

Unlocking the potential of inclusive research and innovation systems and policies in Least Developed Countries (LDCs)

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RESEARCH PLAN

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Introduction

Research and innovation (R&I) are a key driver of the knowledge economy promoting economic growth, productivity and employment. According to Schumpeter, innovation drives the creative destruction process underlies modern growth theory, and it is the critical ingredient in historical accounts of how countries achieve prosperity (Schumpeter, 2008- Original work published 1942). R&I are also essential in addressing a wide range of ongoing societal problems, keeping public and private companies at the competitive edge and achieving each of the 17 Sustainable Development Goals (SDGs) of the UN 2030 Agenda. There is also abundant evidence that R&I played and is playing, a key role in the take-off of Asian economies such as South Korea, China and India (OECD, 2016).

Despite the vast potential returns to innovation, developing countries do far less innovation than advanced countries (The World Bank, 2017) and, especially, Least Developed Countries (LDCs) still lags behind in reaping the digital dividend of technology. These countries are often characterised by difficult business and governance conditions, lower educational levels, and poor infrastructure. Their innovation systems are characterised by several weaknesses, such as low level of Research and Development (R&D) investments, inadequate research infrastructures and capacities, fragmentation of the innovation ecosystems, weaknesses in national research and in the higher education system, low impact of R&D on the economy and society etc. These challenges (along with the low number of publications and patents, the brain drain of researchers, gender imbalance and low capacity of technology transfer) raise particular challenges for the promotion of innovation.

Bridging the technological innovation gap in LDCs is a shared concern among governments, policy agencies, research centres and universities, among others. Recent policies, statement and policy instruments underline the need to increase investment in Science, Technology and Innovation (STI) to achieve sustainable socio-economic growth, reduce poverty and ensure food security. Investment rates in LDCs also remain lower on average than in developing countries – and below the rate required to spark structural transformation.

This thesis will analyze the dynamics, challenges and opportunities of developing innovation systems in LDCs and how the potential of R&I can be unlocked through grassroots, open, inclusive and gendered innovation.

The term "open innovation" was coined by Henry Chesbrough, Professor at the Center for Open Innovation at the University of California at Berkeley (Ramírez-Montoya, M. S., & García-Peñalvo, F. J., 2018). There are several definitions of open innovation, but a recent definition by Chesbrough is "a process of distributed innovation based on managing knowledge flows across organizational boundaries, using monetary and non-monetary mechanisms consistent with the organization's business model".

Regarding grassroots innovation, it refers to grassroots creativity, comprising of traditional knowledge (TK) and skills, which are translated into innovation by the poor and marginalized people of the rural areas (Gupta, 2006).

Finally, there is a robust evidence showing the positive impacts of reducing gender inequalities in R&I and education in both developed and developing countries (García-Peñalvo, F. J., Bello, A., Dominguez, A., & Romero Chacón, R. M., 2019).

Main goals

The study acknowledges that the key drivers for an inclusive and sustainable development lie in science, technology and innovation and in strengthening national and regional science, technology and innovation systems.

This study aims at understanding what are the key factors to foster an environment conducive to R&I as well explain conditions that can promote or hamper innovation in low resource settings as well as policy options to address them. The study will examine how the situation has evolved regarding R&I in LDCs in the last decade and identify who are the actors that might be regarded as the major stakeholders. It will also analyze how South-South collaboration for technology and innovation can be promoted in a systematic way to promote inclusive sustainable development across all LDCs.

The objective of the study is to demonstrate how grassroots, open and inclusive innovation are key factors to enhance the quality of R&I policies and systems.

The study will build on from concepts such as smart specialization, open innovation, grassroots and inclusive innovation. It will also apply perspectives and concepts of the neoclassical and the National Innovation Systems (NIS), triple and quadruple helix and situated knowledge in understanding the context, in order to identify key policy issues and suggesting ways to address them with the ultimate goal of contributing to more coherent and effective policymaking in developing countries. Especially considering the 'triple helix' of academic-industry-government relations as a key component of any national or multi-national innovation strategy (Etzkowitz, H., & Leydesdorff, L., 1997) (García-Peñalvo, F. J., 2016) (Carayannis, E. G., & Campbell, D. F. J., 2009) and that involving the public as one of the four major actors (science, policy, industry, and society) in research, development, and innovation is the dominant paradigm both in international STI-policy and in innovation research (Quadruple Helix Model).

However, the heterogeneity of innovation performance and governments will be taken into consideration in supporting any endeavour to improve innovation ecosystems in these countries.

To better describe innovation systems in LDCs context the concept of innovation systems will be extended to include learning, innovation development and competence building. It means that innovation processes will constantly be interlinked with knowledge. The dynamic linkages and interactions that take place among key actors such as firms, government departments, universities, civil society organisations, and science granting councils, will also be considered in systemic learning as well as the distribution of knowledge throughout the system leading to the strengthening of capabilities.

The geographical scope of the study is to cover all 47 LDCs, with a particular focus on 3 to 4 countries (case studies), which should be representative of the rest so as to – as much as this is possible – draw recommendations which would serve all.

This doctoral thesis will address and provides a multi-level research framework to provide a broad perspective on innovation systems to provide a high level of insight and guidelines which may be valuable to policymakers, governments and international organizations.

