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Content analysis of institutional policies on open science[1]

Alejandra Manco Vega

*alejandra.manco-vega@univ-lyon1.fr
ELICO, University of Lyon 1, 43, boulevard du 11 novembre 1918, Villeurbanne 69100 (France)

Introduction

In the context of transnational policy transfer (Stone, Porto de Oliveira & Pal, 2020). Open science is gaining traction worldwide, with open science policies being enacted at institutional, national, regional, and international levels. Nevertheless, open science has both a bottom-up and a top-down policy approach. While the practical implementation is by far a bottom-up affair, national policies and strategies and all kinds of policies overall are top-down issue (Méndez, 2021). Likewise, it is argued that institutional open science policies can only be successful if they are developed in close collaboration with researchers rather than from the top down (Ali-Khan et al., 2017).

During the last ten years, many institutions have begun to design, adopt, and implement open science policies (Schmidt et al., 2018) (Kretser et al., 2019). This research aims to investigate the institutional policies, declarations, and position statements of research institutions on open science from different countries: Brasil, France, Peru, and the UK. More specifically, this study analyzes institutional open science policies in regards to five main aspects: open science definitions, open science components available in the institutional open science policies, policy intertextuality, and how these policies are intertwined with other issues such as social, educational, economic or even political contexts.

This research provides an understanding of what diverse research institutions mean by open science, how such policies and declarations influence researchers and interact with funders and government policies, and how open science is framed in the context of broader social dynamics in science in different countries. In addition, it provides an overview of the critical characteristics of open science institutional policies from various countries to aid in filling the current gap in the literature about open science policy implementation. Therefore, adding more diversity to the empirical studies on this specific subject.

Methods

This poster uses document analysis as a research method. Document analysis is a technique that evaluates online or printed documents. It is a low-cost method of getting empirical data in a nonintrusive and nonreactive manner (Bowen, 2009). It is especially suited for qualitative documentary analysis of policies (Cardno, 2018).

Data collection for the document corpus from the institutional policies was made in different stages:

1. Using the QS World University Rankings 2022 as a guide, we determine the top 20 universities in each of the four selected countries.

2. The document corpus was constructed using a search strategy for each university. Each university's search strategy is as follows: we'll try each search to discover a policy for each university we've identified. If none are discovered after the last phase, we will conclude that no open science policy has been discovered.

2.1 For each university, we will attempt these searches to find an open science policy. If none is found after the last step, we will identify that no open science policy was found.

Search 1: search google using [University name] AND open science policy (or its local translation)

Search 2: Go to the university's website and search [open science policy] (or its local translation).

3. Compiling and managing the documents into a spreadsheet to organize them and then start metadata extraction of the documents.

4. Documents importation to Nvivo software.

5. The coding process for thematic categorization was made using an inductive category development approach using the software Nvivo 12.

A total of 31 documents were retrieved after the search process. 16 from France, 14 from the UK, 1 from Brazil, 0 from Peru.

The specific research questions are addressed in Table 1:

Table 1. Research questions

Area	Research questions
1. Open Science definitions	Which is the open science definition in the policies? What is the aim of the policy and its possible outcomes? How do institutional policies discuss open science?
2. Open Science components	Which are the open science aspects emphasized in the documents? Which are the approach and components mainly highlighted in these open science policies?
3. Researchers	How does the open science institutional policy addresses the researcher's career in benefits and progress?
4. Policy intertextuality	What is the relation between the institutional policy and the national/regional declaration, a policy? legislation on open science? or other internal documents/policies? If mentioned. How does the institutional OS policy intertwine with the national research infrastructure? If mentioned.
5. Relation to other issues	How are these policies related to the country's overall science policy and social/economic/political contexts? If mentioned If mentioned, how is the communication with the general public framed in the policy?

Results

Open Science definitions.
All institutional policies have their open science definition. One common issue is that this concept is defined in terms of opening research outputs. Moreover, the main difference between French, Brazilian, and British documents is that the term refers to the same concept: open science and open research.

The definition of open science is intertwined with a transparency in science claim. It is argued that transparency in science is improved via open science. Moreover, transparency is associated with research quality, rigor, and significance. More effective and visible science are also brought as aims of the different policies. Similarly, it is heavily intertwined with the notion of research quality. Open science is perceived as an element of achieving high-quality research.

Other aims of the open science institutional policies that are not so popularly mentioned are access to knowledge maximization, providing accessibility and discoverability, enhancing knowledge sharing, and the universality of research. It is sometimes addressed as a reference framework to guide scientific practices.

Institutional policies discuss open science through its different strategies. These different strategies focalized mainly on changes in the evaluation elements for research assessment,

enhancing internal communication and collaboration, Ph.D. students training in open science, offering support to researchers, and skills development and training in software. Other strategies not so popular in the policies but still seldomly mentioned are creating a dedicated open science page, funders seeking, and library engagement with open science.

Open science components.
The open science aspects emphasized in the documents are open access and open research data. However, only seldomly other components such as methodology, protocols, documentation, laboratory notes, software, metrics, licenses, patents, and citizen or participatory science are also stated.

The primary rationale for the existence of open access to scholarly outputs existence is the fact that it is financed mainly with public funds. It is also presented that open access increases citations and its visibility in the academic world.
The issue of Article Processing Charges (APCs) is treated directly in French institutional policy documents. Publication in journals with APCs is strongly discouraged in French policy documents as this type of publication involves additional costs that are difficult for an institution to control. Nevertheless, some institutions also envisage a fund and a framework for managing these supplementary publication costs. Along the same lines, favoring open access publication rather than a hybrid journal is also preferred in French policy documents. On different lines, in the case of UK policies, the term gold open access is already an interchangeable term with the APCs publication model.

