

From experimentation to public service delivery in social media. An analysis of institutionalization dynamics in Dutch local governments

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ABSTRACT

Social media is being used by a large part of local administrations. As a highly disruptive adopted innovation, it is important to understand the process of institutionalization through empirical variables. This paper studies the Dutch case to analyze to what extent social media technologies have been institutionalized within major city councils in Netherlands. The study tries to answer the following research question: What is the level of institutionalization of social media in Dutch city councils with more than 50,000 inhabitants? Taking this into account, this work is based on two analytical levels: on the one hand, it performs a comparative analysis of Dutch city councils that responded to a survey on social media institutionalization. On the other hand, based on previous descriptive empirical results, the paper studies Utrecht as a case of success to analyze the level of social media institutionalization through Social Network Analysis and automated natural language processing with data crawled from Twitter. Overall, results show that social media institutionalization in Dutch city councils has been high, developing decentralized practices with formal commitments for social media use and with a high sense of leadership, showing interesting participatory and public service delivery logics. At the same time, the case of Utrecht confirms that a high level of institutionalization requires management capabilities and goals definition and implementation, including a conversational approach to citizens, and an emerging approach to public service delivery.

CCS CONCEPTS

• Information systems ~ Social networks • Applied computing ~ E-government

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KEYWORDS

Social networks, social media institutionalization, local government, big data, automated natural language processing, Netherlands.

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1 Introduction

Social media have become one of the most outstanding technological innovations on this decade. It is such a global phenomenon, and with so much penetration, that neither private nor public organizations are outside of it. In the case of public administrations, understanding how social media institutionalization is occurring is especially important, as this organizations are communicating with citizens and even delivering public services inside these networks. This paper studies those institutionalization processes in local governments. For this purpose, our paper focuses on the study of the Dutch case, using two parallel strategies: the analysis of 31 municipalities based on original unpublished statistical data, and the study of a specific city council based on data extracted from Twitter and analyzed through an artificial intelligence algorithm. All this is intended to contribute to the reflection on social media adoption and institutionalization processes inside the public sector.

Social media adoption in public administrations continues to be a living and constantly evolving process. Progress in social media use constitutes a response to citizen demands who, as experienced users, have increased expectations in terms of responsiveness, information delivery and real-time conversation (Medaglia and Zheng, 2017). But it also constitutes a great chance for public administrations to gain new opportunities in terms of transparency, democratic participation, co-production, policy-making, knowledge-management and citizen engagement (Reddick et al., 2017; Linders, 2012; Kavanaugh et al., 2012),

ultimately expecting improvements on public service delivery (Rodríguez-Bolivar, 2015; Khan, 2013; Criado et al., 2013). Therefore, public administrations have already proven that social media can be a powerful ally for certain uses on emergency management (Chatfield and Reddick, 2018; Yuan and Gascó, 2018; Panagiotopoulos et al., 2016), healthcare (Tursunbayeva et al., 2017; Khan et al., 2014), police and security (Williams et al., 2018; Brainard and Edlins, 2015; Meijer and Thaens, 2013), international relations (Barnett et al., 2017), or public innovation (Loukis et al., 2017), among others. All these public policy areas have seen an evolution in the use that public managers make of these technologies, from mere communicative practices to uses that are starting to take advantage on the participative and collaborative potential of social media.

However, as of today, there is no unanimous agreement on the effects and results of adoption, use and dissemination of social media in public administrations. This partially explains the popularity of studies that focus on how that technologies are used by public administrations (Medaglia and Zheng, 2017), the results of which have been commonly used to deduce strategies and patterns of adoption (Mergel, 2016; Mergel, 2013). Thus, scholars have developed models based on different stages or categorizations (DePaula et al., 2018; Khan et al., 2014; Mergel and Bretschneider, 2013; Mergel, 2013, among others), usually inspired in previous e-government research (Gil-García, 2012; Fountain, 2001), and some others on diffusion of innovations theories (Coursey and Norris, 2008; Rogers, 2003). This last view is particularly interesting, since it takes social media as an innovation itself, usually due to how disruptive social media affordances (such as its visibility impact, the anonymity of users or its collaborative potentials) are (Stamati et al., 2015), and how they impact on the rigid procedures and structures of public sector (Criado et al., 2018; Chen et al., 2016; Stamati et al., 2015).

Adoption, especially if related to diffusion of innovations theory, inevitably leads us to reflect on institutionalization of these technologies. If we currently know some patterns of adoption, academic interest must now be in observing how these patterns adapt to public administrations particularities within different contexts (Lin et al., 2016; Rodríguez-Bolivar, 2015; Criado and Rojas-Martín, 2015). Institutionalization goes beyond use, since it usually studies a continuum of practices that range from the convergence of routines and procedures, to the integration of social media within the mission and vision of the organization and the existing organizational technological paradigm (Mergel, 2016). However, social media institutionalization within different contexts is not currently widely studied. Only few models have worked with social media institutionalization (Mergel, 2016; Mergel and Bretschneider, 2013), in the same way that few are the studies that empirically work on these issues within specific contexts (Criado et al., 2017; Mergel, 2016; Bonsón et al., 2015).

