

Decision model to weight indicators for monitoring Responsible Research and Innovation in national R&D systems: the Spanish case

ABSTRACT

This study proposes a decision model based on Analytic Hierarchy Process to weight indicators in the field of Responsible Research and Innovation (RRI). The set of indicators proposed so far to monitor RRI initiatives by the Expert Group on Policy Indicators for Responsible Innovation of the UE are considered too large to be used at a cross-cutting level in certain R&D schemes. Therefore, in this paper we propose a methodology based on AHP and a group of stakeholders to select those more relevant in each R&D context by assuring an appropriate coverage of the issue.

Keywords: Analytic Hierarchy Process, Policy Evaluation, Responsible Research and Innovation indicators

1. Introduction

The increasing interest on promoting RRI by the European Commission (EC) has implied the appointment of an expert group to set indicators to monitor the impact of such initiatives. As a result, a list of one hundred indicators has been proposed (Expert Group on Policy Indicators for Responsible Innovation, 2015). The indicators cover the process, outcomes and perception about eight areas related with RRI: governance, public engagement, gender equality, science education, open science/access, ethics, sustainability and social justice/inclusion. To facilitate the monitoring of these areas, the selection of smaller set of indicators adapted to the reality of each R&D context has been suggested (Expert Group on Policy Indicators for Responsible Innovation, 2015). This study aims to propose and test a decision model to weight the most relevant indicators to monitor national R&D initiatives using the case of Spain as an example.

2. Literature Review

The idea of RRI has become of increasing interest within the EC policy in the last years. RRI implies processes that allow those who initiate and are involved in them at an early stage (A) to obtain relevant knowledge on the consequences of the outcomes of their actions and on the range of options open to them, (B) to effectively evaluate both outcomes and options in terms of ethical values, and (C) to use these considerations. A & B considered as functional requirements for design and development of new research, products and services (European Commission, 2013). RRI based governance processes are expected to meet the criteria of anticipation, reflexivity, inclusion and responsiveness (Stilgoe, Owen, & Macnaghten, 2013). Efforts to propose indicators to monitor RRI initiatives have result in a large set of items and it has been suggested that smaller sets should be considered to assure manageability and the successful implementation of

monitoring of RRI as a cross-cutting principle of research programs, i.e. Horizon 2020 (Expert Group on Policy Indicators for Responsible Innovation, 2015).

3. Hypotheses/Objectives

This study aims to test a decision model to select the most relevant indicators to monitor RRI initiatives and to demonstrate the following hypotheses regarding RRI initiatives:

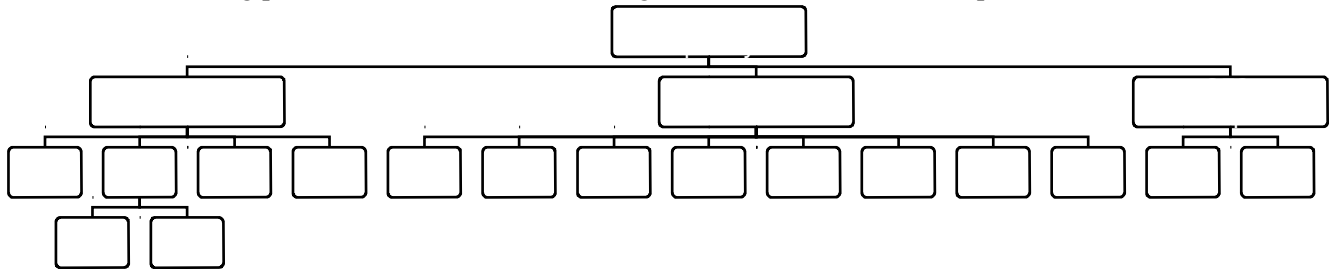
- 1.- The indicators to monitor RRI are not equal in importance in different contexts.
- 2.- The indicators to monitor RRI can be prioritized.
- 3.- Specific sets of indicators to monitor RRI can be proposed for each R&D context.

4. Research Design/Methodology

This study has considered the list of indicators provided by the report “Indicators for promoting and monitoring Responsible Research (Expert Group on Policy Indicators for Responsible Innovation, 2015). The set included more than one hundred indicators divided in eight areas. In the area of (environmental) sustainability, there were not concrete indicators provided so they have been proposed by an expert on environmental assessment. One expert per area has prioritized the indicators of each area according to the proposed AHP model. After analyzing the results we provide a reduced context-based set of indicators to easily monitor the process of measuring the impact of RRI policies.

5. Data/Model Analysis

The AHP model is composed by eight sub-models for each of the eight areas. The following picture shows the sub-model of gender indicators as an example.



6. Limitations

For this present work we have contacted only one expert per RRI area. We know one expert is not enough representative of the group of stakeholders, so we will interview at least two more experts of each group for the future development of this study.

7. Conclusions

The study has demonstrated that the methodology is suitable to weight indicators in a concrete R&D context as the Spanish national. As a result we have obtained a set of weighted indicators that will make easier to monitor the cross-cutting RRI initiatives in Spain. The experts have respond with no difficulties the questionnaires elaborated for each area and have assessed their participation in the study as positive.

8. Key References

European Commission. (2013). Options for Strengthening Responsible Research and Innovation. Retrieved from https://ec.europa.eu/research/swafs/pdf/pub_public_engagement/options-for-strengthening_en.pdf

Expert Group on Policy Indicators for Responsible Innovation. (2015). Indicators for promoting and monitoring Responsible Research and Innovation Report from the Expert Group on Policy Indicators.

Stilgoe, J., Owen, R., & Macnaghten, P. (2013). Developing a framework for responsible innovation. *Research Policy*, 42(9), 1568–1580. <http://doi.org/http://dx.doi.org/10.1016/j.respol.2013.05.008>