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Intelligibility of communication with stakeholders after accounting system change: an exploratory data analysis of Italian universities

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Intelligibility of communication with stakeholders after accounting system change: an exploratory data analysis of Italian universities

Abstract

Purpose – This study aims to explore the intelligibility of communication with stakeholders in performance reports of Italian public universities addressed to external stakeholders as an immediate result of accrual accounting adoption. It focuses on the visual forms and changes in the readability of the information disclosed instantaneously after this significant accounting reform.

Design/methodology/approach – We collect the stakeholder section of performance reports published before and after accrual accounting adoption. Then, we use manual and computer-assisted textual analysis. Finally, we explore the data using Principal Component Analysis and Qualitative Comparative Analysis.

Findings – This study demonstrates that switching from cash to accrual accounting provokes immediate changes in communication patterns. It confirms the significant reduction of readability and increase in visual forms after accruals accounting adoption. Our results indicate that smaller universities especially put effort into increasing intelligibility while implementing a more complex accounting system. We also find a relation between the change in readability and the change in visual forms that are complementary in most cases.

Practical implications – The findings underline the possibility of neutralising the adverse effects of accounting reform associated with its complexity and difficulties in understanding by the use of visual forms and attention to the document's readability.

Originality/value – This paper adds a new dimension to the study of public sector accounting from the external stakeholder perspective. It provides further insight into the link between accrual accounting adoption and readability, together with the use of visual forms by universities.

Paper type: Research article

Keywords: visual forms, readability, universities, accrual accounting, reforms, communication

JEL code: M14, I22, I23,

1. Introduction

Public universities constitute an important section of the public sector in European countries, considering the societal benefits they provide and, at the same time, sizeable public

funds devoted to their maintenance and development. Universities build knowledge and disseminate it, contributing to economic growth and social progress (Valero & Van Reenen, 2019). While the generally positive impact of universities appears unconvertible, the performance of particular institutions varies, creating a need for performance evaluation. The performance evaluation results may affect the allocation of public funds to universities and the funding decisions by public and private donors. Universities are expected to be accountable, and they are subject to reforms that affect public institutions concerning their performance measurement and reporting. In this study, we examine recent reform results and the introduction of accrual accounting in Italy, which influences the way universities account for their income and costs, the assets at their disposal, and the liabilities associated with their functioning. Our goal is to explore how Italian universities improve the intelligibility of their reports directed towards external stakeholders using visual forms and modifying text readability as a direct effect of the accrual accounting implementation. The results enable us to obtain an insight into the changes in reporting of public institutions at a moment of important accounting reform.

Several issues motivate us to undertake this study. First, the proponents of the accrual accounting reform intended to increase the level of transparency in the presentation of activities, effects, and costs (Gigli *et al.*, 2018a). There is no doubt, however, that the level of transparency of a document depends not only on the manner in which accounting is effected but also on the way of conveying information, which consists of the readability of the texts and the appropriate use of visual forms. In light of the above, we aim to verify if the transition from cash accounting to accrual accounting in Italian public universities is related to changes in the form of information presentation that is disclosed to the stakeholders. Second, universities are under continuous pressure to be more accountable to the government and local communities, businesses, and international networks. The "third mission" of the university (the first two being teaching and research), which is related to knowledge transfer, commercialisation of innovations and intensified cooperation with business and society, broadens the scope of accountability (Laredo, 2007, Secundo *et al.*, 2015, Zomer and Benneworth, 2011). We are interested in how universities address the challenge of delivering intelligible information concerning their outcomes.

The adoption of accrual accounting, which replaces cash accounting, can be construed as a phase in a stream of reforms aimed at transferring management practices from the private sector to public institutions (Broadbent and Guthrie, 2008; Cohen and Karatzimas, 2017). The case for adopting accrual accounting in the public sector was self-evident as early as in the 1990s when governments began adopting New Public Management (NPM) principles and

focused on public sector efficiency, effectiveness, transparency, and accountability (Lapsley *et al.*, 2009). However, according to Nasi and Steccolini (2008), the main paradox of the reforms is that accounting techniques (formally inspired by accountability principles) have sometimes led to a reduction of accountability due to *inter alia* poor disclosure and communication (especially in external reporting). This thesis has also been recently confirmed by Bonollo (2022), who conducted a systematic literature review of 106 academic articles published between 1980 and 2021 on the drawbacks of adopting accrual accounting in the public sector. She concluded that introducing accrual accounting rules makes accounting information more complex and arbitrary for public managers, policymakers, users, citizens, and stakeholders. In order to avoid some of the adverse effects of this critical accounting reform and facilitate perceptions of its introduction for stakeholders, it is necessary to manage the disclosure of the information more effectively and proactively. In this regard, we can cite another recent study by Cohen *et al.* (2022) confirming that infographics improve accounting understandability.

The question of how an accounting reform affects organisational behavior concerning outcomes presentation remains open to verification in each specific case. This paper attempts to discover how universities change their reporting practices in the immediate aftermath of adopting accrual accounting.

We analyse the content of performance reports published by Italian public universities before the reform and in the first year of accrual accounting adoption in order to determine how communication methods changed. Italy offers a valuable research setting, where the higher education sector underwent a profound transformation from a completely centralised system to a more autonomous one, with universities gaining decision freedom at the management, organisational, and partly at funding level. Until the late 1980s, universities in Italy were managed by the national government. Decision-making was centralised, and little attention was given to the assessment of effectiveness and efficiency at the level of individual universities. In the mid-1990s, law transformation began increasing the managerial focus of universities (Aversano *et al.*, 2017). Reforms, notably the one by Brunetta and Gelmini, introduced rules fostering transparency in reporting performance and improved comprehensibility for external stakeholders (Dal Molin *et al.*, 2017). The transition from cash to accrual accounting was an element of this broad reform.

In this paper, we investigate one particular section of the annual report disclosed by Italian universities, a section that is explicitly directed towards users outside of the organisation: "summary of information of interest to citizens and external stakeholders" (*Sintesi delle informazioni di interesse per i cittadini e gli stakeholder esterni*) included in the performance

report (*Relazione sulla performance*). We use content analysis to investigate the patterns in presenting a performance by university managers and how this changed in the first year after the adoption of accrual accounting. We analyse the number and type of visual forms placed in the report. In general, as the previous research confirms, the text is more easily understood when accompanied by visual forms (Cromley, *et al.*, 2010, Cohen *et al.*, 2022). Therefore, we expect that as universities change reporting to a more complex system, they will use visual forms to make the report more plain, understandable, and user-friendly. We also assume that they focus on the readability of the published text, which, together with the visual forms, brings overall greater intelligibility. This study, extends the previous works of first-time adoption carried out by other researchers, for example, Agasisti *et al.* (2015), that conducted their analysis on the reports of a sample composed of six Italian universities adopting accrual accounting voluntarily before the introduction of Law n. 240/2010. We also add to the study of Allini *et al.* (2017) that focused exclusively on the readability of the disclosure provided by Italian universities after a change to accrual accounting in their financial statement.

In this study, we adopt multiple methods and tools for data analysis. We hand-collect the stakeholder section of performance reports published before and after accrual accounting adoption. Then, we use manual and computer-assisted textual analysis. We explore the use of visual forms by universities adopting Principal Component Analysis (PCA). Finally, we apply a Qualitative Comparative Analysis (QCA) to find logical relations between the change in visual forms and in the readability including also universities' characteristics as additional conditions.

Our empirical results confirm that many preparers in our sample appear to be aware of the consequences of implementing accrual accounting on financial reporting and that they put effort into presenting performance information more intelligibly for external stakeholders. This is, however, mainly executed through the implementation of various types of visual forms. The readability of the text accompanying the visual forms proves to be generally lower. However, we also find a connection between readability and visual forms that indicates their complementarity in most cases.

The contribution of this paper is threefold. First, we extend the policy debate concerning the effects of accounting reforms in the public sector by exploring the link between accounting, textual disclosure and the use of visual forms. Our study also confirms the connection between accrual accounting adoption and the greater difficulty of text understanding in the information disclosed by universities. Moreover, we indicate the complementary coexistence of visual forms and the readability of text in the analysis of intelligibility. Second, we contribute to the

voluntary disclosure literature and content analysis studies, in particular, by exploring the use of traditional and innovative, complex visual forms. Third, we contribute to management research on higher education institutions by providing an account of the diverse results of the accruals implementation in Italian universities.

The article is structured as follows. Section 2 presents the literature review, starting with the adoption of accrual accounting in the public sector and the challenges it creates in communication with stakeholders. Next, it presents the literature devoted to the use of visual forms in reporting as a means of improving communication and readability. This section concludes with the formulation of research questions. Section 3 presents the data collected from the content analysis of performance reports published by Italian public universities and explains research methods. Section 4 shows the results and is followed by the discussion of findings and presentation of conclusions.

