrate on the development of methods for the quantitative assessment of institutional innovations.