This paper focuses on the study of social media institutionalization within local public administrations. For this purpose, the study selects the Dutch case, collecting data based on Twitter, and from an original questionnaire on social media adoption, which is part of a broader research project focused on

the understanding of adoption and institutionalization factors of digital social networks in European local administrations. Therefore, the following research question is posed: *What is the level of institutionalization of social media in Dutch city councils with more than 50,000 inhabitants?*

Thus, the analysis is presented in two levels. First, and based on the data obtained from the questionnaire, and using the theory established in the EEGS model (Enacting Electronic Government Success) (Gil-García, 2012) that will be lately explained, descriptive empirical analysis is carried out using variables, such as the departments in charge of social media, the existence of guidelines for social media use, and the presence of leadership, among others, with the aim of exploring what is the level of social media institutionalization in organization's back-office. Second, and based on the analysis of strategies for the use of digital social networks in the public sector (Mergel, 2013), as well as bearing in mind techniques for the analysis of networks such as Social Network Analysis (SNA) and techniques coming from artificial intelligence, such as automated natural language processing, this paper analyzes the specific case of Utrecht, which was selected based on our questionnaire results. In this case, the objective is to explore how this institutionalization is going on within front-office, that is, in the interactions with citizens through network communities.

Some final thoughts are necessary. First, the choice of local government is particularly important, due to the widespread adoption of these technologies at that level of government (Rodríguez-Bolivar, 2015; Gibson, 2010), as it is the closest type of government for citizens. Second, in a universe of studies still particularly dominated by the United States, studies from other contexts are especially interesting, and the Dutch case offers the particularities of the administrative model of continental European tradition (Painter and Peters, 2010), with research indicating advanced uses of these technologies within that context (Meijer and Torenvlied, 2014). The Dutch context case is also a particularly interesting case on social media institutionalization, as we know that great efforts towards collaborative uses of these technologies have been made in certain policy areas, such as police departments (de Graaf and Meijer, 2019). But less is known about this social media institutionalization dynamics in relation to its local governments.

The remainder of the paper is structured as follows. First, a literature review is presented focusing on the institutionalization of social media, showing some of the frameworks on which our variables are based. Second, research methods are posed in relation to the work with the questionnaires and big data/machine-learning analysis. Then, results are shown, first through descriptive aggregates for the 31 Dutch city councils, and later, for the SNA and the automated natural language processing for the specific case of Utrecht. The paper concludes with main findings and few brief conclusions.

2 Literature review: social media institutionalization in the public sector

Social media institutionalization follows dynamics that are similar to previous waves of technological adoption. For this reason, many previous theories on adoption and institutionalization have been adapted to take on the specific needs of social media technologies (Mergel, 2016; Mergel and Bretschneider, 2013). Here, there are two well defined theoretical corpus that we will review throughout this section: a) theories focused on the diffusion of innovations (Coursey and Norris, 2008; Rogers, 2003), which usually generate ideal models constructed as a chronological progression and where technology expands gradually and/or linearly through networks of innovators and later, towards society and organizations. This approach has been applied in the public sector under some criticisms (Margetts et al., 2016; Bannister, 2007). On the other hand, b) theories that focus on how technology is shaped (Gil-Garcia, 2012; Fountain, 2001) and adapted by users in relation to individual, organizational or contextual decision processes, ultimately allowing to discover explanatory factors relying on this institutionalization. In this paper, we take into account both scopes to explore how social media institutionalization occurs in local governments. For this purpose, we have made a brief summary of ideas and some variables involved in the process of social media institutionalization, that we will later use in our specific study on the Dutch case.

2.1 Stages for social media institutionalization

Studies on social media institutionalization have identified some important trends in public sector organizations. First, it is well known that those process starts with some experimentation (Picazo-Vela et al., 2016). This is normally followed by some kind of definition for protocols and objectives for social media use, mainly codified by user's guides (Chen et al., 2016), although in many cases these guidelines are not formally adopted (Criado et al., 2018). Finally, this process may lead, at least in some cases, to institutional and organizational changes in public sector organizations (Mergel and Bretschneider, 2013).

Although the above is certainly a simplification, it reflects that social media institutionalization is usually considered as an evolving process, based on several categories or stages and inspired, in some extent, by diffusion of innovations theories. If we consider social media as an innovation itself (Mergel, 2016), it is compatible thinking that it should be extended and institutionalized in public administrations following incremental dynamics. Therefore, diffusion of innovations theories applies a five-ideal categorization of innovators (Rogers, 2003), that it is interesting to review as it would influence taxonomies on social media institutionalization. Thus, people and organizations can take the role of (Rogers, 2003): a) innovators, venturesome organizations that take the initial risks and face the uncertainties of creating the social media product; b) early-adopters, risky users that are able to early adopt new technologies, becoming the first judges and later leading dissemination process to critical

mass; c) early-majority and d) late majority, that correspond to a progressive critical mass adoption of innovation; and finally e) laggards, that reject innovation, in many cases because of a lack of resources to understand or implement it.