2. Literature review and research questions

2.1. Public sector reforms and accrual accounting

New Public Management (NPM) stirred a global wave of public sector reforms over the past three decades. NPM-inspired reforms are associated with a move towards better communication with stakeholders to assure accountability (Blomgren, 2007; Strathern, 2000; Tsoukas, 1997). In its broadest sense, accountability is "a state of being in which persons are obliged to answer to others" (Gabbard, 2000, p. 53). In practical terms, accountability is defined as "the obligation to give an account" (Perks, 1993, p. 24), "the obligation to report to others, to explain, to justify, to answer questions about how resources have been used, and to what effect" (Trow, 1996 p. 310). Stensaker and Harvey (2011, p. 1) focus on accountability at universities stating that "one of the most profound changes in higher education during the last couple of decades is the increasing interest in accountability". Accounting is one of the key elements needed to assure accountability (Boven, 2006, p. 6). Gray *et al.* (1996, p. 42) also argued that accountability can contribute to a "free and fair" society because it holds out "the possibility for the development of accounting in a way in which individuals are better informed and empowered, in which inequities in wealth are potentially exposed and the inequalities of power are somewhat reduced". As Steccolini (2019, p. 258) underlines: "While accounting has been described as fundamental in the implementation of the NPM program, in turn, NPM appears to have grown increasingly central in the study of public sector accounting".

Accounting practices in the public sector have been undergoing radical changes to adapt to the reforms in public management (Hood 1995; Lapsley 1999). Accounting tools are seen as

the fundamental means through which managers or external agencies and bodies are made accountable for the results attained (Liguori *et al.*, 2012, p. 906). To achieve that, accounting, which used to be focused on providing information to national budgetary and financial authorities, needed to integrate the notion of accountability to external stakeholders (Coy *et al.*, 2001). This led to the emergence of a new format of public reporting that increasingly took shape similar to that found in companies (Christiaens *et al.*, 2010; Bergmann, 2012).

The reforms of the public sector involve the change of the very basis on which accounting rests: the approach to the registration and communication of the economic activities that universities are accounted for. Around the world, NPM reforms included proposals for the adoption of accrual-based accounting (Aucoin, 1990; Barzelay, 2001). Financial reporting by public sector institutions traditionally has been centered on the receipts and disbursements of cash, while assets and liabilities are reported in separate systems and formats. The key product of such accounting has been a cash-based financial statement that indicates whether an institution meets its budget, runs a deficit, or achieves a cash surplus during the accounting period (IFAC 2000, p.47). In contrast, accrual-based accounting is built on conceptual frameworks developed for the private sector, which links the different types of accounts in one system (Hodges and Mellett, 2003, p.102). The transition from cash-based systems to accrual accounting is motivated by the need to improve public sector reporting, and the consequences of the switch are far-reaching (Cohen and Karatzimas, 2015, p. 449).

Accrual-based accounting is frequently underlined to be superior to cash-basis accounting (subject to costs) (Kwon, 1989). Accrual accounting offers benefits to organisations that need an accounting system that performs many roles, such as detecting errors or fraud, measuring performance, and accounting for the depletion of capital stock. In NPM theory, accrual accounting is crucial in addressing the lack of available information in public sector organisations concerning their costs and the value of their assets (Scott *et al.*, 1990). The potential benefits of accrual accounting in the public sector are discussed in many publications (Parker and Guthrie, 1990; Mellett, 1997; Brorström, 1998; Perrin, 1998; IFAC-PSC, 2003, FEE, 2007, Anessi-Pessina and Steccolini 2007, Lapsley *et al.*, 2009, Ball, 2012). Many studies highlight the information limits of cash accounting systems compared to the opportunities offered by an accrual accounting system (Parker and Guthrie 1990; Perrin 1998; Anessi-Pessina and Steccolini 2007). Ball (2012) points to accrual-based accounting as crucial to improving financial reporting within governments and public sector organisations. Grossi and Soverchia (2011, p. 528) underline that "accrual accounting is expected to provide more useful information for long-term assessment of public policies' financial sustainability, both for

internal use (for cost and price calculation, make-or-buy choices, outsourcing, etc.) and for external use, thus improving government's transparency, accountability, and performance evaluation".

In sum, accrual accounting was expected by its proponents to increase accountability, financial transparency towards external stakeholders and generally the efficiency of public organisations (Jones, 1992; Micallef, 1994; Evans, 1995; Christiaens and Rommel, 2008), mainly through a change in the reporting pattern. Accrual accounting is therefore supposed to be more effective than cash accounting. However, it is essential to notice that accrual-based financial reporting is not only different from cash-based one, but it is also considered to be more complex (Diamond, 2002 and Šević, 2006) and to some may be difficult to understand (Grossi and Soverchia 2011, p. 529). Public sector accounting research has included little investigation of the negative consequences that the implementation of accrual accounting can generate (Azhar et al., 2022). This is confirmed by the latest study by Bonollo (2022), which through a systematic literature review of academic articles published between 1980 and 2021, indicates several significant drawbacks of accrual accounting adoption in the public sector. The increased complexity may impede access by stakeholders and hamper transparency instead of improving it. The complexity of the information and the lack of its understanding by potential users prevent accrual accounting from promoting the participation of various groups of stakeholders in political life, democratic control and accountability (Connolly and Hyndman, 2006; Ellwood, 2009; Harun *et al.*, 2015; Nasi and Steccolini, 2008; Pilcher, 2011). Information that is not comprehensible maybe not useful, and therefore, it will make a lesser contribution to ensuring adequate accountability (Wallace *et al.* 1994).

However, the problem of complexity and difficulties in understanding may be overcome with efforts focused on the increased readability of the information disclosed and improved information presentation. As public organisations become increasingly aware of the need to engage with their stakeholders, they should approach reporting from a user-need perspective (Mack and Ryan, 2007). It may appeal especially to performance reports that are not subject to strict regulation, allowing universities to freely combine the various dimensions of performance in these documents, illustrating their outcomes with visual items and focusing on their readability.

2.2. Reporting reforms in Italy

Italian universities must comply with accounting rules set by the state; the Ministry of Education firmly regulates their teaching and research activities, and they are accountable to the Ministry of Economy for all their financial activity (Agasisti, *et al.*, 2015, p. 495). In 2010, the Italian Parliament approved a reform of public universities. As one of its essential elements, the higher education system was compelled to introduce full accrual accounting and budgeting following the approval of Law no. 240/2010 in December 2010, with 2015 set as the deadline for the adoption. This was further supported by Legislative Decree n. 18, dated 27 January 2012, which formulated precise implementation guidelines and indicated the deadline of 2015 for making the change and some subsequent regulatory provisions. Few universities made the switch before the deadline approached. The Association of University Managers formally asked Parliament for an extension of the deadline, arguing that legitimate technical issues arose, and due to the lack of additional resources and competencies, the Reform could not be effected in time (Agasisti *et al.*, 2015, p. 496). Consequently, universities in Italy transitioned to accrual accounting in different years, depending on how problematically a university tackled this obligation.

The introduction of the Reform has stimulated extensive national debate, which has mainly referred to the potentials and limits of the new law (Biondi *et al.*, 2015; Trequattrini *et al.*, 2015), the programming phase concerning the introduction of this Reform (Paolini and Soverchia 2015, Coran and Pilonato, 2015), critical points of the process of change (Lombardi *et al.*, 2015), institutional and organisational barriers of the process (Gigli and Mariani, 2018), as well as the related technical and accounting problems (Tizzano 2015, Modugno and Tivan 2015) and to the governance of universities after the introduction of the Reform (Lucianeli, 2013). The study by Arnaboldi and Azzone (2004) highlighted the main difficulties encountered by the Italian system in the implementation of new planning and control techniques concerning this Reform. Gigli *et al.* (2018a) analysed the effects of the change in accounting logic on the reporting of business performance results of universities. In another study, Gigli *et al.* (2018b) considered the possible sources of organisational decoupling and their effects in public universities as they pass from cash to accrual accounting. The only study that refers to the readability of the transition from cash to accrual accounting at universities researches exclusively the impact of the change on the financial report confirming greater complexity as a result of the Reform introduced. None of these studies, however, has dealt with the intelligibility of communication after the accounting change in the Performance Report – a part directly

dedicated to the broad spectrum of university stakeholders, which is the objective of this paper. The relation between the visual forms and readability after the accounting reform was also not studied previously.

