

Where's the smartness of learning in smart territories ?

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Abstract. In the future smarter territories are expected to induce transformations of many aspects of the learning processes, but how their smartness is and will be related to that of the learning ecosystems ? In this paper, by means of Principal Component Analysis, we critically analyse methods presently used to benchmark and produce University rankings, by focusing on the case study of the Italian Universities. The outcomes of such analysis allow us to demonstrate the existence of a strong correlation between smart cities' and universities' rankings, i.e. between learning ecosystems and their territories of reference. Present benchmarking approaches, however, need to take in more consideration people feelings and expectations. Accordingly we introduce an innovative approach to the benchmarking of learning ecosystems based, also, on the so called *flow*.

Keywords: Smart City Learning, University Rankings, Smart Learning Ecosystems, Smart City Benchmarking, City Smartness, PCA, Flow

1 Introduction

Much the same as the large diffusion of personal devices and network technologies have transformed the social behaviour of young generations (often referred as *digital native*), transformation of cities into smarter cities will progressively modify all constituent elements of learning ecosystems: spaces, contents, processes, skills, methods of assessment [1]. However to fully understand the on-going process, it is important to identify which are the factors that contribute to determine the smartness of a territory.

Because of this, recently, we have critically examined [2-4] the approaches used to benchmark the smartness of a city and, as well, to produce smart city rankings [5-7]. Apart from highlighting several methodological limitations of such approaches, it came out that the classical models of territorial and urban development are quite far from common perception. People think that a city is smart when: supports the well-being of individuals (also when they play the role of a citizens); helps in preserving the environment where they live and carry on their activities; minimises mobility problems (also to allow for personal time optimisation). Among other aspects,

moreover, a city is considered smart when supports to some extend also culture, education and knowledge circulation [4].

At present there not exists any study that put in relationship the "smartness" of cities and territories with that of their learning ecosystems. This is also because *smart universities* or *smart schools* rankings have never been produced. There exist, however, several universities rankings. In the next paragraphs, in order to explore possible relationships between territories and learning systems, we will analyse in details one the most comprehensive Italian universities ranking [8] and investigate the existence of possible correlations with the work on smart city rankings of ref. [4].

2 University rankings: a critical analysis

Each year in Italy two university rankings are produced but here, for sake of brevity, we report only on a critical analysis conducted on the last version of the ranking elaborated by "Il Sole 24 Ore" [8], from now on R1, based on 12 factors (see table 1).

Tab. 1. List of the 12 factors used in [8] to produce the 2015 ranking of the Italian universities: E1-E9 have been used to rank Education, while R1-R3 to rank Research.

Indicator	Description
E1: Attractiveness	% of enrolled students coming from outside the territory
E2: Sustainability	average number of teachers for basic and core activities
E3: Internships	% of credits acquired during internships
E4: Int. Mobility	% of credits acquired abroad (e.g. Erasmus)
E5: Scholarships	% of eligible candidates who have been awarded scholarships
E6: Dispersion	% of students still enrolled in the second year
E7: Effectiveness	% inactive students
E8: Satisfaction	judgment expressed by undergraduates on courses and curricula
E9: Employment	% of students still looking for a job 1 year after graduation
R1: Ext. Funds	funds attracted for research projects
R2: Research Eval.	ANVUR evaluation of research products
R3: High Education	ANVUR evaluation of higher education

To assess the statistical significance of such ranking first of all one has to check for the existence of correlations between the twelve factors that have been considered. If you do that, you find that R1 suffers the same problems of the smart city rankings based on soft factors [2-4]: many of the selected factors, in fact, are highly correlated with each others. Since it is almost impossible to identify factors that are completely uncorrelated we have identified as lower threshold for a tolerable correlation, 0.3. Fig. 1a shows only correlations whose intensity is above such threshold.

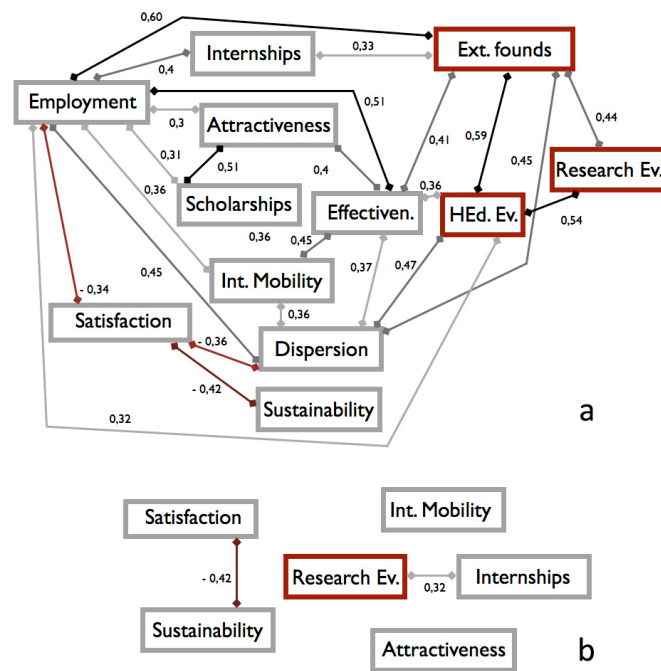


Fig. 1. (a) map of the correlations affecting R1; (b) reduced representational space composed by 6 weakly correlated factors.

