

# Evaluation of Medium-Long Term Effects of Innovation Interventions in Rural Development Programmes: The Use of FADN

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**Abstract:** The novelty of interactive innovation model in the European innovation policy 2014-2020 calls for new evaluation arrangements in view of assessing its implementation and performances on farms and productive sectors. The purpose of the study is to explore the utilization of the FADN to assess, at farms level, the effects of innovation projects implemented under RDPs 2007-2013. The Farm Accountancy Data Network (RICA), appropriately matched with the data collected in the database of measure 124, offers the possibility of using a huge accounting data of beneficiaries in order to evaluate the effects of investments on farms. Indeed, the RICA database includes also a lot of environmental data, which allows us to state some judgments on the environmental impacts of innovation measures. However, these data do not allow a full analysis and need to be supplemented by ad-hoc recognitions and direct surveys on beneficiaries in order to further discuss generic indicators and, thus, to explain and validate their reading. The study offered the opportunity to explore the extent to which the FADN could be used for the evaluation of the impact of innovation and the need for further data collection, both quantitative and qualitative, aimed at completing, validating and explaining the information included in the RICA database. The work has allowed to start a modeling on the basis of FADN data, which henceforth will be used in the on-going evaluation of innovation interventions.

**Key words:** Evaluation, FADN, cooperation for innovation, interactive innovation model

## Introduction

Innovation is a key element to face future challenges, as highlighted in the “Europe 2020 Innovation Union” flagship initiative (European Commission, 2010), which introduces the European Innovation Partnerships (EIP), proposing a new approach to the definition of EU research and innovation pathways.

The orientations of the EIP-AGRI (agricultural EIP) go beyond the “linear innovation model”, fostering an “interactive innovation approach” aimed at speeding up transfer from research to practice. The EIP-AGRI focuses on bottom-up approaches and multi-actor partnerships aimed at linking and engaging farmers, advisors, researchers, businesses, and other actors in practical projects, through the Operational Groups (OG).

Such an approach aims not only at encouraging the co-creation of innovation and applicable solutions but also at speeding up the generation and dissemination of new insights and innovative ideas. Moreover, it contributes to ensure greater effectiveness in the definition of research and experimentation areas under Horizon 2020 and, in general, to raise the attention and understanding of researchers to practical problem-solving.

Under the rural development policy several measures have been designed to stimulate innovation, in particular the cooperation measures (Article 35) supporting the establishment of “Operational Groups”, as well as pilot projects and the development of new products, practices and processes.

The novelty of the OGs calls for new evaluation arrangements in view of assessing, both on a qualitative and quantitative level, the implementation of innovations and their performances on farms and productive sectors (Cristiano and Proietti, 2014a; TAP, 2016; EC, 2015; Impresa project EU, 2016).

In principle, the performances should be assessed against the main objectives of the EIP-Agri and of the measure 16, which are the achievement of competitive and sustainable farming and forestry, through promoting agricultural innovation which is more resource efficient, productive, low emission, climate-friendly, and resilient, and that operates in harmony with the essential natural resources on which farming depends.

Given these objectives, the assessments of the effects of innovations and of the participation of farmers to OGs at farm level should embrace the viable, social and relational dimensions of farm development, in order to achieve the increase of innovative capabilities, capacities of entrepreneurship and competitiveness of farms. Furthermore, the investigations on economic and environmental dimensions should allow assessing the extent to which the innovations address specific problems and/or opportunities of farms' development and sustainability: farms' profitability, productivity, margins, environmental sustainability (Cristiano and Proietti, 2014a).

Also, there is the need to take adequately into account the possible influence, on farms performance, originated by new interaction processes among the actors of the GOs, trade-offs and synergies.

This multi-dimensional analysis requires, evidently, the definition of an evaluation framework which uses of a mix of methods and techniques (Birner et al. 2016).

In this view, the evaluation of the experiences co-financed by measure 124 of the RDPs 2007-2013 can be used as a reference. In fact, the aim of measure 124 "Co-operation for development of new products, processes and technologies in the agriculture and food sector and in the forestry sector" was to promote the co-operation between primary producers in agriculture and forestry, the processing industry and/or third parties, in order to develop new products, processes and technologies in the agricultural, food and forest sectors.

However, in 2007-2013 RDPs evaluation arrangements were minimal and focused on the financial inputs and physical outputs of measure 124, while the economic and environmental effects of innovations at farm level could not be fully investigated. The main limitations to the assessments of innovations' effects at farm level are clearly reported in the ex post evaluations of RDPs and can be summarized as follows: (1) due to the pre-competitive nature of the measure, the level of farms' investments on innovations were very often too limited to influence significantly the increase of net added value of farms; (2) effects of innovations on farming can be observed mainly in the medium and long-term period; (3) the lack of specific indicators hampered the analysis of the links between the farms' performances and the innovations implemented at farm level; (4) costly and time consuming analyses inhibit the conduction of specific assessments at farm level.

