

Analyzing the Centralised Use of Multiple Social Media by Government from Innovation Diffusion Theory Perspective

Ferro, E., Loukis, E., Charalabidis, Y., Osella, M.

Abstract: Governments have started increasingly using web 2.0 social media as a new channel of interaction with citizens in various phases of public policies lifecycle. In this direction they have started moving from simpler forms of exploitation of these strong bi-directional communication channels to more complex and sophisticated ones. These attempts constitute important innovations for government agencies, so it is necessary to analyse them from this perspective as well. This paper analyzes an advanced form of centralised use of multiple social media by government agencies from this perspective, using the well established Diffusion of Innovation Theory of Rogers. It is based on a pilot application of the above approach for conducting a consultation campaign concerning the large scale application of a telemedicine program of the Piedmont Regional Government, Italy. It has been concluded that this approach has the fundamental preconditions for a wide diffusion (relative advantage, compatibility with existing values and processes, reasonable complexity, trialability and observability), at least in government organizations having a tradition of bi-directional communication with citizens in all phases of policy making, and also some experience in using social media for this purpose.

1. Introduction

Governments have started increasingly using web 2.0 social media as a new channel of interaction with citizens in various phases of public policies life-cycle (agenda setting, policy design, adoption, implementation and monitoring and evaluation) (Osimo, 2008; Punie et al., 2009; Bertot, Jaeger and Hansen, 2012; Bonsón et al., 2012; Snead, 2013). While initially they adopted simpler forms of exploitation of these strong bi-directional communication channels, recently they tend to shift towards more complex and sophisticated ones (Ferro et al., 2011; Charalabidis and Loukis, 2012; Charalabidis et al., 2012). These attempts constitute important innovations for government agencies, so it is necessary to analyse them from this perspective as well. It is important to investigate to what extent they have the fundamental preconditions for a wider diffusion in government. For this purpose we can use methods and frameworks developed by the extensive previous research on innovation diffusion (MacVaugh and Schiavone, 2010). Such research can reveal both 'strengths and weaknesses' from this perspective, i.e. characteristics and contextual factors that favour diffusion in government, and also characteristics and contextual factors that hinder it, so it can provide direction concerning the required improvements in relevant systems and methods, and also the contexts they are more suitable for.

This paper makes a contribution in this direction. It analyzes an advanced form of centralised use of multiple social media by government agencies from an innovation perspective, using the well established Diffusion of Innovation Theory of Rogers (Rogers, 2003). This advanced approach to social media exploitation by government hinges on the use of a central system for the conduction of consultation campaigns on a policy-related topic in multiple social media, carefully selected so that each of them attracts a different targeted group of citizens (more details on it are provided in Ferro et al., 2011; Charalabidis and Loukis, 2012; Charalabidis et al., 2012). Each campaign includes automated centrally controlled and coordinated publishing of relevant content (or even micro-applications if allowed), termed as ‘Policy Gadgets’ (or ‘Padgets’), in a number of selected social media using their application programming interfaces (APIs) through a central platform, and then retrieval of citizens/users interactions with these Padgets (e.g., views, likes, ratings, comments) from the afore-mentioned social media. Finally, these interactions undergo various levels of sophisticated analyses including: i) calculation of various analytics (e.g. numbers of views, likes, ratings, comments per day/region per gender, age and education group for each of the targeted social media or in total), ii) text mining (based on opinion mining techniques (for a review of them see Maragoudakis, Loukis and Charalabidis (2011)), in order to determine the ‘sentiment’ of citizens’ comments (positive or negative), and the main topics, issues, suggestions, arguments raised by them), iii) future projections through simulation (e.g. using system dynamics or agent-based simulation, for more details see Charalabidis, Loukis, and Androutsopoulou (2011)). Our analysis is based on a pilot application of the above approach for conducting a consultation campaign concerning the large scale application of a telemedicine program of the Piedmont Regional Government, Italy. This research has been conducted as part of project PADGETS (‘Policy Gadgets Mashing Underlying Group Knowledge in Web 2.0 Media’ – www.padgets.eu), supported by the ‘ICT for Governance and Policy Modeling’ research initiative of the European Commission.

