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Composite indicators for monitoring regional development – seven years of Portuguese experience

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A comprehensive view of progress – from economic growth to development

The need to adopt a more comprehensive view of progress rather than focussing on traditional indicators such as GDP is becoming increasingly consensual around the world (European Commission *et al.*, 2007; Stiglitz *et al.*, 2008). Within this multidimensional approach, development takes place in a global and increasingly integrated international context in which territories compete among them and sustainability issues become particularly relevant.

Following the point of view of territorial cohesion, development relies on a threefold dimension – economic, social and environmental sustainability (European Commission, 2014: 17) – with the overall development in each region being the joint result of the regional performance on three major components:

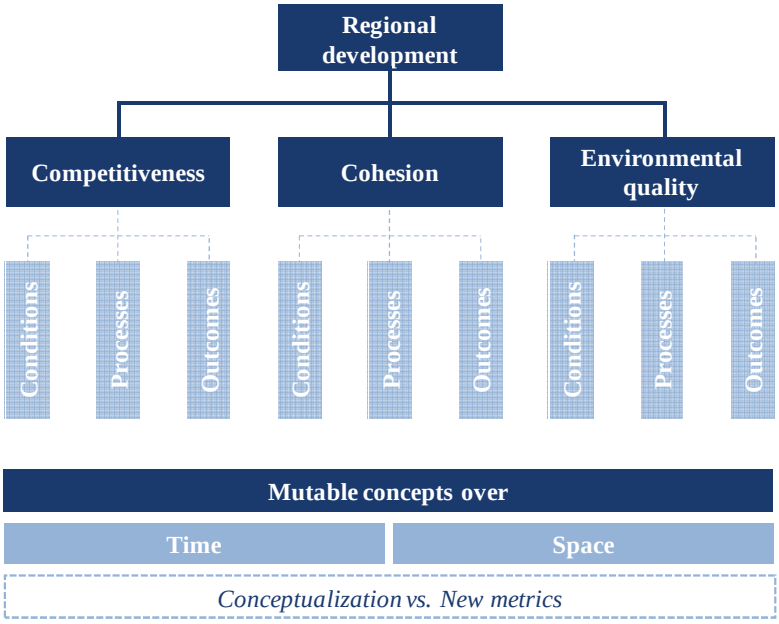
- *competitiveness*, which gives rise to the ability to penetrate markets and to generate economic growth;
- *cohesion*, which results from acceptable and equitable living conditions and thus fosters the conditions for a sustainable economic and social reproduction and territorial attractiveness;
- *environmental quality* expressed in an integrated platform that uses both environmental living conditions in the region, and environmental sustainability of broad (economic, social and territorial) development process.

Moreover, each of these three components on which development relies (*competitiveness*, *cohesion* and *environmental quality*) should account for the interaction of *conditions*, *processes* and *outcomes*.

According to this conceptual framework, each component reflects the role of different factors considered crucial for development: the potential resources (the *conditions* for development), the behaviour of political, economic and social players (the *processes*) and their effectiveness in terms of *outcomes* (Mateus *et al.*, 2005). In other words, the development of each region must be understood as the joint and interactive product of the *conditions* for a better regional performance; of the agents' behaviour, especially private and public policies, which represent the *processes* intended to make the best use of the existing conditions, leading to *outcomes*, which express the effectiveness in the improvement of regional well-being and sustainability.

Since statistical and conceptual constraints do not always permit this ideal formulation, these sub-components are not computed (Figure 1). Thus, the composite indicator, ISDR, presented in this paper, although conceived with a three-tier theoretical structure, has two empirical levels in the sense that the overall development estimated for each region results from the region's performance with regard to the three components: *competitiveness*, *cohesion* and *environmental quality*.

Figure 1 – A multidimensional approach to regional development



Furthermore, when dealing with complex phenomena as development, one should consider that the concepts at stake are mutable over time and space, in order to assure that the distance between the conceptual outline and the metrics used is minimized. As for the time dimension, a proper metric for development should account for both the state of the relevant theoretical literature (like the current awareness of the need to go beyond traditional indicators) as well as for emergent phenomena such as globalization and the environmental issues. With regard to the space dimension, territorial assets do matter to define the conceptual approach of regional development. Therefore, the process of translating concepts into new metrics must take into account the territorial scale, due to the effects that a specific governance model implies to achieve regional progress and due to the influence of the territorial organisation of structural assets in spatial interaction and hinterlands. Moreover, whether the scope of the investigation is national, as the case of our composite indicator, or an international one (as discussed in Vala and Pinho, 2011) also matters to properly determine the relevant conceptual framework.

