Research Policy xxx (2016) xxx–xxx

Contents lists available at ScienceDirect

Research Policy

journal homepage: www.elsevier.com/locate/respol

Opening the black box of impact – Ideal-type impact pathways in a public agricultural research organization

M. Matt[a,*], A. Gaunand[c], P-B. Joly[d], L. Colinet[b]

[a] GAEL, INRA, CNRS, Grenoble INP, Univ. Grenoble Alpes, 38000 Grenoble, France
[b] INRA, 147 rue de l'Université, 75338 Paris Cedex 07, France
[c] INRA, LISIS, 147 rue de l'Université, 75338 Paris Cedex 07, France
[d] LISIS, CNRS, ESIEE Paris, INRA, UPEM, Université Paris-Est, 77454, France

ARTICLE INFO

Article history:
Received 17 November 2015
Received in revised form 26 July 2016
Accepted 28 September 2016
Available online xxx

JEL classification:
H43
O33
A13
C39

Keywords:
Public agricultural research
Societal impact
Impact pathways
Ideal-types
Evaluation

ABSTRACT

This paper develops a renewed research impact assessment approach that goes beyond the traditional computation of internal rates of returns but allows collective learning, understanding and guiding systems transformation. Our approach (ASIRPA) builds on the broader research impact assessment literature which discusses impact-generating mechanisms in nonlinear dynamic processes. The main originality of ASIRPA is that it is based on a theory of innovation inspired by Actor Network Theory and a standardized ex-post case study methodology. Standardized case studies allow systematic codification of the variables for each case study, and the building of four ideal-type impact pathways. Each of these ideal-types is characterized by specific translation mechanisms, critical points, research and adoption networks, research outputs, and impacts. Our analytical framework and empirical analysis provide new insights into the contribution of an agricultural Public Research Organization to impact generation, and the role of users and networks in impact pathways.

1. Introduction

Research Impact Assessment (RIA) is well established but the changing relations between research, innovation, and society require new ways of conceiving and practicing RIA. This is the main argument in this paper. Specifically, traditional RIAs focus mainly on accounting and accountability, and involved methodologies that focus on the economic efficiency of research investment. The computation of internal rates of return was a central goal of RIA and especially in agricultural research (Alston et al., 2009; Evenson, 2001). This conceptualization and practice of RIA are based on two hypotheses: (a) a linear model of innovation where investment in research increases the stock of knowledge which in turn increases productivity, and (b) the belief that economic growth automatically results in social progress.

The changing relations between research, innovation, and society are at the heart of the new discourse on societal challenges which emerged in the US, Europe and other areas as a central piece of the new master frame in the 2000s (Lund Declaration 2009). Although mission oriented research has been on the agendas of many countries for some time, the discursive matrix includes several changes that challenge the linear model of innovation. It suggests that innovation is complex and interactive (Kline and Rosenberg, 1986), that there is a shift from mode 1 to mode 2 production of knowledge (Gibbons et al., 1994), and that there is a need to address societal "grand challenges", that are not systematically solved by economic growth. Grand challenges are about systems transformations (Kuhlmann and Rip, 2014): they involve changes to social, economic, and technical systems, and objectives which are not given at the outset but have to be uncovered along the way. In line with this new master frame, RIA involves collective learning and can be considered a tool to guide complex transformation dynamics. It is important to be aware of the key conceptual changes at stake. The French sociologist Vatin (2013), suggests that evaluation should provide an understanding of the processes that produce value, or what he calls the processes of valorization. Sys-

* Corresponding author at: GAEL, INRA, CNRS, Grenoble INP, Univ. Grenoble Alpes, 38000 Grenoble, France.
E-mail address: mireille.matt@inra.fr (M. Matt).

http://dx.doi.org/10.1016/j.respol.2016.09.016
0048-7333/

tems transformation is a long and complex process, with multiple causes and consequences, including the problem that some values are taken for granted (Stirling, 2014). Hence, there is a strong need to develop new RIA approaches that go beyond traditional methods and are suited to the current interactions between research, innovation, and society.

Such a recasting of RIA is already underway. For instance, the Public Value Mapping (PVM) approach was designed to assess the capacity of research to achieve social goals (Bozeman and Sarewitz, 2011). The SIAMPI project (Social Impact Assessment Methods for research and funding instruments through the study of Productive Interactions between science and society) developed an approach aimed at uncovering how productive interactions contribute to the generation of impact (Spaapen and Van Drooge, 2011). The ASIRPA[1] approach we are proposing draws on these approaches (Joly et al., 2015) but exploits a set of standardized ex-post case studies in order to learn about the generic features of impact-generating mechanisms.

In this paper, we explore the two main characteristics of the ASIRPA approach (a) its foundation on a theory of innovation inspired by the Actor Network Theory and (b) its use of standardized case studies which allow thick description of specific situations, and typological analysis. Based on 32 cases, we identify four ideal-type impact pathways. For each type of pathway, we characterize the impact-generating mechanisms and critical points, and some important issues that have been neglected in the literature.

