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New trends in intellectual capital reporting

Exploring online intellectual capital disclosure in Italian universities

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New trends in
intellectual
capital
reporting

Abstract

Purpose – The purpose of this paper is to explore a new way to disclose intellectual capital (IC) in universities through their websites. Going beyond traditional tools used for intellectual capital disclosure (ICD), this study aims at identifying possible determinants of ICD via the web.

Design/methodology/approach – This paper analyses the institutional websites of a sample of Italian universities adapting the theoretical framework developed by Low *et al.* (2015) to the peculiarities of the Italian university system. Moreover, the relationship between certain explanatory factors identified in previous research and the extent of online ICD represented by two disclosure indexes was tested through an ordinary least squares regression model.

Findings – The analysis reveals the extensive use of ICD via websites, especially regarding human and internal capital, while the disclosure of external capital through this means is still limited. Internationality and online visibility both positively affect the extent of a university's ICD.

Research limitations/implications – The paper represents the first study investigating online ICD and its determinants in universities, contributing new knowledge to help answer the how and what of the matter.

Practical implications – The results can serve as encouragement to university managers to enhance online ICD to meet the information needs of a wider audience.

Originality/value – This is the first study to provide evidence about online ICD in universities and to reveal some of the possible determinants to improve this disclosure.

Keywords Universities, Higher education, Intellectual capital, Disclosure, Internet reporting, Online disclosure
Paper type Research paper

1. Introduction

In the modern “new knowledge economy”, intellectual capital (IC) is considered a key driver for value creation both in private and public organisations (Lev, 2001; Bezhani, 2010; Siboni *et al.*, 2013; Low *et al.*, 2015). Public organisations in particular are characterised by a “high degree of intangibility” (Secundo *et al.*, 2016), since their primary outputs are intangible services, thus creating a strong need for intellectual capital disclosure (ICD) (Bezhani, 2010; Ramírez Córcoles *et al.*, 2016).

The economic, social and political changes that have occurred in recent years in public sector universities (particularly the New Public Management (NPM), the Bologna Process and the emergence of the “third mission”) call for greater strategic and organisational autonomy, especially with regard to the budget allocation process, entrepreneurship and activities related to the third mission (Bezhani, 2010; Parker, 2011; Siboni *et al.*, 2013; Ramírez Córcoles *et al.*, 2016).

Since universities are knowledge-intensive organisations in which the development of intangible resources is pivotal, these changes require the development of new measurement and reporting models that include IC. There is a growing claim for a wider disclosure of value created by universities to support fundraising activities, to ensure accountability



in the use of public funds and the outcomes of research and teaching, as well as close relationships with industries and territories (Bezhani, 2010; Siboni *et al.*, 2013; Ramírez Córcoles *et al.*, 2016).

Nonetheless, research on IC in universities is still quite limited (Dumay *et al.*, 2015), and what does exist has mostly consisted of analyses of annual reports as the primary data source, given their free availability and widespread use by previous researchers (Dumay, 2014; Dumay and Cai, 2015; Dumay and Guthrie, 2017).

Indeed, in recent years, several scholars (Abeysekera, 2006; Dumay and Tull, 2007; Dumay and Cai, 2014; Dumay, 2016; Dumay and Guthrie, 2017) have emphasised the limitations of annual reports as a means of ICD, because they are not designed to provide IC information but are essentially backward looking and subject to manipulations that can make them unreliable.

There is, thus, a need to go beyond traditional reporting tools by exploring if different data sources may provide stakeholders with more information on IC (Edvinsson, 2013; Dumay, 2016; Cuozzo *et al.*, 2017). In this vein, some scholars have begun to investigate websites (Cormier *et al.*, 2009; Lardo *et al.*, 2017; Pisano *et al.*, 2017) with the awareness of their potential for organisations to improve their relationships with their stakeholders (Pisano *et al.*, 2017). In particular, Dumay (2016, p. 179), emphasising the role of web-based disclosure of IC in the private sector context, stated that it is “dynamic” and “followed”. Similar investigation could be extended to public organisations devoted to research and teaching, as universities, to detect how web-based disclosure may improve ICD.

Scholars highlight several other advantages of online disclosure in the public sector: better accessibility, greater transparency and accountability towards stakeholders, lowered costs and a timelier dissemination of information (Meijer, 2007; Gandía and Archidona, 2008; Serrano-Cinca *et al.*, 2009; Gallego-Alvarez *et al.*, 2011).

In order to improve the extent of research on IC reporting in universities and overcome the limitations of ICD studies based on annual reports, this study explores a new way of disclosing IC—university websites—and thus contributes new IC knowledge in the public sector (Guthrie, 2014; Dumay and Cai, 2015; Dumay, 2016; Cuozzo *et al.*, 2017).

This study focusses on the websites of a sample of Italian universities and pursues the following two objectives:

- (1) To investigate the extent of online ICD in Italian universities through a content analysis of institutional websites, based on the theoretical framework already developed in university context by Low *et al.* (2015), adapted to the peculiarities of the Italian university system and, at the same time, to analyse the way in which IC information is conveyed by examining the structure of websites in terms of accessibility and usability.
- (2) To test the relationship between some explanatory factors identified in previous research and the extent of online ICD as represented by two disclosure indexes—the first comprising only IC items and the second also comprising features related to the websites’ accessibility.

To this end, the paper has been structured as follows: the next section presents the results of previous research on ICD in universities, and Section 3 clarifies the research questions and states the hypotheses tested. Section 4 describes the research methodology and the method of data collection. The results are discussed in Section 5, and the last section outlines the conclusions, highlighting both limitations as well as the value of this research.

This paper makes an innovative contribution to the existing literature, being to the best of our knowledge the first study that explores a new data source (websites) to investigate ICD in universities, providing empirical evidence of the explanatory factors influencing the

level of web-based ICD in Italian universities (Dumay and Guthrie, 2017). Results of the research may be beneficial as a basis for developing adequate strategies addressing ICD through the web.

2. ICD in universities

Previous empirical studies on ICD have mostly focussed on the private sector (Guthrie *et al.*, 2006; Low *et al.*, 2015), with only a few focussing on the public sector, most of which concentrated on universities as public organisations naturally prone to using largely intangibles assets as input (Bezhani, 2010; Low *et al.*, 2015; Secundo *et al.*, 2015).