Communication effects of the accrual accounting reform need to be viewed in the broader context of performance reporting, especially since an increased focus on accountability was a major motivation for the reform. This issue has substantial relevance in Italy, where a ubiquitous regulatory transformation occurs among public universities to make their governance and accounting systems accountable and transparent to stakeholders (Steccolini 2004; Riccaboni and Galgani 2010). In 2009, the Italian legislature introduced and regulated a system designed to measure and evaluate university performance, which was intended to help public organisations focus on planned objectives, achieving results, monitoring, and reporting performance (Bonollo and Zuccardi Merli, 2018). Following the Legislative Decree no. 150/2009 all public institutions are obliged to implement the so-called "Performance Management Cycle" that provides the definition and assignment of objectives to be achieved, the identification of the necessary resources, the monitoring of ongoing initiatives, the application of any corrective actions, the use of reward systems based on merit measurement and evaluation criteria. The results must be reported at the end of the annual cycle. Consequently, all public organisations must prepare and communicate a performance report presenting obtained results and comparing them to the objectives.

Performance reports issued by Italian public universities refer to the activities supporting research, teaching, and their third mission. Bonollo and Zuccardi Merli (2018) summarise the purpose of this communication in the following way: "the Performance Report must be able to respond to the very different information needs of the different parties involved while remaining a concise and easy to understand document aimed at a broad and varied audience (though containing annexes with more detailed information). It should be remembered that the structure and form of the document are important aspects of its effectiveness as a communication tool". Importantly for our study, the report has a relatively free format, allowing universities flexibility in choosing methods to communicate their activities and results. Accordingly, we can study the choices universities make in using this format.

2.3. Communication with stakeholders

Although this study concerns a mandatory element of annual performance disclosures (*Relazione sulla performance*), our focus is on discretion applied by the preparers as to the

method of presenting the information required. The section we study is the stakeholder report (*Sintesi delle informazioni di interesse per i cittadini e gli stakeholder esterni*), which we refer to as the stakeholder performance report for brevity. It is a part of the performance report directed specifically to citizens and external stakeholders, who may have limited awareness of the technicalities involved in accounting and performance measurement at a public university. Following classic financial accounting literature indicating that the "demand for financial reporting and disclosure arises from information asymmetry and agency conflicts" (Healy and Palepu, 2001, p. 406), the demand by citizens for information about the public sector institutions can be construed as an extreme case. Typically, citizens' monitoring and control abilities are much weaker than those of investors, resulting in higher agency costs. Neither can citizens easily obtain and understand any information provided by public sector institutions, which tend to be more complex than those of private businesses. This extreme information gap explains why the Italian regulator requires universities to prepare a performance report section dedicated to external stakeholders. Given the discretion of the information content and the form of its presentation, this format invites preparers to try a different approach to communicating performance and improving intelligibility. Visual forms, in particular, can help citizens understand complex information.

Visualisation is defined, in general, as "mechanisms by which humans perceive, interpret, use and communicate visual information" (Scaife and Rogers, 1996). Human brains are hard-wired to process visual information: the visual cortex provides direct access to human consciousness (Clark and Mayer, 2011). As a result, humans learn and remember more efficiently and effectively when text is accompanied by visual forms than the text alone (Dunlap and Lowenthal 2016, p. 42). This fact has direct implications for the use of data visualisation in performance disclosures. Visual forms can reduce the effort required to understand reports, leading to improved information acquisition by external stakeholders. The main aim of visualisation is to communicate information more clearly and effectively by using graphical means (Inan and Dur, 2012).

Otten, *et al.*, (2015, p.1901) explain that "data visualisation combines principles from psychology, usability, graphic design, and statistics to highlight important data in an accessible and appealing format. Doing so helps bridge knowledge producers with knowledge users, who are often inundated with information and increasingly pressed for time. (...) Visual forms are an effective way to present complex data in a visual format that is compelling, provides rapidly available information, and is directly useful for decision-making purposes". Houts *et al.* (2006) underline that visualisation, including graphs, diagrams, and other infographics, is useful for

communication and engagement, especially when used to support comprehension among individuals with low literacy in the subject, such as citizens attempting to assess the performance of a public institution. A university's performance comprises various dimensions: financials, student education outcomes, research output, and broader social impact. The multidimensionality of performance calls for the use of complex, innovative visual forms.

An infographic is "a larger graphic design that combines data visualisations, illustrations, text, and images together into a format that tells a complete story" (Krum, 2014, p. 6). It is a type of picture that bends data with design, helping individuals and organisations concisely communicate messages to their audience (Smiciklas, 2012, p. 3). As a Harvard Business Review article explains: "A great infographic is an instant revelation. It can compress time and space. (..) It can illuminate patterns in massive amounts of data. (...) It can make the abstract convincingly concrete" (Ovans, 2014).

High-quality, innovative infographics can be powerful sources for engaging the reader of the information disclosed by the university and may make the context of the information transmitted to the stakeholder easier to understand and more readable. Thanks to infographics, the message presented to the reader becomes more evident, concise, and easier to understand. Infographics can support reading comprehension while strengthening critical thinking and synthesising skills. Infographics can be a powerful visual approach to conveying information and supporting conceptual understanding because people see with their brains (Smiciklas, 2012). Infographics support attention, minimise cognitive load, create aesthetically appealing artefacts, activate or build schema by using objects and information known to learners, and they can motivate (Clark and Lyons, 2010).

In sum, the use of various visual forms enriches and enhances the act of reading, effectively engaging the reader (Bellver, 1989). It strengthens readers' concentration on the texts, leading to improved understandability of the story and contents. Organisations use visual forms to make the otherwise "dry" content of their performance reports more comprehensible. Some professional organisations, such as the International Integrated Reporting Council, officially suggest using visual forms as best practice (Havemo, 2018a and Havemo 2018b). Indeed, modern accounting research recognises visual forms as an important object of study (Beattie and Jones, 2008, Davison, 2015). As the complexity of accounting and performance reports increases with new regulation, public institutions and their stakeholders may benefit from more extensive use of visual forms.

The communication with stakeholders through the information disclosed also encompasses the comprehensibility (clarity) of the text. In other words, the text should be

readable. It is expected to have an appropriate textual style and lexical consistency and should not be terminologically ambiguous. Klare (1974) describes readability as the ease of understanding or comprehension due to the writing style. Readability is a measure of textual difficulty for the reader (Chiang *et al.*, 2008). Readability is positively associated with effective communication (Courtis and Hassan, 2002; Subramanian *et al.*, 1993). One of the crucial characteristics of a good report is its ability to convey the information to its broad audience in a way that is easy to read and understand and is appropriate for decision-making (Chatterjee, 2008; Cook and Sutton, 1995; Jones, 1998, Richards and van Staden, 2015). Readability is an essential aspect of textual evaluation because it implies the value of the information to be fully comprehended (Luo *et al.*, 2018). Performance reports should be easy to read to provide value to stakeholders so that the information can be appropriately used in decision-making processes. Previous studies agreed that complex narratives were less effective and costlier in the analysis process (De Souza *et al.*, 2019; Callen *et al.*, 2013). The complicated text requires more time and effort to extract meaningful information, which can jeopardise analysis (Bloomfield, 2008).

Consequently, the meaning of the information can be hampered by increased text complexity. In reference to corporate texts, Chavkin (1997) examined the level of complexity considering two critical features: the difficulty of the words (a difficult word is a “technical” word) and the length of sentences. The author regarded that simple sentences with easier words, having fewer than four syllables, provide better intelligibility. Empirically, many studies have focused on readability in the private sector, however, most of the research has neglected the importance of readability in the public sector, where accountability is a fundamental paradigm. The lack of previous studies is evident in the context of the universities. With our study, we try to close this research gap.

2.4. Research questions

Three main themes arise from the literature review, motivating our research questions. First, reporting reforms aim to improve public universities' accountability towards their diverse stakeholders. The stakeholder-centric view of accounting and reporting is reflected in the stakeholders' theory lens, originally introduced to the literature by Freeman (1984), which is commonly used in studies of voluntary disclosure choices (Hadro *et al.*, 2022, Bryl *et al.* 2022). Once universities acknowledge they need to manage divergent interests rather than report to a supervisory body, it becomes apparent that they need to go beyond regulatory disclosure

(Poncelet, 2003). Instead, they need to consider how stakeholders perceive the performance report and its characteristics. Laud and Schepers (2009) show that this can be achieved with improved intelligibility, which is defined as understandability, clarity and simplicity. In this paper, we extend the study of intelligibility to public universities, concentrating on two means of achieving it: visual forms and improved readability.

