Intellectual Capital disclosure and academic rankings in European universities: Do they go hand in hand?

ABSTRACT

Purpose – In this paper a comparison of the way IC is disclosed in the websites of the universities in three European countries is performed in order to assess the way universities decide to communicate IC to their stakeholders and identify potential patterns and trends. In addition, the relation between the level and the type of IC web disclosure in universities and academic rankings as a proxy of performance is explored to reveal interrelations.

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Design/methodology/approach – The study is based on a sample of 128 universities coming from Greece (22), Italy (58) and Spain (48). The websites of the universities are content analysed to measure the level of IC disclosure. The IC disclosure metrics are then correlated with the academic rankings of the World Ranking.

Findings – While the level of IC disclosure among universities and among countries is not homogeneous, human capital and internal capital items are more heavily disclosed compared to external capital items in all three countries. In addition, larger universities in terms of number of students tend to disclose more on IC. Moreover, there is a positive correlation between the level of web IC disclosure and the academic ranking that challenges the IC disclosure strategies followed by the universities.

Originality/value – The paper represents an innovative contribution to the existing literature as it investigates websites to assess the level of IC disclosure provided by universities in a comparative perspective. Furthermore, it analyses the relationship between the online IC disclosure and European universities academic rankings and provides evidence on the interaction between the IC disclosure and the ecosystem in which the universities operate contributing to the 4th stage of IC research.

Research paper

Keyword: University Rankings, Intellectual capital (IC), IC web disclosure, comparative IC research, Universities.

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1. Introduction

University management, traditionally built around a culture of collegium and bureaucracy (McNay, 1995) has experienced profound changes during the last decades. The New Public Management (NPM) era has caused a shift from traditional bureaucracy management to modern public management. Empirically, this shift results in the adoption of routines and practices taken from the world of business such as the focus on performance, the treatment of service users as "customers" as well as the introduction of new accounting tools and techniques suitable to better support decision making towards efficiency and effectiveness (Pollitt, 2009; Turri, 2014). A further agent of change, at least in Europe, is the so-called Bologna Process which has introduced "the qualification frameworks" (Bologna Working Group, 2005) to ensure high-quality teaching among universities and has stimulated the competitiveness, mobility and comparability among different European Higher Education Systems (HES).

Furthermore, the role of universities in the development of economy and society has been recognised and the importance of activities related to technology transfer, cooperation with industries and community has become evident, so that, beyond the traditional first and second mission (teaching and research, respectively), the "third mission" (engagement with the society) has gained momentum (Laredo, 2007).

A further innovation deserving attention is the increasing use of Information and Communications Technology (ITC) which has been widely adopted by universities to communicate with stakeholders (Bisogno *et al.*, 2014). In this realm, and by taking into account that universities are knowledge-intensive organisations strongly based on the use and development of intangible resources, there has been a growing attention by scholars and institutions (MERITUM, 2002; Leitner *et al*., 2014; Ramírez Córcoles and Gordillo, 2014) to intellectual capital (IC) management, measurement and disclosure in universities.

Research conducted so far on the examination of the IC disclosure in universities has analysed the annual reports (Bezhani, 2010), the social reports (Sangiorgi and Siboni, 2017) and the performance plans (Siboni *et al*., 2013). However, scholars have recently suggested the use of different data sources apart from the traditional ones to examine IC disclosure (Pisano *et al.*, 2017; Ndou et al., 2018), providing, therefore, corroborative evidence that traditional reports are not the only means of IC disclosure (Dumay and Guthrie, 2017). Within this realm, a first attempt to analyse web-based IC disclosure in universities has been made by Manes Rossi *et al*. (2018).

Despite the existence of a European market in higher education, comparative research studies about IC disclosure in universities are limited in number (Low *et al*., 2015) while they have not

focused so far on online IC disclosure. Comparative research may be beneficial to better understand both behaviours and trends in disclosing IC to stakeholders, beyond national borders, detecting convergences or even divergences in web disclosure practices (Vandemaele *et al*., 2005). Moreover, it could provide empirical evidence on how universities located in different countries open up their organisational boundaries to the broader ecosystem in which they operate especially in relation to the impact of IC on society and environment which falls within the fourth stage of IC research (Secundo et al., 2018).

In this realm, our study contributes to the fourth stage of IC research. It explores whether the European universities that operate in a European educational ecosystem disclose IC on their websites following similar patterns and to what extent this disclosure is related to their performance. While performance is a multifaceted issue in higher education, the importance of academic rankings as pivotal tools to compare higher education performance and productivity has progressively emerged (Hazelkorn, 2013; Urdari *et al.*, 2017). Academic rankings have quickly established themselves among policy makers, governments and institutions as useful instruments for measuring the university performance (Urdari *et al.*, 2017), as well as a means for promoting universities image in the recruitment of students and academic staff (Bisogno *et al.*, 2014).

More specifically, this paper aims at answering the following two research questions:

RQ1: *Do European Universities follow the same disclosure patterns?*

We have selected three Mediterranean countries (Greece, Italy and Spain) with similar administrative traditions and regulations in the public domain (Cohen *et al*., 2018). In none of these three countries an IC report is mandatorily required. Thus, the context allows for a meaningful comparison. Moreover, grasping useful insight regarding the current practices, patterns and trends and testing convergences/divergences among universities based in different European countries could provide useful input to European institutions for setting relevant IC disclosure guidelines.

In addition, we try to assess whether the level and the type of IC disclosure in websites is related to university rankings, a phenomenon that is part of the most complex process of "marketization" and "corporatization" of universities (Parker, 2011). Thus, our second research question is set as follows:

RQ2-*Are academic rankings and IC disclosure interrelated?*

More specifically, while we acknowledge that university rankings assess a plethora of university parameters to set up their scoring system, we test whether the rankings obtained are interrelated with IC disclosed information. In the end, rankings are a metric that aims to show the stock and the creation of IC. In this perspective – notwithstanding that each ranking system might be controversial (Liu and Cheng, 2005) – rankings are a synthetic expression of the comparative value of a certain university in the ecosystem within which it operates.