This approach has been also applied in public administration using social media technologies. Mergel and Bretschneider (2013) have tried to develop a three-stage adoption process, mainly based on the study of the process, and not on the analysis of decisional factors. One of the most interesting aspects of this model is that it has been successfully applied to social media studies considering these technologies as an innovation for the public sector. Here, one may note that many public organizations could be simultaneously in different stages, or stuck in one of them, for a long period of time (Mergel and Bretschneider, 2013): a) decentralized, informal early experimentation by social media mavericks, where few innovators start to use social media within the organization, outside its recognized technological paradigm and rules, without investment decisions and using word of mouth to spread social media among other colleagues generating first informal projects; b) coordinated chaos, when the dissemination of social media reaches such a point that it becomes an interest and concern for the organization, beginning to generate informal standards and policies and increasing awareness within top managers, but also stepping up the possibilities of sanctions and paralysis of these informal projects; and finally, the stage of c) institutionalization and consolidation of behaviors and norms, usually culminates with the widespread practice of social media in the organization, formally regulated through guidelines and protocols. This implies generating new roles played by civil servants (for example, community managers), bringing specialized training, as well as shifting the leadership of these projects to new units and departments.

2.2 Social media strategies: from push to public service delivery

Regarding the above-mentioned stages of social media institutionalization, changes in utilization are not unusual, and they should reflect to some extent a greater or lesser level of institutionalization. In other words, different social media tactics (Mergel, 2013), depends on what kind of interactions they seek: the more one advances in the interaction, the more institutionalized social media will be. Following Mergel's (2013) work, public administration can develop: a) one-way push tactics, focused on using social media for providing institutional information, ultimately boosting transparency and accountability; b) two-way pull tactics, seeking a participative use of this technologies, bearing in mind citizen engagement through consultation and deliberation; and finally, c) networking and co-design tactics, which offers a more collaborative view, where citizens proactively contribute to government activities. This classification has been recently reviewed by DePaula et al. (2018), adding a new category to this framework, worded as "symbolic presentation", which is fundamentally referred to the massive use that public administrations have of social

networking potential for self-promotion and marketing (Bonsón *et al.*, 2015). Nonetheless, this last addition to the original model will not be part of our analysis.

However, these frameworks have not taken into account a more advanced use of social media technologies, one that consists on a greater level of institutionalization: the use of social media for public service delivery. Even if it is only at a very embryonic phase (Rodríguez-Bolívar, 2015; Khan, 2013), some public administrations are using social media for making specific social transactions. In that sense, Khan (2013) stated that social media can enable operations oriented to collaboration, by enabling certain service transactions to be carried out through this new channel. Although it is not possible to describe services fully completed through social media (Khan, 2013), some actions can provide a starting point for social media public service delivery. Here, the literature offers some examples, including weather early warnings (Chatfield *et al.*, 2013), requests to solve crimes, searches for missing people or give recommendations on traffic (Williams *et al.*, 2018), warning about diseases (Tursunbayeva *et al.*, 2017), and within local government, using social media to make contests, post content with educational and co-production purposes or give warnings about current state of streets (Reddick *et al.*, 2017; Khan, 2013; Linders, 2012). Our study will approach the use of social media for public service delivery through automated natural language processing with the categorization of Twitter content.

2.3 Factors related to social media institutionalization

Finally, this category includes theories exploring factors behind technological institutionalization. In that sense, Zheng (2013) proposed five type of factors by which governments are challenged: a) social and economic factors; b) political and legal factors; c) organizational and managerial; d) management of information and e) technological factors. As pointed out by Zheng (2013), resistance to institutionalization appears in the organizational and management level, along with the economic and political dimensions. As for technological dimensions, they appear as less challenging (Zheng, 2013), since social media is usually developed by third parties and, thus, public administrations do not assume the cost of their development.

In terms of frameworks, one of the most interesting contributions has come from new institutionalism. Its capacity to understand stability and change in public administrations (DiMaggio and Powell, 1991), have turned it into a reference when it comes to observe how technology penetrates organizations. These contributions have been resumed on Fountain's (2001) theory on enacted technology, one of the most cited theories to understand technological enactment in governments and public administrations. Also, Fountain's approach has served as inspiration to the Enacting Electronic Government Success (EEGS) model (Gil-García, 2012), that have been successfully applied on social media studies (Criado *et al.*, 2017). This framework seeks to study technology success in public organizations, and it is grouped around three types of variables: a) organizational structures denotes characteristics of

the organization, such as units or departments in charge of social media, specific training on social media received by civil servants, or formal/informal project leadership, among others; b) institutional arrangements refers to all these regulations, political control or even socio-structural behaviors imposed by the organization or its members affecting the implementation, such as user's guides (formal or informal protocols), formal commitments to transparency, open government and e-administration, or a favorable administrative culture; and c) contextual and environmental factors implying a large number of external factors that affect the implementation in the organization, usually focused on the demographic, economic or political conditions involving the organizational context.

Finally, from an internal decisions point of view, there are also some key factors. Mergel (2016) has systematized some of these characteristics into two categories: a) decentralization vs. centralization, here, public administrations face the decisional challenge of centralizing their communication and activities from an unique official account/profile, or disaggregating this from various accounts/profiles between departments; and b) strategic alignment and routinization of behaviors, that involves aligning social media characteristics with the mission and vision of the organization, as well as its formal consolidation through routinized practices around the organization. In this study, we will use some of these variables to explore the level of institutionalization of social media in Dutch city councils.