The strand of research investigating IC in universities has emphasised the profound changes that have occurred in this realm, with a “third mission” emerging for universities that goes beyond research and teaching activities and includes activities aimed at increasing social welfare and supporting private economic initiatives (Parker, 2011; Secundo *et al.*, 2015). In the new scenario in which universities operate, intangible resources have become pivotal in enhancing competitiveness and growth (Ramírez Córcoles *et al.*, 2016). Consequently, as claimed by Secundo *et al.* (2015), there is a growing need for information about IC resources employed in universities and their management. The role of disclosure is to provide reliable and timely information that may be material for stakeholders to make decisions in their relationship with an organisation, even when they have no power to influence the information flow provided (Rylander *et al.*, 2000; Abeysekera, and Guthrie, 2005).

In particular, according to Sangiorgi and Siboni (2017, p. 357), ICD has acquired a pivotal role in university context both “for managers seeking to improve their decision-making process as well as to address stakeholders’ information needs, including the European Union, national governments, national evaluation agencies, researchers, current and future students, financial supporters, partners, etc.”

Thus, several ICD studies have investigated the categories of information typically disclosed. In particular, Bezhani (2010) classified IC indicators adopted as disclosure tools in UK universities. He found that among a sample of 30 UK universities, the most disclosed category of information in annual reports is human capital.

Low *et al.* (2015), using the same tripartite classification adopted in the present study, in a three-year longitudinal study of a sample of 90 universities from New Zealand, Australia and the UK, found that the most disclosed IC categories in annual reports are internal capital and human capital, while the quality index score of external capital is the highest.

In recent years, many IC researchers (Abeysekera, 2006; Dumay and Tull, 2007; Dumay, 2016) have expressed concern about investigating ICD exclusively through annual reports, asking for more research examining other potential IC dissemination channels. Based on this perspective, Siboni *et al.* (2013) investigated the performance plans of 44 Italian universities through a content analysis, with a focus on IC. In a recent study, Sangiorgi and Siboni (2017) conducted a content analysis of 17 social reports issued by Italian universities, revealing a significant level of ICD. Their results highlight an increasing attention to providing integrated information on sustainability, environment and governance variable, each of which includes a component of IC.

However, all these documents are prepared annually and do not solely focus on IC. For these reasons, some studies addressing university disclosures have highlighted that the website can be a more useful tool to enhance communication with the university’s stakeholders (Ismail and Bakar 2011; Bisogno *et al.*, 2014).

Considering ICD through a theoretical lens, the stakeholder theory perspective has often been embraced by scholars (Guthrie *et al.*, 2004; Abeysekera, 2006; An *et al.*, 2011), also referring to information disclosed on the web (Lee *et al.*, 2007). The stakeholder theory posits that all stakeholders, both internal and external, are entitled to access information about

activities and results obtained by an organisation (Watts and Zimmerman, 1986; Deegan and Samkin, 2009). Universities as public organisations are required to satisfy the public's demand for greater oversight and accountability. Providing information online allows stakeholders to fulfil their information needs and to be aware of the value creation process. This can, in turn, create a good relationship with different stakeholder groups, facilitating their support and approval.

The need to provide ICD has also been examined in light of the legitimacy theory. Guthrie *et al.* (2004) suggested using this theory when addressing the notion of a "social contract" between the organisation and the community in which it operates. According to Deegan (2000), a social contract represents the plurality of expectations that the community has with respect to activities managed by the organisation. In this perspective, a wider disclosure on the contribution of IC elements to the process of value creation would strengthen the legitimacy of universities.

Drawing on previous research and following a suggestion by scholars (Edvinsson, 2013; Guthrie, 2014; Dumay, 2016), the present paper intends to investigate online ICD and, going beyond traditional classifications, to seek explanatory factors behind this disclosure. The research does not focus on the managerial perspective, rather it favours the information's need of external stakeholders who demand greater accountability about the universities' relevant assets, mainly involving IC. In doing so, this study explores a new way to disclose IC and potential determinants affecting this disclosure.

3. Researching ICD: research questions and hypotheses

Past research on ICD shows a gap in the public sector, especially in the university setting, because previous studies have mainly focussed on the annual report as the primary data source and have neither identified nor analysed possible explanatory factors of ICD.

Aiming to fill this gap, this study poses the following two research questions:

RQ1. What is the extent of online ICD in Italian universities?

RQ2. Which are the potential explanatory factors influencing the extent of online ICD in Italian universities?

3.1 Development of hypotheses

To identify some potential drivers affecting the level of online ICD, we refer to studies on online disclosure in the public sector in general (mainly with regard to universities and local governments), attempting to contextualise past research results in IC research.

In particular, four main variables have been identified, representing possible strategies which could be adopted by the university board of directors, rectors and managers in order to improve the level of online ICD: complexity, internationality, internet visibility and board size.

In addition, two control variables: size and age have also been tested. They have been considered as control variables since they are fundamentally linked to the dimension of universities and they do not represent factors on which it is possible to act in the short term, since their modification would require long years of investment. Moreover, they are also linked to external factors.

3.1.1 Complexity. In 2010 in Italy, a law (n. 240) was enacted based on the principles of autonomy, accountability, efficiency, effectiveness and transparency, with the aim of reforming the Italian university system (Sangiorgi and Siboni, 2017). This law asks for re-organising universities into autonomous organisational structures (with departments replacing faculties) to ensure a greater simplification of activities.

Gallego-Alvarez *et al.* (2011), emphasising that the complexity of universities may be associated with the number of faculties, argued that larger universities (in terms of the number of faculties) tend to disclose more information on their websites than

smaller ones. Moreover, Bisogno *et al.* (2014) stated that complexity—proxied by the number of faculties—influences the extent of the web-based disclosure universities engage in as well as the navigability of their websites. Both Gallego-Alvarez *et al.* (2011) and Bisogno *et al.* (2014) hypothesised a positive relationship between university complexity and online disclosure, but the former found a positive though not a significant relationship, while the latter found a positive and significant relationship. Considering that Italian universities are organised into departments, we have selected this number as a proxy for complexity.

Thus, based on previous studies, this study posits the following hypothesis:

H1. There is a positive relationship between university complexity and the extent of online ICD.

3.1.2 Internationality. In the new knowledge economy, there is an increasing call for academic internationalisation (Altbach and Knight, 2007; Gallego-Alvarez *et al.*, 2011).