Second, the switch of the accounting basis from cash to accrual is a significant reform, but it does not, at least immediately, lead to improved use of the accounting numbers themselves. On the contrary, the change in the content and format of the information provided imposes an additional processing difficulty on the users. The users may, therefore, turn to performance reports and other explanations in the reports rather than rely on accounting numbers that have just changed. Consequently, the preparers of stakeholders' reports may recognise this trend and put more effort into preparing this disclosure element, choosing the most appropriate communication techniques.

Third, visual forms can be particularly effective in improving the intelligibility of performance reports. Faced with the challenge of presenting unfamiliar, complex information resulting from the adoption of accrual accounting, universities may turn towards new visual forms. Therefore we study the use of visual forms in detail by collecting and analysing the contents of the stakeholder section in university performance reports.

In sum, we focus on the following research questions:

RQ1 – How many (and which types of) visual forms do Italian public universities use in stakeholder performance reports before and after the transition from cash to accrual accounting?

RQ2 – What is the change in the readability scores of stakeholder performance reports prepared by Italian public universities before and after the transition from cash to accrual accounting?

RQ3 – Are the changes in visual forms and readability of stakeholder performance reports prepared by Italian public universities after the transition from cash to accrual accounting complementary or substitutive?

3. Methodology

3.1. Sample

To answer our research questions, we analyse the performance report's content published on a compulsory basis each year by Italian public universities. We extract a specific

section of the performance report (specifically, the second one) called *Summary of the information for the stakeholders*, which is intended by the regulator to meet the multiple external stakeholders' information needs. The content and the form of presentation can vary, since the preparers enjoy significant freedom in this field. In general, the stakeholder performance report is expected to provide an overview of the most critical financial and non-financial information concerning the university.

First, we compiled a list of 55 Italian public universities from the ministry website (<https://www.miur.gov.it/>). Next, we downloaded all performance reports available on the Internet. Then, for each university, we collected two documents: one from the period preceding the adoption of accrual accounting ($t - 1$) and another one from the period after the adoption (t). Being in line with the aims of this research and following prior research concerning the first-time adoption of diverse accounting reforms, we analyse the immediate short-term period effect (t and $t - 1$) brought by the application of new accounting rules (e.g. Jaruga *et al.*, 2007, Bischof, 2009, Lopes and Lopes, 2019). Long-run empirical research on corporate reporting confirms an increasing trend in the amount of stickiness, particularly after introducing new regulations (Dyer *et al.*, 2017). That indicates that organisations tend to change the reporting patterns immediately after the amendment of the new regulations, duplicating in later periods the way and form of the information presented. This argument also supports the analysis of the immediate changes related to the first-time accrual rule adoption.

We excluded all those universities from our sample that did not disclose the two documents' complete set. Our final sample consists of 62 performance reports from 31 universities.

The exact timing of accrual adoption varies between universities. The law (D.Lgs. 18/2012) allowed universities some flexibility in choosing the period to adopt accrual accounting as long as they met the 2014 fiscal-year-end deadline. Consequently, the pairs of documents relate in our sample to different periods depending on the university. 13 out of 100 universities postponed the adoption until the deadline; only one opted for early adoption (3% in 2012 and 19% in 2013). The remaining universities are late adopters, taking advantage of the deadline extensions granted to them. The last adoption took place in 2017.

The universities in our sample are spread geographically between the three main regions of Italy. The North is represented by more than one out of three universities analysed (19% from the Northeast and 16% from the Northwest). 32% of the sample comprises universities located in Central Italy, while the remaining ones are in the South (26%) and on the islands (about 6%). Regarding the universities' size in our sample, a bit less than half (45%) are *big* or

mega universities (with respectively more than 20.000 and more than 40.000 students enrolled), according to the classification introduced by the Centre for Social Studies and Policies (CENSIS). In comparison, 55% are classified as *small* or *medium* (with less than 10.000 and between 10.000 and 20.000 students enrolled). The population composition ratios, with reference to the same geographical and dimensional variables, are very similar and, in substance, overlapping.

Figure 1 summarises the geographical distribution and size of the researched universities. The black circles indicate the locations, and their area is proportional to the universities' size.



Figure 1: Geographical locations and sizes of researched universities

3.2. Research methods

We use content analysis and statistical analysis to answer our research questions. We begin by introducing a taxonomy of visual forms, which we then use to classify the visual forms we find in the reports. It is essentially a functional taxonomy highlighting the aim rather than the look of the visual forms. We manually count the instances of visual forms and classify them into the following groups:

1. Traditional visual forms:

- **visual forms to group data:** *tables with numbers, tables without numbers, tables with numbers and icons;*
- **visual forms to draw a cross-sectional comparison:** *bar charts, comparative bar charts, stacked bar graphs, pie charts;*

2. Time oriented and innovative visual forms:

- **visual forms to draw a comparison over time and perform trend analyses** *comparative time-series bar charts, time-series comparative column line graphs, time-series tables, time-series line graphs, time-series multiline graphs;*
- **innovative visual forms** *timelines, hierarchical graphs, visual resumes, lists, texts, location-based infographics, photos, word clouds, systemic diagrams, visualised number infographics.*

Once we collect all data regarding the extent of visual forms, we apply Principal Component Analysis (PCA) to determine which types are used jointly. PCA is an explorative statistical technique aimed at reducing dimensionality and increasing data interpretability without losing too much (relevant) information. By diagonalising the covariance matrix (or the correlation matrix, if the original variables were scaled), PCA converts original data into a new dataset with a reduced number of variables called Principal Components (PCs), which have the following characteristics: they are uncorrelated to each other, they are obtained in descending order by explained variance, and they express the same total variance of the original datasets. Subsequent analysis of the correlation between the original variables and the PCs allows us to understand how the variables were converted to PCs (Jolliffe, 1986).

PCA based on the count of visual forms is instrumental in answering RQ1. In particular, we used PCA to sum up and simplify our data by reducing their dimensionality. Starting from the counts of the each visual forms' type, we used Principal Component Analysis to identify two synthetic variables able to group them based on their usage in the reports analysed. This led to obtaining two groups of visual forms that appear independently, because some of the four types tend to co-occur. In short, PCA could be seen here as a classification tool that allows studying universities' reports to identify the similarities between them from the point of view of all the visual forms they contain.

RQ2 requires a measure of readability, so that we may determine its change at accrual adoption. Readability is a text feature in accounting and finance predominantly analysed in

written disclosures of listed companies (Loughran and McDonald 2014; Clatworthy and Jones 2001; du Toit 2017; Lee 2012; Asay, Elliott, and Rennekamp 2016; Li 2008; Stone and Lodhia 2019). Research evidence in financial reporting proves that e.g. the level of readability can be related to future companies' performance (Li 2008), investors' trading activity (Lawrence 2013) and analysts' attention (Lehavy *et al.* 2011). There are many definitions of readability in the academic literature with one of the most general indicating that readability is *the ease of understanding or comprehension due to the style of writing* (Klare 1963). Yet as the level of readability is usually evaluated by the predictive device (without reader participation) using counting of language variables (Klare 1974), a more technical definition of readability assumes that *it is an analysis of the syntactical complexity of prose, typically based on the variables sentence and word length* (Stone and Lodhia 2019, p.1534).

To measure the degree of readability we use the GULPEase index (Lucisano and Piemontese, 1988). This index is a measure that calculates the readability of a text based on the length of words (measured in number of letters), the number of words and the length of sentences. The Gulpease index was initially defined in 1982 and developed in 1988 at the University Roma “La Sapienza”, Rome, Italy, by the Linguistic Pedagogical University Group (in Italian, “Gruppo Universitario Linguistico Pedagogico” or GULP), in collaboration with the Italian section of the International Business Machines Corporation (IBM) (Dini *et al.* 2017). It is dedicated to compute the score of ease to read and understand of the Italian texts. This index is obtained using the following algorithm:

$$R = 89 + [300 \times (\text{number of sentences}) - 10 \times (\text{number of letters})] / (\text{number of words})$$

Finally, in order to answer RQ3, we check whether the changes in readability and the use of visual forms can be observed across accounting system reform applications. In this way, we check whether the readability and visual forms disclosed in stakeholder performance reports prepared by Italian public universities after the transition from cash to accrual accounting are complementary or substitutional.

We use the following model:

$$\text{Change in Visual Forms} = f(\text{Change in Readability, Size, Region_Nord, Late_Adoption}),$$

where:

- Change in Visual Forms is a continuous variable which measures the difference in the number of all visual forms included in the documents before and after the accounting system change;
- Change in Readability is a continuous variable which measures the difference between the GULPEase scores in the documents before and after the accounting system change, an increase/decrease in the the GULPEase scores means an increase/decrease in a document readability;
- Size is a dichotomy variable indicating the size of a university, taking 1 if a university is recognised as *big/mega* university and 0 if it is recognised as *small/medium* (according to CENSIS classification);
- Region_Nord is a dichotomy variable indicating the geographical location of a university, taking 1 a university is situated in the North of Italy and 0 otherwise;
- Late_Adoption is a dichotomy variable indicating the adoption period of the accounting system change taking 1 if the change was before the year 2014 and 0 otherwise.