The emphasis is made on research data management and its principles. Data re-usability and the issue of adjusting research data to the different standards of scientific communities are proposed in the aims of the research data policy.
There are also references to the universities' research data management policy documents. Especially highlighted in the UK open research policy documents. Research data plan in the institution is a popular mention in French documents.
The policies usually further explain data storage, stewardship, and curation requirements. Data repositories are often mentioned as mainly belonging to the university as the most critical place in UK policies; other international data repositories such as Zenodo are displayed in other documents. In French documents, the CNRS will be responsible for creating a generalist data repository. Further reference to the FAIR principles is almost always present.

The other components in the policies are shared protocols, laboratory notes, metrics, licenses, patents, and citizen or participatory science, although not widely mentioned. Furthermore, open publishing is also mentioned as a component in the policies; one part of this concept is the assistance provided to the university-sponsored publications as they adopt the principles of open science and provide a platform for dissemination; therefore, it is intertwined with open access. Finally, open-source software is mentioned concerning research and research support projects and editorial platforms.

Researchers.
Institutional open science policies address the researcher's career as responsible research assessment. However, this issue is primarily discussed in French documents.
To rethink the evaluation of researchers by adopting criteria that align with the goals of open science and accounting for their contributions to open science in the assessment. It is starting to introduce the open science criteria in the evaluation of researchers and research units.

There is a specific mention of harmonizing rewards for open science, including alterations to the current mechanisms for scientific evaluation and compensation. It is further argued that the assessment of the scientific content must serve as the foundation for the review, leaving behind the impact factor. Moreover, it is also asserted that every type of research output must be valued in the evaluation process.

Policy intertextuality

Institutional open science policies have many intertextual relations. Regarding relations with declarations, French institutional open science policies usually adhere to the Jussieu Call for Open science and bibliodiversity. While policies from the UK and Brazil mention San Francisco Declaration on Research Assessment (DORA) as a critical antecedent.

On an international level, the Brazilian open science declaration relates to the UNESCO recommendations on open science and the UN's 2030 Agenda for Sustainable Development. Moreover, the document from Université de Lille (2021) relates open science as providing a helpful global framework and instruments for influencing national laws and practices, especially in the North-South debate.

Regarding national references, in France, the law for the Digital Republic of 2016 (Loi pour une République numérique) is usually mentioned as a critical antecedent for the policies. On the other hand, institutional open science policies from other countries do not mention a specific national law. Moreover, French institutional policies are aligned with the CNRS roadmap for open science (Feuille de route pour la Science Ouverte) and the National Plan for Open Science (Plan national pour la Science ouverte). Regarding the policies from the UK, some of them are aligned with the position of the LERU, The League of European Research Universities, and in one specific case (Lancaster University, 2022) with the UK Research and Development Roadmap.

Regarding regional alignments, Plan S is mentioned in a couple of French institutional policies (Université de Lille, 2021) (École des Ponts ParisTech, 2019), which is mentioned as a means to free and immediate dissemination of publications related to research funded by national and European funding agencies. Another mention is the plan Horizon 2020 as an antecedent for a regional effort regarding open science.

There are several ways in which the institutional Open Science policies intertwine with the national research infrastructure. The need for public research data infrastructures is usually mentioned in the policies of French institutions. Also, the importance of the European Open Science Cloud (EOSC) and the HAL archive and its interoperability with other repositories is brought up. The Brazilian declaration emphasizes the importance of sharing open infrastructure for supporting research.

Relation to other issues: science policy, social, economic and political contexts, communication with the general public.

There is no specific mention of the overall science policy. However, guidelines mention the institution's engagement with the open science ecosystem, significantly aiding projects and participating in the global, local, national, and regional efforts.

The only Brazilian open science declaration is from the Universidade São Paulo (USP) (Universidade São Paulo, 2021). It is also notable that this is the only document that mentions equity, diversity, and inclusion as inherent to open science and further discusses the social

impact of science, especially its implications for the development of nations. Finally, the policies do not discuss further economic and political contexts in detail.

In most policies, the communication issue is related to internal communication; between other researchers and within the academic community, i.e., the university. However, the subject of the general public -society overall- is related to the idea of making science accessible to all and not specifically to science communication.

Discussion and conclusions

This poster suggests that open science is defined as opening research outputs in the different institutional policies. Therefore the main open science components developed in the guidelines are open access and open research data. Other open science components are only very seldomly developed.

As for the different intertextual relations of the institutional open science policies, it is evident that some references are repeated as key antecedents, and others are highly particular to each case. For example, the Brazilian institution's declaration on open science relates to the international organizations point of reference, while the other institutional policies do not mention this. This suggests a case of policy transfer up to a certain degree (Stone, Porto de Oliveira & Pal, 2020).

It is possible to observe that in the French case, the interest in open science is a strategic goal for the government through a top-down policy (Méndez, 2021) approach with laws, roadmaps, and the national plan for open science to which the different institutional open science policies are aligned.

No other open science-related documents were found for the universities in Brasil and Peru. However, it is evident there is an interest in the subject since there are activities about this issue carried out in the different research centers. Furthermore, in both cases, there are notably already several policies related to open data and open access. Rezende & Abadal (2020), Oliveira, Ribeiro & de Oliveira Santos (2021), Babini & Rovelli (2020) have done extensive work on the regulatory frameworks, open access, and open data policies analysis in the Brazilian case, while Babini & Rovelli (2020) examine policies related to open access and open research data in the Peruvian case. The absence of policies in the South American cases may indicate that even though the subject of open science is extensively discussed, it is still not materialized in action.

Finally, further research would be needed to discover the nuances in the open science policies in the different institutions, countries and regions and their evolution over time.

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