

Public policies go social: using sentiment analysis to support the action of policy-makers across the policy cycle

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Abstract. This paper contributes to the debate on how Internet promotes the interaction among politicians, bureaucrats and citizens. We show that, in a «Big Data» world, the comments of social media users can be profitably used to extract meaningful information that supports the action of policy-makers across the policy cycle. For this purpose, we analyze Twitter data through a modern technique of Supervised Aggregated Sentiment Analysis. In particular, we develop two case studies related to the «jobs act» labour market reform and to the «#labuonascuola» school reform, both formulated and implemented by the Italian Renzi cabinet in the last years. Our results show that social media data can help policy-makers 1. to rate the available policy alternatives according to citizens' preferences; 2. to monitor citizens' behaviors, opinions, and perceptions during the implementation of a public policy and 3. to catch stakeholders' mobilization and de-mobilization processes. Although social media analysis cannot replace other research methods, it provides a fast and cheap stream of information that can supplement traditional analyses, enhancing responsiveness and institutional learning.

1. Introduction

The potential contribution of social media to transform the power relationship among politicians, bureaucrats and citizens is the object of an exciting debate involving political scientists and philosophers, public policy scholars, ICT experts and practitioners focused on the widely known concept of e-government (Carter and Bélanger 2005; Margetts 2009).

Scholars point out that social media provide an opportunity to foster the transparency of governments and to strengthen the interaction between citizens and public administrations, which in turn can positively affect trust in political institutions (McNeal *et al.* 2008; Tolbert and Mossberger 2006; Welch *et al.* 2005).

As for transparency, scholars underline how social media give to politicians and bureaucrats the opportunity to account for their actions in the platforms preferred by citizens. In particular, public entities could disseminate information concerning their activities, allowing citizens to monitor public expenditure and to formulate judgments on public services (Kim and Cho 2005; La Porte *et al.* 2006; Bertot *et al.*, 2010; Bonsón *et al.* 2012; Khazaeli and Stockemer 2013).

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What is more, the diffusion of social media facilitates politicians' and bureaucrats' interactions with citizens and external stakeholders. Indeed, scholars highlight how online citizen-to-government and citizen-to-citizen interactions favour debates on social and political matters and positively affect citizens' interest in political processes, like elections, policy agenda setting and policy implementation (OECD 2007; Kuzma 2010; Chun et al. 2010; Picazo-Vela et al. 2012; Bertot et al. 2012).

Another stream of literature focuses on the fascinating issue of «co-production» of public policies, involving politicians, bureaucrats and citizens through Internet applications (e.g. von Hippel 2005). Scholars often underline the limited digital resources made available to public administration (Landsbergen 2010; Bonsón et al. 2012; Lee and Kwak 2012).

In the present paper we adopt a pragmatic approach displaying how social media can be used, here and now, to support the action of policy-makers across different steps of the policy cycle. In particular, we will show how a modern technique of text analysis (e.g., Hopkins and King 2010), called Supervised Aggregated Sentiment Analysis (SASA), can be used to profitably extract meaningful information on public policies from the unsolicited comments published online by social media users. For this purpose, we will develop two case studies related to two major public policies that driven the agenda of the cabinet led by Matteo Renzi, between 2014 and 2015. In particular, we will investigate the labour market reform, better known as «jobs act», and the school reform, labelled «labuonascuola» (which stands for «the good school»).

The paper is organized as follow. The next section summarizes the existing literature and explains how the analysis of social media can support policy-makers across the policy cycle. The third section describes the SASA technique of sentiment analysis. The fourth section presents the two case studies. The last section concludes.

2. Social media and public policies across the policy cycle

Public entities are characterized by a sharp distinction between ownership, which belongs to voters (policy-takers), and management, which belongs to elected politicians and bureaucrats (policy-makers). At the election time, voters choose as their representatives those politicians that propose the policy platform closest to the voter's preferred ideal point. Once in office, however, politicians have to rely on public administrators and bureaucrats to translate their electoral promises into actual policy outputs. Therefore, voters contract a sort of 'double principal-agent relationship' (Vedung 1997), delegating directly to politicians and indirectly to public administrators and bureaucrats the responsibility to adopt and execute public policies consistent with voters' preferences.

Even neglecting the two major difficulties occurring when the principal contracts with a set of agents under asymmetric information, namely moral hazard (hidden action) and adverse selection (hidden knowledge), this distinction between ownership and management should raise in policy-makers an interest to know citizens' updated preferences, to measure their satisfaction and to receive feedbacks on actual policy outcomes. «What do citizens think about?» should be the fundamental question raised by politicians and bureaucrats having the responsibility of making decisions on behalf of voters.