Based on these premises, the present research, after assessing the levels of IC disclosure provided on the websites of Greek, Italian and Spanish universities, examines to what extent the level of IC disclosure on the web is related to university rankings. We have to make clear that it is not the relation between academic rankings and IC that is assessed. As university rankings are considered a measure of performance of the universities (Wu *et al*., 2012) and IC is one of the main

drivers of organizational performance, especially in intangible based entities, such as universities, the relationship between IC and universities' ranking could be rather considered as self-explanatory. However, revealing the existence of a relation between IC web disclosure and academic rankings would foster IC disclosure through websites with multiple benefits for researchers, academics and students who would be able to retrieve value-adding information in an easily accessible manner (Ndou et al., 2018). In other words, if IC disclosure is related to academic rankings and highly ranked universities disclose more IC information, this would boost IC reporting strategies in university websites. Moreover, identifying what to disclose, based on the relations of IC categories (i.e. internal capital, external capital and human capital,) to academic rankings, would be useful to decision makers, allowing for the application of a proper IC disclosure strategy (Dumay and Guthrie, 2017).

The paper unfolds as follows. In the next section, a synthesis of previous research on IC in universities as well as the idea of academic rankings as an emerging phenomenon are presented. Section three introduces the reader to the context regarding the characteristics of the universities in the three Mediterranean countries under comparison. Section four describes the methodology, while section five contains the analysis of the results and the discussion. The last section draws some conclusions, highlighting the contributions of the research, the way forward and the limitations.

2. Intellectual capital disclosure and university rankings: literature review

Universities are complex organisations, with a multi-mission orientation and high complexity in obtaining financial and human resources. In the achievement of the commonly recognised three missions (teaching, research and the third mission), universities are based on the intense use of knowledge, relationships, human resources and other intangibles which constitute the largest proportion of their assets (Secundo *et al*., 2016). As therefore most of their assets are of intangible nature, universities provide fruitful ground for IC creation and development.

Literature offers several classifications of IC initially developed for the private sector and subsequently adapted to the public sector and the universities context in particular. A broadly accepted classification, generated by the first study of Edvinsson and Malone (1997) on Skandia, brakes down IC in human capital (HC), structural capital (SC) and relational capital (RC). This classification that has been largely adopted by public institutions and international projects (European Commission, 2006; MERITUM, 2002) with some variations, is often used in analysing universities (Leitner, 2004; Sánchez *et al.*, 2006; Ramírez Córcoles *et al.*, 2011).

A further classification, also widely accepted by scholars, is the one which echoes the framework developed by Sveiby (1997), which identifies *internal*, *external* and *human capital*. This classification has also been adopted in exploring IC in universities, especially in analysing IC disclosure (Sánchez *et al.*, 2006; Low *et al*., 2015). Within a University context, internal capital is defined as the knowledge within the institution at the end of the working day. It comprises governance principles, organisational routines, procedures, systems, cultures, databases, intellectual

property, among others (Low *et al.*, 2015). External capital is defined as the sum of resources refereeing to the external relationships of the institution such as "customers", "suppliers", R&D partners, government, etc. (Sánchez *et al.*, 2006; Low *et al.*, 2015). Finally, human capital is defined as the knowledge that the human resources (teachers, researchers, PhD students, and administrative staff in this case) would take with them if they left the institution (Manes Rossi *et al*., 2018).

But IC in universities also needs to be disclosed apart from being generated. According to An *et al.*, (2011) IC disclosure can be considered as a theoretical framework per se, at the intersection of four different theories (Agency, Stakeholder, Signalling and Legitimacy). "*It can be assumed that organizations voluntarily disclose their IC so as to reduce information asymmetry and discharge accountability to various stakeholders, as well as signal their legitimacy and excellence to society*" (An et al., 2011, p. 579). Scholars started to discuss the role of IC disclosure a long time ago, also encouraged by the experience of mandatory IC university reporting in Austria (Leitner, 2004). IC disclosure may be beneficial for both internal and external stakeholders, allowing to better know and assess the university's performance.

The digital revolution and the emergence of innovations in communication process have stimulated scholars to follow a more innovative research perspective exploring new paths for IC disclosure including websites and social media (Dumay and Guthrie, 2017; Massaro et al., 2017; Manes Rossi *et al*., 2018). Internet landscape provides new ways to discuss and disclose IC information with immediate benefits in terms of greater transparency, convenience and timeliness (Dumay and Guthrie, 2017; Massaro et al., 2017). As such, web 2.0 tools are gradually replacing static forms of communication such as annual reports as useful instruments to convey IC information to stakeholders (Massaro et al., 2017). In particular, digital means reveal a proactive and prompt information communication behaviour by universities in an attempt to engage with different stakeholders. Considering the existence of a market for universities, where the ability to attract funds, students and researchers has become pivotal to the success (Parker, 2011), disclosing IC through the website is strategically relevant. Universities web sites can contribute in building a bridge between universities' internal and external knowledge by supporting universities in concentrating the gaze on the complex ecosystem in which they operate and share resources. This is consistent with the strand of the fourth stage of IC research (Secundo et al., 2017) according to which "IC is utilised to navigate the knowledge created by countries, cities and communities and advocates how knowledge can be widely developed thus switching from a managerial to an ecosystem focus" (Dumay and Garanina, 2013, p. 21). This is of outmost importance considering the growing relevance of the third mission of the universities. The third mission has been defined as "as any activity, not included in teaching and research, that universities perform in relation to "external environments" " (E3M, 2010, p. 15). It includes three different dimensions, which prompt universities to engage with the external ecosystem: technology transfer and innovation; continuing education; and social engagement, creating and developing IC on a large scale (Secundo et al., 2016; Secundo et al., 2018).