In addition, to elaborate more profound analysis, we also used two other models which take into consideration the division of visual forms into traditional and time oriented/innovative ones:

$$\text{Change in Traditional Visual Forms} = f(\text{Change in Readability, Size, Region_Nord, Late_Adoption}) \text{ and}$$

$$\text{Change in Time Oriented and Innovative Visual Forms} = f(\text{Change in Readability, Size, Region_Nord, Late_Adoption}),$$

where:

- Change in Traditional Visual Forms is a continuous variable which measures the difference in the number of traditional visual forms included in the documents before and after the accounting system change;
- Change in Time Oriented and Innovative Visual Forms is a continuous variable which measures the difference in the number of time oriented and innovative visual forms included in the documents before and after the accounting system change.

To overcome the limitations of the many grouping variables in our model and a relatively small sample, we applied QCA. It is a set-theoretic method that uses sets and searches for set

relations to form concepts and formulate casual relations between social phenomena applying Boolean algebra rules (Schneider and Wagemann, 2012). The method was first presented by Ragin (1987) and initially predominately used in sociology and political science. Lately has become also explored in business and management studies (Cucari, 2019; Wagemann *et al.*, 2016), developing a new wave of "neo –configurational" research (Greckhamer *et al.*, 2018), but it is still relatively unknown by a large number of scholars (Seny Kan *et al.*, 2016). In the context of universities, it has been applied in the study by Zorio-Grima *et al.* (2017) to identify the combinations of factors leading to experience in sustainability reporting by Spanish public universities.

Set-theoretic methods operate on membership scores of elements in sets (Schneider and Wagemann, 2012). In the QCA, there are two types of variables – crisp sets variables and fuzzy sets variables. Crisp sets have dichotomies variables, where one full significance membership is in a set and 0 full non – membership in a set. If a variable is a dichotomy by its nature, it belongs to a crisp set. In our models, Size, Region_Nord and Late_Adoption are dichotomy variables. In contrast, Change in Visual Forms, Change in Traditional Visual Forms, Change in Innovative Visual Forms and Change in Readability are continuous variables (fuzzy sets variables) which need the calibration of membership degree in a set. For that scope, we use Fuzzy Set Direct Calibration Method described by Ragin (Ragin, 2007).

Once all variables are calibrated, we run fs/QCA software (downloaded from <http://compasss.org/software/>). The terminology in QCA imposes the “condition” for what in conventional regression analysis is often referred to as the “independent variable” and “outcome” for the “dependent variable” (Schneider and Wagemann, 2012). In our research, as we have three models, the outcomes are: Change in Visual Forms, Change in Traditional Visual Forms and Change in Time Oriented and Innovative Visual Forms. There are four conditions for each outcome in our models: Change in Readability, Size, Region_Nord, Late_Adoption, logical reasoning behind that models implies that the combinations of all four conditions lead to a high change in visual forms (traditional, time oriented/innovative and jointly). For each outcome there are 2^k (where k is the number of conditions/variables) logically possible combinations of conditions, thus for each of our model there are 16 combinations. fs/QCA software uses the Quine-McCluskey algorithm with the simplification rules of Boolean expressions to determine configurations that are sufficient or necessary conditions for specific levels of an outcome (Fiss, 2007; Schneider and Wagemann, 2012). Finally, the QCA results for each outcome are presented as models of sufficient and necessary conditions configurations separately, along with the degree of consistency and coverage.

The consistency and coverage are evaluated for each configuration (combination) as well as for each model as a whole. They are similar metrics to correlations and coefficient of determinations for a conventional regression approaches (Cuadrado-Ballesteros *et al.*, 2017). Consistency is defined as a degree to which empirical evidence is consistent with the set-theoretic relation in question (Rihoux and Ragin, 2008). While coverage can be interpreted as a numeric expression of the empirical importance (sufficiency) and relevance (necessity) of a given condition (or a combination) for producing an outcome (Schneider and Wagemann, 2012). The formulas expressing consistency and coverage are as follows (Rihoux and Ragin, 2008):

$$\text{Consistency } (X_i \leq Y_i) = \frac{\sum(\min(X_i, Y_i))}{\sum(X_i)}$$

$$\text{Coverage } (X_i \leq Y_i) = \frac{\sum(\min(X_i, Y_i))}{\sum(Y_i)}$$

Where min indicates the selection of the lower of two values, X_i represents membership scores in a combination of conditions, and Y_i represents membership scores in the outcome.

The consistency and coverage are evaluated for each configuration (combination/solution) and each model as a whole. In the case of coverage, there is a distinction among (Schneider and Wagemann 2012): solution coverage, which indicates how much of the outcome is covered by the entire solution term, and raw coverage, which indicates how much of the outcome is covered by each of the combinations (paths). The set-theoretic measures in question bear similarity to the evaluations of significance and strength found in regression analysis. As a result, it is important not to interpret a subset relation that lacks a minimum level of consistency and a proper range of coverage (Misangyi *et al.* 2017; Rihoux and Ragin, 2008). The author of QCA suggests that an fsQCA model represents the strengths of theoretical expectation and the quality of the data, when consistency is at least 0.85 and coverage is between 0.25–0.65 (Rihoux and Ragin, 2008). However, Schneider and Wagemann (2012) opt for the 0.75 as consistency limit value.

The last particular features of QCA are three levels of model results: a parsimonious solution with fundamental conditions for a model, an intermediate solution, which is a subset of a parsimonious solution and a superset of a complex solution (the third possible solution). We focus on the intermediate solution, recognised as the most widely used in research interpretation

due to its striking balance between complexity and parsimony (Wagemann *et al.*, 2016; Zorio-Grima *et al.*, 2018).

- **Results**

Results for RQ1 – How many (and which types of) visual forms do Italian public universities use in stakeholder performance reports before and after the transition from cash to accrual accounting?

Table 1 presents descriptive statistics concerning the visual forms presented in the analysed documents before and after the change from cash to accrual accounting. All the average amounts of visual forms (for each type and in total) and the standard deviations are provided. In brackets, we present the amounts of visual forms that explicitly refer to the financial statements data. Overall, the average visual forms used in the documents analysed increased from *t-1* to *t* (8.80 per report before and 10.67 after the accounting change). The increasing pattern is the same for all the categories of infographics.

Table 1 Descriptive statistics for visual forms in the performance reports before and after the accrual accounting adoption.

	Before				After			
	Mean		St. dev.		Mean		St. dev.	
Visual forms to group data	3.71	(0.54)	4.82	(1.55)	4.39	(0.55)	5.30	(1.09)
Visual forms to draw a cross-sectional comparison	1.61	(0.00)	3.68	(0.00)	1.74	(0.00)	3.55	(0.00)
Visual forms to draw a comparison over time	2.35	(0.26)	2.78	(0.68)	3.03	(0.55)	3.33	(1.31)
Innovative visual forms	1.13	(0.00)	2.60	(0.00)	1.52	(0.00)	3.02	(0.00)
<i>All types of visual forms</i>	<i>8.80</i>	<i>(0.81)</i>	<i>8.83</i>	<i>(1.64)</i>	<i>10.70*</i>	<i>(1.10)</i>	<i>9.39</i>	<i>(1.56)</i>

* indicates statistically significant change at p-value 0.1

In order to understand if the number of visual forms used in the report analysed increased, we performed a paired samples Wilcoxon test (also known as Wilcoxon signed-rank test). It is a non-parametric alternative to paired t-test used to compare paired data when they are not normally distributed (as in our case). The p-value is 0.089, significant at 10%, so we can reject the null hypothesis that the difference is zero or positive. To fully answer RQ1 and, in particular, to highlight changes in the different types of visual forms used before and after

the reform, we carry out the principal component analysis on all the data available, both before and after the switch to accruals. PCA allows us to understand if it is possible to group the visual forms used in the analyzed reports into similar categories from the point of view of their use. In particular, by studying the linear correlations between the counts of the four types of visual forms initially identified, it is possible to test whether there is a smaller number of synthetic variables (the principal components, precisely) that can effectively represent the phenomenon without excessive loss of information. In Table 2, the results show that only the eigenvalues of the first two synthetic dimensions are higher than the average of the total variance (which is 1, as we scaled the variables before performing the PCA). We retain the two dimensions following a well-established standard of practice (Kaiser, 1960).