In order to solve these problems there is the need of adequate micro-economic data. Such kind of data are generally collected by the Farm Accountancy Data Network (FADN), even if they are not focused nor adapted to give information on innovation.

The FADN is a sample survey made annually and carried out to collect information on income and economic performance of farms in the European Union and can meet the demands of programming and evaluation of public administrations of Rural Development Programmes. The sample surveys are carried out with a uniform methodology, which is in full compliance with the requirements of statistical representativeness (European Commission, 2012)<sup>1</sup>.

Indeed, over time, the use of FADN for evaluation has increased in Europe and the European Commission itself. Until 2003, the FADN was only used for economic analysis focused on the incomes from agricultural production; then, also in response to the specific requests of the European Court of Auditors (ECA, 2003), it started to serve analyses on farms' multi-functionality through the collection of information on other gainful activities (such as farm tourism, processing of products, farm sales).

Also, since the FADN collects lots of structural and environmental information on farms and practices, its use was largely extended to assess the environmental impact of the CAP and other matters, such as the effects of direct support on incomes, of organic farming, of measures applied to the dairy sector, of the farm advisory services systems.

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<sup>1</sup> In Italy the FADN is operated under the responsibility of the national Consilium of Research in Agriculture – Policies and Bioeconomy (CREA-PB).

Across the years, in some Member states the FADN was adapted and detailed in order to address specific needs for information of farmers, policy makers/analysts and evaluators. On this point, FLINT (Poppe et al. 2017) states that in a certain number of MS the enlargement of the scope of FADN brought to the actual availability of data related to new policy topics, such as agricultural machinery and building, livestock and crop production, organic farming, manure, slurry and energy consumption and quality of life.

Very recently, the FP7 FLINT project highlights the present-day of the FADN for analyses at farm level, since it “explicitly considers the heterogeneity of the farming sector in the EU and makes a large variety of policy analyses possible” (O’Donoghue et al., 2017).

However, the European Court of Auditors (ECA, 2016) and evaluators of rural development programmes still highlight limitations in available data for monitoring the performance of the CAP towards its objectives and the lack of adequate micro-economic data and relevant indicators for the evaluation of new policy topics (Latruffe et al., 2016).

Particularly, for the specific case of innovation, at this time, the FADN does not provide any specific information on the adoption of innovation at farm level except by using the investments in assets as a proxy (van der Meulen et al., 2016).

However, the adoption of innovation *per se* does not allow to assess its effects at farm level neither the addressing of specific problems/opportunities by the farm.

The purpose of this study, that is still going on, is to address this last point by exploring the utilization of the FADN to assess the technical, economic and environmental effects of innovations at farms level<sup>2</sup>.

This is done through using a sample of FADN farms which applied to measure 124 of RDPs during the programming period 2007-2013 (Cristiano et al., 2015).

The results of this study will be possibly used for the adaptation of the national FADN survey to the needs for information of the Managing Authorities of the RDPs and for the evaluation of the EIP-Agri and OGs.

## Methodology

In Italy, the FADN has been implemented beyond the legal basis, allowing to feed specific databases for evaluation uses (ex-ante and ex-post evaluations) and for the definition of farms’ simplified balance sheet (SBS). The last is a tool which serves the assessments of the level of competitiveness of farms, through aggregating the information collected into an economic and capital situation according to a typical balance sheet scheme. Also, the GAIA software is a tool which offers a set of analytical information on farms accounting and technical arrangements and allows to trace the margin costs and incomes related to the specific productions and the different segments farming practices.

This research steps from the assumption that a specific innovation should bring to changes that can be observed at farm level and measured through relevant economic, technical, environmental and/or social indicators. To this purpose a number of relevant indicators have been identified on the basis of the thematic areas of innovation (according to the USDA classification<sup>3</sup>) corresponding to the investments applied by a sample of farms.

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<sup>2</sup> This study is a continuation of the analyses on the on-going implementation of innovation projects, which allowed to capture descriptive and relational information about organizational models of cooperation, with a focus on farmer’s empowerment and knowledge exchange arrangements, as well as about roles and functions played by different actors, with a focus on innovation brokerage and networking (Cristiano and Proietti, 2013, 2014b; Cristiano, Proietti and Striano, 2015).

<sup>3</sup> USDA classifies innovations on the basis of areas of problems and it has a certain level of detail.

Based on the methodology already used in other studies (Borsotto et al., 2017), the economic, technical and environmental analysis of a certain number of farms included in the FADN is being carried out using the Simplified Balance Sheet (SBS) procedure<sup>4</sup>.

In fact, the SBS provides a number of relevant indicators which cover economic and environmental topics, such as: use of pesticides, nitrogen balances, water consumption, greenhouse gas emissions, farm practices with respect to soil erosion, intensive farming, farm mechanization, soil organic matter, use of advisory services, family and female labour force, quality certifications.