We maintain that social media analysis could help politicians and bureaucrats to answer this general question because they are a treasure trove of opinions freely expressed by users on almost any

aspect of their life, including their relationship with public institutions and their judgments on public services, programs and policies. However, to draw information from social media in a reasonable and profitable manner, at least two conditions have to be fulfilled: first, policy-makers must take into account that social media are not a panacea able to answer any informative demand and, second, they have to resort to a proper technique of social media analysis.

To discuss what kind of information policy-makers can draw from social media, we refer to the notion of policy cycle, firstly proposed by Lasswell (1951) and later refined by other scholars (e.g. Easton 1963; Brewer 1974). This model depicts policy-making processes as problem-solving strategies composed by the following stages: agenda setting, policy formulation and adoption, policy implementation and policy evaluation. Some policy analysts criticize this model due to its scarce capability to describe actual public policy processes, which are usually more complex (Jenkins-Smith and Sabatier 1993). Nevertheless, this analytical framework can be useful to locate in time the informative demands that policy-makers could formulate (Lippi 2007).

A big stream of literature has investigated the potential role of social media as «fire alarms», (Leavey 2013; Curini et al. 2014) as well as their ability to affect the policy agenda of media and governments (for a review: Ceron et al. 2014). In particular, scholars have developed social media based indexes on a variety of topics, such as health (e.g. Lampos and Cristianini 2012; Signorini et al. 2011), racism and intolerance (Stephens 2013), economic expectations, subjective well-being or happiness (Curini et al. 2014) as well as political trust (Ceron 2015)¹. For instance, Lampos and Cristianini (2012) predicted the diffusion of flu in the United Kingdom using Twitter data. Similarly, Stephens (2013) exploited Twitter data to create a «hate map» that identifies the degree of racism and intolerance across different counties in the United States, a tool that could be useful to adjust the educational policy and to prevent episodes of interracial violence. Curini, Iacus and Canova (2014), instead, analyzed Italian tweets to monitor the daily level of happiness, showing that this is affected by meteorological elements, but also by the spread between German and Italian Bonds. Finally, an indicator of political trust that records the share of anti-politics sentiment expressed on Twitter has also been provided (Ceron 2015).

Beside the potential role that social media can play in the agenda setting phase, we argue that they are suitable tools to support policy-makers' activities over the whole policy cycle, from the formulation phase to the evaluation one. In particular, they can be used during the formulation of a public policy to monitor citizens' opinions on the overall topic and to compare their reactions to alternative policy solutions suggested by policymakers. Analogously, social media can provide fruitful insights on citizens' perceptions and degree of satisfaction toward a public policy during its implementation phase, allowing policy-makers to adjust it in real time, if needed. Moreover, social media analysis allows policy-makers to estimate the degree of online political mobilization, assessing whether some groups are particularly active in supporting or criticizing a reform. Finally, to evaluate the ability of a public policy to display the advocated outcomes, policy analysts may refer to social media analysis as a device to conduct consumer satisfaction surveys.

¹ For instance, the Wired Next Index measures the citizens' expectations toward innovation. It has been shown that the social media data used to create this index anticipate those provided by traditional offline indexes that monitor the trust of private companies and consumers. See: <http://www.wired.it/attualita/2014/04/10/wired-next-index-big-data/>

In conclusion, the analysis of social media during over the policy cycle may help policymakers to get an overall idea of how unsolicited citizens reacted to the activities carried out. In light of this, monitoring citizens' behaviours or measuring citizens' satisfaction through social media could support traditional implementation research in enhancing institutional learning by identifying the conditions useful to reach the advocated outcomes.

3. Sentiment Analysis: The method matters

The «Big Data» world, particularly in the realm of social media content, offers a huge amount of information that can have a major impact on real life, particularly in the field of public policy (King 2014). Such quantity of data, however, is not always informative. In fact, we can incur in information overload (Kovach 2010) when the amount of information available to policy-makers exceeds their capacity to process such information. The overload hampers the ability of political actors to act and damages the quality of the decision-making process. To avoid this risk, social media analysis should carefully try to separate the signal from the noise.

So far, the analysis of social media has been carried out through traditional techniques of sentiment analysis (SA) that rely on ontological dictionaries or natural language processing (NLP) to interpret the comments published online. Unfortunately, it is well known that the approach employed in traditional SA presents three major drawbacks. First, the natural language used by social media users evolves continuously and it is sensitive to the discussed topic (politics, sports, movies, etc.) and to the group of authors that comment on it (e.g., gender, age, occupation, education). Second, these methods fail to detect ironic sentences and to catch all the nuances of the language (i.e., jargon, abbreviations, neologisms and rhetorical figures). Third, traditional SA estimates the aggregated sentiment by classifying and summing up the sentiment of each single comment. Such an additive technique, however, can lead to biased estimates of the aggregate distribution because it sums up the potential misclassification errors attached to each probabilistic classification choice made by the algorithm.