In the last decades, several programmes (TEMPUS and ERASMUS) and policy reforms (the Bologna Process) have pushed for the harmonisation of all European university systems in order to foster comparability and competition between them, with particular emphasis on the international mobility of students (Altbach and Knight, 2007; Gallego-Alvarez *et al.*, 2011). Universities use internationalisation to recruit the most capable students and researchers by offering them the chance to learn about other cultures and access higher education in other countries, thereby gaining competitive advantage (Altbach and Knight, 2007; Kim, 2009; Gallego-Alvarez *et al.*, 2011). This new kind of competition leads universities to provide more information about their activities, addressing international students and researchers as well (Ramírez Córcoles *et al.*, 2016). According to Gallego-Alvarez *et al.* (2011), the website is a useful tool to promote and disclose activities and opportunities to an international audience, given its immediate accessibility and usability (many websites are in different European languages). Indeed, in their research on the online disclosure of Spanish universities, they found a positive relationship between internationality and the extent of online disclosure.

Thus, in line with previous studies, this study posits the following hypothesis:

H2. There is a positive relationship between a university's internationality and the extent of online ICD.

3.1.3 Internet visibility. Meijer (2007) highlighted the superiority of the internet as a channel for the dissemination of information, since it allows stakeholders to build an opinion about public sector organisations' performance without the influence of the mass media. In this regard, Dumay and Guthrie (2017) stated how stakeholders prefer other means of communication for their timeliness and how newspapers are also gradually adapting to this trend by publishing more information online.

Greater internet visibility puts greater pressure on public sector entities, which consequently display more information on their websites to improve their legitimacy and to satisfy the growing information needs of internet users (Serrano-Cinca *et al.*, 2009).

Empirically, Gandía and Archidona (2008) found a positive and significant relationship between Spanish city councils' internet visibility and voluntary website disclosure. Serrano-Cinca *et al.* (2009) also found a positive and significant relationship between Spanish local public administrations' internet visibility and e-disclosure.

Thus, consistent with most of the previous studies, a positive relationship is expected to be found between university internet visibility and the extent of online ICD, leading to the following hypothesis:

H3. There is a positive relationship between university internet visibility and the extent of online ICD.

3.1.4 Board size. NPM logics have prompted public universities to introduce governance structures and mechanisms similar to those of private companies; consequently, members from industries and territories with greater market orientation (Parker, 2011) have been introduced on their boards.

In recent years, scholars (Cerbioni and Parbonetti, 2007; Cormier *et al.*, 2009) have investigated the influence of governance on ICD as per the framework of the agency theory, arguing that although the increase in the number of board members leads to an improvement in the monitoring capacity, this advantage could be negatively counterbalanced by the increase in both time spent on decision making and in problems with communication and coordination. Thus, an increase in board size does not necessarily lead to an improvement in the extent of voluntary disclosure if the number of board members exceeds a certain threshold (Cerbioni and Parbonetti, 2007).

It is worth noticing that law n. 240/2010 limits the number of board members in Italian universities to a maximum of 11.

Several empirical studies have investigated the relationship between ICD and board size in universities: Gordon *et al.* (2002) did not find a significant relationship between university board size and the extent of disclosure, and Bisogno *et al.* (2014) and Gallego-Alvarez *et al.* (2011) also did not find a significant association between university board size and online disclosure.

Based on these contrasting results, this study posits the following hypothesis:

H4. There is a relationship between university board size and the extent of online ICD.

3.1.5 Size. Several studies on public sector transparency and disclosure highlight that larger public entities tend to disclose more information through technological and innovative tools (websites) than smaller entities, since they have more resources and are subjected to a greater demand for transparency by a larger number of stakeholder groups (Serrano-Cinca *et al.*, 2009; Cuadrado-Ballesteros *et al.*, 2014).

Therefore, from the perspective of the stakeholder theory, a website can be a stable and an efficient vehicle of communication to fulfil accountability to university stakeholders (Ismail and Bakar 2011).

Moreover, larger public entities and universities in particular are more politically visible and are subject to greater external influence from their stakeholder community (e.g. taxpayers, governments, students), so they are inclined to disclose more information, especially on the web, to reduce political costs and acquire greater legitimacy (Gordon *et al.*, 2002; Gallego-Alvarez *et al.*, 2011; Garcia-Sánchez *et al.*, 2013; Cuadrado-Ballesteros *et al.*, 2014).

Most scholars have found a positive relationship between size and different types of voluntary online disclosure provided by local governments (Gandia and Archidona, 2008; Serrano-Cinca *et al.*, 2009; Cuadrado-Ballesteros *et al.*, 2014; Brusca *et al.*, 2016). In the context of academia, Gordon *et al.* (2002) found a positive and significant relationship between colleges' and universities' size and the extent of disclosure they engage in. Moreover, Gallego-Alvarez *et al.* (2011) showed a positive correlation between size and the extent of web-based university disclosure.

Thus, based on previous studies, this study poses the following hypothesis:

H5. There is a positive relationship between university size and the extent of online ICD.

3.1.6 Age. Banks *et al.* (1997, p. 211) stated that "established universities tended to have better quality disclosure than new universities in the categories of service performance and financial performance". In the same vein, Ismail and Bakar (2011), in their study on a sample of Malaysian public universities, found that established universities disclose more information both in their annual reports and on their websites than new universities.

On the other hand, some scholars emphasise how younger organisations are more innovative and more likely to adopt new technologies to improve accountability practices in comparison with older organisations, which may suffer from problems of inertia due to internally consolidated routines and resistance to change (Saxton and Guo, 2011; Lee and Joseph, 2013).

Nevertheless, from an empirical perspective, besides the positive relationship found by Ismail and Bakar (2011) in the context of Malaysian universities, Gallego-Alvarez *et al.* (2011) and Bisogno *et al.* (2014) have found no significant relationship between university age and online disclosure.

Thus, based on previous studies, this study posits the following hypothesis:

H6. There is an association between university age and the extent of online ICD.

4. Research methodology

4.1 Sample construction and data collection

This study was conducted in the year 2017 and focusses on Italian public universities, which represent an interesting area of investigation because they “are considered critical players in the knowledge-based society” (Secundo *et al.*, 2015, p. 420).

The Italian university system has been affected by a large process of change, leading to, for instance, the introduction of performance measurement systems, three annual performance plans and the adoption of accrual accounting. However, the new law does not require the compulsory adoption of IC reporting documents (Sangiorgi and Siboni, 2017). In addition, all Italian public administrations are obliged to have on their websites a section called *amministrazione trasparente* (transparent administration), containing all of their financial, organisational and administrative information in accordance with specific requirements (Esposito *et al.*, 2013; Brusca *et al.*, 2016; Sangiorgi and Siboni, 2017) but without reference to IC information.