Table 2 Variance explained by the synthetic dimensions obtained performing the PCA

PCs	Eigenvalue	Percentage of variance	Cumulative percentage of variance
PC1	1.54	38.53	38.53
PC2	1.01	25.24	63.77
PC3	0.96	24.09	87.86
PC4	0.49	12.14	100

Taken together, the first two dimensions (PC1 and PC2) explain more than 63% of the total variance (Table 2). Aware of the fact that the variance explained by the third principal component is relatively high (18.97%), we performed 100,000 PCA on as many random datasets of similar size to address this issue and compared the results with those in Table 2. The positive difference between the cumulative percentage of variance obtained in our data reduction process (77%) and the mean obtained from the simulations (59.10%) suggests that the two components are sufficient. Moreover, the ninety-fifth percentile of the distribution obtained in the simulations is 63.26%, which is lower than the actual variance explained in our sample. Thus, we conclude that the two dimensions offer an efficient reduction in data.

By projecting the vectors referred to the original variables on the bi-dimensional plane identified by PC1 and PC2, it is possible to understand which factor they are associated with and finally name the resulting two synthetic variables.

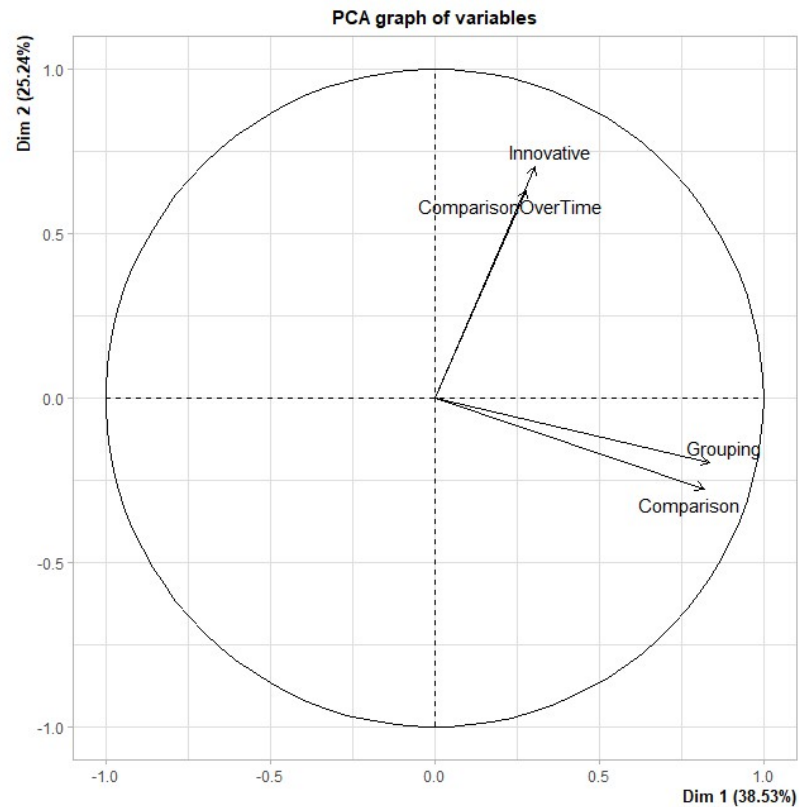


Figure 2: Variable Factor Map

Figure 2 indicates that all the types of visual forms are positively correlated with the first principal component because all of them point horizontally and on the right, like PC1. Precisely, the first dimension is highly and positively correlated with the number of all the visual forms except for the categories named *visual forms to draw a comparison over time and innovative visual forms*. These last two types of visual forms are indeed positively correlated with PC1 but also much more highly correlated with the second principal component (PC 2) because it points decisively upwards much more than the other vectors. Apparently, *Traditional Visual Forms* (visual forms to group data and those drawing a cross-sectional comparison) are used together, while *Time Oriented and Innovative Visual Forms* (visual forms to draw a comparison over time and innovative visual forms) are used regardless of whether the other two types are used.

Keeping in mind the general results of PCA performed considering a biperiodal context, we turn our attention to the tendencies observed after the adoption of accruals. The *individuals factor map* at Figure 3 presents each observation on a grid formed by the first two principal components. It is followed by the Figure 4 presenting changes in the two groups of visual forms identified by PCA.

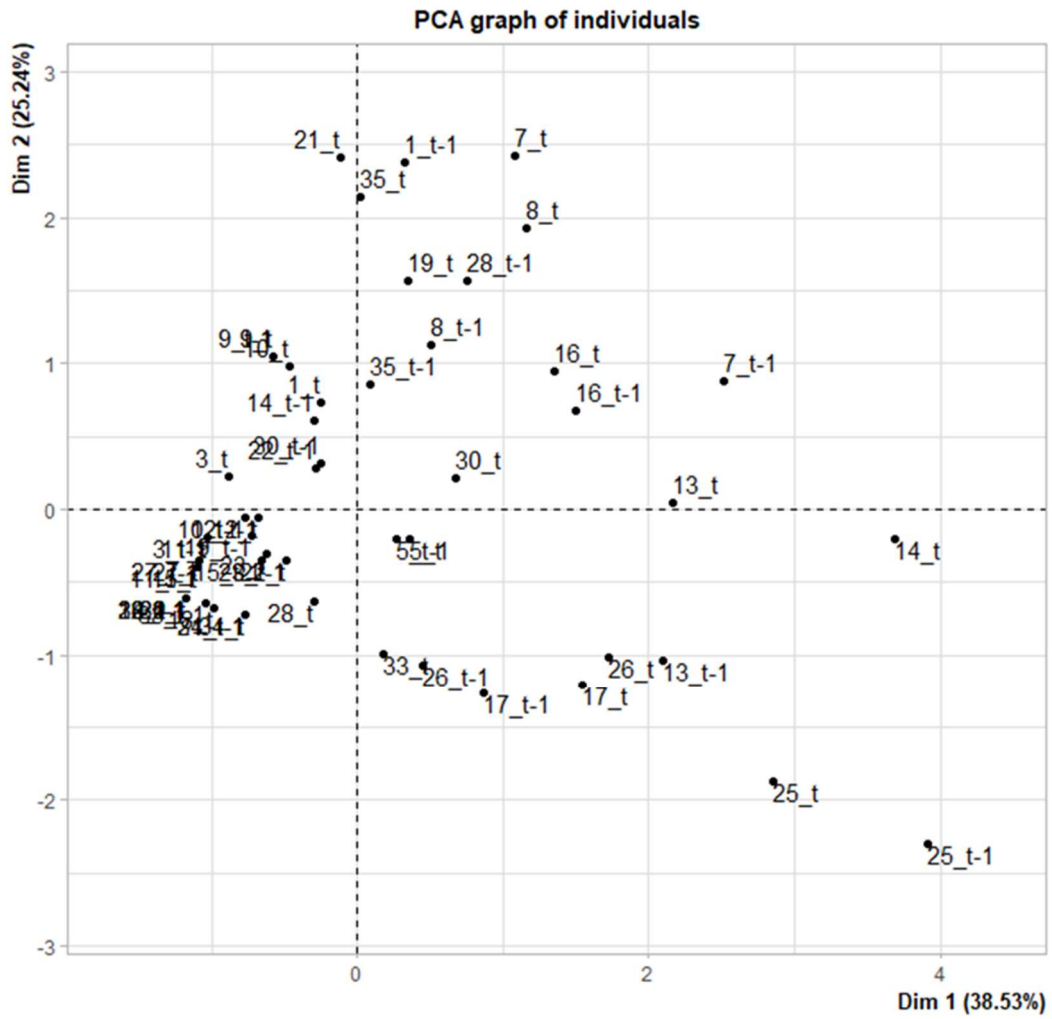


Figure 3: PCA loading plot of the first two principal components (Dim 1 vs Dim 2)