Several scholars emphasize the need to cope with these problems integrating the analyses of large quantities of social media posts made through automated algorithm with in-depth content analyses of the same texts (Lewis *et al.* 2013).

The Supervised Aggregated Sentiment Analysis (SASA) method introduced by Hopkins and King (2010) points exactly in this direction and combines the accuracy of manual coding with the advantages of a highly automated analysis. To do that, this approach adopts a kind of aggregated machine learning, based on a two-stage process. In the first step, human coders, who are more effective than ontological dictionaries in capturing the nuances of the language², read and code a subsample of the texts downloaded from the Web to create the «training set³». In the second step, an algorithm employs the information provided by human-coders and performs an automated statistical analysis, which extends the accuracy of manual coding to the whole population of texts. The analysis then

² For example, the expression «what a nice rip-off» includes both a positive and a negative term and will be misclassified by tools for sentiment analyses based on ontological dictionaries, while any human-coder will be able to properly classify it as negative. See also endnote 17 for an example of ironic language isolated thanks to the hand-coding stage.

³ Note that the training set need not be a representative sample of the population of texts. The only requirement is that the use of language in the training set has to be homogeneous to that used in the population of texts.

produces accurate estimates of the aggregate distribution of the opinions in the whole population of collected texts, leading to an error around 2-3%, which is remarkably lower than traditional SA⁴.

It is worth to remind that, although the SASA approach potentially allows to capture the meaning of the whole population of comments published online, the socio-demographic traits of social media users may not be representative of the whole population of citizens (e.g. Bakker and de Vreese 2011; Vaccari et al. 2013). In fact, social media users tend to be younger and more highly educated. However, these differences appear lowered when focusing on people who express political opinions (Bakker and de Vreese 2011). Furthermore, we find trivial differences when contrasting the ideological self-placement of Italian social media users with that of the whole Italian population (source: IPSOS February 2012; Redacted). What is more, several studies found similarities between the opinions expressed by social media users and those supported by the whole population of citizens (e.g. Franch 2013; O'Connor et al. 2010).

However, even if such similarities vanished, investigating the opinion of social media users would be interesting per se. First, social media users represent a new form of «activated public opinion», whose reaction to public policy may reflect the opinion of recipients or that of other actors directly involved in a public policy. Indeed, social media discussions on specific issues can be representative of larger streams of conversations (Jensen and Anstead 2013) and social media users can act as opinion-makers that influence (and anticipate) the viewpoints of the wider public (O'Connor et al. 2010) and the media ecosystem (Farrell and Drezner 2008). Finally, they often represent the most active citizens, meaning those able to mobilize and contest a reform (Bennett and Segerberg 2011).

In the next section we will see how the SASA method here discussed can be employed to investigate the opinions of such «activated public opinion».

4. Putting words into action: two applications of the SASA method to the labour market and school reforms launched by the Renzi cabinet.

To exemplify how an accurate analysis of social media can support policy-makers, we will develop two case studies related to as many public policies formulated and implemented by the Renzi cabinet.

As first, we will monitor the formulation, adoption and implementation phases of the jobs act, i.e. the labour market reform, showing how the online public opinion reacts to the different proposal at stake and how the comments posted by the internet users can be employed to rate their degree of approval towards the available policy alternatives. Finally, we will show how the same comments can be used to evaluate the perceived success of this public policy, at least from the eyes of the citizens.

As second, we will analyse the school reform, labelled 'buonascuola', because this is a significant case study to show the effect of the stakeholders' mobilization. Furthermore, we will compare the results obtained by our social media analysis with those derived from a traditional survey and from a public consultation promoted by the Renzi cabinet to involve teachers, students and their parents in the formulation of this reform.

⁴ The error shrinks to 1.5% when the number of hand-coded documents in the training set reaches the threshold of 500. This error is heavily lower if compared to traditional SA, whose best algorithms produce, at least, a classification error around 15-20%.

These two reforms drew the interest of the Italian public opinion over the last two years and generated a vivid debate and a strong opposition from trade unions. Indeed, the unions organized several strikes to protest against them. In addition, these two reforms intensified internal conflicts within the party of the Prime Minister, called ‘Partito Democratico’. In particular, prominent members of the minority of the party did not vote for the labour market reform while two members of Parliament (one of whom was a former junior minister and one of the leaders of the minority) decided to exit from the party group as they disagreed with the school reform.