The paper is organized in five sections. In the following section 2 the background of this study is outlined. Then in section 3 the research methodology is described, while in the following section 4 the results are presented. The final section 5 contains some conclusive remarks and future research directions.

2. Background

2.1. Social Media in Government

As mentioned in the introduction social media, though initially used by private sector firms mainly in their marketing and customer service activities, are increasingly adopted and utilised by government agencies. It is gradually recognised that social media offer to government agencies significant opportunities for: i) increasing citizens’ participation and engagement in public policy making, by providing to more groups a voice in discussions of policy development and implementation; ii) promoting transparency and accountability, and reducing corruption, by enabling governments to open up large quantities of activity and spending related data, and at the same time citizens to

collectively take part in monitoring the activities of their governments; iii) public services co-production, by enabling government agencies and the public to develop and design jointly government services; iv) crowdsourcing solutions and innovations, by exploiting public knowledge and talent in order to develop innovative solutions to the increasingly serious and complex societal problems (Bertot et al., 2010; Lathrop and Ruma, 2010; Bertot, Jaeger and Hansen, 2012; Bertot, Jaeger and Grimes, 2012; Linders, 2012).

Highly useful for public policy making can be the capabilities offered by social media to apply the ‘crowdsourcing’ ideas (Surowiecki, 2004; Brabham, 2008), which have been initially developed in the private sector and which have subsequently taken root in the public sector as well (probably with adaptations to the specificities of government); these Web 2.0 platforms enable government agencies to mine useful fresh ideas from large numbers of citizens concerning possible solutions to social needs and problems, new public services or improvements of existing ones, or other types of innovations (Bovaird, 2007; Torres, 2007; Lukensmeyer and Torres, 2008; Chun et al., 2010; Hilgers and Ihl, 2010; Nam, 2012; Linders, 2012; Margo, 2012). This can lead to the application of open innovation ideas in the public sector (Hilgers & Ihl, 2010), and gradually result in ‘co-production’ of public services by government and citizens in cooperation (Bovaird, 2007; Linders, 2012). According to Lukensmeyer and Torres (2008) such ‘citizen-sourcing’ may change the government's perspective from viewing citizens as “users and choosers” of government services to “makers and shapers” of them.

However, it is widely recognized that further research is required for developing new advanced and more efficient and effective forms of exploiting the capabilities offered by social media in government, and also for evaluating them from various perspectives (Chun and Luna Reyes, 2012; Bertot, Jaeger and Hansen, 2012). The research presented in this paper contributes in this direction, focusing on the the evaluation of an advanced form of social media use by government from an innovation diffusion perspective.

2.2. Diffusion of Innovation Theory

Extensive research has been conducted on innovation diffusion, in order to understand it better and identify factors that favour it (MacVaugh and Schiavone, 2010). One of the most widely accepted and use theories of innovation diffusion is the one proposed by Rogers (2003), which has been extensively employed for analyzing ICT-related innovations in both the public and the private sector (Wonglimpiyarat and Yuber, 2005; Raus, Flügge and Boutellier, 2009; Loukis, Spinellis and Katsigiannis, 2011; Al-Jabri and Sohail, 2012). According to this theory, there are five critical characteristics of an innovation that determine the degree of its adoption, which are shown with their definitions in Table 1.

Characteristic	Definition
Relative Advantage	The degree to which an innovation is perceived as better than the idea, work practice or object it supersedes
Compatibility	The degree to which an innovation is perceived as being

	consistent with the existing values, past experiences, and needs of potential adopters
Complexity	The degree to which an innovation is perceived as difficult to understand, implement and use
Trialability	The degree to which an innovation may be experimented with on a limited scale basis
Observability	The degree to which the results of an innovation are visible to others

Table 1: Innovation characteristics that determine the degree of its adoption

Therefore it is paramount to assess to what extent various proposed approaches to social media usage by government agencies for supporting public policy making have the above characteristics, which result in higher levels of adoption and diffusion.

