

Towards system-based models of universities: a cluster analysis based on Italian data

by Letizia Donati | Marco Bellandi | Università di Firenze | Università di Firenze

Abstract ID: 50

Inviato: 06/05/2021

Evento: XIX Workshop Annuale SIEPI

Argomento: XIX Workshop Annuale SIEPI

Parole chiave: University's models; Universities missions' tensions; System-based university; Academic engagement.

Track 14. Relazioni Università-Impresa

Objective

Universities are considered crucial actors in the economic and social development of their regions (Benneworth et al., 2017): a third mission has been added to universities' functions beside teaching and research to fulfil this regional role. Nonetheless, universities' abilities to effectively engage with regional stakeholders is somehow contrasted by the recent trend towards globalization of the higher education sector with the rise and consolidation of university's rankings and the increased competition between higher education institutions (Arocena et al., 2019). In order to address the growing number of tasks that universities are expected to perform, scholars have developed different university' strategic models. The entrepreneurial model (Etzkowitz et al., 2000) has emerged in a phase in which third mission was strongly focused on the commercialisation of research results based on technology transfer practices such as the creation of patents and spin offs (Bercovitz and Feldman, 2006). However, scholars soon recognized that university third mission is not confined to the technological and the commercial sphere and a wide set of activities gathers within more recent approaches towards academic engagement (Perkmann et al., 2013; Abreu and Grinevich, 2013). In line with this perspective, recent models of universities have emerged to address this wider approach, such as the Civic university, developed to reconnect the global dimension of higher education institutions with their local base (Goddard et al., 2016) and the Developmental University, theorized to meet social development goals and the needs of excluded and disadvantaged communities (Arocena and Sutz, 2017). However, implementing this type of strategies is not an easy task: criticalities may emerge when universities are located in peripheral areas characterized by a fragile institutional setting that may not be responsive to the efforts put in academic engagement strategies (Bonaccorsi, 2017; Benneworth and Nieth, 2018; Kempton, 2019). This is because the features of the local context in which universities are located do have an impact on universities' interactions with local actors (Bellandi and Caloffi, 2010; Casper, 2013; Grimaldi et al., 2020). Nonetheless, universities' models are useful tools to guide the design of institutional academic strategies in a period in which universities are expected to simultaneously perform excellent research, provide high quality in teaching and engage

with regional stakeholders to support local development dynamics. Civic or Developmental models have received lesser attention in terms of quantitative research compared to more entrepreneurial approaches that could rely on a robust set of TT indicators (i.e., mainly patents and spin offs). Therefore, we propose an integrated model, i.e., the System-based university conceived as a synthesis of the aforementioned engagement strategies. The System-based university's framework constitutes the preliminary basis to proceed with the empirical exploration of engaged models through quantitative method. It is argued that the System based university relies on three main factors: i) synergy between the core missions of teaching and research and the third mission, ii) alignment between the needs expressed by the territory and the knowledge produced by the university, and iii) a balanced approach to research excellence. Different or imbalanced combinations of these factors might lead to different approaches to academic engagement. It is argued that universities which focus mainly on the pursuit of excellence would be characterized by a global dimension (i.e., globalist), while universities that are mainly devoted to support their local systems would be characterized by a local dimension (localist). Finally, those universities able to balance between Excellence and Alignment, i.e., where synergy is at work, are more likely to follow system-based approaches, in other word they show the capacity to align locally and think globally (with varying degrees of efforts in excellence and alignment).

This paper has two main objectives: firstly, drawing on the System based theoretical framework, it seeks to identify reliable proxies and indicators to operationalize this model. The indicators will allow to take into account the underlying characteristics of both synergy, alignment and excellence. Secondly, through the use of a multivariate technique on Italian data, to shed light on the emergence of System-based approaches in academic engagement strategies.

Methodology

The empirical analysis relies on Italian data mainly for three different reasons: firstly, data on higher education institutions are extremely difficult to collect due to the heterogeneity in the regulations of higher education systems across Europe; this makes cross countries comparisons hard to be performed in a holistic way, therefore we have focused on just one academic system. Secondly, Italy is a latecomer in the institutionalization process of university third mission, nonetheless a rapid acceleration took place in the last decades which led to the consolidation of the Italian knowledge transfer system (Cesaroni and Piccaluga, 2016). Thirdly, the Italian context is characterised by a sharp socio-economic divide between its regions, with southern areas lagging behind the northern part of the country. This makes the empirical analysis of universities' behaviours particularly interesting in terms of engagement with peripheral regions.

The sample is composed by 75 Italian universities (with a total of 100 higher education institutions active in Italy in 2014) and an original database has been built collecting data

from different sources.

It has been decided to perform a cluster analysis in order to explore whether the Italian universities in the sample can be grouped according to the framework presented in Figure 1. In order to form the clusters, we have relied on the Ward method that belongs to the family of hierarchical and agglomerative clustering techniques. This type of method has been preferred since the number of groups has not to be decided in advance (Bellandi et al., 2020).

Results

According both to the dendrogram and the Calinski-Harabasz index (Calinski and Harabasz, 1974), the first best option would be to retain two groups. However, the inspection of the dendrogram as well as of the Calinski-Harabasz index suggests that a second-best option to group the sample would be to retain six clusters. Therefore, to obtain a more fine-grained picture of the universities under analysis we opted for this latter partition.