In our analysis we will apply the SASA method to Twitter data. We focus on Twitter for a number of reasons. First, Twitter is the second most used social network site in Italy, hence it is a large and relevant arena sometimes used by news media to catch trends and shifts in public opinion (the so called «momentum»: Jensen and Anstead 2013). Moreover, compared to other social network sites, Twitter is largely used to discuss political issues (Vaccari et al. 2013)⁵. Finally, its content is freely available and for this reason it has been widely adopted in the literature on social media and public opinion (e.g. O’Connor et al. 2010; Jensen and Anstead 2013).

The online debate on the «jobs act(s)»

During the formulation and the adoption phases of a public policy, social media data allow policy-makers to monitor citizens’ opinions on the available policy options and to rate them according to citizens’ preferences. Here we provide an example related to the online debate on the labour market reform promoted by the Renzi cabinet.

The expression «jobs act» has been introduced in the Italian public debate in January 2014 by Renzi, who employed it to describe a set of labour market reforms. The jobs act actually consists of two legislative measures, approved on March 12th during the Council of Ministers of the Renzi cabinet. These measures are the decree no. 34 (Poletti’s decree) and the enabling bill no. 1428 (incorrectly labelled «jobs act» by the press). The decree no. 34 simplifies the conditions to hire employees under fixed-term and apprenticeship contracts. The enabling bill no. 1428, instead, is a more complex measure, aiming to rewrite the Italian labour code in a simplified version, to rationalize the forms of atypical labour contracts, to increase the efficiency of employment and training services and to enlarge the access to social security cushion. These measures follow two distinct parliamentary processes. The discussion of the Poletti’s decree started in the House of Deputies on March 22nd and it has been converted in the law no. 78/2014 on May 16th. Conversely, the discussion of the enabling bill no. 1428 started on April 3rd in the Senate and it has been approved in the Lower House on November 25th, while the Senate finally adopted it on December 3rd 2014.

We will apply the SASA technique to assess citizens’ approval of the jobs act across the different stages of the formulation of these two policy measures. In addition, we will also inspect the reasons why social media users favour or oppose the reform.

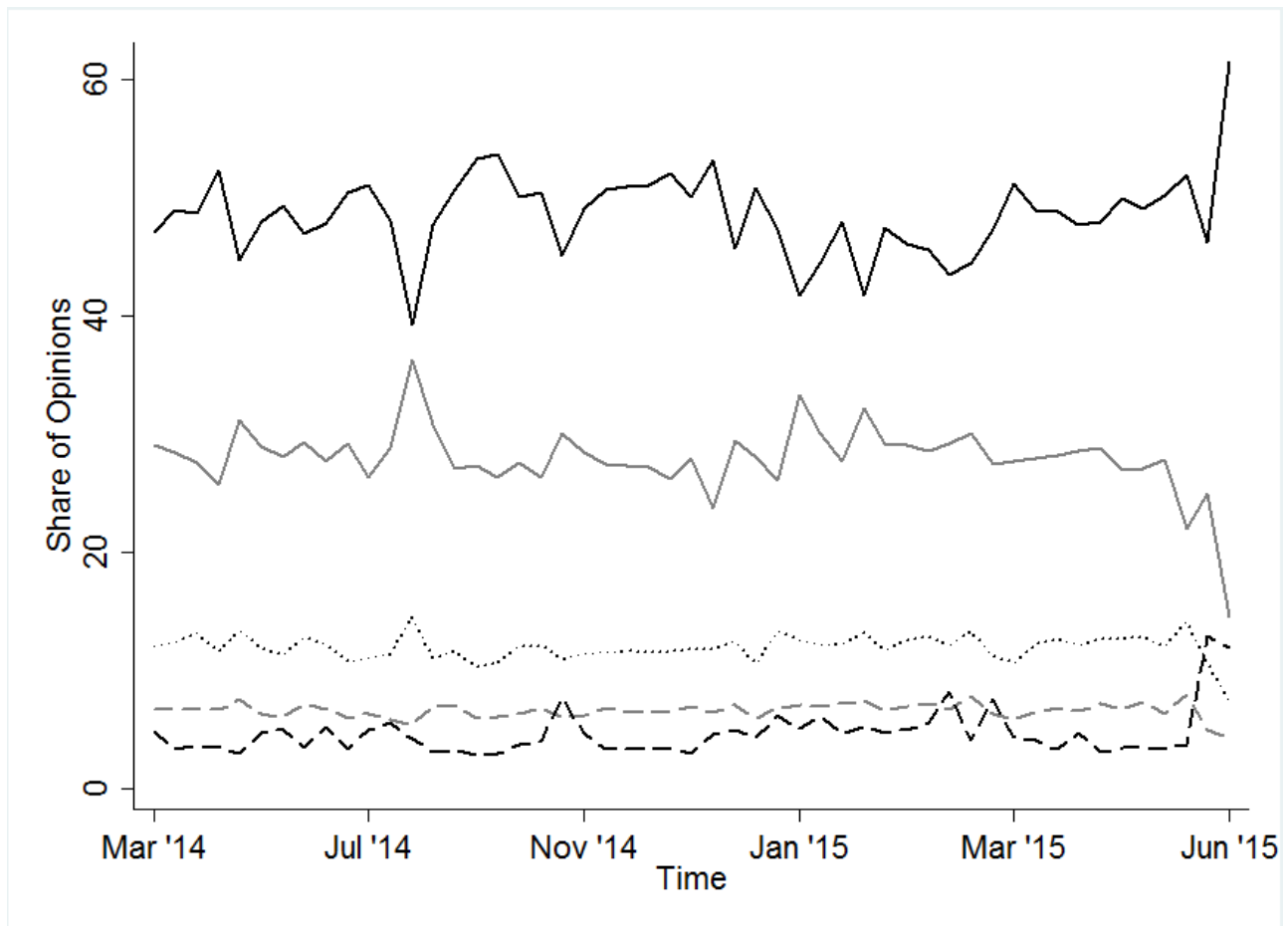
From March 2014 until June 2015, we downloaded 730,000 tweets containing all the possible couples of the following words: *job(s)*, *act(s)*, *articolo 18*, *Renzi*. Then, we analyzed the opinions of social

