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How advanced are Italian regions in terms of public e-services? The construction of a composite indicator to analyze patterns of innovation diffusion in the public sector ☆

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ABSTRACT

This paper applies an open and transparent methodology to construct a composite indicator for the analysis of the diffusion of ICT in the public sector and the development of public e-services across Italian regions. This methodology, based on OECD/EC-JRC Handbook and incorporating experts' opinion into a Data Envelopment Analysis, will allow us to define a ranking of Italian regions in terms of ICT adoption and of e-service development. Data are obtained by merging four different surveys carried out by Between Co. (2010–2011) and Istat – Italy's National Bureau of Statistics (2009). We add to extant empirical literature in three ways. First, we offer a comprehensive measurement of advances in digital government that is not circumscribed to a single domain (e.g. administrative procedures of public administrations) but is rather aimed to capture a wide spectrum of public e-services (e-government, e-education, Intelligent Transport Systems, e-health). Second, we tackle a major drawback of existing statistics and benchmarking studies which are largely based on the count of services provided online, by including more sophisticated indicators on the quality of services offered and on back office changes. The results – both in terms of scores and regional rankings – highlight the presence of different patterns of adoption and use of public e-services at the local level. Third, we offer a rich account of the extreme heterogeneity of public e-service development and of the underlying technological and organizational change at the sub-national level, and hence provide a basis for the differentiating policy measures across regions.

1. Introduction

Composite Indicators (CIs) are increasingly used by statistical offices, international organizations (e.g. OECD, EU, WEF, IMF) and academic researchers to convey information on the status of countries and regions in fields such as the environment, economy, society or technological development (see, among others, Cox et al., 1992; Cribari-Neto, Jensen, &

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Novo, 1999; Griliches, 1990; Grupp & Mogee, 2004; Huggins, 2003; Wilson & Jones, 2002). Even though significant disadvantages could come along with benefits (OECD, 2008; Saisana & Tarantola, 2002)[1], the proliferation of these indicators is a clear symptom of their analytical and operational relevance in macro and micro economics in general (Granger, 2001).

In particular, the use of CIs in benchmarking has a significant impact on policy making. This is especially true in the European context, where benchmarking is an important component of the so-called European "open method of coordination", a method that applies in those policy fields, such as the European Digital Agenda and the promotion of public e-services, where the European Commission has no formal competence. In this case, common policies and objectives are set on a voluntary basis, and implementation is ensured not by regulation but by peer pressure. From this perspective, CIs are key tools to define a ranking of countries and regions in terms of achievement of a given policy objective, and hence enable countries and regions to self-evaluate their relative position as laggards or front-runners.

In addition, robust and comparable CIs at the sub-national (e.g. regional /NUTS2) level are increasingly needed by national governments to explore within-country differences, and also by the European Commission to monitor the evolution of lagging regions towards developing objectives of Regional Policy. Of course, the main beneficiaries of such a measurement are the regional governments themselves, whose institutional powers and role have increased in the last two decades in several countries, even though institutional competences and innovation leadership vary significantly across Europe (Nauwelaers & Wintjes, 2011).

While the literature on the diffusion of public e-services has been growing over the past decade (cfr. Arduini & Zanfei, 2011), and the use of composite indicators has become quite frequent in this field (European Commission, 2001, 2002, 2003, 2005, 2006, 2007, 2009, 2004, 2008; UN, 2001, 2003, 2004, 2005, 2008, 2010, 2006, 2007, 2009), there is still ample room for improvement. As we shall see, extant composite indicators can hardly capture the complexities of public e-service development. In fact, they have so far focused on a few service domains, each considered in isolation from the other, and with an almost exclusive attention to e-government; they are not designed to measure organizational transformations induced by ICT diffusion within and across public administrations; they are most often defined at the national level and are thus unable to capture the extreme heterogeneity of web based services across regions; they are based on oversimplified data aggregation methods and are generally not robust to sensitivity analyses.

This paper aims to fill these gaps in the literature by developing a sound, open and transparent methodology based on the OECD Manual (OECD, 2008) and applying it to the construction of a composite indicator for the analysis of public e-service diffusion in Italy. The methodology we shall use offers a series of advantages addressing the above-mentioned issues. In fact:

(a) the CI developed in this paper enables to synthesize information on the development of a wide spectrum of public e-services in four different domains, namely e-government, e-education, e-transportation and e-health. On the one hand, this will allow us to provide a more comprehensive measure of the overall progress of digital government as a result of four important service domains rather than a single one. On the other hand, the application of this methodology will make it possible to compare advancements in public e-service development across different domains, thus highlighting public sector activities that are lagging behind and those that are forging ahead;
(b) our CI will allow to account for (and distinguish across) different aspects of service provision including: technical and organizational change within PAs, the use of ICT to support traditional services and multi-channel delivery;
(c) the CI developed in this paper allows performances to be evaluated at the regional level, so that different local patterns of investment in e-service development can be appreciated;
(d) the methodology used in this paper to aggregate measures of public e-service development, based on the application of a Data Envelopment Analysis (DEA), has been enriched to account for international experts' judgments and tested for robustness of yielded results. The DEA approach, integrated with Budget Allocation, represents a novel approach in constructing composite indicators in the public e-service field, that allows for more accurate measurement and benchmarking. Using this methodology we can effectively combine information on structural characteristics of Italian Regions with expert judgment on the relative importance of different aspects of ICT diffusion underlying e-service development.

The final scores and rankings obtained from our statistical exercises illustrate a large variety of patterns in e-services diffusion among the Italian regions. In fact, both regional rankings in the four domains and the performances in each aspect of e-service implementation and provision highlight the presence of different trajectories of diffusion and different "regional models" of public e-services implementation.

The remainder of this paper is organized as follows. In Section 2 we highlight pros and cons of existing CIs in the public e-services field. Sections 3 and 4 present the methodological aspects of the construction of our CI, from framework definition to the collection of experts opinions, to final aggregation of available measures of public e-service diffusion. In

[1] Among the main cons, the OECD (2008, pp. 13–14) lists the following: (a) CIs may deliver misleading policy messages if poorly constructed or misinterpreted; (b) may invite simplistic policy conclusions; (c) may be misused, e.g. to provide undue support to a desired policy, if the construction process is not transparent and/or lacks sound statistical or conceptual principles; (d) the selection of indicators and weights could be arbitrary and subject to political dispute; (e) may disguise weak performances in some dimensions and increase the difficulty of identifying proper remedial action, if the construction process is not transparent; and (e) may lead to inappropriate policies if dimensions of performance that are difficult to measure are ignored.