Methodology

The study proposes a synthesis of several methodologies, which ensures the production of a unique and comprehensive product. It will utilise both deductive and inductive methods by moving between theoretical construction and empirical study. Within this general research methodology, a mixed approach comprising of both qualitative and quantitative methods will be applied (García-Peñalvo, F. J., Moreno López, L., & Sánchez-Gómez, M. C., 2018). The first one is collecting secondary data by reviewing previous studies and relevant documents (Kitchenham, B., & Charters, S., 2007) (García-Peñalvo, F. J., 2020).

This research will first highlight the literature review concerning the key dimensions of LDCs innovation systems. A global and thorough review of readily available documentation which is relevant for the assessment of the state of play of STI policies in LDCs. The desk review will be based on information collected through a systematic analysis of available documents relevant to the assessment of STI in LDCs countries. I will conduct a literature review and desktop-based research of previous related publications, projects and other initiatives that can inform and support to understand the current situation of STI in LDCs, as well as provide a foundation for the study. This will also include an analysis of secondary data to obtain a more comprehensive overview.

In order to obtain relevant information related to the status of STI in LDCs, including key challenges, opportunities, and trends, and understand key players in relevant STI areas, the study will identify a list of relevant local and regional stakeholders in LDCs. Consultations with key experts and representatives from key stakeholder groups will be undertaken to complete and support the documentation/data collected from the desk research.

Recognised open data sources for world-wide indicators will also be collected and analysed. This would reduce comparability issues between countries that may arise with the gathering of data from different sources (e.g. national statistic offices) for each of different countries. Examples of data sources with world-wide indicators are the World Bank Science and Technology indicators, international patent databases (e.g. Patentscope, Patstat, WIPO IP), the UNESCO Institute for Statistics, UNCTAD information economy statistics, African Economic Outlook statistics, African Science Technology and Innovation Indicators (ASTII). However, if world-wide indicators are not available, the data will be gathered on a per-country basis ensuring the highest possible cross-country (or regional) comparability.

Microdata from the World Bank Enterprise Survey, which has unique data on firm-level innovation trends in most LDCs, will also be studied. It will be possible to analyse by sector, gender (women-led firms), type of innovation and R&D-strategies, creating additional country-level indicators that are highly relevant to the study.

A code of ethics for educational research (BERA's Ethical Guidelines for Educational Research) will be used as a reference to conduct the study according to the highest ethical standards

Resources

This work is developed in the PhD program: Education in the Knowledge Society (García-Peñalvo, 2014, 2019; García-Peñalvo et al., 2019a), being its portal, accessible from <http://knowledgesociety.usal.es>, the main tool of communication and visibility of the advances (García-Holgado et al., 2015; García-Peñalvo et al., 2019c). It will include all the publications, stays and attendance at conferences during the course of the work.

This PhD thesis is developed in collaboration with the GRIAL Research Group of the University of Salamanca (García-Peñalvo et al., 2019b; GRIAL, 2019)

All the papers and outcomes derived from this PhD Thesis Research will be available in an open access repository (García-Peñalvo et al., 2010, Ramírez-Montoya et al., 2018).

Personal contacts developed in R&I agencies in LDCs, as coordinator of global projects of UNESCO, as well as during the creation and implementation of a Policy Support Facility for African, Caribbean and Pacific (ACP) countries for the ACP Secretariat programme, will be consulted.

Schedule

Regarding the work plan of the present research project, it will be carried out in three years with the phases and activities shown below

First-year:

- Comprehensive literature review including:
 - o General literature on STI in LDCs (white and grey literature, including technical papers from government agencies and papers from research centers);
 - o Regional and global reports and publications from international and regional organizations including but not limited to UNESCO, UNCTAD, WIPO, AUDA-NEPAD, the African Development Bank and relevant NGOs;
 - o Policy and gap analysis reports, analysis of STI at regional and national levels;
 - o Publicly available data relating to STI indicators (WIPO, World Bank, UNESCO, WEF, GSMA...).
 - o Main publications, journal articles, reports, and other grey literature related to STI in LDCs (ie. “The Innovation Paradox in Emerging Economies” by the World Bank)
 - o Relevant websites and reports of non-institutional organisations encompassing LDCs.
- Mapping of key stakeholders
- Collection of data
- Desktop research and analysis

Second-year:

- Literature update: a review of recent studies that have been published in the last year on the object of study
- Carrying out statistical analysis of the data collected
- Preparation of questionnaire for interviewing key stakeholders in the research and development systems in the LDCs
- Administration of the questionnaire
- Preparation of a paper on the state of R&I in LDCs and on the main dynamics, challenges and opportunities in LDCs based on the results of the previous desktop research
- Participation and dissemination in scientific conferences
- Elaboration of articles to be sent to academic journals

Third-year:

- Literature update: review of recent studies that have been published in the last year on the object of study
- Identification of the dynamics, challenges and opportunities of developing innovation systems in LDCs and how the potential of inclusive R&I can be unlocked.
- Preparation of final publication on how grassroots, open and inclusive innovation can enhance the quality of R&I policies and systems in LDCs
- Distribution, Defense, and Deposit of the Dissertation

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