All three factors used to benchmark the research are strongly correlated each others and some factors, such as *Effectiveness*, *Employment* and *Dispersion*, show correlations with a large number of other indicators. The elimination of the most correlated indicators led us to identify a representational space composed by only 6 relatively uncorrelated factors, Fig. 1b, that includes also *Satisfaction* as representative of the subjective judgments expressed by the students.

The Principal Components Analysis (PCA) applied to the subspace of of Fig. 1b, beside the clustering among universities with similar characteristics, highlights the existence of a demarcation line (red line) that, with very few exceptions, separates universities located in the South-Central Italian regions from those located in the

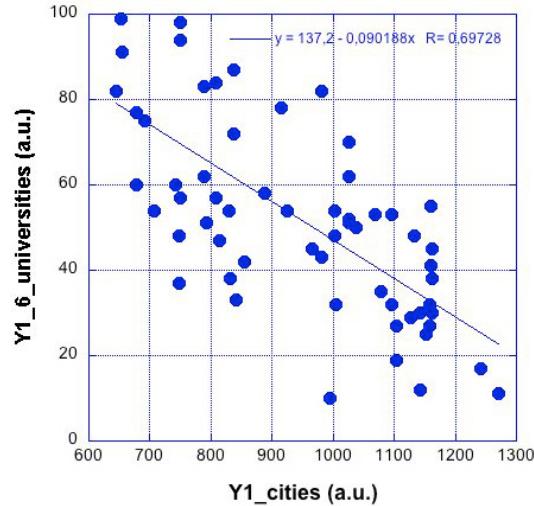


Fig. 3. First principal component values derived from PCA [4] applied to the city ranking of ref. [6] vs. First principal component values derived from Fig. 2

Regarding the high correlation of Fig. 3, it is interesting to underline that the university ranking of ref. [8] has been realised taken into account also factors that relate universities to cities and territories, the most significant of which appears to be the *Internships*. Stands out, also, the relevance explicitly given to *Attractiveness*, which actually should be the ultimate goal to strive for, and that it is expected to be directly (not indirectly) correlated to all factors, not only to *Scholarships*, *Effectiveness* and *Employment* (see fig. 1a). The emergence of such correlations can be partially justified by the analysis performed in references [2, 4] which showed how *smart economy* appears to be the leading factor in top-down approaches to smart city benchmarking. *Smart economy*, in fact, is closely related to the "rings" of Fig.1a most of which have in common the *Employment*. A noteworthy aspect is also the use of subjective data - the factor *Satisfaction* - integrated to objective ones although, for the time, limited only to the evaluation of the educational process as a whole.

3 Smartness of learning ecosystem: toward a novel benchmarking approach

In summary, the existence of a correlation between the "quality" of the universities and the smartness of cities and territories have clearly emerged, although the infrastructural and top-down nature of the benchmarking methodologies seems to confine the attractiveness of a learning ecosystems mostly to economic aspects. On the other hand, we know [3,4] that the achievement of a smarter economy, although represents the engine on which one can build opportunities, is not a primary goal in people expectations. Because of it would be advisable to modify the

approaches to benchmarking and universities ranking, with the aim to obtain more detailed information, either qualitative and quantitative, on where actually resides the attractiveness of the learning ecosystems and, in turn, their ability to meet people expectations.

To this end, as for the case of the smart cities, we believe that it is important to explore novel analytic tools and approaches (to be integrated with the more traditional ones) aimed at measuring factors more closely related to the attractiveness of the environments and the positive tension that may sustain and stimulate individuals in their daily activities.

We have recently suggested that such positive tension should be identified with what has caused, throughout the history, the cultural dominance of specific regions, e.g. Florence during the Renaissance, and that can be defined as *territory flow* [9]. By transliterating from a person to a context (university, city, territory), we can state that a smart context is a context where the human capital, (and more in general each individual/citizen) owns not only a high level of skills (possibly innovative ones), but is also strongly motivated by continuous and adequate challenges, while its needs are reasonably satisfied. The *state of flow* of a context, thus, should be maintained by cooperative and convergent actions carried on by all main stakeholders belonging to a given community.

Accordingly, the main challenge for the future will be the identification of the most adequate indicators and dimensions (together with the development of suitable analytics) that will allow for a constant monitoring of the *state of flow* of all categories operating in a learning ecosystems. A goal that, unavoidably, call for an alliance among researchers with different background to fully uncover the smartness of *territories and learning*.

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