⁵ With respect to their ideological self-placement, Italian Twitter users are only slightly skewed to the left, though at the expense of non-attached users, while the share of centre-left, centrist, centre-right and right-wing users is in line with that of Italian population (Vaccari et al. 2013).

media users at 24 different points in time, distinguishing between those who favoured and those who opposed the reform. When available, we also delved into the motives behind positive and negative statements. The opinions on the jobs act fell into five main categories: it damages workers' rights («#Renzi non crea lavoro ma toglie tutele e diritti ai lavoratori aumentando precarietà e licenziamenti! Questo è il #Jobsact»); it grants rights to those workers who do not have any («Il #JobsAct tutela tutti ed è incentrato sul contratto unico. La mistificazione di @StefanoFassina è inammissibile»); it will decrease unemployment («#direzionepd: @matteorenzi, "Il lavoro si crea innovando" #JOBSAct #riformalavoro @pdnetwork»); it is useless («il #JobsAct è vuoto/inutile, questo articolo anche di più. Tante parole che prendono in giro #lavoro»); it is not enough («@matteorenzi nel #JobsAct nessuna considerazione delle partite Iva. Fai un #jobsacta per i freelance»).6

Figure 1 reports the variation across time in the share of opinions belonging to each of these five categories. From the top to the bottom, the five lines represent, respectively, the share of opinions stating the jobs act «damages workers' rights» (solid black line), «grants rights» (solid gray line), «is useless» (dotted line), «decreases unemployment» (dashed gray line), «is not enough» (dashed black line).

FIG 1. *The evolution of the opinions on the jobs act from March 2014 to June 2015*



⁶ The analysis has been done by two trained coders. Intercoder reliability is 0.93, for the rating of the overall sentiment, and 0.80 with respect to the motives.

The negative sentiment toward the reform prevails over the entire time span under consideration. When it comes to the reasons behind the sentiment, we observe that only few (6.7%) believe that this reform will succeed in decreasing unemployment.⁷ For many months, the values of the categories «decreases unemployment», «is useless» and «is not enough» are relatively stable and their share is quite low. This suggests that, for the large part of the debate, online comments focused on the dimension of workers' rights rather than on the expected outcome of the reform. The polarization of the opinions reacted to the different viable policy alternatives that emerged during the formulation of the policy (i.e. more or less flexibility, more or less guarantees), allowing to rate such proposed solutions according to preferences expressed online by social media users.⁸

For instance, the share of comments arguing that the reform «damages workers' rights» decreased in the mid of April, after the Commission for Public and Private Employment in the Lower Chamber adopted amendments to the Poletti's decree. In particular, such amendments reduced the possibility to delay fixed-term contracts from eight to five times and introduced the obligation for companies with more than 30 employees to hire 20% of their trainees with open-ended contracts before activating new apprenticeships. Therefore, the public opinion felt to be more protected and the positive sentiment toward the reform relatively grew.

Something similar happened in the mid of September, when Renzi presented the policy agenda for the «next 1000 days» highlighting the will to overcome the dualism of the Italian labour market, and Maurizio Sacconi proposed (in agreement with the government) an amendment to the enabling bill no. 1428 introducing the so-called «open-ended contract with increasing protections». These two events raised the idea in the public opinion that the reform «grants rights to those who do not have any», and enhanced the jobs act's approval.