Composite indicators – a new opportunity for National Statistical Systems

Composite indicators are particularly appealing for monitoring multidimensional phenomena and as the result of the aggregation of primary indicators they have become widely used to assess territorial units' performance in various areas. The main strength of composite indicators is their ability to integrate large amounts of information into easily understood formats, and so to transform information into knowledge both for analytical and political purposes (OECD, 2003: 3). This feature makes composite indicators an element that simplifies the analysis of complex phenomena, particularly those concerning the support of objective assessment of multi-dimensional phenomena. From the territorial point of view, composite indicators are particularly attractive in the sense that they allow the ranking of territorial units' performance and the assessment of changes over time. Following this line of reasoning, composite indicators represent a new opportunity for National Statistical Systems.

The Portuguese regional development composite indicator (ISDR) was first released by Statistics Portugal in 2009, as an experimental exercise (Bohata *et al.*, 2012; DGINS, 2015) based on a partnership with a national public agency for development planning (a body of the Ministry of Environment, Spatial Planning and Regional Development) taking advantage of the expertise of

both institutions in the field of statistics and territorial analysis. The aim was to provide a tool to monitor regional development and thus inform in a simple manner both policymakers and citizens about the progress achieved with regard to development. In fact, such a composite indicator can be used to support the contextual analysis of public policies with territorial impact but, besides policymakers, may also be meaningful to other agents with an interest in territorial matters.

This goal of producing a regional development composite indicator was in line with a wider discussion, involving both statistical offices and governmental agencies, on the need to monitor development in a multidimensional perspective, by taking into account economic growth, social conditions and environmental sustainability. As it happens, regional development issues are increasingly placed on a new perspective: their context is now marked by international economic integration and growing competition among territories, as well as by the increasing importance of environmental issues.

In its first application, the Portuguese regional development composite indicator reported results for 2004 and 2006. It was computed for the, at that time, 30 Portuguese NUTS level 3 regions and estimated for Portugal and for the seven Portuguese NUTS 2 regions. These results were published in 2009.

The robustness of the composite indicator was supported not only by a sensitivity analysis but also by a joint debate over the methodological options with a group of experts in the fields of regional development and statistical analysis based on the results of the sensitivity analysis. The sensitivity analysis tested the conceptual relevance of the primary indicators (discussing the coherence between theoretical and statistical concepts and using principal component analysis and correlation analysis); the methodological options (on the normalization procedures in a static scenario and in a dynamic one and on the aggregating and weighting procedures); the joint analysis of alternative scenarios (looking into regional dispersion and volatility); and the ability to synthesize phenomena (by comparing with other composite indicators and checking the ‘fit to purpose’ consistency).

From an experimental exercise to a policy driven statistic

The quality of a composite indicator relies on the availability of relevant statistical data. Overall, ISDR comprises 65 primary indicators – *competitiveness* and *cohesion* compile 25 indicators each and *environmental quality* gathers 15 indicators. The basic requirement for selecting an indicator was its relevance to assess the dimension of development at stake (either *competitiveness*, *cohesion* or *environmental quality*) through one of the three subcomponents (*conditions*, *processes* and *outcomes*). The indicators were mainly selected from the 2007-2013 National Strategic Reference Framework (PT-NSRF) context indicator set. To avoid over-sizing the analytical dimension of each of the three components, the choice of the primary indicators was supported by an analysis of correlation between indicators. The possible existence of highly correlated indicators was studied prior to deciding on its removal, since the type of information provided by an excluded indicator is not necessarily fully achieved by the remaining ones. The 65 primary indicators were selected from both standard statistical sources (53) and administrative sources (12).

Computing a composite indicator also implies methodological options regarding normalization, aggregation and weighing procedures as well as decisions on how to display the results. This set of choices may produce a distance between the information selected to portrait a given phenomena and the indicator's final results, which has frequently led to associate composite indicators with lack of transparency and reduced robustness (OECD *et al.*, 2008). Therefore, a composite indicator should rely on sound conceptual and statistical principles that should be based upon a sensitivity analysis and an experts' review.