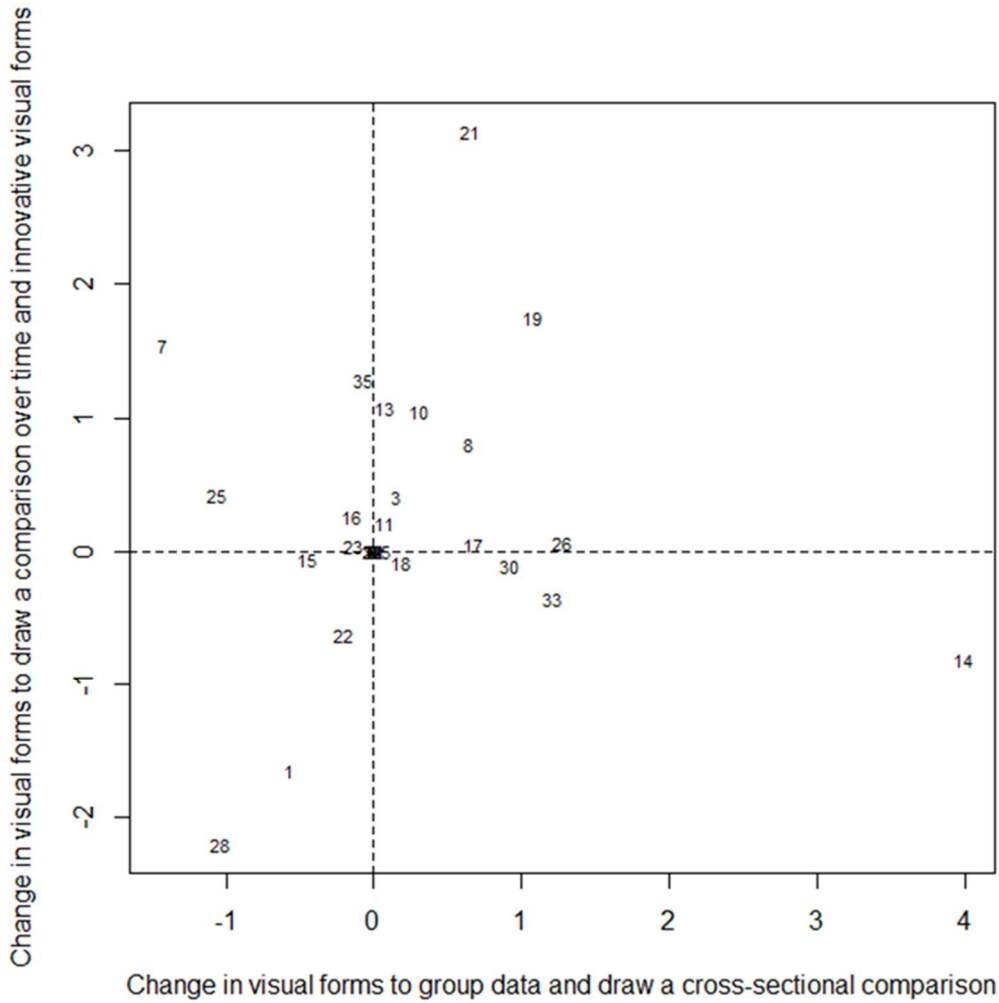


Figure 4 Changes over time in the two groups of visual forms identified by PCA

Each university appears twice on the map: before and after the adoption (respectively with the labels t-1 and t). The horizontal and the vertical shifts on this graph indicate the change in the two groups of visual forms identified by PCA for each report. A movement from left to right means that the number of Traditional Visual Forms increased. In contrast, a shift in the opposite way highlights a reduction of such visual forms. When applied to the shifts in the vertical direction, the same logic can be used to summarise the change of Time Oriented and Innovative Visual Forms. For example, concerning the university identified by id number 28, the first observation (identified with the label 28_t-1) relates to the document published before the adoption of the accruals. In contrast, the second one (identified with the label 28_t) refers to the period following the adoption. The coordinates of the two points representing that university on the plane, respectively (3.91 – 2.30) and (2.85 – 1.87), highlight it reduced both the amount of Traditional Visual Forms and that of Time Oriented and Innovative ones across

the accounting system change. The same happens for other universities in the figure, for example, those with labels 7 and 16. The graph at 4 summarises what has been written above. Each point on the plot indicates the change in traditional visual forms (abscissa) and that in time oriented and innovative ones (ordinate).

To understand if a relationship between the changes in the use of visual forms (both the categories identified by PCA) and universities' size exists, we performed three Chi-squared tests for categorical data and as many Fisher's exact tests. On the one hand, we used a dichotomic variable for the size, which tells from *small/medium* and *big/mega* universities (according to CENSIS classification). On the other hand, we considered the increase in the use of the first category of visual forms (right shift on the grid in Figure 3), the increase in the use of the second one (top shift) and the increase in both types of visual forms (top-right shift). In none of the cases, we found statistically significant associations between the variables considered.

Finally, we tried to figure out if a relationship exists between a timely/late adoption of accrual accounting and a change in the use of visual forms (both categories identified). As before, we considered the increase in both types of visual forms, individually and jointly. Then, we distinguished the universities into two groups: those that adopted accrual accounting before 2014 and the others. Subsequently, we performed a Chi-squared test and Fisher's exact one without obtaining statistically significant associations. Not even this time we got significant results. Finally, we tested whether an association exists between the increase in types of visual forms (individually and jointly) and the geographic location of the universities analysed. A Fisher's exact test shows the attraction (which means positive association) between the increase in both categories of visual forms and the location in the South of Italy for the universities analysed.

Results for RQ2 – What is the change in the readability scores of stakeholder performance reports prepared by Italian public universities before and after the transition from cash to accrual accounting?

To express a more comprehensive opinion on the change in the intelligibility of such documents, it is also necessary to analyse their readability level. The analysis conducted in this step gives us the answer to RQ2. Overall, the readability of the documents analysed slightly decreases after the accounting system change as the average value of GULPEase score reduces (from 41.02 to 39.70 as reported in Table 3). Specifically, more than 54% of the reports

disclosed by the Italian university in our sample present a lower GULPEase score after the transition from cash to accrual accounting system. In order to understand if the differences between the GULPEase scores of the universities' reports before and after the adoption are negative (which means that the readability level has decreased), we performed a paired samples Wilcoxon. The p-value is 0.0499, so we can reject the null hypothesis that the difference is zero or negative.

Table 3 Descriptive statistics for GULPEase score before and after the accrual accounting adoption.

	Before		After	
	Mean	St. dev.	Mean	St. dev.
<i>GULPEase score</i>	41.02	5.64	39.70**	4.80

** indicates statistically significant change at p-value 0.05

As before, we tried to figure out if a reduction of the GULPEase score (a decrease in the documents' readability) is associated with the universities' size. Thus, we performed a Chi-squared test and Fisher's exact one considering the size of the analysed universities (always according to the CENSIS classification and telling from *small/medium* and *big/mega* universities) and the reduction of the documents' GULPEase score. In particular, we considered a dichotomic variable that has the value *yes* if the GULPEase scores after the adoption of accrual accounting decreased, *no* otherwise. No significant results were found. Then, we studied the potential association between the reduction of the GULPEase score and the timely/late adoption of accrual accounting by universities. Again we divided the universities between those adopting accrual accounting before 2014 and the others. Then we performed a Chi-squared test and Fisher's exact one and we did not find out statistically significant associations. Finally, we tested whether an association exists between the reduction in the GULPEase score and the geographic location of the universities analysed. Using a Fisher's exact test, we found a positive association between the reduction of the GULPEase score (which means a decrease in the readability of the documents) and the location in the centre of Italy for the universities analysed.

Results for RQ3 Are the changes in visual forms and readability of stakeholder performance reports prepared by Italian public universities after the transition from cash to accrual accounting complementary or substitutive?

In the final step of our analysis, we were exploring the relation between the changes in visualization and readability using QCA. The Table 4 presents the results of the necessary analysis for the three outcomes: Change in Visual Forms, Change in Traditional Visual Forms, Change in Innovative Visual Forms. For all variables, the value of coverage metrics is lower than 0.9, which means that there is no single factor (variable) included in the models that explains by itself a high level of Change in Visual Forms, Change in Traditional Visual Forms, Change in Innovative Visual Forms. That results indicate running further steps in QCA with sufficient conditions (Allen and Allen 2015).

Table 4 QCA necessary conditions.

Outcome variable	Change in Visual Forms		Change in Traditional Visual Forms		Change in Time Oriented and Innovative Visual Forms	
	Consistency	Coverage	Consistency	Coverage	Consistency	Coverage
Change in Readability	0.77	0.62	0.81	0.67	0.75	0.69
~Change in Readability	0.71	0.68	0.68	0.67	0.72	0.78
Size	0.39	0.37	0.35	0.35	0.49	0.54
~Size	0.60	0.48	0.64	0.53	0.50	0.45
Region_Nord	0.31	0.38	0.33	0.42	0.34	0.48
~Region_Nord	0.68	0.46	0.66	0.46	0.65	0.50
Late_Adoption	0.83	0.46	0.81	0.47	0.79	0.50
~Late_Adoption	0.16	0.32	0.18	0.36	0.20	0.45

~ represents the logical negation

Table 5 presents the combinations of sufficient conditions. Out of 16 possible logical combinations of variables (factors/conditions) for each model, we received two solutions that led to an increase in Visual Forms and one solution for an increase in Traditional Visual Forms and an increase in Time Oriented and Innovative ones. In three models, all variables are included in our solutions as conditions, which means they are all relevant to the outcomes. Specifically, it proves that change in readability (the difference between the GULPEASE scores in the documents before and after the accounting system change) is relevant in each solution.