3. Research Methodology

In order to analyze the abovementioned advanced form of centralised use of multiple social media by government agencies developed in the PADGETS project (Ferro et al., 2011; Charalabidis and Loukis, 2012; Charalabidis et al., 2012) from an innovation perspective a pilot application of it was made in cooperation with Piedmont's Regional Government, Italy. One of its major problems has been for long time its high spending (on average about 80% of its total budget) for providing health services to its citizens. The increasing budget reductions currently experienced at local and at national level require regional governments to face a major challenge: significantly lower health related expenditures without deteriorating quality of service. For achieving these conflicting objectives Piedmont's Regional Government examined various actions, one of them being the application of telemedicine methods. In this direction it launched a pioneering telemedicine small scale project in one of the least populated and most mountainous of its provinces: Verbano-Cusio-Ossola (VCO). This telemedicine project was supported by the Local Health Authority (LHA) of VCO that serves a population of about 172,000 citizens, with 23% of them being over 65 years old. The evaluation of this small scale project was positive, so Piedmont's Regional Government had to decide whether it should proceed to the large scale application of telemedicine practices in the whole Piedmont. Since this was a difficult and complex decision, for which a plethora of factors had to be taken into account, and also due to their long tradition of bi-directional communication with citizens in all phases of their policy making processes, they decided to conduct a consultation with citizens on this in multiple social media, using the central platform and the whole approach developed in the PADGETS project.

In particular, the objective of this social media campaign was to convey information on the planned extension of the telemedicine initiative in the whole Piedmont region to interested and affected citizens (e.g., patients and their families, doctors, health management employees), and then to collect feedback from them. The regional government expected through this campaign to gain a better understanding about the levels of final users' interest in and acceptance of these telemedicine services and the

technology mediated model proposed for their provision; also, to identify possible barriers due to practical problems or internal organizational resistance, and therefore to take appropriate actions for addressing them. In this project participated four organizational units of the regional government which had relevant competences: the public health, budget & finance, institutional communication and regional innovation units. Piedmont Region had already some experience in using several social media, so it had set-up and used accounts in them. For this consultation campaign it was decided to use as central channel the Facebook. This is due both to its peculiar interaction patterns as well as to the noteworthy penetration rate of it in the Piedmont's population. Beside Facebook, the campaign has made use of Twitter and YouTube. Flickr and LinkedIn, for their part, assumed an ancillary role.

After the end of this consultation campaign the analytics provided by the above social media were examined. Also semi-structured interviews were conducted with involved experienced staff from the above four participating units (public health, budget & finance, institutional communication and regional innovation units). Their main objective was to assess to what extent the proposed approach (centralised use of multiple social media), viewed as an innovation in government agencies policy making processes and work practices, has the five preconditions - characteristics proposed by the innovation diffusion theory of Rogers (2003) for a wide diffusion and adoption: relative advantage, compatibility, complexity, trialability and observability. The main questions are shown in Table 2. Each interview lasted between half and one hour and was tape-recorded and then transcribed. Open coding (Maylor and Blackmon, 2005) of interviews transcripts followed, in order to extract the main points of them.

<p>To what extent the proposed approach:</p> <ul style="list-style-type: none"> - is a better way for consultations with citizens on various public policies than the other existing 'physical' (i.e. through 'physical' meetings) or 'electronic' ways for this (relative advantage) ? - is compatible with the values and the policy formulation processes of government agencies (compatibility) - its practical application by government agencies policy makers does not require much effort (complexity) - it can be initially applied in small scale pilot applications by government agencies, in order to assess its capabilities, advantages and disadvantages, before proceeding to a larger scale application (trialability) - is an innovation highly visible to other public agencies, policy makers and the society in general, which can create positive impressions and comments (observability)
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Table 2: Main questions of the interviews