Implications

The groups resulting from the cluster analysis suggest that different combinations of the identified proxies for alignment and excellence lead to different universities' profile in which synergy is indirectly signalled by a balanced presence of both excellence and alignment. Table 2 summarizes how the identified clusters match the taxonomies outlined in Figure 1 and highlights a an evolutive perspective concerning universities approach towards synergy among the three missions.

Table 1 Cluster's taxonomy according to the theoretical framework. Source: Author's elaboration

Cluster	Typology	Potential evolution	
		Increasing synergy	Decreasing synergy
1	Transition	System-based Local	Localist
2	Transition	System-based	Localist
3	Transition	System-based Local	Localist
4	System-based Local	System-based	Globalist
5	System-based Global	Further consolidation	Globalist
6	System-based	System-based Global	Globalist

References

Abreu, M., & Grinevich, V. (2013). The nature of academic entrepreneurship in the UK: Widening the focus on entrepreneurial activities. *Research Policy*, 42(2), 408-422.

Addie, J. P. D. (2017). From the urban university to universities in urban society. *Regional*

Studies, 51(7), 1089-1099.

Arocena, R., & Sutz, J. (2017). Inclusive knowledge policies when ladders for development are gone: Some considerations on the potential role of universities. In Brundenius, C., Göransson, B., & de Mello, J. M. C. (eds.). *Universities, inclusive development and social innovation: An international perspective*. Springer, 179-198

Arocena, R., Göransson, B., & Sutz, J. (2019). Towards making research evaluation more compatible with developmental goals. *Science and Public Policy*, 46(2), 210-218.

Bellandi, M., & Caloffi, A. (2010). Il modello "university research-centric district" fra difficoltà e opportunità. *Economia e Politica Industriale*.

Bellandi, M., Caloffi, A., & Masi, S. (2020). Bottom-level organizational changes within entrepreneurial and engaged models of university: insights from Italy. *The Journal of Technology Transfer*, 1-26.

Benneworth, P., & Nieth, L. (2018). Universities and regional development in peripheral regions. In Benneworth, P., & Nieth, L. (Eds.). *Universities and Regional Economic Development: Engaging with the Periphery*. Routledge.

Benneworth, P., Pinheiro, R., & Karlsen, J. (2017). Strategic agency and institutional change: Investigating the role of universities in regional innovation systems (RISs). *Regional studies*, 51(2), 235-248.

Bercovitz, J., & Feldman, M. (2006). Entrepreneurial universities and technology transfer: A conceptual framework for understanding knowledge-based economic development. *The Journal of Technology Transfer*, 31(1), 175-188.

Bonaccorsi, A. (2017). Addressing the disenchantment: universities and regional development in peripheral regions. *Journal of Economic Policy Reform*, 20(4), 293-320.

Caliński, T., & Harabasz, J. (1974). A dendrite method for cluster analysis. *Communications in Statistics*, 3,1-27.

Casper, S. (2013). The spill-over theory reversed: The impact of regional economies on the commercialization of university science. *Research Policy*, 42(8), 1313-1324.

Cesaroni, F., & Piccaluga, A. (2016). The activities of university knowledge transfer offices: towards the third mission in Italy. *The Journal of Technology Transfer*, 41(4), 753-777.

Etzkowitz, H., Webster, A., Gebhardt, C., & Terra, B. R. C. (2000). The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm. *Research policy*, 29(2), 313-330.

Everitt, B., & Hothorn, T. (2011). An introduction to applied multivariate analysis with R. Springer Science & Business Media.

Goddard, J., Hazelkorn, E., Kempton, L., & Vallance, P. (Eds.). (2016). The civic university: The policy and leadership challenges. Edward Elgar Publishing.

Grimaldi, R., Kenney, M., & Piccaluga, A. (2020). University technology transfer, regional specialization and local dynamics: lessons from Italy. *The Journal of Technology Transfer*, 1-11.

Kempton, L. (2019). Wishful thinking? Towards a more realistic role for universities in regional innovation policy. *European Planning Studies*, 27(11), 2248-2265.

Laredo, P. (2007). Revisiting the third mission of universities: Toward a renewed categorization of university activities?. *Higher education policy*, 20(4), 441-456.

Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D'Este, P., ... & Krabel, S. (2013). Academic engagement and commercialisation: A review of the literature on university-industry relations. *Research policy*, 42(2), 423-442.

Pinheiro, R., Benneworth, P., & Jones, G. A. (2012) Understanding regions and the institutionalization of universities. In R. Pinheiro, P. Benneworth, & G. A. Jones (Eds.), *Universities and regional development: An assessment of tensions and contradictions*. London: Routledge. (pp. 11-32)

Power, D., & Malmberg, A. (2008). The contribution of universities to innovation and economic development: in what sense a regional problem?. *Cambridge journal of regions, economy and society*, 1(2), 233-245.

Ramella, F., & Rostan, M. (2019) La terza missione degli accademici Italiani: un quadro d'insieme. In Perulli, A., Ramella, F., Rostan, M., Semenza, R. (Eds). *La terza missione degli accademici Italiani*. Il Mulino (pp. 175-206)