In October, however, members of the minority factions of the Democratic Party, jointly with the trade unions, started to raise concerns on the risk that the open-ended contract with increasing protections may reduce the number of workers sheltered by the article 18 of the Statute of Workers.

The debate became more and more polarized around this issue up to the point that in a party meeting held on October 20th, the Democratic Party split and the minority factions voted against the proposal of Renzi related to the jobs act. In the same days, the CGIL trade union proclaimed a strike for the following October 25th. These events negatively affected the online support for the reform and, in October, a growing share of tweets pointed out that the jobs act would damage the workers' rights. Finally, in November, a compromise led to the final wording of the paragraph related to the reform of Article 18, which now allows to reinstate the worker in the workplace in case of null and discriminatory dismissals, but also in case of unjustified disciplinary dismissals, though only in peculiar circumstances. This compromise, however, did not succeed in reducing the criticism and the overall sentiment toward the jobs act remained negative. The negativity decreased after the adoption of the jobsact, which was finally approved on December 3rd 2014 (Cfr. law n. 183/2014, published on the Gazzetta Ufficiale on December 12th, 2014). At the end of December and at beginning of January, when the Ministry of Labour starts to discuss the implementation decrees, we observe a lower level of criticism. However, when the implementation decrees have been finally adopted the negative sentiment has deeply grown.

⁷ For a similar view: <http://www.clandestinoweb.com/sondaggi-da-tutto-il-mondo/163608-jobs-act-per-i-cittadini-e-svantaggioso-ma-un-italiano-su-due-non-ne-conosce-i-contenuti/>

⁸ Accordingly, the share of comments stating that the jobs act «damages workers' rights» is negatively related ($r = -0.85$) with those arguing that it «grants rights» to those who have not.

Many comments in fact strongly criticized two particular aspects of the reform such as the possibility for the employers to control their workers by looking at the usage of computers and mobile phones owned by the company, as well as to unilaterally lower the workers' tasks thereby reducing the amount of salary to be paid to each worker. In consequence of these last adjustments made to the reform, the share of comments contending that it damages workers' rights dramatically risen.

In June, however, another factor has contributed to alter the content of the opinion expressed online. For the first time after the reform definitively entered into force (March 7th 2015), the government released data on the evolution of unemployment showing a decrease (-0.2% with the unemployment that reached the level of 12.4%) as 159,000 workers have been employed in April, i.e. the first full month during which the law was into force (increase in the employment rate: +0.7%). The government celebrated this positive result claiming that the new law was starting to wield effects. The activated public opinion, however, reacted online in a rather different way. On the one side, the share of those arguing that the law is useful decreases, in June, by 7 points. On the other side, we observe a slight decrease also in the share of comments convinced that the unemployment (from 7% to 4.5%), whereas we notice a peak of comments saying that the reform is not sufficient to produce effects. The category «is not enough» has risen by more than 9 points and this seems to suggest that the online opinion has judged these first data on unemployment with a certain degree of scepticism as the strong expectation of many citizens were not yet fully satisfied.

«Labuonascuola» school reform: comparing social media sentiment analysis with traditional insights from survey data and public consultation

On September 3rd 2014 the Renzi cabinet opened the formulation phase of its school reform presenting a draft document concerning the main principles underlying the reform and promoting a public consultation, which lasted three months (from September 15th to November 15th 2014). This consultation aimed to listen to the stakeholders' opinions and to collect their suggestions, following similar practices recently promoted in two other countries (UK and France) on the same topic (school and education). This consultation took place both online (through a dedicated website containing several forums, the submission of an online questionnaire and emails) and offline (through the organization of public debates in more than 2000 Italian schools). Overall, 1.8 millions of citizens have been involved in the consultation, 200,000 of whom actively participated in the online debates. These numbers makes such consultation the largest ever made in Europe, according to the data provided by the Italian government. Once the consultation closed, the cabinet officially proposed the bill on March 12th and the discussion started in the House of Deputies on April 4th 2015. After some amendments, proposed and approved as answers to the strike organized by teachers on May 5th, the first draft of the school reform has been approved by the House of Deputies on May 21st. The Senate made further adjustments and finally adopted it on June 25th. The bill is currently back to the House of Deputies for the final acceptance.

Similarly to the previous analysis, we monitored the opinions expressed by citizens' on social media platforms in two different moments. The first one is September 2014, when the Renzi cabinet manifested the intention to reform the Italian education system and started the public consultation on this topic. The second one takes place from March to May 2015, when the bill started its parliamentary *inter* and the teachers' trade unions mobilized to oppose it. Overall, 393,387 tweets were downloaded

and analysed in order to assess the reform's rating and to identify the aspects which generated positive or negative reactions. The results obtained by our social media analysis have been then compared with the output of the public consultation and with the insights derived from a traditional survey commissioned by the Prime Minister at the end of April (i.e. almost in the same period in which we analysed social media content). The results of this comparison are reported in Table 1.