The sampling process began by considering all Italian public universities (61). Private universities (including those promoted by public bodies) and telematics universities were excluded due to differences in accounting data, legislative background and funding sources. The universities for foreigners of Perugia and Siena and the University of Rome “Foro Italico” are engaged in specific activities that make them incomparable with the others. Thus, the final sample consists of 58 universities.

The source of data for size and internationality is the MIUR Database[1], which collects most of the accounting and quantitative data on institutions of higher education. Data about age, complexity and board size were obtained directly from the website of each university. Data about internet visibility were collected from the search engine www.google.com.

4.2 IC framework development and web accessibility

Studies on ICD have so far conducted a content analysis and have been criticised for the absence of comparability and consistency resulting from the employment of several IC frameworks and coding schemes (Guthrie *et al.*, 2004; Krippendorff, 2013; Dumay and Cai, 2015).

To overcome this limitation, the tripartite classification presented by Sánchez *et al.* (2006) and used by Low *et al.* (2015) was assumed as a reference. The IC categories are derived from the most common approaches used in the private sector (see, e.g. Sveiby, 1997; Edvinsson, 1997; Meritum, 2002) and adapted to the contexts of universities:

- Internal (organisational) 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, etc.

- External (relational) capital is defined as all resources linked to the external relationships of the institution such as “customers”, suppliers, R&D partners, the government, etc. (Sánchez *et al.*, 2006; Low *et al.*, 2015).
- Human capital is defined as the knowledge that the human resources (in this case, teachers, researchers, PhD students and administrative staff) would take with them if they left the institution.

Then, in accordance with previous ICD research (Guthrie *et al.* 2004; Dumay and Cai, 2015), a well-established theoretical framework was selected to define the list of items, improving the reliability and comparability of the study.

The theoretical framework developed by Low *et al.* (2015) was employed as the basis to investigate the ICD content on university websites. The choice originates by a twofold motivation.

First of all, a model that was already employed in IC research in universities has been adopted to avoid the risk of a limited comparability with previous studies in the same field (Dumay and Cai, 2014, 2015). Second, the adoption of an already used framework, even if in different countries, allows making reference to an already established coding scheme, thus improving the reliability of the analysis (Dumay and Cai, 2015).

Further, to improve the accuracy of the analysis and adapt the framework to the peculiarities of the Italian context and the source of the data (websites), a sample of five university websites was initially tested. The results led to a partial modification of Low *et al.*'s (2015) list, even without altering the conceptual basis.

A detailed description of the disclosure categories with the changes made is shown in Table I.

Scholars have also in the past categorised website disclosure analysis into two parts: content, referring to information provided, and presentation, referring to the accessibility of websites (Debreceeny *et al.*, 2002; Gandia and Archidona, 2008; Boubaker *et al.*, 2011; Gallego-Alvarez *et al.*, 2011).

Thus, presentation analysis is pivotal to assess the added value offered by the website in comparison with traditional means of communication. An analysis of features and tools that improve the accessibility, readability, quality and timeliness of the information is critical (Boubaker *et al.*, 2011).

In particular, a web disclosure index that encompasses both content and presentation items is considered highly reliable because it takes into account not only the extent of information disclosed on websites but also the quality of information in terms of its ease of accessibility (Chatterjee and Hawkes, 2008).

Thus, based on previous studies (Gandia and Archidona, 2008; Gallego-Alvarez *et al.*, 2011; Bisogno *et al.*, 2014), a final list of 17 items grouped into three categories (technology, interactivity with users and navigability) was developed and employed in order to assess the characteristics of the universities' websites in terms of accessibility (Table II).

4.3 Content analysis: the disclosure indexes and the coding process

Krippendorff (1980, p. 21) stated that content analysis is a “research technique for making replicable and valid inferences from data according to their context”. Content analysis, especially in ICD research (Guthrie *et al.*, 2004), is considered objective, empirically valid and reliable (Krippendorff, 1980; Guthrie *et al.*, 2004; Low *et al.*, 2015).

Moreover, McMillan (2000) stated that the advantages of content analysis could be extended equally to web content analysis. An established theoretical framework and a reliable coding process have been adopted to explore online disclosure (Dumay and Cai, 2014, 2015).

Furthermore, one of the most suitable methods to analyse and quantify the information collected through content analysis is the construction of a disclosure index, which also

IC items	Description	Score	New trends in intellectual capital reporting
<i>Internal capital</i>			
1 Intellectual property as patent rights ^a	Information about patent rights held by the university	0–1–2	
2 Intellectual property as publications ^a	Information about publications, books and articles developed by researchers	0–1–2	
3 University culture	Comprising the vision, attitudes, experiences, beliefs, values and future programmes of universities	0–1–2	
4 Management philosophy	Information on university's mission and main objectives	0–1–2	
5 Infrastructural facilities ^b	Information on university's infrastructural framework and facilities (e.g. classes, libraries)	0–1–2	
6 Infrastructural ICT ^b	Information about ICT technologies such as databases, connections, new technologies, new instruments and software	0–1–2	
7 National research projects ^c	Research projects financed by National bodies	0–1–2	
8 European and international research projects ^c	Research projects financed by European and international bodies	0–1–2	
<i>External capital</i>			
1 Brand identity ^d	Information about university brand identity	0–1	
2 Brand merchandising ^d	Information about university brand merchandising	0–1	
3 Student satisfaction	Information about students and their satisfaction with the learning processes	0–1	
4 Mobility programmes for students ^f	Information about mobility programmes for students and international programmes (e.g. Erasmus)	0–1–2	
5 Post-graduation, high education and specialisation programmes ^f	Information about agreements with companies and public institutions for students' placements as well as masters, training, collaboration, post graduate or post-doctorate and specialisation programmes	0–1	
6 University third mission—spin off ^e	Table with information about number and activities of university spin-off	0–1–2	
7 University third mission—research consortia and cluster ^e	Information about university research consortia and technological clusters	0–1–2	
8 Students information	Information about the number of students per faculty or department	0–1	
9 Graduate students information ^f	Information about the number of graduate students	0–1	
<i>Human capital</i>			
1 Teaching staff information ^f	Panel with the name, qualification and department of affiliation of researchers, associate professors and full professors employed in the university	0–1–2	
2 PhD students' information ^f	Panel with the name and department of affiliation of PhD students	0–1–2	
3 PhD students' courses information ^f	Information on PhD students' courses and programmes	0–1–2	
4 Research fellows information ^f	Panel with the name and department of affiliation of research fellows	0–1–2	
5 Mobility programmes for employees ^f	Information about mobility programmes for researchers and professors and international programmes (e.g. Erasmus)	0–1–2	
6 Administrative staff information ^f	Panel with the name, qualification and department of staff and administrative employees employed by the university	0–1–2	
7 Internationalisation of teaching staff ^f	Information about visiting professors or researchers	0–1–2	
8 Training programmes	Education or training programmes for employees provided by the university	0–1	
Notes: ^a The original item intellectual property has been split into two items; ^b the original item information systems/networking system has been split into two items; ^c the original item research projects has been split into two items; ^d the original item brand has been split into two items; ^e the original item business/university partnership has been split into two items; ^f new items added			