3 Methods

This paper studies social media institutionalization in local governments. To do so, we focus on the Dutch case, trying to answer the following research question: *What is the level of institutionalization of social media in Dutch city councils with more than 50,000 inhabitants?* This paper uses a double analytical strategy. On the one hand, it focuses on the aggregate descriptive statistical analysis of Dutch local city councils (*"gemeente"*). On the other hand, and based on the results of these analysis, we selected a success case, Utrecht city council, studying the institutionalization of social media through SNA and automated natural language processing. By developing this strategy, we obtain two main benefits: a) first, we have a broad vision on how institutionalization has taken place in Netherlands local governments; b) at the same time, we can observe the particular institutionalization dynamics within a concrete success case.

3.1 Studying social media institutionalization level on Dutch city councils through new institutional variables

The first level of the study is based on a questionnaire about the adoption and use of social media aimed at municipalities with more than 50000 inhabitants. This questionnaire was conducted in 2017/2018 through different European countries, including Netherlands, and it was sent in English and Dutch to public managers in charge of social media profiles. In the case of Dutch city councils, this survey obtained a 40.25% of response rate (31

cases out of 77). The city councils that filled out the questionnaire were the following: Amsterdam, Alkmaar, Almelo, Amersfoort, Arnhem, Bergen op Zoom, Breda, De Fryske Marren, Delft, Eindhoven, Enschede, Gooise Meren, Groningen, Haarlem, Hardenberg, Heerenveen, Hengelo, Hoorn, Leeuwarden, Leiden, Leidschendam-Voorburg, Lelystad, Meierijstad, Purmerend, Rotterdam, s-Hertogenbosch, Sittard-Geleen, Terneuzen, Utrecht, Zoetermeer and Zwolle.

The questionnaire was based on a total of 21 questions, from which the following variables (based on EEGS model) (Gil-García, 2012) were extracted and processed using the STATA statistical software. This survey is oriented to explore the level of social media institutionalization achieved by each case, and including the following dimensions:

Main social media technologies employed (Q.5 Please indicate the social media sites on which your Organization is present and the number of active profiles), which refers to social media platforms in which local governments opened official profiles.

Departments in charge of social media (Q.7 Please could you indicate which unit/s or department/s are involved in the management of social media in your Organization?), which refers to units or departments that manage and lead social media strategy and use, with a more centralized or decentralized view (Mergel, 2016).

Social media use guides (Q.3 Please indicate whether or not a guide has been developed for using social media in your Organization), which refers to the presence or absence of documents that inform about some of the most important social media management decisions.

Mechanisms for measuring social media results (Q.4 Is there a system in place for assessing or measuring the results of using social media?), which refers to the presence of tools or strategies to evaluate how a city council is doing with social media, usually but not exclusively through quantitative metrics.

Training on social media (Q.11 Do they receive training on how to manage social media?), which refers to any kind of course or learning on social media received by public managers in charge of digital profiles.

Sense of leadership (Q.12 Do you think there is a sense of leadership in your Organization supporting the presence on social media?), which refers to the importance of having informal or formal leaders (especially top managers) leading the diffusion and progression of social media innovation.

3.2 Analyzing Utrecht city council as a success case using SNA and automated natural language processing

This comparative and quantitative approach is followed by an in-depth case study analysis. Thanks to the previously developed questionnaire, we were able to detect certain success cases in social media institutionalization which scored high in some variables such as having use guides or developing certain training strategies among public managers. One of those cases was Utrecht, being the top-rated case in those categories. For

addressing Utrecht social media institutionalization particularities, two research techniques were used: the SNA and the automated natural language processing.

Prior to the analysis, tweets were downloaded using the Twitter public API. Two different download sequences were made: the first one, between January 1, 2018 and January 31, 2018, was carried out only to obtain tweets from the Utrecht city council official account (@GemeenteUtrecht), downloading a total of 661 tweets for selected period, using a specialized application. This data was obtained for the automated natural language process. On the other hand, using the free software tool (*t-hoarder*), a longitudinal crawl was made for three months (from December 3, 2017 to February 28, 2018) using as search chains “*Gemeente Utrecht*” and “@GemeenteUtrecht” (Utrecht city council). This analysis obtained a total of 11,124 tweets, which were subsequently processed for the SNA.

This latest dataset was converted using *t-hoarder* to a .gdf file processable with Gephi, an app for the generation of SNA graphical visualizations. SNA allows us to respond to the relational nature of interactions of the City Council, and although we know networks are artificial constructs, their visual representations can be useful to study how relationships and interactions between actors are produced, what they respond to and how they occurred the way they do (Hennig *et al.*, 2012). For this study, the graph was made by filtering Twitter users on Utrecht city council’s community by degree centrality (measuring the number of input and output retweets), drawing the graph with the intention of generating a quick visualization of different network hubs of conversation (sub-communities). This strategy not only allowed us to study the interactions between actors in the network, but also to verify how an entire community was generated around Utrecht city council via conversation, allowing us to find out about its institutionalization tactics using network structure (Smith *et al.*, 2015).