By contrasting the three sources of data, it is possible to identify some common patterns. Indeed, all sources highlight how the main stakeholder, i.e. the teachers, played a leading role by dominating the discussion and by trying to affect public opinion. This is true not only for comments posted on social media platforms, but also for conversations which took place on the online fora organized during the public consultation. In particular, two third of the comments in the online fora have been clearly written by teachers and these professional category represents the majority (54%) of those who answered to the questionnaire provided by the government. The teachers' activism proved to be able to condition public opinion even looking at survey data. In this case, indeed, the asymmetrical information available to teachers made both the majority of students and the general public, including students' parents, to agree with them, opposing the reform. For analogous reasons, and with not surprise, we observe that the comments – both those published on social media (74%) and those related to the consultation (70.8%) – have been largely provided by women, who constitutes the wide majority of teachers.

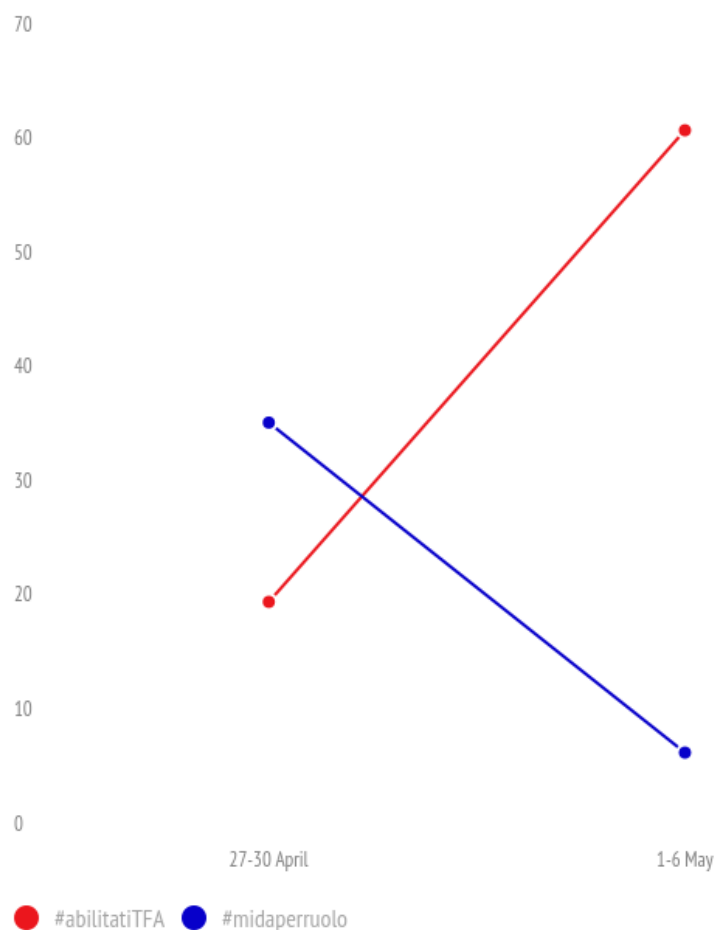
TAB 1. *Comparison between the results of Government consultation, survey polls and sentiment analysis of social media*

Item	Social media	Survey	Consultation
Date	1 Mar – 6 May 2015	30 Apr 2015	15 Sep – 15 Nov 2014
Prominence of comments/answers provided by the stakeholders (teachers)	Yes	Yes	Yes (54% of answers to the questionnaire and 66% of posts on forums made by teachers)
Preponderance of comments/answers made by women	74.0% women	n.a.	70.8% women
Main topic of interest	Hiring teachers	Hiring teachers	Hiring teachers (around 49.7% of posts on forums)
Support for hiring temporary workers	62.2%	60%	68.25%
Headmaster as a 'manager'	Second reason for negative sentiment (7.2%); less relevant after amendments (4.8%).	55.8% oppose	Suggest power sharing
Rate of the reform	90.3% negative	71.6% negative	n.a.