Table I.
Intellectual capital items (content)

Accessibility items		Score
<i>Technology</i>		
1	Fast download of the main website (< 10 s)	0–1
2	Graphs and images	0–1
3	Use of sound files	0–1
4	Use of video files	0–1
<i>Interactivity with users</i>		
1	Access and link to information on libraries (catalogue, bibliographic databases, etc.)	0–1
2	Access and link to information on social and cultural activities	0–1
3	Information on other university services: sports, radio, etc.	0–1
4	Access to social network (Facebook, Twitter, Instagram, etc.)	0–1
<i>Navigability</i>		
1	Help button	0–1
2	Glossary of terminology	0–1
3	High readability (option of switching to high readability version)	0–1
4	Text size (possibility of changing text size)	0–1
5	Web map/table of contents	0–1
6	Internal search engine	0–1
7	Website in English	0–1
8	Website multilanguage (other European and international languages)	0–1
9	Content menu always visible	0–1

Table II.
Web accessibility
items (presentation)

allows the development of subsequent statistical analyses on potential drivers affecting the extent of disclosure observed (Gallego-Alvarez *et al.*, 2011). Coy *et al.* (1993, p. 122) stated that “a disclosure index amounts to a qualitative-based instrument designed to measure a series of items which, when aggregated, gives a surrogate score indicative of the level of disclosure in the specific context for which the index was devised”.

Accounting literature uses two approaches—an un-weighted and a weighted disclosure index. Following previous online disclosure studies on the public sector (Gandía and Archidona, 2008; Bisogno *et al.*, 2014; Cuadrado-Ballesteros *et al.*, 2014), the un-weighted approach has been adopted in the present research.

This choice of an un-weighted approach is based on the following rationales.

First, the focus of the research is not addressed to a specific user group but to all the potential university stakeholders, who have been given equal relevance. Coherently, the same importance is recognised to all information analysed and gathered in the indexes.

Second, this approach reduces the potential subjectivity problems of assigning weights and judgements of quality to the items (Bisogno *et al.*, 2014; Cuadrado-Ballesteros *et al.*, 2014).

Generally, to quantify a disclosure index, a dichotomous procedure is adopted in which an item scores 1 if it is disclosed and 0 if it is not disclosed (Gandía and Archidona, 2008; Striukova *et al.*, 2008; Gallego-Alvarez *et al.*, 2011; Pisano *et al.*, 2017).

However, some studies on website accessibility (Styles and Tennyson, 2007; Chatterjee and Hawkes, 2008) have emphasised how the quality of web-based information can vary depending on the position and the number of steps required from the user to retrieve it. In particular, Middleton *et al.* (1999), in a discussion on the structure and content of university websites, have emphasised how some universities excessively fragment content by including some information only on some departments' sites. Moreover, these sites may have different structures and styles, resulting in confusion and difficulties in finding information.

Thus, according to previous studies, assuming that higher accessibility enhances information quality and that the structure of the Italian public university websites is rather

complex, a different score has been assigned for those IC items that can be disclosed in a different way. More specifically, a score of 2 has been assigned if the item is disclosed on the main university website, a score of 1 if the item is only on the department's website and not on the main website and a score of 0 if the item is not disclosed at all.

Thus, the two disclosure indices are calculated as follows:

- (1) A content disclosure index, including the 25 IC items (content) in Table I (ICD index):

$$\text{ICD index} = \frac{\sum_{i=1}^l d_i}{l},$$

where $\sum_{i=1}^l d_i$ is the score obtained in the sub-group of 25 IC items (content); and l the maximum score obtainable in the sub-group of IC items:

- (2) A global ICD index, considering all the items (25 items for content and 17 items for presentation), has been developed (GICD index):

$$\text{GICD index} = \frac{\sum_{k=1}^n d_i}{n},$$

where $\sum_{k=1}^n d_i$ is the score obtained by considering all the 42 items (content and presentation); and n the maximum score obtainable taking into account all the items.

With regard to the coding process, the information required for these indexes was obtained by performing a systematic content analysis of selected university websites during January and February 2017, a sufficiently narrow period that permitted avoiding any anomalies that may occur when a web analysis is conducted for longer periods (Lee and Joseph, 2013).

The analysis was restricted to a single information source to provide a more precise and reliable analysis—web pages in web-browser format (Striukova *et al.*, 2008; Cormier *et al.*, 2009). Other documents available on websites such as annual reports or financial reports as PDF files, Word files and so on were excluded as distinct information sources (McInnes *et al.*, 2007; Striukova *et al.*, 2008; Cormier *et al.*, 2009) that are not coherent with the kind of research performed.

This allowed the study to capture only the benefits and specific contents of web-based disclosures that are accessible to the stakeholder community at a low cost (Cormier *et al.*, 2009) and to explore the ICD of Italian universities in a completely new and innovative way, avoiding replicating previous research conducted primarily using annual reports (Dumay and Cai, 2014; Cuzzo *et al.*, 2017).

Moreover, the content analysis was performed by multiple coders, which, according to previous ICD scholars (Guthrie *et al.*, 2004; Striukova *et al.*, 2008), helps ensure the accuracy and reliability of the coding process.

First, after analysing five university websites to adapt the coding framework to the peculiarities of the context analysed, the two researchers defined the set of coding rules. Second, the researchers coded another sample of three university websites using the final coding list in order to assess potential differences, clarify grey areas and set the final coding rules.

After discussing the differences and defining the final set of coding rules, the analysis was conducted independently by the two researchers using another sample of ten university websites.

Thereafter, to test the reproducibility aspect of reliability, after this second round, the Krippendorff's α was calculated using an SPSS macro, leading to a value of 0.8194 by

considering only ICD index elements and 0.8169 by considering all the elements (GICD index elements). The values are considered acceptable since they are above the minimum acceptance threshold of 0.80 (Krippendorff, 2013, p. 278; Dumay and Cai, 2015).

4.4 Empirical models

Two multivariate regression models were used to test to what extent the potential explanatory factors associated with theories and previous research can influence the level of online ICD by universities.