Our perspective implies that network structure categorization and interpretation can be especially useful for the understanding of social media tactics, ultimately deepening into institutionalization. To put it in other words, this paper covers this interpretation based on the classification of network structures proposed by Smith *et al.* (2015), around six categories that can be directly related to different management purposes: a) polarized networks, build around two dense groups, confronted and without links between them; b) tight networks, built on the basis of small and densely connected groups with few isolates; c) brand networks, standing out for their large number of disaggregated and isolated actors; d) community networks, with usually conform many small groups of highly connected modules, working as independent sub-groups with its own leaders; e) broadcast networks, with a distinctive hub or actor that sends information that is massively shared by isolated hubs and users; and f) support networks, which is similar to broadcast networks, sharing the structure of a big hub that, in that case, replies to isolated users.

Table 1: Tactics over social media institutionalization.

Dimensions	Indicators	Some tweet samples (translated from Dutch)
Providing information	Messages that simply offer basic information or information about city council activities. Tweets about events, streaming’s, inaugurations, samples, consultations, press releases, political positions, and self-promotion, among others.	This month two new exhibitions in the town hall: Timeless timeline? by Halina Zalewska, and Libertinism? by artists from Atelier Spat. https://twitter.com/GemeenteUtrecht/statuses/948539871567560704
Citizen interaction	Response messages, direct mentions in response to other users, and references to contacting through private/direct messages.	Reply to: @renelukassen Excuse, issues around the container will be removed soon ^ HE https://twitter.com/GemeenteUtrecht/statuses/950370618079371267
Public service delivery	Messages that specify the willingness to provide to some extent a public service or collaborate with the citizen, calls for action, help requests or warnings related to municipal public services (health, waste treatment, education, libraries, weather forecast, traffic, public transport, police, public problems with power, water, vital incidents, etc.).	Red code! We have temporarily stopped garbage collection. As soon as the wind subsides, we will restart our work. https://twitter.com/GemeenteUtrecht/statuses/953927788200947712

On the other hand, automated natural language processing was carried out to detect, using content analysis of downloaded tweets, different tactics established in the use of social media by Utrecht city council. Therefore, our theoretical foundations were based on the Mergel’s (2013) categorization, but slightly modifying it to incorporate in the framework one more dimension: public service delivery. Our assumption here is the

closer to this category of public service delivery, the higher will be the maturity in social media implementation (therefore, a higher level of institutionalization). This keeps analytical categories as shown below:

Providing information (corresponds to “push” category), denotes the use that public administrations of social media as a mean to disseminating institutional information.

Citizen interaction (corresponds to “pull” category, but also “networking” dimension), implies all actions involving bidirectional interactions between actors.

Public service delivery, infers the use of social media as platforms to public service transactions, addressing they may be at an embryonic stage, underdeveloped or only have a complementary mission on the original public service delivery (which will probably be provided physically and not virtually).

Table 1 summarizes different indicators used for the automated natural language processing process, following the previously specified categories.

Regarding these specifications, tweets were translated from Dutch, and analyzed through our machine-learning tool. This application was used for automatic tweet content classification. The owners of the application collaborated in our research project and they were in charge of technical specifications, through their proprietary artificial intelligence algorithm, carrying out the automated natural language process. Working with this team, a specific dictionary was generated, and later expanded by synonymy, taking advantage of the machine-learning functionalities of the tool. Due to the great diversity of tweet contents, a small percentage of them could not be correctly classified or they had to be included in two analytical categories.

4 Results

In this section, we present preliminary results about our research. First, we show descriptive empirical statistics for the EEGS model, exploring the level of social media institutionalization for the sample of Dutch city councils. Secondly, the study focuses on the case of Utrecht, through the analysis of its social media community and its network structure on Twitter, also studying tweets content in relation to social media tactics. Regarding these two steps of our research, now we summarize the most important results.

4.1 Measuring social media institutionalization on Dutch city councils

Before reviewing variables related to social media institutionalization, we decided to focus on what kind of social media technologies were used by Dutch city councils (Figure 1 shows main social media platforms). As recent literature shows, public administrations are using third-party technologies (Mergel, 2016; Mergel and Bretschneider, 2013), including Facebook, Twitter, YouTube, etc. This implies that public organizations have not created their own social media platforms and they have opted by using others’, despite risks for privacy and loss of control. Complementary, Dutch city councils have decided to open profiles in social media based on the number of

active and/or registered users. Our 31 municipalities display accounts both in *Facebook* and *Twitter*. At the same time, they are actively using other kind of social media more focused on image and video, so far not very popular within public sector organizations. This is the case of *YouTube* (Bonsón and Bednárová, 2018), which is reported to be used by our 31 city councils. It is also interesting the case of *Instagram* a social media platform actually in operation in most of the cases (27). This platform primarily targets young people, and this may imply a greater openness of public administrations towards this socio-demographic group. Other interesting case is *LinkedIn*, in most of the cases a social media platform used to recruit public employees and promote exchanges and collaboration among them.

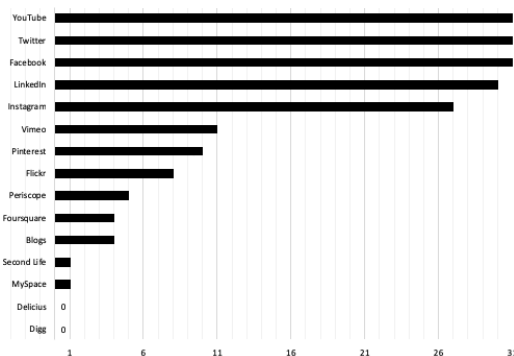


Figure 1: Main social media technologies employed by Dutch city councils (by frequency).