4. Results

4.1 Citizens' Reach and Engagement

In terms of reach, the policy messages of this campaign that were posted in the above social media have generated over 28,000 impressions. This figure, that has to do with the mere reception of the policy message in the social media realm, is characterized by a cross-platform nature. In Facebook, the figure encompasses the views of posts associated to the campaign which are located on the fan page chosen by the policy makers. Regarding YouTube, here the principle does not change, therefore the indicator includes views of the telemedicine related videos uploaded as part of this campaign. With respect to Twitter it is important to point out that the number of impressions of a given message (“tweet”) cannot be computed resorting to either native or third parties’ tools. In this platform, the only viable solution has been to estimate impressions using click-throughs on links as well as YouTube referrals: as a consequence, this value represents a significant underestimation (at least one order of magnitude) of the actual performance expressed on the specific platform. Translating impressions into unique user accounts, the data offered by the platforms’ analytics show that over 11,000 accounts have been reached.

Moving from passive interactions to active engagement, platforms’ analytics reveal the participation of more than 300 (unique) individuals during the campaign lifecycle. The inherent cross-platform nature of this consultation campaign implies the use of different measures from each platform for the calculation of this indicator: unique users who generated a story through comments, likes, and public sharing in Facebook, unique users who performed actions such as like, dislike, comments and sharing in YouTube and, in Twitter, unique users who re-tweet and reply to tweets representing policy messages published by the campaign initiator.

As a supplement to afore-mentioned figures, it is relevant to stress that performances exhibited by campaign messages published during the pilot on Piedmont Regional Government’s accounts have been remarkably superior to other messages posted in the same period apart from the institutional campaign, which may be seen in the guise of a control group. A quintessential example in this vein has to do with Facebook regional channel: taking into account this platform, PADGETS messages had a reach three times larger than others (on average) while, in terms of active engagement, PADGETS campaign generated reactions about twenty times more than usual.

Going beyond reach and engagement numbers, precious stimuli for policy makers derive from citizens’ opinions on this specific policy topic under examination. First of all, telemedicine may be seen as the cornerstone for the rationalization of public spending, especially in a period when budget constraints are tighter than ever. Some messages in this vein are as follows:

‘The project has very good prospects and it can certainly represent an efficient way to reduce the cost of public health and prevention services’.

‘An example to follow for regions like mine, Lazio, where – more and more frequently – past and present spending reviews are leading to closure of hospitals’.

The search for efficiency in public spending is not the only pro ascribable to telemedicine according to the audience since substantial benefits arise also on the patient’s side: whilst the continuous supervision of the patient’s conditions contributes to improve the quality of healthcare provision, a reduction in the number of trips between

dwelling places and local hospitals has a remarkable impact in terms of savings (i.e., time devoted to mobility and cost of fuel) and environmental footprint (i.e., containment of CO₂ emissions). Some messages emphasizing the patient's dimension are as follows:

'Telemedicine can remarkably reduce the queue for particular clinical examinations whose waiting time has now become eternal'.

'By improving the quality of life as well as the quality of care provision, telemedicine constitutes a smart use of technology. Tough times for aficionados of long queues at the counters of local health offices!'.

However, despite rosy expectations and fervent impulses coming from technophiles, there are still some major roadblocks clearly perceived by the population. In fact, a number of concerns have been expressed about the uneven technological literacy among patients, in light of the relentless aging phenomenon:

'Technology scares, especially those who are not born with the PC in the cradle'.

'Without broadband connection the inhabitant of a mountainous village cannot reap the benefits of this service and travels continue to be needed. In addition, without proper education and widespread awareness the potential of the service will not be harnessed'.

Finally, citizens involved in the campaign outlined the risk of applying a technocratic approach that does not take into account the human aspects of the physician-patient relationship:

'In any case, data interpretation – especially in more complex situations – requires always a thorough (and human) assessment'.

'You cannot improvise a system in this vein without adequate training of healthcare personnel and a well-grounded estimation of the time they can devote to telemedicine'.