Specifically, within ISDR's framework, four composite indicators are produced – *competitiveness*, *cohesion*, *environmental quality* and *overall index of regional development* – on the basis of the 65 statistical indicators properly normalized (statistical standardization and minmax rescaling, with the minimum and maximum reference values extracted from the set of 65 standardized indicators for the available time span), for the Portuguese NUTS level 3 regions and with the indicators being aggregated by a non-weighted average to the dimensions level as well as from the dimensions level to the overall index level.

The four composite indicators are referenced to the national value (Portugal = 100), with the national value estimated by the NUTS level 3 regions indexes average, weighted by the resident population, and not directly obtained from the model which is exclusively applied to the NUTS 3 regions. In the same way, the values for the NUTS level 2 regions are estimated by the corresponding NUTS 3 regions average, weighted by the resident population, as a way to ensure that national values computed from each of the two geographical levels are the same.

After the release of the first exercise of ISDR, the debate continued with national and regional authorities. This debate reinforced the argument that stresses the advantages of composite indicators as tools that inform in a simple manner both decision-makers and the general public about complex phenomena and their progress, enlightening the discussion on regional development. The debate with policymakers also underlined the importance of providing a statistical tool for direct policy use on a regular basis, in order to support the contextual analysis of public policies with territorial impact (Junker, 2014; Eurostat, 2014b).

Following the debate with stakeholders, ISDR is now issued on an annual basis by the Portuguese National Statistical System – an experience of seven editions. In its first application, ISDR reported 2004 and 2006 results and was computed for the, at the time, 30 Portuguese NUTS 3 regions – those set by the European Regulation (EC) 1059/2003 of the European Parliament and of the Council –, and estimated for Portugal and for the seven Portuguese NUTS 2 regions. In June 2015, the results were for the first time computed according to the new Portuguese NUTS 3 (now consistent with the administrative associations of municipalities), set by the European Commission Regulation (EU) 868/2014, which has reduced the number of regions from 30 to 25. Given that ISDR is based on a set of 65 primary indicators, the adoption of a new NUTS framework introduced a new challenge and a test to the ability of ISDR to remain a relevant tool to support public policies. At the time, an effort was made to reduce the dissemination time lag – results are now published with a one and a half years lag.

In complement to the suitable time and space dimensions, the conceptual framework of the composite indicator must also meet the needs of policymaking. Policies are now designed to give territories equitable competitiveness and cohesion conditions over which sustainable development (territorial cohesion) may be built. In contrast to this, past policies were devised to help less developed territories achieve equal living conditions. So, nowadays, the

multidimensional approach of development stands as the appropriate way to address regional development from the public policy perspective. In this line of reasoning, the Portuguese regional development composite indicator should fit the purpose of assessing territorial cohesion.

As mentioned before, the 65 primary indicators were mainly selected from the 2007-2013 National Strategic Reference Framework (PT-NSRF) context indicators system. This system of indicators was discussed and approved by relevant public administration bodies within the scope of competences of the Statistical Council's Territorial Base Standing Section. Since the first release, ISDR is being using for monitoring the implementation of the PT-NSRF and included in the Portuguese annual reports on the financial execution of the EU structural funds.

Additionally, ISDR was considered as an *ex ante* conditionality for the 2014-2020 Portuguese Partnership Agreement (Portugal 2020, 2014: 266), due to its use by national and regional authorities. Moreover, the new local finance law (Law no. 73/2013, September 3rd) assigned ISDR with a new function in terms of policy decision-making by rendering central government grants to associations of municipalities (geographically consistent with the NUTS 3 regions) dependable on the regional performance as captured by ISDR (INE, 2015). This new use moved ISDR from the technical sphere to the centre of the political debate bringing Statistics Portugal to new dimensions of exposure. Furthermore, the preparation of the 2014-2020 Portuguese Partnership Agreement, which has emphasized the need to set the NUTS level 3 according to a relevant administrative level – the intermunicipal entities – leading to the changes set by the European Commission Regulation (EU) 868/2014, has positioned a new paradigm for regional development and territorial cohesion, underlying emerging issues that the new version of ISDR would have to portrait.