In relation to departments in charge of social media profiles, Figure 2 shows some main trends. In general, Dutch local governments share a high decentralized management *modus operandi* (Mergel, 2016), around a wide variety of units and departments (45.16% of cases). Even so, *communication departments* (32.26% of cases) continue to play a fundamental role managing digital profiles, which may indicate dynamics of institutional communication and symbolic information have a great weight over social media tactics (DePaula et al., 2018).

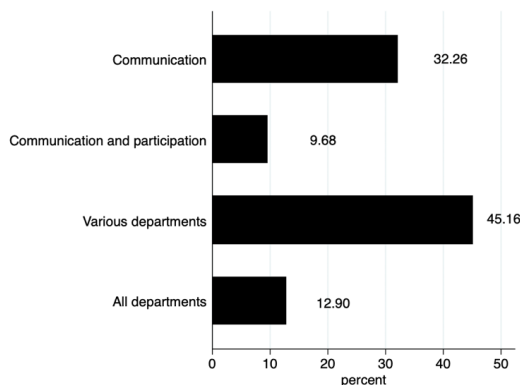


Figure 2: Departments/units in charge of social media.

Regarding the presence of documents that formalize the utilization of social media in city councils, Figure 3 shows an important orientation towards its adoption. 54.84% of our sample cases indicated they use a social media guide, which formalize their strategies and protocols for social media practices. Presence of this type of documents, being for internal use or available by citizens, shows a fundamental interest in formalizing social media use in organizations (Criado et al., 2018; Mergel and Bretschneider, 2013). On the other hand, almost 20% of the cases responded that, although they did not have a user's guide, they were working on having one soon. Nonetheless, still a significant number of cases (25.81%) noted that they had no plans to formalize these practices.

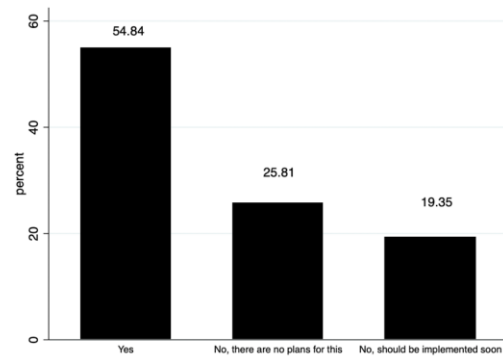


Figure 3: Presence of social media use guides.

In relation to training received on social media, Figure 4 shows unanimous results. A large majority of consulted public managers (93.55%) indicated that training was being offered in social media within their city council. This aspect is critical as it shows the inclination to institutionalization practices, regarding the importance that training has for a correct use of this type of technology. Among training activities, surveyed public managers indicated that they have received specialized training courses, both inside and outside their institution.

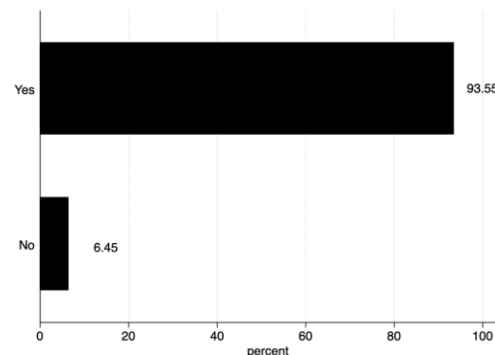


Figure 4: Presence of social media training for public managers.

Additionally, measuring and monitoring social media appeared to be fundamental (Figure 5). As can be seen, most of the surveyed local governments have institutionalized the use of mechanisms to measure results (90.32% of cases). Among these mechanisms, public managers highlighted the importance of quantitative metrics coming from apps such as *Coosto*, *Google Analytics*, *Hootsuite* and *Obi4Wan*. Also, they highlighted the importance that internal website statistics and metrics play in the day-to-day institutionalization of social media evaluation and monitoring, including those coming from *Facebook* and *Twitter*. No practices related to qualitative metrics appeared as relevant for public managers in charge of social media profiles.

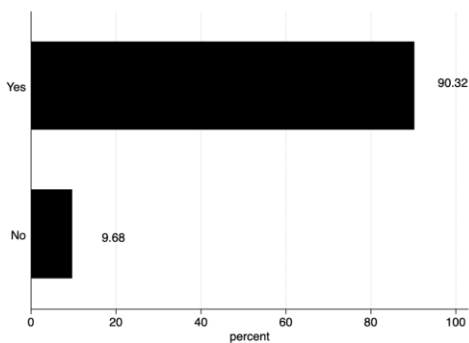


Figure 5: Presence of mechanisms for measuring social media results.

Finally, Figure 6 shows scores for a Likert scale conducted to measure the perception of leadership regarding social media institutionalization process in city councils. In general terms, public managers suggest that the existence of leading players is important (with a mean of 3.32, being 5 “maximum sense” and 1 “minimum sense”). These leadership figures are fundamental to breaking through an “organized chaos” to the formulation of an institutionalized social media policy, either this leadership comes from top managers, or it is a more spontaneous and informal reaction (especially in early phases of social media diffusion).