4.2. Innovation Diffusion Determinants Assessment

All interviewees agreed that this approach (centralised use of multiple social media) offers strong relative advantages, in comparison with existing both 'physical' alternatives (e.g. physical meetings for communicating with citizens concerning various public policies under design or implementation) and 'electronic' ones (e.g. government e-participation/e-consultation portals). The inherent nature of this approach goes beyond traditional schemes of 'official' e-participation/e-consultation portals developed and operated by government organizations. It stresses that in such circumstances, the way in which consultations work never satiate the appetite of policy makers, owing to the presence of notable difficulties which lead to low levels of uptake and, above all, hamper citizens' inputs from having a clear impact. In particular, a 'formal' e-consultation gives citizens a brief opportunity to offer comments in response to a limited set of questions posed by government. Also, these designated 'official' e-consultation spaces are largely unknown to the general public due to the high costs of promotion and the slow pace of dissemination. Furthermore the tools they provide are often usable only by an affluent and acculturate minority. Another problem is that when the consultation period ends, policy makers are hit by a wave of textual comments, without obtaining a

clear picture of *vox populi*. However, the examined approach overcomes the above weaknesses and problems. It leverages already established installed bases and paves the way to a friction-less (i.e., faster and more frequent) interaction between policy makers and society. A substantial relative advantage arises with respect to previous generation of e-participation models due to the fact that the government makes a first step towards citizens rather than expecting the citizenry to move their content production activity onto the 'official' spaces created for e-Participation,. It was also mentioned that the high levels of citizens' reach and engagement achieved in this pilot application of the examined approach, and the useful insights offered by citizens' textual comments and opinions, as discussed in previous section 4.1, indicate the significant relative advantages that the examined approach provides.

With respect to compatibility, the interviewees found that the pronounced cross-sectoral nature of this approach renders it a precious decision support tool capable to maximize the 'horizontality' in terms of application scope, and, as a consequence, it may be easily and effectively employed for any kind or thematic area of public policy. Furthermore, it can be used in every stage of the policy life-cycle (agenda setting, policy design, adoption, implementation and monitoring and evaluation). As a result, with regard to compatibility, the recourse to multiple social media seems to fit in with the policy formulation processes of government agencies. All interviewees concluded that the whole approach was compatible with the values and policy formulation processes of Piedmont Regional Government. However, some remarked that this compatibility is to a significant extent due to two specific characteristics of the particular government agency, which might not exist in other contexts: i) their long tradition of bi-directional communication with citizens in all phases of policy making, and ii) their previous familiarity with and experience in using social media for the above purpose. They stressed that a 'typical public servant' might initially not feel 'culturally fit' for and familiar with the language and style of dialogue of most social media, and find it difficult to participate effectively in such dialogues; so some training, followed by some 'familiarization period' would probably be required. Also, it was mentioned that an 'organizational compatibility' is of critical importance, and this achieved through the assignment of the use of social media for communicating with citizens to an existing organizational unit, or the establishment of a new one for this purpose.

With respect to complexity, it was mentioned that the proposed approach, in combination with the ICT tools supporting it, have the distinctive trait of keeping moderate the cognitive effort required to policy makers. Despite processing data in accordance with advanced modeling techniques, the tool hides complex algorithms behind the scene and provides decision makers with a set of synthetic, fresh and relevant data through intuitive visual outputs. The easily understandable way of reporting campaign results determines a substantial simplicity in usage that clears the hurdle of complexity, creating a fertile soil for a smooth adoption by every policymaker inclined to embrace 'open' policy making.

Furthermore, the successful completion of the pilot held in Piedmont Region corroborates the *a priori* conviction that this approach might take advantage of a noticeable scalability that allows to move all along the continuum ranging from small scale to full scale. All interviewees agreed that this innovation may be experimented

without particular obstacles, since there does not exist a 'minimum efficient scale' for running a campaign, so it is characterised by trialability. It was recognised by all that this approach can be initially applied by government agencies in small scale pilot applications in order to assess its capabilities and to fine-tune the underpinning mechanisms, before proceeding to larger scale applications. After having had the chance to test how this innovation impacts every-day life of policy makers, if convinced, they may decide to move from a project (or pilot) perspective to an accomplished process perspective, making it the default tool for approaching challenging decisions that call on 'collective intelligence' since in-house multidisciplinary teams, top-notch skilled resources and world-class computer suites do not suffice to cope with.