Both the ICD index and the GICD index have been exploited as dependent variables to test the hypothesis and to capture any effects of the six potential determinants (four main variables and two control variables) not only on the content IC index (ICD) but also on the composite IC index (GICD), which also takes into account web accessibility features.

Two ordinary least squares (OLS) regression models were employed in order to test the six hypotheses as follows:

$$\begin{aligned} \text{ICD} = & \beta_0 + \beta_1(\text{complexity}) + \beta_2(\text{internationality}) + \beta_3(\text{internet visibility}) \\ & + \beta_4(\text{board size}) + \beta_5(\text{size}) + \beta_6(\text{age}) + \varepsilon_i, \end{aligned}$$

$$\begin{aligned} \text{GICD} = & \beta_0 + \beta_1(\text{complexity}) + \beta_2(\text{internationality}) + \beta_3(\text{internet visibility}) \\ & + \beta_4(\text{board size}) + \beta_5(\text{size}) + \beta_6(\text{age}) + \varepsilon_i, \end{aligned}$$

where ICD is the intellectual capital disclosure index of university; GICD is the global intellectual capital disclosure index of university; β_0 is the constant; β_1 – β_6 is the coefficient of the explanatory variables (complexity, internationality, internet visibility, board size, size and age); ε_i is the error or disturbance terms of university.

Table III summarises the hypotheses, definitions of variables, proxies and expected signs.

5. Results and discussion

5.1 Content analysis results

The results collected (Table IV) confirm what has been argued by past literature—the web can be an effective and useful means of communication to disclose IC information, overcoming the limitations of annual reports (Dumay and Tull, 2007; Striukova *et al.*, 2008; Lardo *et al.*, 2017).

Regarding the content category in particular, on average, each university discloses 19.76 IC items (79 per cent of total IC items) on its website, with a special focus on human capital (86 per cent of total human capital items disclosed, on average, by each university) and internal capital (81.5 per cent) followed by 70.3 per cent of external capital.

This result is consistent with the study of Low *et al.* (2015). Moreover, it is coherent with central government requirements for both human resource evaluations and fund allocation criteria.

Table III.
Summary of
hypothesis and
independent variables

HP	Variable	Variable proxy	Expected sign
HC 1	Complexity	Logarithm of the number of departments	+
HC 2	Internationality	Logarithm of the number of foreign students	+
HC 3	Internet visibility	Logarithm of the results of a search in “google.com” in which the university appeared in the last year	+
HC 4	Board size	Number of board members	±
HC 5	Size	Number of students	+
HC 6	Age	Number of years since the foundation year	±

	Total items	Mean	%	Variance	Min.	Max.
Internal capital	8	6.52	81.5	1.41	1	8
External capital	9	6.33	70.3	2.54	3	9
Human capital	8	6.91	86.0	1.13	5	8
Total content	25	19.76	79.0	9.03	9	25
Technology	4	2.88	72	0.25	2	4
Interactivity	4	3.76	94	0.26	2	4
Navigability	9	4.72	52	2.60	2	8
Total presentation	17	11.36	67	3.29	7	16
Total items	42	31.12	74	15.30	18	38
Disclosure indices						
ICD index		0.70		0.01	0.35	0.91
GICD index		0.69		0.01	0.40	0.85

Table IV.
Websites content
analysis: results

Moreover, the mean value of the ICD index is 0.7, with a minimum value of 0.35 and a maximum value of 0.91. This high mean value evidences, as also shown in Table V, that many items are disclosed on the main university website, ensuring easier accessibility and better usability of information.

Regarding the presentation category, on average, each sampled university presents 67 per cent of the web accessibility features analysed (11.36 items per university) with a predominance of interactivity items (94 per cent of total interactivity items presented, on average, by each university), followed by technology items (72 per cent) and navigability items (52 per cent).

This result is consistent with Gallego-Alvarez *et al.* (2011) and highlights how Italian public universities exploit the potential offered by websites to engage in more accessible and understandable ICD.

Table V shows the results of the web content analysis of each item.

Regarding the content category, the most disclosed IC components are “international programmes for student mobility” and “post-graduation, formation and specialisation programmes” in the external capital category, and “teaching staff information”, “PhD students” course information’ and “mobility programmes for employees” in the human capital category. It was seen that 58 universities (100 per cent) disclose these items.

Moreover, the most disclosed items in the internal capital category are “intellectual property as publications” and “infrastructural ICT” (56 or 96.55 per cent of the universities).

Lesser discussed are “university culture” in the internal capital category with 13 occurrences (22.41 per cent) followed by “brand merchandising” and “graduate student information”, both with 19 occurrences, in the external capital category.

Regarding the presentation category, results show that in the technology category, 100 per cent of the sampled universities allow fast download of their main websites as well as use graphs and images to improve the presentation of content on their websites. In the interactivity with users’ category, 100 per cent of the sampled universities provide links to information on libraries.

In the navigability category, all the items occur in all the entities analysed, since all the websites have an internal search engine.

On the contrary, only 7 per cent of universities employ audio files to enhance web surfing, and only 10 per cent offer the option to change the text size. It is also interesting to note that, from the perspective of internationalisation, a large number of universities (86 per cent) offer the opportunity to view the website in English, while a small percentage (24 per cent) also allow their website to be viewed in other international languages in addition to English.