A challenge for Statistics Portugal dissemination strategy

By releasing composite indicators, National Statistical Systems take on a new challenge, going beyond the standard statistical operations and demanding the assimilation of new concepts, methodologies and procedures. The comprehensive view of progress, the time and space dimension of ISDR – regularly released with a reduced time lag and adaptable to the relevant NUTS breakdown – and the appropriate metadata provide this composite indicator with the relevant features to make it useful both to policymakers and citizens. Furthermore, these

methodological options must be followed by an appropriate dissemination strategy, which should include a communication orientation that takes into account the new functions settled for ISDR.

ISDR's yearly results are released according to the standard dissemination formats – the ones adopted for traditional statistical projects:

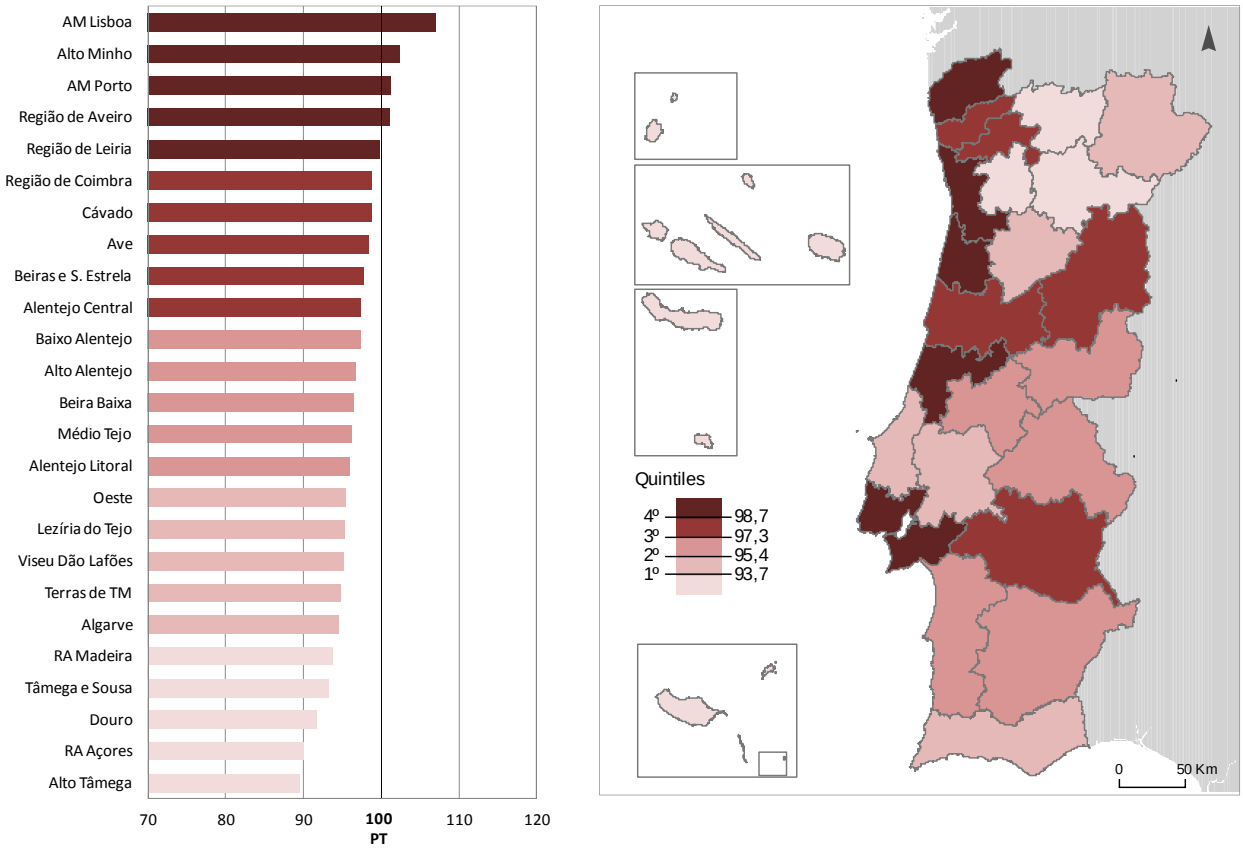
- a *press release* – a description of the results supported by graphical elements and complemented with a brief description of the methodology;
- *web indicators* – four indicators (global development, competitiveness, cohesion and environmental quality) feeding the online database at Statistics Portugal website;
- a *methodological note* – a detailed description of the methodology following a predefined template which was designed specifically for standard statistical operations and fitting less adequately the conceptual framework of a statistical study like ISDR.