The relevant information is being collected through direct interviews to the farmers and the data are processed through the specific web application that generated the SBS for each case study.

Particularly, the case studies is being carried out in order to: 1) investigate, better and together with the farmers, the characteristics of the innovations and the effects on the company level; 2) to test the methodology developed for assessing the economic and environmental effects of company-wide innovations.

All case studies have been selected from the FADN sample of companies that had access to measurement 124.

The choice of case studies has not been defined by statistical sampling methods. Given the sensitivity of the data required to the business owners and the time they required to collect budget information, the choice has been rather guided by practical business opportunities. Therefore, the survey involve farms with which the FADN detectors have direct contacts and trust relationships. Farms have been selected in different regions and have different economic dimensions and type of farming (TF).

Structured questionnaires are being provided to the farmers in order to collect relevant data on the farms' structural, economic and management aspects and production processes.

Based on this data, the farms' SBSs are being defined to determine the farms profitability and production costs.

## **Results**

At the moment, 4 case studies have been finalized.

The first results of analysis highlight a number of challenges in using the FADN for the purpose of measuring the effects of innovations at farm level.

### *The need for an analytical accounting and technical methodology*

The current accounting methodology is certainly not appropriate to capture the effects of innovations at farm level, due to the wide diversity of the types of innovations and to the marginal contribution of certain innovations to the added value of the productions.

In fact, as resulted also in previous studies (Cristiano and Proietti, 2017) and ex post evaluations of RDPs, around of 70% of the innovations applied in RDPs are process innovations, meaning that they were related to production methods (improving cultivation techniques, introducing control tools, improving processing techniques, marketing procedures, or organizational structure) aimed at creating an “internal” competitive advantage by enhancing the efficiency, or reducing costs and working time, and so on.

Certainly, many of these internal changes can be observed through the FADN, for example through analyzing sectoral outcomes that can be connected to specific innovations. In one of the analyzed cases, for example, innovation in seed sowing (sod seeding) was assessed through the gross margin, with the attribution of man/machine hours related to the production process, highlighting the reduction of production costs and of man/machine hours in the crops sown with new techniques. Thus, given the diversity of incremental and process innovations often applied in rural

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<http://www.bilanciosemplificato.inea.it/>

development, a proper classification of the innovations is instrumental to link the most appropriate indicators to the expected performances of the investments at farm level.

Moreover, the collection of a huger amount of micro-economic data and the implementation of more analytical accounting methodology would certainly detect the most appropriate parameters and would allow capturing the effects of the specific innovations along the farms' value chains.

#### *Assessing the contribution of a specific innovation to farms' changes is challenging*

In some cases, farms' changes and performance can hardly be directly attributed to the implementation of a specific innovation. This is mainly due to the fact that the changes could be the results of a range of types of innovations and/or, even of investments, applied by the farmers in the period between the starting of the specific innovation and its ending. Too, as emerged from the implementation of measure 124 in RDPS 2007-2013, innovations require a medium-long period for implementation and for entry in regime, depending also on the typology.

In fact, in the case studies, we encountered an inherent difficulty in attributing certain results to a specific innovation, rather than to other investments or strategies realized in the same period, in order to meet regulatory constraints or to pursue new opportunities, etc.. Moreover, the farmers themselves show a remarkable difficulty in perceiving the exact economic dimension of innovation in the overall farm performances.

In this case, the measurement of ex-ante and ex-post economic-environmental data is not enough, but it is necessary to apply an annual accounting monitoring in order to identify changes related to different choices and investments, beyond the specific innovation, so as to attribute the real effects as carefully as possible.

Also, even the collection of micro-data and analytical accountancy at farms level could not fully address the issue of assessing the contribution of a single innovation to the observed performance.

#### *Assessing synergies and side-effects of interaction*

The interactive innovation can very possibly cause synergies and side-effects within the partnerships which influence the farmers' global performance and entrepreneurships.

In fact, the interactive innovation improves the relationships with all the different partners by triggering various kind of agreements and transactions involving, not only to informative, but also organizational or commercial aspects: agreements for raw materials supply (eg. animal feed), organizational arrangements (eg. joint purchase of machinery), creation of logistic platforms in favor of the group and so on.

Therefore, cooperation for innovation boosts farmers' ability to "adopt a systems approach", thus increasing the global performance of the group.

From this perspective, the effects of innovation can be witnessed not only on a single farm, but on a group of them, producing different impacts on the individual farm's systems.

Moreover, the interdependence between the different partners directly affects individual farm results. The farm does not innovate on its own, but innovates as a group.

Therefore, synergies and side-off effects of interactive innovations should be appropriately assessed and attributed to the specific investments through OGs.

Here the FADN very rarely can help.

## **Discussion**

These findings focus on some key points:

- the need for a systematic and concurrent Monitoring and Evaluation of innovations at farm levels;
- the need to grasp synergies and side-effects of interaction;
- the challenges in performance analysis.

Are farms' changes a matter of contribution analysis?

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