



An ELECTRE-based decision aid tool for stepwise benchmarking: An application over EU Digital Agenda targets



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ABSTRACT

The study offers a decision support tool for stepwise benchmarking. Within a benchmarking exercise, we propose a method for selecting a preferable development path that consists of a sequence of intermediate benchmarks. First, an outranking multi-criteria approach is used to establish the hierarchical position of benchmarking units. For each unit, we evaluate possible development paths and distinguish those that are characterised by balanced improvement steps along the whole path. The proposed method can help decision makers to 1) detect disparities among benchmarking units and 2) identify intermediate benchmarks for less successful ones in each stage of their progress toward the ultimate benchmark target. The method is applied to benchmark European Union Member countries against Digital Agenda key performance targets.

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1. Introduction

Benchmarking is a management tool defined as a systematic process of measuring products, services or business practices against those recognised as business leaders [1]. The idea behind benchmarking is to evaluate one's own performance relative to the others to select the best practice exemplars and to consider performance improvements by learning from more successful competitors. All of these considerations require specific decision-making activities that range from how to gauge pertinent statistics on performance and pinpoint areas that need improvement to setting goals and finding ways to meet them. Hence, there are a number of DSS (decision support systems) that exploit benchmarking as an underlying method, whereby prevails its use as a tool to compare and/or to set target values. A recent example is the study of Dong et al. [2], who presented the model that identifies the managerial benchmark (for the purpose of comparison). Similarly, Tremblay et al. [3] define three types of benchmarks to use for comparisons.

There are two essential elements of benchmarking. The first involves comparing with other practice exemplars, which allows for a more objective evaluation of one's own performance. The second involves evaluating against other benchmarks—the term refers to a point of reference, a target, or the best in class standard, that is, someone or something to reverse.

Originally, benchmarking was used to measure and improve processes and performances of various types of business entities, but over time its scope and level of implementation have been extended. At the international level, benchmarking serves as a tool for comparing national successes in a specific field of interest. Benchmarking involves determining how well a country is doing in reference to other countries and/or in reference to the benchmark/reference point and identifying ways to improve. Thereby decision makers are provided with objective insights on performance and on *improved user understanding* [4]. The added value of international benchmarking is in transforming performance indicators into a framework for decision making. This is an important feature when complex and multidimensional phenomena are assessed and evaluated, such as that of public policy [5,6]. For those sectors where countries share the same policy goals, benchmarking evolves from a management tool to a policy instrument in the sense that it supports policy makers as they engage in learning from their counterparts in other parts of the world [7–9].

International benchmarking found widespread implementation in the fields of electronic communications and ICT (information and

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communication technology) policy where it was promoted as an ICT policy tool both globally (through WSIS¹ and activities of ITU²) and in the EU. One of the seven flagships of the new Lisbon Strategy (Europe2020) – the Digital Agenda for Europe (DAE), with its seven pillars, 101 actions and 13 specific targets – is intended to achieve social and economic benefits of a digital single market founded on fast and ultra-fast Internet access.

The prevalent impetus behind the popularity of benchmarking was provided by the European Union's (EU) promotion of a new model of governance called the *open method of coordination* (OMC). At the core of the OMC are non-binding policy instruments and collective monitoring tactics aimed at encouraging exchange of knowledge and experience among countries.

While the OMC led to the mass production of international benchmarking studies, it also invoked debates on the merits and pitfalls of benchmarking as a decision aid tool [10–17]. Among principal concerns are those related to progress toward a desired performance. Where the specific targets are long term and/or require significant improvements, as is the case with Digital Agenda goals, gradual progress toward benchmark targets is gaining importance. One way to adjust benchmarking to address successive performance improvements is found in the literature under the term *stepwise benchmarking*.

This study addresses the concept of stepwise benchmarking and is grounded on our previous work that has promoted a new ELECTRE (ELimination Et Choix Traduisant la REalité; Elimination and Choice Corresponding to Reality) based benchmarking tool—ELECTRE Multi-level Outranking, abbreviated as EMLO [6]. We have enriched the EMLO with development paths and analyses of development dynamics and incorporated it in a user friendly software solution. To demonstrate the utility of our model, we have applied it to benchmark EU member countries against DAE key performance targets.