All these products are available at no cost for all users.

However, as mentioned previously, composite indicators represent a challenge to official statistics dissemination strategy. First, there is the challenge of assuring transparency. Since a composite indicator is the result of a combination of various statistical sources, ideally all the primary data should be available to users. However, there are constraints in terms of confidentiality, since certain data that cannot be made available to the public, and in terms of administrative sources that produce data not necessarily fit for statistical standard dissemination. Second, a composite indicator should allow for contextual analyses, by providing user-friendly tools to enable regional performance comparisons and to obtain results according to users weighting options. Third, methodological documentation is designed to fit the features of standard statistical production and so the challenge is to communicate the metadata and quality standards that are suitable to statistical processes involving *multiple data sources* or *statistical compilations* (Eurostat, 2014a). Specifically, composite indicators' results are required to be provided together with the appropriate metadata that both reveals the methodology adopted and clearly delimits the aim and the analytical potentialities of the results. Finally, the dissemination strategy should be able to handle different production labels and particularly to fully adopt the 'fit for purpose' approach and its *differentiated quality assurance (for statistics for direct policy use, standard and experimental statistics)* (Eurostat, 2015) consequences.

Moreover, “The way composite indicators are presented is not a trivial issue. Composite indicators must be able to communicate a story to decision-makers and other end-users quickly and accurately.” (OECD *et al.*, 2008: 40). ISDR’s press release displays the results for each of the four composite indexes using appealing graphical elements (tables, charts and maps) and there is a selective presentation of metadata. As an example, Figure 2 shows the most recent results – 2013 – for the *overall index of regional development* by combining a bar chart and a map.

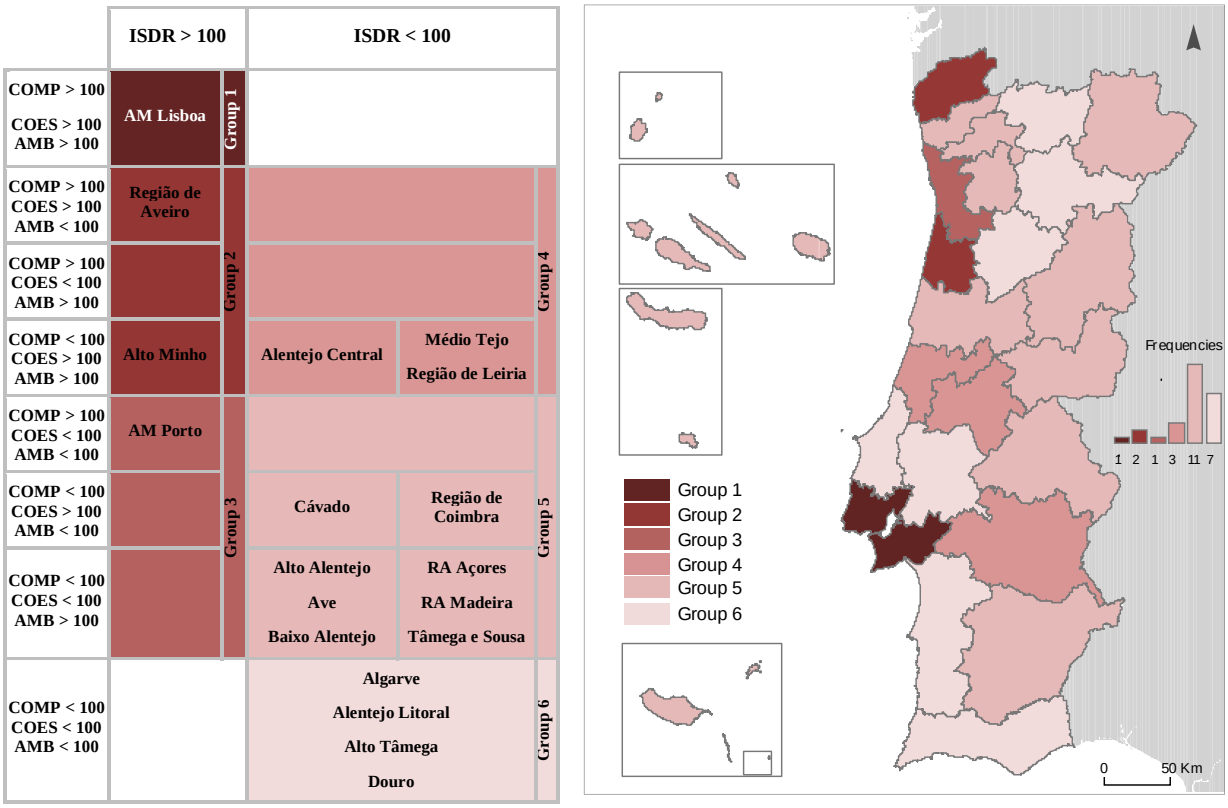
Figure 2 – Overall index of regional development (Portugal = 100), NUTS 3, 2013



