

Analysis of Impact Pathways of Research on Agriculture

The findings and recommendations presented in this Research Brief are based on six regional case studies, which were performed to develop and test a methodological framework for assessing the impacts of Scientific Research on Agriculture (SRA). The aim was to investigate the complex innovation processes occurring along related impact pathways. The case studies were selected in five countries for their agro-ecological and socio-economic diversity. The methodology developed was based on the Participatory Impact Pathway Analysis (PIPA) and complemented by some additional methods, mainly to adapt the PIPA approach to the requirements of an ex-post impact assessment (using Outcome Harvesting). We also put more emphasis on the role of the actor network, considering its great importance in the agricultural sector. All cases showed that the intended impacts as defined at the beginning of the research programme are at least partially met at the time of the assessment, and that both unintended and unexpected effects occurred. Enabling and disabling factors were identified regarding the development of trust, networks and role of economic and institutional frameworks. We provide recommendations aimed at the research and research policy community on ex-ante, within-project, and ex-post research impact assessment, as well as on management of research calls and of funding frameworks.

Analysing research impacts – rationale for a participatory dynamic approach

The conceptual framework adopted in IMPRESA was based on a Participatory Impact Pathway Analysis (PIPA). In the literature, the PIPA approach was originally used in an ex-ante manner, prior to implementation of the research programme. In that way, it was developed as a causal model summarising how the innovation pathway was intended to occur, from research activities to outputs, outcomes and finally impacts. However, in the IMPRESA case studies, the goal was to evaluate the impacts and role of the research in an ex-post manner.

The rationale of focusing on the Impact Pathway of research programmes was based on criticism of the 'logical framework', which is mainly used as a monitoring and evaluation tool for project

management. The underlying causal model of this framework is quite straightforward: inputs invested in the research process lead to research activities that produce outputs, which in turn generate outcomes and finally impacts. This simple unidirectional and sequential view of innovation processes is problematic, since it contradicts the most recent conceptions that understand innovation as resulting from complex interactions and learning processes. Moreover, the logical framework simply and automatically attributes the entire range of impacts to the intervention, thus not taking into account alternative or additional causal factors to the impact pathway.

The impact pathway model used in IMPRESA for assessing the impacts and role of research represents not only the inputs, outputs, outcomes and impacts of

research, but also the way in which these interact with feedback loops, and interactions between different technical, commercial and institutional spheres.

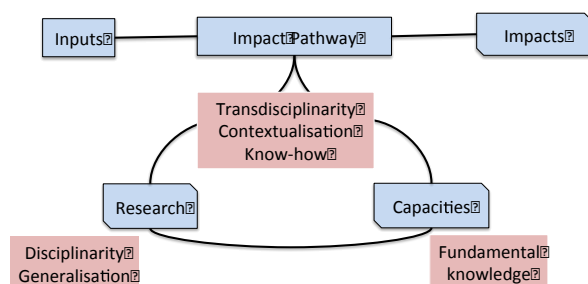


Fig. 1 Impact pathway interactions

The methodology we have applied is based on PIPA and complemented by some additional methods. This is mainly to adapt the PIPA approach to the requirements of an ex-post impact assessment (using Outcome Harvesting), as well as identifying and analysing evidences of causal mechanisms along the pathway towards impacts. We also put more emphasis on the role of the actor network (using either stakeholder mapping or social network analysis as tools). Furthermore, the information collected is triangulated with various other sources during the evaluation process (using both Process Tracing and semi-structured interviews with actors in order to highlight counterfactuals).

KEY MESSAGE:

Trust among actors that fostered networks and collaboration, as well as development of the skills of beneficiaries are important factors for the innovation process.

The approach consisted of seven steps:

1. Initial screening of the case and actors, impacts and research questions;
2. Stakeholder pathway building;
3. Refinement of the pathway;
4. Data collection;
5. Evaluation of the pathway;
6. Feedback round with stakeholders;
7. Conclusion

Selected case studies

The relatively small number of six case studies, in five different countries, was chosen in order to allow detailed and in-depth comparison.

A wide range of past innovations within agricultural sectors were selected: a dairy cow fertility index in the United Kingdom, an optical crop sensor for arable farming in Germany, the Integrated Pest Management (IPM) in olive farming and on-farm biogas in Italy, organic arable production in Camargue in France, and a Varroa control product for beekeeping in Bulgaria.

Participatory Impact Pathway Assessment (PIPA) – some highlights

In the six case studies, the diversity in activities, outputs, outcomes and impacts of agricultural scientific research is very large. All cases provided evidence that their expected impacts were at least partially met. The level of impacts was considered both at farm and territory levels.

Significant unintended direct impacts occurred in several case studies (e.g. market changes, changes in policy support, etc.). The case studies also revealed a number of unexpected indirect impacts, whose many were either negative or ambiguous (e.g. black market resale of subsidised Varroa control products, contribution to dairy system intensification, etc.).

Most case studies contain at least elements of scaling up. Typically, this was linked to: awareness-raising arising from capacity building and the research done; the setting up of lobbying and marketing organisations; changes in the regulatory framework; and developing convenient uses of the new product/technology.

In all case studies, the role of research in the innovation process was embedded in a set of preceding, related, or subsequent innovations of a different nature. These included changes in governance, in market

conditions, in the legal framework, and in financial support.