The fieldwork for this research was conducted at the National Institute for Agronomic Research (INRA), a public mission oriented research organization. We consider that agricultural research is a good candidate for designing approaches aimed at addressing societal challenges, due to the many global challenges (climate change, environmental sustainability, food security) facing agriculture in the coming decades. The intervention research we report builds on current approaches and practices but proposes an original approach which was implemented to perform a RIA. We discuss the results of using this approach which we hope will be the inspiration for new solutions to address societal challenges.

2. The quest for impact assessment methods: some examples of methods in use

This section reviews recent RIA approaches that focus on societal impacts. These approaches are based on cases studies and they consider a broad set of impacts (economic, social, political, environmental, and health) and highlight impact-generating mechanisms. By impact of public research, we mean direct and indirect effects of the various components of research (knowledge production, infrastructure building, scientific advice, etc) on the economy, environment, health, etc. Research impacts are usually generated by lengthy and complex processes and propagate extensively. Impact-generating mechanisms consist in chains of translation that connect problems to the production of knowledge and transform scientific knowledge into actionable knowledge. These impact-generating mechanisms refer to the involvement and interaction of actors in the innovation process through the co-definition of their interests, and the technology. The chains of translation are analyzed with various theoretical lenses in the selected RIA approaches presented here (cf. Table 1). The latter mostly use processual analyses characterized by various steps or phases interconnected in a nonlinear dynamic way.

In the PVM approach, scientific knowledge gains value through its use by 'Knowledge Value Collective' (KVC) actors, "for example, government and private funding agents, end users, wholesalers, equipment and other scientific resource vendors, and so forth" (Bozeman, 2003; p.13). KVC "move[s] science from an individual and small group enterprise, to knowledge development and dissemination" through the whole of society, "ultimately, [producing] social outcome[s]" (Bozeman, 2003; p.27). In the PVM approach the following factors and mechanisms are used as analytical lenses and they are seen as determining the social impact of research (Bozeman and Sarewitz, 2011): the characteristics of the knowledge produced by research activities, the institutional arrangements and management affecting knowledge production and use (user-producer interactions, networking, etc), and the political and legal context. Bozeman and Sarewitz (2011, p.1) argue that it is vital to have a deeper understanding of these factors to help science policy-makers in "making choices among competing paths to desired social outcomes".

The payback framework (Donovan, 2011) is based on a logic model consisting of stages and interfaces between the research system and the wider user environment. The logic model contributes to the analysis of the 'story' of an innovation from topic identification, project specification, research processes, and research outputs, to the various dissemination steps until the final outcomes. The dissemination and adoption phases highlight the role played by intermediaries and beneficiaries. Wooding et al. (2014) underline various factors associated with high and low impacts. For instance, researchers engaging with practitioners and patients to plan and organize their research projects, are associated with projects with high academic and wider impacts. Research which considers the pathways of translation and application of clinical research are associated with broader impacts. The way data are compiled within this framework facilitates cross-cutting analyses mostly in terms of the paybacks generated.

The SIAMPI approach considers the 'productive interactions' between researchers and stakeholders as central to creating research with any kind of impact (Spaapen and Van Drooge, 2011). SIAMPI focuses on the interactions among actors within a complex process which highlights the production, appropriation, diffusion, and application of relevant knowledge. Productive interactions are defined as exchanges between researchers and stakeholders involved in achieving societal impacts. The interaction becomes productive when stakeholders make efforts to use and apply research results to generate impact. In this approach, the interactions among the actors (de Jong et al., 2014) are the main mechanisms of the impact-generating process. Productive interactions are considered predictors of the success of the social outcomes generated. Spaapen and Van Drooge (2011) justify the lack of focus on impacts saying that "there is not always a clear distinction between social impact and 'productive interactions' because the transition from interaction to impact is often gradual". The case studies are compared on a cross-cutting analytical basis.

The Impact Pathway (IP) is a model based on identification of the different phases of impact generation, the actors involved, the flow of resources, and the progressive transformation of knowledge into outcomes and impacts. The model was designed as an applied assessment tool by consultants in the German Development Agency, GTZ (Kuby, 1999), and refined for inclusion in the international agricultural research framework to evaluate the research impact of the CGIAR[2] (Douthwaite et al., 2003; Walker et al., 2008). Networks of stakeholders play dominant roles in the construction of research outputs and in the diffusion and adoption at multi-scale levels. Technological change is brought about

[1] Assessment of socio-economic impact of public agricultural research.

[2] Consultative Group on International Agricultural Research.

Please cite this article in press as: Matt, M., et al., Opening the black box of impact – Ideal-type impact pathways in a public agricultural research organization. Res. Policy (2016), http://dx.doi.org/10.1016/j.respol.2016.09.016