Considering the need to communicate in a simple way the results of this multidimensional indicator, the outcome of the joint interaction of the three dimensions in terms of the overall index is presented using a table and a map as depicted in Figure 3.

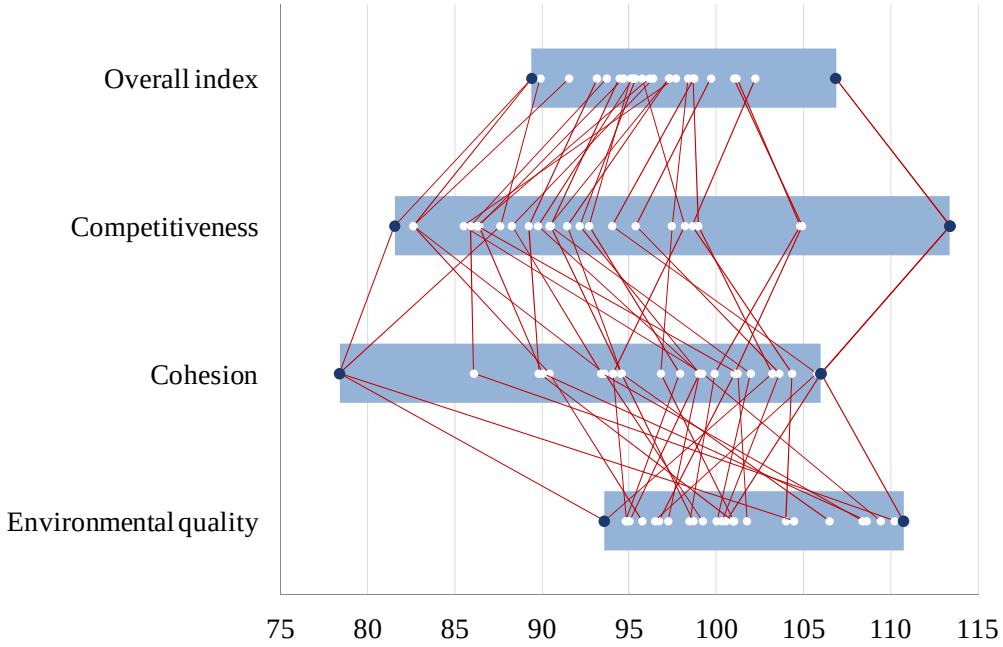
The chart allows for an immediate assimilation of the regional ranking and of the relative position of each region regarding the national average and the rest of the regions. The map portraits the Portuguese territorial pattern of development.

Figure 3 – Overall index of regional development, competitiveness, cohesion and environmental quality: performance in relation to the national average (Portugal = 100), NUTS 3, 2013



Error! Not a valid bookmark self-reference. displays the same information using an alternative chart showing a more significant regional variability for *competitiveness* and a less significant regional variability for *environmental quality*. At the same time, it depicts the complexity of regional development by portraying the variety of territorial profiles regarding the three components of development and the overall performance.

Figure 4 – Overall index of regional development, competitiveness, cohesion and environmental quality (Portugal = 100), NUTS 3, 2013



The purpose of this paper was to discuss the various relevant dimensions of ISDR's construction process with an emphasis on dissemination issues – accounting for the multidimensional perspective of development and the 'fit to purpose' goal, for a regularly release of the data, a reduced release time lag and for a relevant territorial breakdown as well as for the provision of the appropriate metadata and the need to effectively communicate of the results.

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