An fsQCA model is useful when consistency is at least 0.85 and coverage is between 0.25–0.65 (Rihoux and Ragin, 2008). The two of our models (Change in Visual Forms and Change in Traditional Visual Forms) fulfil the criteria of model validity, with coverage equal

to 0.37 and consistency equal to 0.93 for the first one and with coverage equal to 0.32 and consistency equal to 0.97 for the latter one. However, for example, Woodside (2013) argues that the first importance is achieving high consistency, which allows us to include Change in Time Oriented and Innovative Visual Forms into the analysis with a consistency equal to 0.85.

Table 5 QCA results- sufficient conditions for Change in Visual Forms models

Change in Visual Forms = f(Change in Readability, Size, Region_Nord, Late_Adoption)		
Solution(s)	raw coverage	consistency
Change in Readability*~ Size*Region_Nord*~ Late_Adoption	0.05	0.81
Change in Readability*~ Size*~ Region_Nord* Late_Adoption	0.32	0.95
solution coverage: 0.37		
solution consistency: 0.93		
Change in Traditional Visual Forms = f(Change in Readability, Size, Region_Nord, Late_Adoption)		
Solution(s)	raw coverage	consistency
Change in Readability*~ Size*~ Region_Nord* Late_Adoption	0.32	0.97
solution coverage: 0.32		
solution consistency: 0.97		
Change in Time Oriented and Innovative Visual Forms = f(Change in Readability, Size, Region_Nord, Late_Adoption)		
Solution(s)	raw coverage	consistency
~Change in Readability* Size*~ Region_Nord* Late_Adoption	0.16	0.85
solution coverage: 0.16		
solution consistency: 0.85		

* represents the logical 'and' condition, ~ represents the logical negation

For our first model, which investigates the Change in Visual Forms, we received two solutions. The first one indicates that an increase in Visual Forms is related to the positive change in readability, small/medium universities from the northern parts of Italy, which adopted the accounting change before the year 2014. The same outcome can be obtained for also for small/medium universities with positive change in readability, but from the central and southern Italian regions if they were late adopters.

In the second model, where we analysed the Change in Traditional Visual Forms, there is one solution with the same set of conditions as for the second solution in model number one. It means that an increase in Traditional Visual Forms is observed in small/medium universities from the central and south of Italy, being the late adopters of accounting changes with the improvement of their document readability.

Looking at these two models and answering our RQ3, we can conclude that the relation between visual forms and readability is complementary. The same effect is observed in the case of traditional visual forms.

Our third model has only one solution, with a set of conditions that differs from the previous ones. An increase in the Time Oriented and Innovative Visual Forms is related to the negative change in readability, big/mega universities from the southern parts of Italy, which adopted the accounting change after the year 2014. For the universities with those characteristics (big/mega size, central and south regions, late adopters), time oriented and innovative visual forms and readability work as substitutes.

5. Discussion and Conclusions

In today's world, there is a need for continuous analysis and response to the community's expectations to which the institutions are accountable for their choices. Effective communication has the power to consolidate and increase trust and social credit so far accorded. Considering the need to measure performance and appropriately communicate with stakeholders, the Italian Legislator introduced a reform to help public organisations, among them universities, operate on the basis of planned objectives, whose realisation can be monitored and reported. An important change was the obligation to adopt accrual accounting in place of cash accounting as the basis or measurement and reporting of outcomes. Several studies have concluded the inadequacy of accrual accounting alone in meeting users' information needs (Paulsson, 2006; Kober *et al.*, 2010). This, however, may be the result of poor implementation of the reform and scarce communication (Cohen and Karatzimas, 2017). This paper explores, through content analysis, the reporting practices of Italian public universities at a time of accrual accounting adoption. We study changes in communication patterns; readability and visual forms as vehicles to improve the intelligibility of performance reports.

Potentially, accounting system reforms may represent a driving force for improving performance reporting, making the decision process more effective and communication more useful for external stakeholders. There is also a broad literature on the negative effects of the adoption of accrual accounting in the public sector, referring mainly to the complexity of information and the decline in understandability of the information disclosed.

Our first observation is that there is a group of public universities in Italy that do not reveal any information relevant to studying the effect of the accrual accounting reform adoption. While the regulator, by changing accounting rules, emphasises the necessity of increased transparency and accountability, our research indicated that in the case of 24 out of 55

universities, a complete set of documents was lacking. This hindered the comparison of communication before and after the new regulations' adoption.

We explore data from 31 universities that published the required documents, and we find that universities in Italy reacted to the adoption of accrual accounting in various ways, changing their communication patterns and the illegibility of information disclosed. They made different choices in terms of the number and the types of visual forms used and with reference to the change in their readability.

For all the universities, the accounting system's change appears to have been an opportunity to modify the performance report's content in terms of visual forms used. The number of visual forms disclosed increased significantly after the shift from cash to the accrual accounting system. With reference to the types of visual forms, we identified two relevant categories. The first consists of visual forms to group data and those drawing cross-sectional comparisons. The second is composed of infographics to draw comparisons over time and innovative ones. Our results show that visual forms in the two identified categories are used independently, suggesting they serve different purposes.

Further, we acknowledge that intelligibility, apart from visual forms, also comprises the readability of the text released. Our results show a statistically significant reduction in the reports' readability in most of the reports after the accounting change. This means that the information provided in the disclosures is more difficult to decipher and understand by the targeted users, the text published by universities is more challenging to read than before. This result confirms prior literature, in fact accrual accounting adoption is usually associated with increased complexity, making reports more difficult to comprehend (e.g. Diamond, 2002 and Šević, 2006, Grossi and Soverchia 2011). Considering the geographic location, there is a positive association between the universities located in the centre of Italy and the reduction of the reports' readability. These universities should put more effort into preparing the text of the reports dedicated to their stakeholders and focus on the language to be easier to understand.

Finally, we studied if intelligibility drivers (the use of visual forms and readability modifications) moved together across the accounting change. We observed that a group of characteristics makes us expect that the university will disclose the information with better intelligibility. The improvement of readability accompanied by the increase in the visual forms may be anticipated in smaller universities that are at the same time from the North of Italy, on the conditions that they are the early reform adopters, or if they are from the center and South of Italy but at the same time they are late reform adopters. This may indicate that the high intelligibility was launched by the smaller universities from the North, and it was followed by

their counterparts from the center and the South of Italy, which adopted the new rules later. In the situation of these universities, the visual forms and readability were complementary. In contrast, large Italian universities from the center and South that are late adopters tend to increase the number of time oriented and innovative visual forms while decreasing the readability. In their case, the visual forms and readability prove to be substitutional; it seems that these universities try to compensate for the effect of the more challenging text with sophisticated visual forms that might make the text easier to understand.

The findings of this study carry several implications. First, at least in some cases, a transition from cash to accrual accounting rules has brought about comprehensive changes in the communication with stakeholders via the modification of the content and the way the information was disclosed in performance reports. However, the results show this was not the case for all universities analysed in this study. Therefore, we highlight that there is still a need to raise the awareness of the reports' preparers to treat the accounting reform as a possibility to improve communication with the stakeholders and not just as a technical requirement to be introduced. Ignoring the focus on improving intelligibility as a consequence of the accounting reform contradicts its objectives. The practical contributions of this study include providing feedback to universities engaged in performance reports disclosure on the need to enhance the quality of their reporting by improving readability and visual forms. Hence, our research can assist universities' stakeholders in demanding more understandable and useful information for decision-making and supports the efforts of regulators that aim their reforms in greater transparency and accountability.

Our findings underline the possibility of neutralising the adverse effects of accrual accounting reform associated with its complexity and difficulties in understanding through the use of visual forms and greater attention to the document's readability. In our research, we were able to indicate examples of those universities that put a great effort into the increase of intelligibility of their communication while implementing accrual accounting. They can serve as the best examples for other practitioners and regulators to approach this reform, maintaining the essence of the accounting role.

There are two main limitations of this study. First, our research covers a sample and not the entire population of Italian universities. Nevertheless, we analysed all the performance documents before and after the transition from cash to accrual accounting that are publicly available. The second limitation may refer to the fact that in our analysis, we focused on the technical characteristics of the text, not considering other aspects related to the content of the

text, like the materiality and credibility of the information disclosed. That can be an inspiration for other researchers to investigate more comprehensively the effect of accrual accounting adoption.

Future research can also seek incentive structures, or nudges, that would make positive effects more common. We also believe that the methodology and reasoning presented in this study can be adopted in other contexts and to other entities what open avenues for further research.

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