Enabling and disabling factors

The enabling and disabling factors analysed were related to human and social capital, actors' relationships, resource and economic prospects, institutional and policy frameworks, and advisory services. A variety of social factors, linked to key actors' capacity, was found to foster the innovation process. Most importantly, these included trust among actors that fostered networks and collaboration, as well as contributing to the development of beneficiaries' skills. Moreover, economic factors often played a prominent role in the impact pathway.

In the research and development phase, factors that hindered the development of innovation included a lack of public funds (Varroa control product); a lack of problem awareness (dairy cow fertility index), and a general conservatism of the farming community towards adopting new products and/or technologies. In the adoption/diffusion phase, poor economic performance (biogas), high investment costs or prohibitive product prices (optical crop sensor, Varroa control product), as well as the absence of support from the

public advisory system (organic production Camargue, optical crop sensor), delayed the uptake of the innovation(s).

Towards an improved methodology

The original case study manual developed in IMPRESA provided a good menu of options to conduct impact evaluations, our experience through performing case studies has indicated a greater need for flexibility in order to cope with the wide diversity of potential cases. We identified that more attention should be paid to the geographical scope, the data availability, the precise definitions of the concepts of outcomes and impacts, the utilisation of the Process Tracing tool, and finally on the testing of the reliability of alternative explanations.

An important initial step for any case study investigation is an assessment of information availability.

Given the importance placed on capacity building along the innovation process, at the design phase of research projects we recommend involvement of relevant social scientists and professional facilitators. The analysis of the impact pathway clearly demonstrates the complex and non-linear nature of the interactions between inputs, activity, outputs outcomes and impacts.

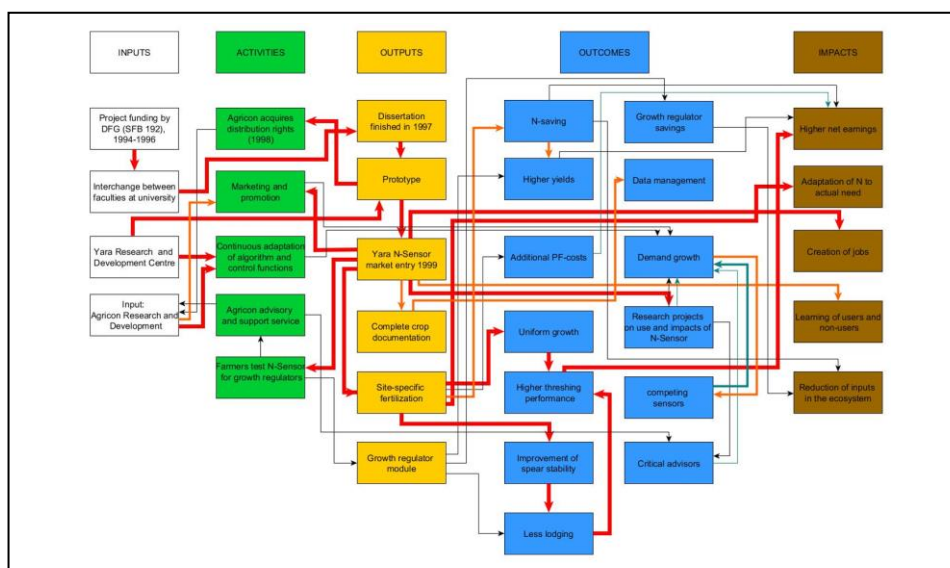


Fig. 2. Impact pathway of an optical crop sensor in Germany

(The strength of the arrows and the colour shows the contribution of the research to the respective link: black is weak, orange is medium, red is strong. Blue links show the negative influence of a link.)



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Recommendations to researchers

It is important to develop a 'culture of impact' across the entire applied research process. Thus, these specific recommendations relate to research design and planning; to the process of research itself; to the analysis of performance to influence subsequent projects and programmes; and to the overall institutional context in which research takes place.

Recommendations relating to the initial pre-research phase of activity are therefore of paramount importance.

Nevertheless, the other recommendations for interim review and effective impact monitoring should not be neglected; otherwise, stakeholder engagement could lapse into symbolic lip service, with minimal enhancement of impacts.

RECOMMENDATIONS TO RESEARCHERS

Ex-ante research impact assessment

- **Plan early for impact, at the outset of the research design:** Importance of additional social competences; anticipation of uses.
- **Involve key stakeholders (including private sector) at an early stage in the research:** Stakeholder mapping is a useful tool.

Maintaining impact focus within project implementation

- **Consider impacts in mid-term project reviews:** External reviews; opportunity to revise options for outcomes and impacts.
- **Provide project resources for 'soft factors':** Trust, network and capacity building; help of professional communication agencies and lead farmers.

Ex-post impact evaluation

- **Enrol researchers into a new 'culture of impact':** Motivation!
- **Where appropriate, conduct an ex-post Participatory Impact Pathway Analysis:** Long enough after the end of the project.

Managing research calls and funding frameworks

- **Build flexibility into calls for projects to allow for new stakeholder perspectives:** Changing circumstances, e.g. concerning markets and policies.
- **Design funding frameworks to gain early involvement of the private sector:** Prior to design of the projects; tensions and possible trade-offs between long-term public and short-term private interests.
- **Monitor research output with data collection tools and protocols at early stage:** Effective information management systems needed.

Disclaimer:

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CONTACT Professor Peter Midmore
Aberystwyth University
Email: pxm@aber.ac.uk
Aberystwyth, SY23 3AL Phone: +44 (0)1970 62 2251

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