However, the benefits and the relevance of IC disclosure through universities' websites have not been adequately studied yet. Some scholars analyse the relationship with some governance, financial and dimensional features of universities with online IC disclosure (Manes Rossi *et al*.,

2018; Ramírez Córcoles *et al*., 2019) obtaining contrasting results in relation to the possible influence of size, age and financial performance. A further possible way of investigation is to assess whether IC disclosure through universities' websites is interrelated with universities' performance. University rankings can be considered as a measure of performance.

In recent years, university rankings have rapidly widespread as a result of radical political and economic changes occurred in European universities (Altbach, 2006). NPM movement has fostered the "marketization" and "corporatization" of universities by placing a strong emphasis on efficiency, effectiveness and performance measurement systems (Parker, 2011). Furthermore, the Bologna Process has imposed the creation of a global market, in which universities compete to reach the best results in terms of teaching and research and attract more funds but also to attract more students and well-known researchers (Sangiorgi and Siboni, 2017). As a consequence, university rankings as mechanisms to compare higher education performance and productivity have gained momentum (Altbach, 2006; Urdari *et al*., 2017). They are considered useful tools to attract students and researchers and enhance academic reputations and competitiveness (Urdari *et al*., 2017). Governments and funders can use rankings to evaluate how universities invest their resources while national evaluation systems can employ rankings to better assess universities performance. Moreover, academic rankings might play a role in enhancing legitimacy and accountability (Altbach, 2006; Urdari *et al*., 2017). A good ranking legitimates the position of a university not only in its community but also in the entire Higher Education System by signalling that it respects social and institutional objectives and values and ensures high-quality standards in terms of research and teaching (Altbach, 2006; Urdari *et al*., 2017).

Nevertheless, academic rankings attract criticism as well (Marginson, 2007; Lukman *et al*., 2014). In particular, the proliferation of different rankings using different indicators and parameters for performance measurement creates compatibility and comparability problems. More specifically, each ranking most likely employs different indicators for measuring university quality (Marginson, 2007). Other problems arise from the data acquisition process as some rankings are based on subjective and qualitative data that are provided by the universities themselves. This undermines the objectivity and reliability of performance evaluation (Lukman *et al*., 2014). Furthermore, many rankings focus their attention solely on research and teaching performance by neglecting the different dimensions of the third mission (Urdari *et al*., 2017).

Based on the above discussion it seems that academic rankings are here to stay as performance mechanisms, regardless of their shortcomings, by assigning a different grade depending on the value recognised to each university. An et al. (2011) point out that entities can be motivated to disclose IC to signal organizational legitimacy and excellence (or superior quality) to the society. In accordance with this, it can be expected that those entities that have more IC due to excellent achievements have higher IC disclosure.

In this sense, it is important to know whether there are tools and policies that are related with academic rankings. IC web disclosure policies could be such tools. Thus, in this paper we assess whether academic rankings and IC disclosure are interrelated.

3. Setting the context: the University system in Greece, Italy and Spain

In the aim of comparing data disclosed on the websites of the public universities located in the three countries selected, the specific features of the university system in Greece, Italy and Spain need to be briefly explained. For this reason, the following subsections present an overview.

3.1 The Greek University system

The first Greek university was established in Athens in 1837, a few years after the founding of the state. The core mission of the Greek universities is the production and transmission of knowledge through research and teaching. Higher education in Greece is structured into two main types of institutions: universities, and technological educational institutions. Greek universities deal both with teaching and research and offer bachelors, master and doctorate courses covering all the scientific fields. Faculties are subdivided into departments, which are mainly responsible for planning and implementing educational programmes. Each department is allowed to grant its own diploma and has considerable autonomy on educational matters. Student places in public universities in Greece are secured after a series of highly competitive Panhellenic (national) entrance examinations covering all tertiary educational institutions.

Although universities have elected governing bodies (the rector and the deputy rectors), their budgets, procurement, financial oversight and employment are determined by national legislation, and the government exercises very tight control over establishing or abolishing faculties and departments and determines the entrance examination system and departmental enrolments (after consultation with each university). More specifically, the Ministry of Education determines human resource issues, including all human resource policies and management systems, the number of staff posts allocated to individual universities and departments, recruitment regulations, faculty remuneration, staff appointment, promotion, social security, pension, etc. (Katharaki and Katharakis, 2010). University funding is based on the number of students and the age of the universities, and it is determined by concrete formulae. Within each university operates the Special Account for Research Grants, whose role is to provide and manage funds designed to meet the needs of research and development projects. In 2006 the Hellenic Quality Assurance and Accreditation Agency (HQA) began its operations as the guardian of issues of quality in higher education. The HQA is an independent body, overseen by the Ministry of Education and is centrally responsible for quality assurance in tertiary education.

Greek universities are not obliged to issue any sort of IC report. Moreover, the information on their websites should not follow a predetermined format.

3.2 The Italian University system

The Italian university system has been traditionally characterised by the prevalence of public universities and marked by a strong bureaucracy based on a massive power centralization and

regulation exerted by the national government which entrusted tasks and financial resources to institutional universities (Aversano *et al.,* 2017).

Today the Italian university system comprises about 97 universities: 67 public (including the 3 High Education Centres and the 3 PhD Schools) and 30 private universities (including 11 telematics universities). The public universities are mainly state-funded and attract about 90% of all Italian students (Siboni *et al*., 2013; Sangiorgi and Siboni, 2017).

Following a common trend in Europe, several reforms in the last twenty years have changed the bureaucratic structure of the Italian university system, in the aim of improving the quality of research and teaching and at the same time of reducing public spending by ensuring greater financial autonomy for universities (Turri, 2014; Sangiorgi and Siboni, 2017). The last reform in 2010, has led to decisive changes in governance, internal articulation, resource recruitment mechanisms, evaluation criteria and financing system, assigning a relevant power to ANVUR the national agency responsible for the assessment of the performance achieved by universities funded by the State (Aversano *et al*., 2017; Sangiorgi and Siboni, 2017). In addition, with the "transparency" decree 33/2013, all Italian public administrations are obliged to publish on their website a section called "amministrazione trasparente" (transparent administration) including financial, organisational and administrative information in accordance with specific requirements but without reference to IC information.