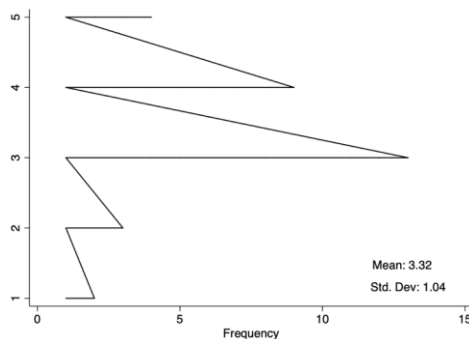


Figure 6: Sense of leadership (1 – minimum sense / 5 – maximum sense).

4.2 Gemeente Utrecht case analysis

The case of Utrecht was identified as a critical case of social media institutionalization regarding the results of our questionnaire. In addition to having use guides and actively measuring social media results, they have a large number of full-time staff managing social media profiles, with a focus towards participation and collaboration, a favorable organizational culture and a lack of adoption inhibitors, also showing a very high sense of social media development within the organization. All these motives gave the opportunity to develop an in-depth case study of social media institutionalization.

Here, we decided to study Utrecht city council as a single case, through two additional research routines. First, the analysis of the generated community around city council’s activity in *Twitter* (Figure 7) offers interesting ideas in accordance with the high level of institutionalization. On the one hand, regarding network structure, and following Smith et al. (2015), this case is among some short of mixed network structure. In brief, its network structure resembles tight networks ideal type, made up of different hubs with different sizes, but widely connected to each other (in this case, through the retweet mechanism). On the other hand, also it has similarities with the community ideal type, since it is made up of different sub-communities, with intra-groups high interactions (both using retweets and replies). Finally, it should be noted that in response to the massively high number of replies posted by Utrecht official profile, network structure could also be close to that of supportive networks. All this shows us that Utrecht is weaving a community whose main strategy could be the promotion of participation and collaboration.

Regarding the actors and their interactions through the community, we can highlight some extra conclusions. First, the preeminence of Utrecht official account (@GemeenteUtrecht) is worth noting, both with regard to its number of input retweets (as shown by the graph), as well as in the number of replies to users, which turns Utrecht account into a “speaker”, in terms of tweet diffusion, but also into an account that is constantly seeking for participation. Surrounding this governmental hub, a large myriad of actors is constantly sharing information posted by Utrecht official account, and in many occasions, from other users. Among these small hubs, there are no additional accounts from other departments or Utrecht units, which indicates that they have conformed their own communities outside the close network of the main official account. As remarkable user groups we have politicians, such as René Dercksen (@ReneDercksen, NL Party for Freedom), accounts of academic institutions (@uniutrecht, University of Utrecht), as well as accounts of activists, associations and citizens. With the exception of Utrecht’s official profile, no actor has a relevant degree centrality in terms of “in” and “out” retweets.

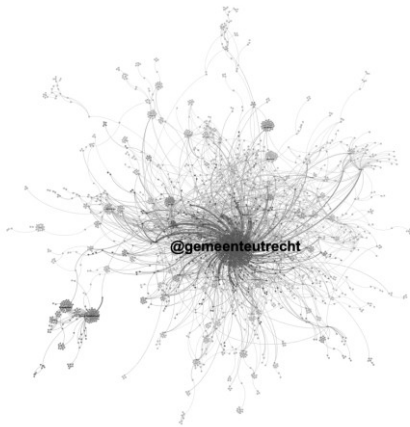


Figure 7: Graph of Utrecht’s city council community on Twitter.

Second, some features already detected by the SNA are commonly shared in relation to tweets’ contents. First, as shown in Table 2, a large number of tweets were classified into the citizen interaction (74.13%) category, which is obviously linked to the number of replies posted from Utrecht city council official account. Therefore, it seems evident that the municipality has developed a clear participatory and collaborative strategy, and that one of its main tactics is a constant response to community members. Being said that, one of the most frequent type of tweets were focused on customer attention, which usually followed next sequence: Utrecht official account shows an initial interest in citizen’s problem or complain (@AstridvanHelden *Where is this? Then I can transmit it to our Surveillance and Maintenance Department. You can also call us via 14030.* ^ SA <http://twitter.com/GemeenteUtrecht/statuses/955400677576110085>), and when they gather relevant information, they provide it to the citizen, usually redirecting him to the appropriate way (@Statsie_Waor @ GroenLinks030 @lotvanhooijdonk *On this website you have more information on the implementation of paid parking:* <https://t.co/IUrNXQb4jG> ^ HE <http://twitter.com/GemeenteUtrecht/statuses/955368974841188352>). Providing information (23%) tactics also stands out, which seems to reflect that, even in a municipality with a clear orientation towards participatory use of social media, posting institutional information is still relevant especially for events and marketing purposes (DePaula et al., 2018).