This paper is organised as follows. Section 2 addresses issues and concerns on benchmarking as a decision aid tool for policy makers and explains the stepwise benchmarking approach. Section 3 refers to the methodology for stepwise benchmarking as devised in this study, which is subsequently applied to a particular benchmarking problem within Section 4. Section 5 summarises our work and points to limitations and future research.

2. Background of the study

As indicated in the previous section, benchmarks are related to the best-in-class achievement and can be used as an etalon for conducting comparisons [18,19]. In cross-national comparisons, benchmarks are often associated with successful countries and their policies—policy benchmarks [15]. This is a practical implication of international benchmarking. The benchmark countries are those whose development policies should be emulated. One of the principal concerns with policy benchmarks, however, is related to the socio-economic, cultural and other differences that may impede countries as they attempt to learn from each other [10,14,20–23]. Rose [20] notes that although each country thinks that its problems are unique, within a given policy area, there is much in common across state and national boundaries, and accordingly, policy makers can learn from how their counterparts elsewhere responded to specific situations. Therefore, regardless of national differences, countries can act as partners in the benchmarking process. This is especially the case when countries share the same development policy framework and institutional support for cooperation, such as in the case of EU member countries.

With respect to the problem that this paper addresses, we should emphasise that ranking countries according to their performance and tracking best practice exemplars prevail within international benchmarking studies. Much less attention, on the other hand, has been given to the

questions *from whom to learn and how to improve*, which are the focus of this study. Namely, the traditional *learning from the best* approach raises a number of concerns related to setting goals that are particularly difficult to achieve immediately or within a specified timeframe. Moore [24] studied this question and found that it is often the case that only 50% of the targets are achieved. Therefore, the search for benchmarks should not focus on the pursuit of the ideal values of performance indicators, but on the values that exist in practice, and as such, can serve as something to strive for. To our knowledge, the idea of *learning from the similar*, i.e., tracking relevant practice exemplars or corresponding benchmarks has appeared in several studies [6,15,16,24,25].

2.1. Underlying concept

The purpose of the pursuit for relevant practice exemplars and corresponding benchmarks is to avoid the uncertainty of tracking towering policy targets. As such, it is an important issue for improving the practical side of benchmarking, as well as the essence of stepwise benchmarking. Although the term *stepwise* can be used to interpret multi-stage analysis process in benchmarking [26], the majority of authors associate this concept with gradual improvement toward performance targets [6,27–30].

The logic of our approach is that a benchmarking unit (country) should follow a sequence of relevant benchmarks along its improvement path toward target performance as doing so allows the decision maker to opt for successive improvement and thus set pragmatic aspirations.

In our study, units under observation are countries having common policy frameworks and the same target values of performance. This specificity affects the choice of benchmarks, i.e., the best practice exemplar is drawn from legal requirements. These requirements, achieved by considering better performing units/countries drawn from practice exemplars, are termed *intermediate benchmarks*. Conceptually, this work develops a decision support tool, which seeks an optimal sequence of intermediate benchmarks out of a multiple of possibilities. The optimal sequence of intermediate benchmarks constitutes a recommended development path, and it is characterised by balanced improvements through all steps of the progress and on all criteria/performance targets.

2.2. Operational basis

In general, benchmarking involves a quantitative analysis for performance evaluation, and depending on the scope and type of problem, various analytical support/benchmarking tools are used. For example, in the field of policy making and public communications, composite indicators (CIs) have been widely used for ranking and comparing countries' performances within international benchmarking exercises [16]. In the presence of multiple criteria that are different by nature and that have different units of measurement, MCDM (multi-criteria decision making) techniques are used to judge the performance of the benchmark units. On the other hand, when the efficiency and/or productivity of units is evaluated, a linear programming-based method first proposed by Charnes, Cooper and Rhodes [31] – Data Envelopment Analysis (DEA) – is the *first choice*. A variety of different DEA models, adaptations and modifications have been introduced to address benchmarking issues, and among them, several approaches address the concept of stepwise benchmarking [27–30,32]. An important feature of DEA in the context of stepwise benchmarking is its capability to set the criteria for the selection of benchmarks from multiple corresponding benchmarks.

As an operational basis for our solution, we selected the MCDM approach, based on the multi-level outranking ELECTRE method, as it was developed specially for the purpose of benchmarking and it was inspired by the DEA procedure and its concept of similarity, i.e., corresponding benchmarks. The suitability of the outranking multi-criteria approach has been presented in recent benchmarking studies, such as

¹ World Summit on Information Society.

² International Telecommunications Union.

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