Among the recent innovations following the trend of enhanced accountability, a specific "rector's report on the results of research, training and technology transfer" has been introduced in 2009. In the same year all public administrations (including universities) have been mandated to draw up a three-year performance plan, identifying the strategic and operational objectives, and related indicators for measuring and evaluating the performance of their administration (Siboni *et al*., 2013).

3.3 The Spanish University system

In Spain, public universities had been controlled and financed by the Central Government until the nineties. From then on, a process of decentralization of higher education to Regional Governments has taken place and Regional Governments are now responsible both for this public service and for providing specific funds. At the moment, there are 50 public universities and 32 private universities, and there are important differences regarding their size and characteristics, even among the public ones.

One of the main challenges faced by the Spanish University System in the last years has been its integration into the European higher education area, which has introduced important changes through the creation of a general framework of quality assurance procedures (Sánchez and Elena, 2006), both from an internal and an external perspective. As for the external quality assessment system, the National Agency for Quality Assessment and Accreditation (ANECA) was created in 2007. ANECA is responsible for the evaluation of the quality of teaching and institutions and the accreditation of the university teaching staff.

This emphasis on quality has also initiated changes in the information published by the universities on their website. Thus, although there is no IC report obligation, universities have become aware of the relevance of managing and publishing information about IC components (Sánchez and Elena, 2006). Stakeholders have also become aware of IC relevance (Ramírez Córcoles *et al*., 2011) and academics have developed a model for IC measurement and reporting (Ramírez Córcoles and Gordillo, 2014). Furthermore, Spanish public universities must apply the law 19/2013, on "Transparency, access to public information and good governance" which requires the publication of institutional, organizational and planning information, juridical information and economic, budgetary and statistical information.

4. Research methodology

4.1 Sample construction

This study focuses on a sample of 128 public universities coming from Greece (22), Italy (58) and Spain (48). Private universities and e-learning universities are excluded from the analysis due to differences in accountability and transparency frameworks, legislative backgrounds and funding sources.

In the Greek case, the sample consists of the total population of public universities in 2017 (22 in total). Technological institutions were excluded from this sample due to differences in the legislative framework and the funding procedure.

To identify the sample for the case of Italy, all Italian public universities, including 61 universities, 3 High Education Centres and 3 PhD Schools have been identified. Then nine universities have been eliminated for reasons of incompatibility and the analysis covers 58 universities.

For Spain, the total population consists of 50 public universities, but two public universities have been eliminated due to their special characteristics. As a consequence, the sample consists of 48 public universities.

Data about university rankings have been obtained from the "Webometrics Ranking of World Universities", issued in 2018 (http://www.webometrics.info/en). This ranking was selected because it is the only one that covers and ranks all the universities of the three countries. Also, it gives a specific score per university and does not place it in a scoring range that is the case in other scoring systems. This ranking system is built with publicly available web data, combining variables into a composite indicator.

The ranking presents five indicators for each university:

- Presence Rank: based on the size (number of pages) of the main domain of the institution. It considers all the subdomains sharing the domain.
- Impact or Visibility Rank: number of external networks (subnets) originating backlinks to the universities' web pages.

- Openness or Transparency Rank: number of citations from top authors according to Google Scholar Citations.
- Excellence or Scholar Rank: number of papers amongst the top 10% most cited in 26 disciplines. Data are considered for a five year period (2013-2017) and obtained from Scimago.
- World Rank: it is a compose indicator based on the four previous indicators, with the following weights: presence (5%); impact or visibility (50%), transparency (or openness) (10%), excellence or scholar (35%).

4.2 Content analysis and the disclosure index development

IC disclosure items analysed in the research are those developed by Manes Rossi *et al.* (2018), based on Low *et al*.'s (2015) study (Table 1). The items are classified under the sub-categories of internal capital (8 items), external capital (9 items) and human capital (8 items).

Insert Table 1 approximately here

Krippendorff (1980, p.21) states that content analysis is a "research technique for making replicable and valid inferences from data according to their context". Moreover, Guthrie *et al*. (2004, p. 287) state that "content analysis seeks to analyse published information systematically, objectively and reliably". In the realm of intellectual disclosure studies, content analysis is widely used, and it has become very popular notwithstanding highlighted weaknesses related to subjectivity, comparability, reliability and lack of innovation (Guthrie *et al*., 2004; Dumay and Cai, 2014; Goebel, 2015).

Regarding the coding process, the information required has been obtained by performing a manual content analysis on universities' websites during the first semester of 2017 (Manes Rossi *et al*., 2018) focusing solely on the web pages in a web-browser format (Striukova *et al*., 2008; Cormier *et al*., 2009). To ensure the accuracy and reliability of the analysis, a first sample of 6 (six) universities' websites (two from each country) has been simultaneously investigated by all the researchers. This allowed to define the coding and clarify the grey areas. After considering the differences and determining the final set of coding rules, the analysis has been performed independently by the researchers (Guthrie *et al.*, 2004; Striukova *et al.*, 2008). Rather than adopting the common dichotomous procedure, we follow a scoring system that assigns the values of 2 (two), 1 (one) and 0 (zero). A score of two is assigned if the item is disclosed on the main university website, being easier to find, a score of one if the item is only evident on the department's website and not on the main website, being less easy to find, and a score of zero is given if the item is not disclosed at all.

Moreover, following previous disclosure studies (Gallego-Alvarez *et al*., 2011; Bisogno *et al*., 2014) the unweighted approach is adopted. This methodology considers that all items are equally important and allows for subjectivity issues reduction.

On the basis of the results obtained, an IC Disclosure Index (ICD Index), including all the 25 IC items of Table 1 is developed in order to quantify and assess the level of online IC disclosure. The calculation of the ICD Index is as follows:

$$\textbf{ICD Index} = \frac{\sum_{i=1}^{l} d_i}{l}$$

where $\sum_{i=1}^{l} d_i$ = score obtained in the group of 25 IC items and l is the maximum score obtainable in the group of the 25 IC items. The maximum value of the ICD Index is 1 and the minimum is 0.