Finally, public service delivery appears as the least relevant category within this city council (3.33% of cases). This behavior was expected based on previous research. In fact, the cases in which our artificial intelligence algorithm detected public service delivery were especially related to alerts and warnings about garbage collection, maintenance activities (@AstridvanHelden *I have contacted maintenance. Please send us your private telephone number and contact address in a private message, to go to the Neighborhood Monitoring and Maintenance contact person.* ^ ME

<http://twitter.com/GemeenteUtrecht/statuses/951056223004225536>), collection of specific or seasoned materials, for example Christmas trees (*This month we pick up your Christmas tree on collection days. You can take your tree to our collection point >>* <https://t.co/xBsMD0dfYH> <https://t.co/I8KZ5YbR5Z> <http://twitter.com/GemeenteUtrecht/statuses/948086786722615297>) or alerts about weather conditions in relation to city activities (@Brwjeroenb @GroundhopperPat *Because of the snow Competition 12 has been suspended, there is now a night competition. In these cases, we always consider whether an extra measure is necessary. Consulting with the clubs and the police we have opted for a combi bus with departure point Woerden* <http://twitter.com/GemeenteUtrecht/statuses/951511289557331969>), among others. As one may think, some of these tweets were also classified as participatory due to its response nature.

Table 2: Automated natural language processing results for Utrecht Twitter profile.

	Percent (with N)
Providing information	23% (152)
Citizen interaction	74.13 % (490)
Public service delivery	3.33% (22)
Total categorized	599 tweets
Total extracted	661 tweets

5 Debate and conclusions

This study has explored social media institutionalization in Dutch city councils with more than 50,000 inhabitants. For this purpose, we have followed a double strategy. On the one hand, and through variables stemming from new institutionalist theories, this paper has studied the level of social media institutionalization for a sample of municipalities that responded to an international questionnaire. On the other hand, and based on previous results, the case of Utrecht has been selected and analyzed using two additional techniques: Social Network Analysis (SNA), and natural language processing, a technique coming from artificial intelligence allowing tweet contents to be automatically analyzed. This section summarizes the contributions and findings of this research and discusses its implications for further research of social media in government.

On the one hand, results derive from an unpublished and original questionnaire about social media institutionalization in the public sector. Second, the focus on an interesting case, regarding social media institutionalization had not yet been explored in academic research related to local governments. In addition, this paper benefits from latest developments in artificial intelligence and machine-learning techniques to fulfill

an exploratory analysis, combining it with a more qualitative point of view.

On the other hand, institutionalization of social media among Dutch city councils has reached high levels of development. A majority of city councils has opened profiles in a wide range of social media platforms, mainly Facebook and Twitter, but also YouTube and Instagram. Besides, most city councils have elaborated official documents for standardizing social media uses (or they are in the process of acquiring them). In addition, this group of city councils have provided specialized training in social media to their public employees and have been constantly measuring results. On the other hand, the case study of Utrecht city council has shown an approach strongly focused on participatory practices. Based on all these ideas, it is time to highlight and discuss the following findings.

First, this study has confirmed the openness to non-generalist social media platforms of Dutch city councils. Although social media practices continue in hands of third-part companies (Mergel and Bretschneider, 2013), public administrations seem to exert some kind of evolution, from generalist, to social media centered on specific characteristics. This phenomenon is especially important regarding platforms for uploading images and video (Bonsón and Bednárová, 2018), mainly Instagram and YouTube. This reflects an orientation towards different formats, less fear of public organizations about the characteristics of these emerging platforms (Chen et al., 2016; Stamati et al., 2015), and a greater orientation towards specific citizens' target groups.

Secondly, this study has also shown the preference for decentralized management of social media technologies. Most of our studied city councils showed that social media management was completely decentralized. At first sight, it seems that municipalities displayed a specific profile for different services, thus assuming additional risks (Mergel, 2016), despite the problems associated with decentralization (mainly, a lack of coordination) (Mergel, 2016).

In addition, this work has highlighted the lack of measurement of social media results based on qualitative metrics. Although a large number of municipalities showed an advanced use of tools for actively measuring results, all these mechanisms seem to be focused towards quantitative metrics. However, it is increasingly important to know more about the qualitative dimension of interactions and content posted, especially regarding the effects that they have on management and on citizens usage (Medaglia and Zheng, 2017; Zavattaro et al., 2015).

Our fourth finding implies an orientation towards participatory practices, but still far from public service delivery implementation. Our in-depth analysis of Utrecht's case study has showed that, as an organization that experience an advanced level of institutionalization of social media technologies, it has adopted highly participatory practices through constantly replying and encouraging participation of community members, which is somehow consistent with recent research (Reddick et al., 2017). Our artificial intelligence algorithm detected, although in smaller numbers, an embryonic approach to public service delivery through warnings and calls for action coming from the

city council's generated content (Williams et al., 2018; Khan, 2013).

This study has also limitations and areas to develop in future studies. On the one hand, the results of the study express the need to building a dependent variable to capture institutionalization dynamics, carrying out analytical models to advance towards empirical explanatory research perspectives. This will inevitably extend variables related to institutionalization processes. On the other hand, the analytical framework that has served as support for our automated natural language processing should be adjusted in future revisions, trying to refine the analytical categories to make them self-explanatory. This evolution of our model will facilitate greater accuracy among the categories of the analysis (provision of information, citizen interaction and public service delivery). Finally, attention to comparative studies among countries will foster the generalization of results.

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