Finally, the interviewees mentioned that the unprecedented exposure (at least in the digital world) given by social media to public policy campaigns makes this innovation highly visible to other public agencies, policy makers and the society in general. In fact, policy messages make their appearance on public pages accessible by everyone (i.e., Facebook Fan Pages, Twitter Pages, YouTube Channels) and viral 'contagious' phenomena occurring in the social media realm in light of intertwined social connections play their part in garnering a rapid and vast spreading of the policy proposal at stake. The resulting observability of the innovation has according to the interviewees a twofold advantage: on one hand, it stimulates the citizenry to step in the debate boosting the adoption rate and, on the other hand, the opportunity to observe how the tool works on the field contributes to create awareness in the public realm about the opportunity to tap social media in order to let 'collective intelligence' percolate across governmental boundaries.

5. Conclusions

The increasing adoption of social media by government agencies constitutes an important innovation in their public policy making processes. Therefore it is important to analyse it from an innovation diffusion perspective as well, taking advantage of the extensive previous research in this area. This will allow us to understand to what extent various existing or emerging forms of social media exploitation in government, simpler or sophisticated ones, have the fundamental preconditions for a wider diffusion in government. Also, it will allow identifying characteristics of the corresponding systems and methods/processes, or of their context (e.g. characteristics of the adopting government organizations or the targeted citizens' groups), which do not favour their diffusion, and take appropriate actions for addressing them.

This paper aims to make a contribution in this direction. It analyses an advanced approach of using social media by government agencies, which includes centralized combined exploitation of multiple complementary social media platforms, taking advantage of their APIs, initially for posting to them various types of policy-related content, and then for the retrieval of users' interactions with them in these social media platforms, in order to undergo sophisticated processing. As theoretical foundation for our research we use the Diffusion of Innovation Theory proposed by Rogers (Rogers, 2003). Our analysis is based on a pilot application of the above approach for conducting a

consultation campaign concerning the large scale application of a telemedicine program of the Piedmont Regional Government, Italy.

It has been concluded that this approach has the fundamental preconditions for a wide diffusion according to the above theory: relative advantage, compatibility with existing values and processes, reasonable complexity, trialability and observability. However, its compatibility depends to some extent on the context: i) on the history and tradition of the adopting government agency with respect to bi-directional communication with citizens in all phases of policy making (in government agencies without such history and tradition the compatibility might be lower), and ii) on its familiarity with and experience in using social media for this purpose (lack of them might reduce compatibility). The shift to a web 2.0 communication style might require a lengthy process among both society and government agencies.

The findings of this paper have interesting implications for research and management. With respect to research, it provides a framework for future analysis of existing or emerging forms, systems and methods of social media use by government agencies from an innovation diffusion perspective, which is definitely a quite important one. In general it opens up a new research direction, which combines theories, frameworks and methods from innovation, political sciences and e-participation research, in order to provide a deeper understanding of social media based innovations in political communication. With respect to management of government agencies, findings indicate that such a complex and sophisticated form of multiple social media use for bi-directional communication with citizens has the fundamental preconditions for a wide diffusion and adoption. However this might depend from previous history and tradition in communication with citizens, and at the same time might necessitate training and familiarization with a new language and style of dialogue with citizens, quite different from the ones dominant previously. Also, it is important each government agency to develop systematically their 'organizational compatibility' in this area, and this can be achieved through the assignment of the use of social media for communicating with citizens to an existing organizational unit, or the establishment of a new one for this purpose. Further research is required on the existing or emerging forms of using social media in government from various innovation related perspectives, in different contexts (e.g. for different topics more or less specialised, in different government agencies with different cultural - organizational characteristics and relevant experiences), using different theoretical lenses.

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