4.3 Data analysis

The Kruskal-Wallis Test is used to determine if there are statistically significant differences between the level of IC disclosure in the three countries. It is a nonparametric test and will be used for each of the 25 items of the index, as well as for the three components of the IC: internal, external and human capital.

Furthermore, aiming at identifying common disclosing IC patters by the universities of the three countries, we have analysed the relationship between the level of IC disclosure and the size of the universities measured by the number of students. Bigger universities have to interact with a large number of stakeholders and consequently they might be more prone to provide IC disclosure than small universities. Previous studies examining the influence of size on IC web disclosure provide contrasting results (Manes Rossi *et al*., 2018; Ramírez Córcoles *et al*., 2019). We calculated the Spearman correlations between the size and the IC components and index. The Spearman rank correlation coefficient is a nonparametric test that measures the association between two ranked variables and is considered more appropriate than Pearson correlation (parametric coefficient) when the variables are not normally distributed or the relationship is not linear.

To analyse the relationship of the IC disclosure with academic rankings, we use the Spearman correlation coefficients. More specifically, we assess whether there is a correlation among the five (5) ranking indicators and the IC indexes (i.e. internal capital index, external capital index, human capital index and ICD Index).

Table 2 contains the descriptive statistics of the five ranking scores for the total sample of the universities.

Insert Table 2 approximately here

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5. Results and Discussion

5.1 Comparing IC disclosure in universities in three Mediterranean countries

In order to study our first research question regarding the existence of a homogeneous IC disclosure pattern in the three Mediterranean countries a comparative content analysis of the IC disclosure in the websites of the universities in Greece, Italy and Spain is performed. Table 3 presents the results of the analysis.

Insert Table 3 approximately here

The mean value of ICD Index for Greece is 0.36, the variance is approximately 0.02, while the minimum and the maximum values are 0.07 and 0.53 respectively. The magnitude of the mean value indicates that Greek universities tend to disclose a significant- but not high- amount of IC information through their websites. This could document the complexity and the limited ability of their websites to provide information.

The internal capital category has the highest average followed by the human capital and the external capital. This evidences that Greek universities place more emphasis to the disclosure of culture and knowledge that has been "conquered" than to the disclosure of connections that people outside the organization have with it (Guthrie *et al*., 2004). These findings are in line with the study of Low *et al*. (2015), who found that the most disclosed categories are the internal and human capital. These findings are also in line with the assertion that universities' main goal is to produce and diffuse knowledge through research and teaching (Ramírez Córcoles and Gordillo, 2014) and therefore the decision to promote internal and human capital is rational.

In Italy, the mean value of ICD Index is of 0.7, with a minimum value of 0.35 and a maximum value of 0.91. This high mean value evidences, on the one side, that Italian universities disclose a large amount of IC information through the websites and on the other side that many items are disclosed on the main web page. Therefore, the structure of Italian university websites seems to be particularly accessible and user-friendly confirming that websites can support universities in IC management and disclosure practices by enhancing stakeholders' engagement (Ndou et al., 2018).

Moreover, on average, each Italian university discloses 19.76 IC items (79% of total IC items) in its website, with a special focus on human capital (86%) and internal capital (81.5%) followed by external capital where 70.3% of items are disclosed. Recent legislative developments in Italy have modified the system of funds allocation to universities stressing the importance of performance and results achieved by universities by encouraging them to disclose information embedded in internal capital and human capital.

The level of disclosure in Spain for all the types of IC is low and very similar across all categories. In the internal capital, the mean is 4.60, which represents only 57.50% of the items considered. In the human capital, the mean of the level of disclosure is 54.13% of the items. For the external capital, the level of disclosure is on average 53.22% of the items. The mean for the 25

items is only 13.73, which indicates that Spanish universities do not disclose on average many of the IC items.

In the ICD Index, the mean is 0.50, with a minimum value of 0.21 and a maximum value of 0.88. This shows that there are important differences among universities and that although some of them disclose most of the IC items, other universities disclose only a few of them. The results show that the level of disclosure of IC in the websites of Spanish universities is only medium and that some efforts should be required to improve the situation in the next years.

Table 4 analyses the popularity of each item and provides information regarding the location on the website where IC items are disclosed (i.e. in the main university website, in the department's website or nowhere).

Insert Table 4 approximately here

The descriptive statistics reveal a pluralism in IC disclosure strategies within the universities within each country. Differences in disclosure patterns might be motivated by legitimating and excellence signals that vary among universities and that are related to the way universities' IC impact on the society and the ecosystem within which they operate consistent with the fourth stage of IC research. As evidenced by the p-value of the Kruskal Wallis test there are only a few cases where the universities in the three countries disclose with the same intensity IC items. If we use the 5% statistical significance level as a threshold, this holds true only for the "Management Philosophy" (internal capital- INT.4), "International programs for students – mobility" (external capital-EXT.4) and "Teaching staff information" (human capital - HC.1). Therefore it seems that universities do not follow a standard IC disclosure strategy.

Moreover, at a country level, will a homogeneity cannot be supported a clear trend towards preference towards internal capital and human capital IC items disclosure is evident. These results can be interpreted form different perspectives. Firstly, as already highlighted by scholars (Leitner, 2004; Ramírez Córcoles and Gordillo, 2014; Sangiorgi and Siboni, 2017), universities, being knowledge-intensive organisations, produce mainly knowledge through scientific research and teaching activities driven by their most relevant resources identifiable in their researchers and teachers, so, it could be expected that the focus of university IC disclosure is on internal capital and human capital which are based on them. Secondly, in the light of the emerging third mission, the disclosure of technology transfer, patents and innovation processes, included in internal capital, has become fundamental in order to provide greater transparency towards stakeholders (Secundo *et al*., 2016). Finally, our results are consistent with An et al. (2011) that universities would voluntary disclose IC to show signs of excellence to the society. Excellence is more easily attributable to internal capital and human capital dimensions.