When it comes to the content of the reform, the attention has been predominantly catalysed by the plan to hire new teachers by stabilizing temporary workers in the school sector. On this aspect, we

find a homogeneous degree of agreement across the three data sources: indeed, more than 60% of comments and survey answers supported the need to hire temporary workers. The second aspect included in the reform that drew the attention of the public opinion is the role of the headmaster, which is expected to become a sort of manager, with discretionary power in the choice of the personnel. Overall, the three information sources highlighted a strong opposition towards this issue. In particular, social media analysis demonstrates that the new role of the headmaster is the second reason behind the negative sentiment towards the reform; traditional survey data estimate that more than 55% of the respondent disagree with this provision and, consistently, the public consultation suggests the need to share decision-making powers inside the school. Social media analysis, however, allows us to monitor the change in the opinion expressed by internet users towards this aspect of the reform: indeed, we notice a marked difference after the government amended this aspect of the reform, partially downgrading the initial attempt to strengthen the power of the headmaster. Finally, both social media analysis and traditional survey data report negative judgments towards the reform.

FIG 2. *Mobilization of different categories of teachers (temporary workers)*



This comparison shows that all the three sources of data provide intriguing information and useful insights, which tend to describe a similar story. In this regard, however, we would like to stress that social media analysis allow us to better capture the process of stakeholders' mobilization (Bennett and Segerberg 2011), monitoring in real time how they react to the amendments that have been

purposely took into account by the government. Moreover, social media analysis allows us to catch the different stakes promoted by rival interest groups. For instance, after that the government modified the priority criteria set to hire temporary workers, we observe a sharp decline in the number of comments promoted by one category of teachers (*#midaperruolo*, those who are not yet enabled to teach, whose share drop from 36.3% to 7.4%). Conversely, those who, being already enabled to teach (*#abilitatitfa*), have been more damaged by this government's decision, become more active online, with a share of comments that grows from 20.6% to 61.9% and remains the only category still mobilized to oppose the reform (see Figure 2).

5. Conclusions

By adopting a pragmatic approach, the present paper contributes to the academic and professional debate on whether and how social media are able to transform the power relationship between politicians, bureaucrats and citizens (Carter and Belanger 2005; McNeal et al. 2008; Tolbert and Mossberger 2006; Welch et al. 2005) enhancing the accountability and responsiveness of public entities.

Focusing on the potential role played by social media analysis during the formulation and the implementation of a public policy, we describe how big textual data can be profitably used to support the action of policy-makers.

In particular, we investigated the reaction of the «activated public opinion» in two case studies concerning as many reforms formulated and implemented by the Renzi cabinet in the last year. This analysis has been performed by applying a modern technique of supervised aggregated sentiment analysis (e.g., Hopkins and King 2010) to Twitter data.

First, we monitored the formulation and the implementation of the 'jobs act' labour market reform, showing that the online debate mainly focused on the level of rights granted to workers and how social media users reacted to the alternative policy proposal at stake according to their own preferences. In particular, we observed an increase in the share of positive sentiment towards this reform, seen as potentially able to increase workers' rights, when the open-ended contract with increasing protections has been proposed. However., this initial optimism dropped as soon as the reform of the Article 18, concerning individual and collective dismissals, entered the policy agenda, as demonstrated by the increase in the the share of those who accused the jobs act to subtract rights to workers. Furthermore, the online public opinion seems disappointed by the first results of the reform whose positive effect on employment was probably lower compared to the expectation of online users.

Second, we analyze the school reform 'labuonascuola', showing how the information available on social media aligns with the data provided by more traditional (and expensive) sources (i.e., a survey and a public consultation promoted by the government). Even though these three sources of data described a common story, only social media analysis allow us to catch the mobilization/demobilization of stakeholders (Bennett and Segerberg 2011) in reaction to the amendments to the bill proposed by the government. The similarity between social media comments and data related to the consultation highlights the potential role of sentiment analysis to extend the recent attempts to involve citizens in the 'co-production' of public policies, allowing them to have their say.

In conclusion, our results confirmed that policy-makers could significantly benefit from data freely available from social media, thereby enhancing institutional responsiveness, accountability and learning. Social media analysis, however, should not be considered as a panacea to replace other research methods. Nevertheless, social media analysis provides a fast and cheap stream of information that could be later matched with other traditional data sources, in order to better monitor public policies.

Going beyond sentiment analysis in the social media world, the SASA technique can be used also to analyze any kind of digital text. As such, in the era of 'open data', text analysis can allow to contrast the behavior and the output of different public administrations enhancing transparency and accountability. Furthermore, it can be used to evaluate citizens' complaints and satisfaction with the performance of bureaucratic offices and services, going in the direction of the reform proposed by the former Minister of Innovation and Public Administration, Renato Brunetta⁹.

⁹ In 2010, the Minister of Innovation and Public Administration, Renato Brunetta, created a social network dedicated to public administration with the aim of allowing citizens to interact with offices and evaluate their conduct. See: <http://www.funzionepubblica.gov.it/comunicazione/notizie/2010/ottobre/25102010---innovazione-brunetta-presenta-miapa.aspx>

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