Category	Content items	Frequency	% of universities	0	1	2
<i>Internal capital</i>						
1	Intellectual property as patent rights	53	91.38	5	1	52
2	Intellectual property as publications	56	96.55	2	4	52
3	University culture	13	22.41	45	1	12
4	Management philosophy	41	70.69	17	21	20
5	Infrastructural facilities	50	86.21	8	33	17
6	Infrastructural ICT	56	96.55	2	4	52
7	National research projects	54	93.10	4	7	47
8	European and international research projects	55	94.83	3	5	50
<i>External capital</i>						
1	Brand identity	35	60.34	23	35	/
2	Brand merchandising	19	32.76	0	19	/
3	Students satisfaction	55	94.83	0	55	/
4	International programmes for students—mobility	58	100.00	0	1	57
5	Post-graduation, formation and specialisation programmes	58	100.00	0	58	0
6	University third mission—spin offs	51	87.93	7	3	48
7	University third mission—research consortia and cluster	50	86.21	8	5	45
8	Students information	22	37.93	36	22	/
9	Graduate students information	19	32.76	39	19	/
<i>Human capital</i>						
1	Teaching staff information	58	100.00	0	53	5
2	PhD students' information	46	79.31	12	43	3
3	PhD students' courses information	58	100.00	0	1	57
4	Research fellows information	35	60.34	23	35	0
5	Mobility programmes for employee	58	100.00	0	2	56
6	Administrative staff information	56	96.55	2	51	5
7	Internationalisation of teaching staff	33	56.90	25	18	15
8	Training programmes	57	98.28	1	57	/
Category	Presentation items	Frequency	% of universities	0	1	2
<i>Technology</i>						
1	Fast download of the main website (< 10 s)	58	100.00	0	58	/
2	Graphs and images	58	100.00	0	58	/
3	Use of sound files	4	7.00	54	4	/
4	Use of video files	47	81.00	11	47	/
<i>Interactivity with users</i>						
1	Access and link to information on libraries	58	100.00	0	58	/
2	Access and link to information on social and cultural activities	47	81.00	11	47	/
3	Information on other university services: sports, radio, etc.	56	97.00	2	56	/
4	Access to social network	57	98.00	1	57	/
<i>Navigability</i>						
1	Help button	25	43.00	33	25	/
2	Glossary of terminology	18	31.00	40	18	/
3	High readability	11	19.00	47	11	/
4	Text size	6	10.00	52	6	/
5	Web map/table of contents	40	69.00	18	40	/
6	Internal search engine	58	100.00	0	58	/
7	Website in English	50	86.00	8	50	/
8	Website multilanguage	14	24.00	44	14	/
9	Content menu always visible	52	90.00	6	52	/

Table V.
Websites content
analysis: results for
each item

5.2 Linear regression models: descriptive statistics results for independent variables

Table VI shows the results of the descriptive statistics of the independent variables. Regarding to the main variables, the complexity variable's values vary from a minimum of 1.10 to a maximum of 4.14 with an average score of about 2.38 and a median of 2.48, while the internationality variable's values range from a minimum of 3.37 to a maximum of 8.60 with a mean score of about 6.36 and a median of 6.53.

Internet visibility shows an average value of 10.14 with a minimum of 7.77 and a maximum of 12.20.

In respect to the control variables, board size results highlight that the number of board members ranges from a minimum of 6 members to a maximum of 11 members with an average of about 9.91 members. Size, measured as the number of students, presents an average value of 25,458.86 with a minimum of 4,219 and a maximum of 99,727. At last, the results related to the variable age show a mean value of 277.84 with a minimum of 18 and a maximum of 1,055.

5.3 Linear regression models: empirical findings of OLS models

Two OLS regression models were run to test the six hypotheses by considering two dependent variables—the ICD index and the GICD index. All independent variables (main variables and control variables) were included in both models.

The assumptions underlying the regression models were tested for multicollinearity (variance influence factor test) and heteroscedasticity (Gandia and Archidona, 2008; Boubaker *et al.*, 2011).

The variance inflation factor (VIF) score was calculated in both models for each independent variable to assess multicollinearity problems. In this case, the highest VIF obtained in both models was 3.677 for the variable complexity, thus eliminating multicollinearity problems, whereas the threshold value is about 10 (Boubaker *et al.*, 2011; Bisogno *et al.*, 2014; Pisano *et al.*, 2017). Moreover, White's and Breusch-Pagan's heteroscedasticity tests yielded negative results (Tables VII and VIII). Furthermore, both the regression models are statistically significant at the 1 per cent level (p -value < 0.01).

Looking at the two regression models, the first, exploiting the ICD index, shows a greater explanatory power (R^2 and adjusted R^2 are 0.51 and 0.45, respectively) than the second model based on the GICD index (R^2 and adjusted R^2 are 0.45 and 0.39, respectively). However, both the results confirm that the models explain a sufficient portion of the variability of the two dependent variables.

In both models, two variables out of six are statistically significant—internationality and internet visibility. Internationality has a positive coefficient and is statistically significant in both models at the 1 per cent level (p -value < 0.01). Internet visibility has a positive coefficient and is statistically significant in the first model at the 1 per cent level (p -value < 0.01) and in the second model at the 5 per cent level (p -value < 0.05).

Complexity is positive and statistically significant, although at the 10 per cent level (p -value < 0.10) and only in the first model. On the other hand, board size and the two control variables, size and age have negative coefficients and are not statistically significant in both the models.

	<i>n</i>	Minimum	Maximum	Mean	Median	SD
Complexity	58	1.10	4.14	2.38	2.48	0.6790
Internationality	58	3.37	8.60	6.36	6.53	1.3094
Internet visibility	58	7.77	12.20	10.14	10.24	0.8877
Board size	58	6.00	11.00	9.91	10.00	1.0477
Size	58	4,219.00	99,727.00	25,458.86	18,861.50	20,411.2380
Age	58	18.00	1,055.00	277.84	92.50	307.2309

Table VI.
Descriptive statistics
for independent
variables

	Coefficient	SE	<i>t</i> -statistic	<i>p</i> -value	Sign.
const	0.115071	0.159399	1.0211	0.4737	
Complexity	0.0486653	0.0282742	1.7212	0.0913	*
Internationality	0.0316814	0.0103911	3.0489	0.0036	***
Internet visibility	0.0438911	0.0151369	2.8996	0.0055	***
Board size	-0.015523	0.0116461	1.3329	0.1885	
Size	-9.48571e-07	9.48571e-07	-1.0964	0.3120	
Age	-6.74446e-06	3.91263e-05	-0.1724	0.8638	
<i>Model specification</i>					
Mean dependent variable	0.697273		SD dependent variable	0.102208	
Sum of squared residuals	0.288940		Regression SE	0.075592	
R^2	0.510586		Adjusted R^2	0.453008	
F(6, 51)	8.867712		<i>p</i> -value (F)	0.000001	

Table VII.
OLS regression model
results and tests—
Model 1—ICD index

Notes: Test—White test: *t*-statistic: LM = 26.1973; *p*-value = $P(\text{Chi-quadro}(27) > 26.1973) = 0.50767$ (not heteroskedasticity); Breusch-Pagan test—*t*-Statistic: LM = 4.85048; *p*-value = $P(\text{Chi-quadro}(6) > 4.85048) = 0.563129$ (not heteroskedasticity); Variance influence factors test: maximum value complexity 3.677 (not collinearity). *, **, ***Statistically significant at the 10 and 1 per cent levels, respectively