Thus our empirical evidence regarding our first research question supports the view that there is not a clear disclosing scheme in the universities in the three countries apart from a preference towards disclosing more on human capital and internal capital.

In order to test if the university size could be a potential factor to explain the level of IC disclosure by universities we have calculated the Spearman correlation ratio between the size and the disclosed IC components. As can be seen in Table 5, the coefficient is statistically significant in all the cases. That is, the internal capital index, the external capital index and the human capital index have a positive association with the size and this association is statistically significant. This provides corroborating evidence that larger universities based on the number of their students disclose more IC information to their stakeholders. Larger universities may consider more important to disclose IC information to increase their legitimacy or communicate signs of excellence. Therefore the size parameter exposes a common factor in our analysis regarding IC disclosing trends and patterns. These results are in line with previous literature findings about the impact of the size on IC disclosure, and in particular with Ramírez Córcoles *et al*., (2019) who find a positive relationship between university size and the level of online ICD.

Insert Table 5 approximately here

5.2 The relation between IC disclosure and university rankings

Our second research question aims at assessing whether there is a relationship between IC disclosure and academic rankings. This could provide evidence whether IC disclosure strategies are related to academic rankings. The coefficients of Spearman correlation (Table 6) show that there is a statistically significant relationship among all the indexes of IC disclosure and the World Ranking. The coefficients are in all cases negative, showing that the universities that have the highest indexes of disclosure are better located in the ranking (the smaller the number, the better the ranking). The global indicator of the ranking reveals that universities that disclosure more intensively on internal, external and human capital attain better values in the ranking.

Insert Table 6 approximately here

Focusing on the individual indicators of the ranking, the results show that universities disclosing more about their IC, in all its dimensions, have the highest values on Excellence and Openness rankings. There is also a strong statistically significant relationship between the ICD index and the Openness and Excellence ranks, as well as with the Global indicator. The internal capital index and the human capital index are statistically related with the Openness and Excellence Rank, while they do relate to the Presence and Impact Rank. The external capital index shows a statistically significant coefficient of correlation with all the variables of the ranking. The correlation among the Presence and Impact Rank and the external capital index is an interesting finding. The empirical evidence of our study (see Table 2) revealed that external capital is the less intensively disclosed IC dimension. Nevertheless, it is statistically related to academic rankings and more specifically to

rankings that the disclosure of other IC dimensions does not seem to have a statistically significant relationship. In other words, universities should not downplay the disclosure of external IC as it is also related to performance as proxied by academic rankings.

6. Conclusions

Universities are knowledge-intensive organisations, strongly based on the use and development of intangible resources, constituting, therefore, excellent cases to perform IC related studies. The disclosure of IC by universities is a research topic that deserves special attention due to the non-financial character of the universities output and outcome.

This paper adds to this research agenda on several fronts. Firstly, it is a study of the public universities in three European Mediterranean countries that, by adopting the model developed by Manes Rossi *et al.* (2018), provides a fresh view on IC disclosure assessment in a comparative approach. The context allows for the performance of a meaningful comparison to grasp useful insight regarding current practices and trends. Secondly, it accesses IC disclosure through the dynamic means of the university websites and not through static reports, answering to a call for research in IC disclosure through alternative communication tools (Dumay and Guthrie, 2017). Thirdly, it focuses on universities that operate in a regulatory environment where IC reporting is not obligatory and therefore universities choose what to report to their stakeholders in relation to their IC on their own initiative. Thus the study falls within the fourth stage of IC research where the effect of IC on the ecosystem in which the entities operate is studied. Disclosing IC signals organizational legitimacy and excellence to the society (An et al., 2011). Last but not least, the study explores whether IC disclosure is related to performance where academic rankings are used as indicators of performance. Our findings, that IC disclosure and academic rankings are interrelated, puts on the table tangible evidence that IC disclosure matters.

The results based on the analysis of the websites of 128 public universities in Greece, Italy and Spain in relation to the 25 IC disclosure items show that IC disclosure strategies diverge. This provides collaborative evidence which contributes to the IC research that IC disclosure is related to the emphasis and focus that public universities would like to communicate to their stakeholders. Nevertheless there is an overarching tendency of public universities to disclose more frequently on human capital and internal capital IC items and less on internal capital items. This is consistent with the conclusion of Massaro et al. (2017) about convergence in IC reporting. In addition, IC disclosure is associated with the size of the universities and larger universities tend to disclose IC more intensively. These universities have to interact with a larger number of stakeholders and consequently they might be more prone to provide IC disclosure in order to increase legitimacy and provide signals of excellence

Furthermore, our analysis on the relationship between the IC disclosure and the academic rankings (i.e. "Webometrics Ranking of World Universities") provides evidence of a positive correlation. Universities that disclose more heavily on IC dimensions on their website are ranked better, mainly in the Openness and Excellence ranking, and vice versa. Moreover, external capital that is less

frequently disclosed in university websites is also statistically related to academic rankings. The results show that IC disclosure strategies are relevant and therefore deciding on an IC disclosure strategy is not trivial.

These findings have significant implications. While in this study we do not measure IC *per se* but IC disclosure, it is evidenced that the universities that are extrovert and openly disclose information about their IC dimensions attain better rankings than the others. In other words, IC disclosure philosophy and academic performance, proxied by academic rankings, go hand in hand as far as universities are concerned. This also confirms the idea supported by An et *al*. (2011) that through voluntary reporting universities can give signals of excellence and close the information asymmetry gap with their stakeholders. As it is difficult to find a university that excels in academic rankings and has at the same time a website that discloses poor information about IC dimensions, universities should better consider specific strategies about IC disclosure through the websites. This result adds to previous studies about the fourth stage of IC research, demonstrating that disclosing IC is related to international ranking, thus reinforcing the idea that universities' IC has an impact on the society (Secundo *et al*., 2018)

This study provides some important implications for policy makers as well. It is obvious that IC items reporting in not self-evident and not all institutions place the same emphasis on disclosing specific items. It should be stressed that the study does not measure the IC of the universities but the level of IC items disclosure. In order to be able to compare universities and have a holistic view of their activities and operations in relation to teaching, research and the third mission some basic disclosure requirements could be imposed. IC disclosure would be used as a tool for public universities to compete in the international university arena and attract students and researchers. We trust that the IC disclosure items used in this study, adapted from Manes Rossi *et al.* (2018), provide a good starting point in order to set an IC disclosure model through their website for public universities.