	Coefficient	SE	<i>t</i> -Statistic	<i>p</i> -Value	Sign.
const	0.247062	0.143316	1.7239	0.0908	*
Complexity	0.0330361	0.0254213	1.2995	0.1996	
Internationality	0.026425	0.00934265	2.8284	0.0067	***
Internet visibility	0.0294162	0.0136096	2.1614	0.0354	**
Board size	-0.00922791	0.010471	-0.8813	0.3823	
Size	-3.56748e-07	8.35198e-07	-0.4271	0.6711	
Age	-7.93342e-06	3.51785e-05	-0.2255	0.8225	
<i>Model specification</i>					
Mean dependent variable	0.689080		SD dependent variable	0.087334	
Sum of squared residuals	0.235579		Regression SE	0.067965	
R^2	0.458129		Adjusted R^2	0.394380	
F(6, 54)	7.577127		<i>p</i> -value (F)	0.000014	

Table VIII.
OLS regression model
results and tests—
Model 2—GICD index

Notes: Test—White test: *t*-statistic: LM = 36.3193; *p*-value = $P(\text{Chi-quadro}(27) > 22.457238) = 0.713797$ (not heteroskedasticity); Breusch-Pagan test: *t*-statistic: LM = 4.832021; *p*-value = $P(\text{Chi-quadro}(6) > 4.832021) = 0.565531$ (not heteroskedasticity); Variance influence factors test: maximum value complexity 3.677 (not collinearity). *, **, ***Statistical significant at the 10, 5 and 1 per cent levels, respectively

Thus, internationality and internet visibility seem to represent two suitable factors on which universities can act in order to create strategies to positively influence the level of online ICD.

The positive relation identified for internationality is consistent with Gallego-Alvarez *et al.* (2011). In particular, some features such as a website in English and sound and video files offer may international students more friendly and accessible disclosure.

The results obtained for the variable internet visibility are consistent with previous studies on local public administrations (Gandía and Archidona, 2008; Serrano-Cinca *et al.*, 2009) and, much like stakeholder and legitimacy theory, Italian universities tend to provide a greater amount of information on their websites by including IC content as the number of internet users increases. This helps satisfy users' information needs and brings the universities more legitimacy (Meijer, 2007; Serrano-Cinca *et al.*, 2009; Garcia-Sánchez *et al.*, 2013; Dumay and Guthrie, 2017).

Furthermore, another possible interpretation of these results is connected to the development of possible strategies to improve universities' reputation and image in the eyes of internet users through the disclosure of more information about their excellence with regard to IC.

In Model 1 (ICD index), the variable complexity is positive and statistically significant albeit at the 10 per cent level (p -value < 0.10). This result is consistent with Bisogno *et al.* (2014) and Gallego-Alvarez *et al.* (2011), although the latter found a positive but not significant relationship. This confirms that complexity positively influences the extent of web-based disclosure that universities engage in, since the amount of information to disseminate increases in proportion to the number of departments, involving the disclosure of IC contents.

6. Conclusion

Public universities have undergone profound changes, especially with the advent of NPM and the Bologna Process. Greater accountability is necessary to deal with greater autonomy, higher ability in collecting financial and human resources to compete in the international scenario and a stronger relationship with the community regarding the advent of the third mission in particular, since universities' activities are mainly based on intangible resources, and their final products are also intangible, new measurement and reporting models including IC have been considered an undisputable means to enhance accountability and fulfil the information needs of a wide plethora of stakeholders. However, scholars have paid attention mainly to reporting and managerial issues in the context of IC, investigating traditional tools for disclosure, and there is a lack of research on the possible determinants of this disclosure via the web.

The present study fills this gap, providing fresh insight into determinants that can enhance ICD. In doing so, the results offer a new perspective on a distinct tool that is nowadays broadly adopted by organisations to communicate with stakeholders and to enhance their engagement—the website.

Through a content analysis of online ICD by Italian universities, the research makes a dual contribution: first, it presents an updated view of the different IC categories disclosed through the dynamic and timely communication tool, i.e. the website, also investigating features related to the presentation of web-based disclosure. Second, by analysing possible determinants of ICD via websites, it provides useful insights on the development of ICD to enhance stakeholders' dialogue and, in turn, contribute to the growth of IC.

Building on previous studies that identify three different categories of IC—human, internal and external capital—two disclosure indexes have been developed; the first is related to ICD and the second includes features regarding the presentation of the content. Thus, a statistical analysis on potential drivers affecting the extent of disclosure obtained has been performed in connection with the two indexes. The results show that Italian universities make extensive use of ICD and that the most disclosed categories of information are human capital and internal capital, followed by information on external capital. These results are consistent with the fact that universities are knowledge-intensive organisations and are thus more prone to disclose information about human resources and research activities. Moreover, it highlights the still emerging third mission and its results. Assuming that external capital is pivotal in the development of the third mission, these results could be of interest to government bodies in universities. In fact, the Italian Ministry responsible for universities and research is progressively introducing reward criteria, allocating a consistent part of public funds to results obtained through teaching, research and third-mission activities. Consequently, a clear disclosure of IC would be beneficial to enhance stakeholder engagement, thus generating a virtuous circle.

The OLS analysis reveals that internationality and internet visibility positively affect ICD by university, while size, age and board size have negative coefficients and are not statistically significant. Moreover, complexity seems to be positively related to ICD but not to GICD.

The study offers room for further developments: by highlighting the determinants of ICD in Italian public universities on their websites, the items that tend to be disclosed to a greater extent and those still being undervalued, these findings can help manage the appropriate tools to improve the use of this important channel of communication and activate a virtuous circle. In fact, by improving accountability, they can, in turn, increase trust and cooperation with the community at large. Moreover, since the web is readily available and easily updated, it allows the spread of useful information and brings legitimacy to the use of public resources.

The academic community and legislators recognise the importance of having guidelines to improve the accountability of public organisations in general and universities more specifically. However, despite the request for transparency via the web, no concrete requirements have been outlined with regard to ICD. The results of this study can help establish a set of required information that should be disclosed about different components of IC.

The study has also some limitations, which need to be overcome in the future: first, this research considers a single year (2017), thus failing to capture reporting trends through longitudinal analysis. A further possible development of the research is to move the attention to how stakeholders perceive IC in universities and which are their information needs in respect to IC components. Such perspective would also allow adopting a weighted disclosure index in the analysis. Moreover, the research considers external stakeholders information need, lacking in feeding managers and board members information need. In this regard, an investigation taking into account these different information users may be supportive for improving decision making in the management of IC resources.

The research can be further developed through a cross-national comparison, with the aim of better understanding to what extent ICD via the web is country specific or is a phenomenon growing at the same pace worldwide.

Note

1. Ministero dell'Istruzione, dell'Università e della Ricerca.

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