The fact that several universities do not disclose several IC items on their websites while others do, needs further study. Our findings provide evidence that there are differences both among countries but also within institutions in the same country. Size is one parameter that seems to matter but apart from that other variables such as the national culture, the management team or the faculty characteristics of the institutions could induce differentiations in the disclosure strategy followed and deserve more analysis.

The relation between academic rankings and IC disclosure is a finding that deserves further study as well. It is not that the level of IC is related to academic performance and therefore academic rankings, which is rather self-evident, but that disclosing IC elements is relevant too. Having websites that are rich in IC related information may provide evidence among others of an extrovert university philosophy, tendency to interact and reduce information asymmetry with stakeholders, increase legitimacy to the society which in turn are related to knowledge-intensive organisations' principles and performance.

This study has some limitations: first, this research considers a single year (2017), so it does not capture the online IC reporting trends over time. Second, the analysis compares public universities in three Mediterranean countries and thus cannot draw conclusions about the whole population of

European universities. Finally, the relations with academic rankings are confined to the "Webometrics Ranking of World Universities". Future studies may enlarge the discussion to other countries, providing a wider understanding of the phenomena.

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Table 1. Intellectual Capital items (content) based on Manes Rossi *et al*. (2018)

Internal Capital	**IC components**	**Description**	**Score**
INT.1	Intellectual Property as patent rights	Information about patent rights held by the university	0-1-2
INT.2	Intellectual Property as publications	Information about publications, books and articles developed by researchers.	0-1-2
INT.3	University Culture	Comprising the vision, attitudes, experiences, beliefs, values and future programs of universities.	0-1-2
INT.4	Management Philosophy	Information about the university's mission and main objectives.	0-1-2
INT.5	Infrastructural facilities	Information about the university's infrastructural framework and facilities (e.g., classes, libraries).	0-1-2
INT.6	Infrastructural ICT	Information about ICT technologies such as databases, connections, new technologies, new instruments and software.	0-1-2
INT.7	National research projects	Research projects financed by National bodies	0-1-2
INT.8	European and International research projects	Research projects financed by European and International bodies	0-1-2
External Capital	**IC components**	**Description**	
EXT.1	Brand identity	Information about university brand identity.	0-1
EXT.2	Brand merchandising	Information about university brand merchandising	0-1
EXT.3	Student satisfaction	Information about students and their satisfaction with the learning processes.	0-1
EXT.4	Mobility programs for students	Information about mobility programs for students and international programs (e.g., Erasmus)	0-1-2
EXT.5	Post-graduation, high education and specialisation programs	Information about agreements with companies and public institutions for students' placements as well as masters, training, collaboration, postgraduate or post-doctorate and specialisation programs.	0-1
EXT.6	University third mission - spin-offs	Table with information about number and activities of university spin-off	0-1-2
EXT.7	University third mission - research consortia and cluster	Information about university research consortia and technological clusters.	0-1-2
EXT.8	Students information	Information about the number of students per faculty or department.	0-1
EXT.9	Graduate students information	Information about the number of graduate students	0-1
Human Capital	**IC components**	**Description**	
HC.1	Teaching staff Information	Panel with the name, qualification and department of affiliation of researchers, associate professors and full professors employed in the university.	0-1-2
HC.2	PhD students' Information	Panel with the name and department of affiliation of PhD students.	0-1-2
HC.3	PhD students' courses Information	Information on PhD students courses and programs.	0-1-2
HC.4	Research fellows information	Panel with the name and department of affiliation of research fellows	0-1-2
HC.5	Mobility programs for employees	Information about mobility programs for researchers and professors and international programs (e.g., Erasmus).	0-1-2
HC.6	Administrative staff information	Panel with the name, qualification and department of staff and administrative employees employed by the university.	0-1-2
HC.7	Internationalisation of teaching staff	Information about visiting professors or researchers.	0-1-2
HC.8	Training programs	Education or training programs for employees provided by the university.	0-1

Scoring: A score of 2 is assigned if the item is disclosed on the main university website, being easier to find, a score of 1 if the item is only available on the department's website and not on the main website, where it is less easy to find, and a score of 0 if the item is not disclosed at all.

Table 2 Descriptive Statistical for academic ranking indicators

	N	Minimum	Maximum	Mean	Standard Deviation
World Rank	128	31	8,411	773.55	1,041.305
Presence Rank	128	75	5,834	1,564.59	1,578.453
Impact Rank	128	219	8,151	1,937.60	1,672.593
Openess Rank	128	130	9,491	999.70	1,265.856
Excellence Rank	128	68	5,789	1,005.84	1,137.358
Valid N (listwise)	128				

Data: Webometrics Ranking of World Universities issued in 2018 (http://www.webometrics.info/en).

Table 3 Web content analysis results for IC categories and Indices for Greek, Italian and Spanish universities

	Greek universities						***Italian universities***					***Spanish universities***					***Comparison***	
	Total items	***Mean***	***%***	***var***	***min***	***max***	***mean***	***%***	***var***	***min***	***max***	***mean***	***%***	***var***	***min***	***max***	**Kruskal Wallis X^2**	*P-value*
Internal Capital	8	4.86	60.79	4.79	0	8	6.52	81.5	1.41	1	8	4.60	57.50	4.54	1	8	25.32	.000
External Capital	9	2.18	24.24	0.82	1	4	6.33	70.3	2.54	3	9	4.79	53.22	2.59	3	9	62.81	.000
Human Capital	8	3.27	40.90	1.92	0	5	6.91	86.0	1.13	5	8	4.33	54.13	3.80	1	8	65.27	.000
Total IC	25	10.32	41.27	13.37	2	16	19.76	79.0	9.03	9	25	13.73	54.92	20.41	7	23		
ICD Index	1	0.36		0.02	0.07	0.53	0.70		0.01	0.35	0.91	0.50		0.03	0.21	0.88		

Table 4 Comparison of disclosure of IC items among countries

	Greek Universities					*Italian Universities*					*Spanish Universities*					*Comparison*	
Internal Capital	**Frq.**	**% of universities**	**0**	**1**	**2**	**Frq.**	**% of universities**	**0**	**1**	**2**	**Frq.**	**% of universities**	**0**	**1**	**2**	**Kruskal Wallis - X^2**	**p-value**
INT.1	17	77.27%	5	12	5	53	91.38%	5	1	52	19	39.58%	29	5	14	45.231	0.000
INT.2	19	86.36%	3	13	6	56	96.55%	2	4	52	20	41.67%	28	7	13	51.118	0.000
INT.3	9	40.90%	13	1	8	13	22.41%	45	1	12	23	47.92%	25	3	20	7.336	0.026
INT.4	19	86.36%	3	7	12	41	70.69%	17	21	20	23	47.92%	25	4	19	**5.514**	**0.063**
INT.5	15	68.18%	7	1	14	50	86.21%	8	33	17	48	100.00%	0	4	44	37.584	0.000
INT.6	11	50.00%	11	1	10	56	96.55%	2	4	52	46	95.83%	2	7	39	22.974	0.000
INT.7	7	31.81%	15	7	0	54	93.10%	4	7	47	21	43.75%	27	5	16	50.936	0.000
INT.8	10	45.45%	12	10	0	55	94.83%	3	5	50	21	43.75%	27	5	16	54.053	0.000
External Capital	**Frq.**	**% of universities**	**0**	**1**	**2**	**Frq.**	**% of universities**	**0**	**1**	**2**	**Frq.**	**% of universities**	**0**	**1**	**2**	**Kruskal Wallis - X2**	**p-value**
EXT.1	8	36.36%	14	8	/	35	60.34%	23	35	/	11	22.92%	37	11	/	15.334	0.000
EXT.2	2	9.09%	20	2	/	19	32.76%	0	19	/	5	10.42%	43	5	/	10.087	0.006
EXT.3	1	4.54%	21	1	/	55	94.83%	0	55	/	18	37.50%	30	18	/	60.665	0.000
EXT.4	22	100.00%	0	3	19	58	100.00%	0	1	57	48	100.00%	0	5	43	**4.771**	**0.092**
EXT.5	2	9.09%	20	2	/	58	100.00%	0	58	0	48	100.00%	0	48	0	113.316	0.000
EXT.6	1	4.54%	21	1	0	51	87.93%	7	3	48	25	52.08%	23	8	17	53.614	0.000
EXT.7	8	36.36%	14	1	7	50	86.21%	8	5	45	43	89.58%	5	9	34	20.418	0.000
EXT.8	2	9.09%	20	2	/	22	37.93%	36	22	/	10	20.83%	38	10	/	7.735	0.021
EXT.9	2	9.09%	20	2	/	19	32.76%	39	19	/	22	45.83%	26	22	/	9.693	0.008
Human Capital	**Frq.**	**% of universities**	**0**	**1**	**2**	**Frq.**	**% of universities**	**0**	**1**	**2**	**Frq.**	**% of universities**	**0**	**1**	**2**	**Kruskal Wallis - X2**	**p-value**
HC.1	21	95.45%	1	17	4	58	100.00%	0	53	5	30	62.50%	18	17	13	**3.738**	**0.154**
HC.2	9	40.90%	13	8	1	46	79.31%	12	43	3	2	4.17%	46	1	1	55.64	0.000
HC.3	2	9.09%	20	1	1	58	100.00%	0	1	57	46	95.83%	2	15	31	80.225	0.000
HC.4	2	9.09%	20	2	0	35	60.34%	23	35	0	28	58.33%	20	18	10	18.492	0.000
HC.5	15	68.18%	7	0	15	58	100.00%	0	2	56	48	100.00%	0	1	47	22.45	0.000
HC.6	18	81.81%	4	11	7	56	96.55%	2	51	5	21	43.75%	27	12	9	16.54	0.000
HC.7	3	13.63%	19	2	1	33	56.90%	25	18	15	7	14.58%	41	4	3	25.11	0.000
HC.8	2	9.09%	20	2	/	57	98.28%	1	57	/	26	54.17%	22	26	/	61.542	0.000

The naming of IC items in presented in Table 1

Table 5. The association between Intellectual Capital Disclosure and Size of Universities. Spearman Correlation

	Internal Capital	External Capital	Human Capital	ICD Index	Size logn
Internal Capital					
External Capital	.563**				
Human Capital	.554**	.642**			
ICD Index	.814**	.860**	.808**		
Size logn	.185*	.430**	.391**	.351**	

**. Correlation is significant at the 0.01 level (2 tailed)
*. Correlation is significant at the 0.05 level (2 tailed).

Table 6. The relations among Intellectual Capital and Rankings: Spearman Correlation

	World Rank	Presence Rank	Impact Rank	Openness Rank	Excellence Rank
Internal Capital	-.402**	-.069	-.109	-.321**	-.301**
External Capital	-.572**	-.178*	-.229**	-.445**	-.436**
Human Capital	-.585**	-.077	-.129	-.400**	-.364**
ICD Index	-.549**	-.095	-0.162	-.407**	-.385**
	**. Correlation is significant at the 0.01 level (2 tailed) *. Correlation is significant at the 0.05 level (2 tailed).				