From e-government to Social Network Government: Towards a Transition Model

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ABSTRACT

This research explores how federal agencies interact with their audiences via Facebook, their most popular social media channel, by analyzing the comments posted by agencies and how users respond to the initial threads. This study seeks to determine whether the additional communication channels that Facebook offers within formal accounts facilitate conversation among individuals in the form of *ad hoc* social groups, contributing to higher levels of participation. This inquiry is based on prior research that established that three conditions influence stocks of social capital in networks – horizontality of network, network density and the number of messages interchanged between networks' members. To test this tri-partite relationship, 4,280 threads initiated by federal agencies were analyzed. Results show that (1) horizontality of network impacts positively participation and it is also associated with higher numbers of users; (2) threads that invite users to participate generate fewer comments than informative messages, which suggest that in Web 2.0-based environments the opinions posted by users are more important than the messages broadcasted by organizations; and (3) when there is a higher number of threads initiated by federal agencies it negatively affects the number of comments posted by users.

Categories and Subject Descriptors

H.1.1 [**Information Systems**]: Models and Principles

General Terms

Documentation, Theory, Verification.

Keywords

Civic Participation, e-Government, Social Media, Online Deliberation,

1. INTRODUCTION

Information and communication technologies (ICT) have opened new opportunities for governments to implement services in a revolutionary way, boosting citizen access to public information [53], improving responsiveness to citizens [32], and generating, among other things, higher levels of decentralization and transparency [35], greater public confidence in government [51], and accountability [55]. In their attempts to define electronic government, scholars have conceptualized the term "e-Government" as the implementation of front-office and back-office operations that are carried out digitally by government [40]. An essential function of e-government is the access and exchange of information, where citizens can interact with the government in a variety of ways such as email, online meetings, forums for voicing opinion and online voting [32]. In this respect, e-Government can affect access to and exchange of political information, communication about political issues, and communication with government officials and elected representatives [17]. Scholars have traditionally studied the nature and direction of the relationship between government and citizens by assessing how far citizens are engaged through e-government initiatives using three contrasting models [6].

The "informative model" of e-Government is based on a one-way relationship in which government produces and delivers information for use by citizens, adopting ICT to implement systems that deliver information more efficiently [26]. This managerial model of information has been associated with the "representative model" of democracy since authorities believe that citizens mostly need better sources of information in order they can determine who represents their interests best [31]. The informative model is also consistent with the first stage of the classic maturity model of e-government developed by Layne and Lee [23], which encompasses the initial efforts of governments to establish an online presence and inform the audiences about their activities.

In contrast, the consultative model of e-Government is a two-way relationship in which ICT enable governments to ascertain citizens' opinions and consider their input as suggestions for better governance [4]. According to this model, governments define issues for consultation, pose questions and manage the overall process, while citizens are only invited to contribute their views and opinions. By facilitating interaction with citizens, governments can seek out voters on particular issues to guide policy-making [5]. Finally, in the "participative model of e-government", citizens actively engage in defining the process and content of policy-making, focusing on the development of stable grass-roots policies [3,26]. This third model considers ICT as a facilitator for public deliberation, and following theories of direct democracy, suggests that citizens must be directly involved in policy debates, expanding public consultations and widening opportunities for deliberation through online issue-related discussion forums.

Previous studies of e-Government, however, have mostly focused on the technical features and civic consequences of the human-medium interaction between citizens and governmental services, and have not considered the "social" characteristic of the Internet, that by definition is a network through which people and

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organizations can interact and communicate with one another [20]. This conception of computer-mediated social network [51], is especially relevant today, given the emerging platforms that rely heavily on web 2.0 applications, a term used to describe services that facilitate interactive information-sharing, interoperability, user-generated content, user-centered design and collaboration. This study aims to explore how federal agencies are using the most popular social media channel, Facebook, to engage citizens in participatory discussions by analyzing how users respond to their threads, and whether the additional communication channels, offered by Facebook within its formal accounts, facilitate conversation among individuals in the form of *ad hoc* social groups, which in turn contributes to higher levels of participation.

2. RELATED WORK

2.1 Towards a social network model of e-government

It has traditionally been argued that the Internet could affect democratic practices if government would promote among citizens more horizontal communication channels and augment among them interactivity in vertical communication channels [15,25]. However, effective multi-way political communication in democratic systems has proven difficult to achieve. With the advent of Web 2.0-based applications for first time organizations have facilitated the access to their content via comments posted by the same audiences. In a political context, this may facilitate effective communication in two different ways. On social networking sites such as Facebook, or video-sharing portals such as YouTube, government agencies have made public comments generated by users under their own communication channels. This means that although the communication process still has a vertical direction –in this case between federal agencies and users– Web 2.0-based applications allow horizontal communication, enabling users to integrate their own social media contacts (friends, viewers, followers or fans) through their system profiles, which facilitates interaction between users in multiple ways. If, for example, a user posts a comment, the message becomes public not only to all the news media contacts, but also to the users' network, forming more "open" communities -since everyone can participate in the discussion- and, moreover, especially to bounded contacts -personal friends who are notified about a comment.

The use of these applications by federal agencies has grown remarkably in the United States. The State Department, for instance, implemented a social network site that facilitates discussions about cultural exchange programs in the online virtual community known as Second Life; its "embassy" is designed to inform, influence, and engage the world. The Federal Emergency Management Agency now allows its YouTube subscribers to learn about its operations in communities across America and comment on its disaster response, and the Army's website even includes a virtual recruiter, confirming the increasing tendency of government agencies to rely on networked technologies to communicate and engage with the public [34].

2.2 Social media and weak ties as a platform for civic participation

The link between the number and composition of people's social networks and political participation has already been widely recognized, along with the observation that political activity is rooted in social structure [48]. Research demonstrates that individual-level variables are insufficient to explain fully civic and political participation, while also important catalysts for civic action are interactions within and across different types of community settings [43]. Of particular importance is the finding that the strength of ties strongly influences civic participation. Social capital scholars argue that bridging ties, namely networks of weak contacts, are especially valuable for information dissemination and political mobilization [37,51], facilitating the exchange of information between distinct groups, and help expedite the flow of ideas among groups [21]. These weak contacts interact as a base of information and resources that citizens do not find in their immediate environment of relatives and close friends. Scholars have emphasized that in a situation where computer networking facilitates knowledge sharing, weak ties may be more important for collective action than strong ties. Others explain that opportunities for participation are usually structured around groups, therefore individuals with more diverse networks have a higher likelihood of being recruited to participate in civic organizations [14]. Consequently, although bonding capital or strong ties may help individuals form and maintain the connections that keep community groups viable, weak tie networks are more appropriate to connect members in communities and engage them in both civic and political affairs.

In the last five years researchers have found a strong relationship between use of Web 2.0-based applications and the formation of weak ties, which according to Putnam and other theorists serve as the foundation of bridging social capital [7,47]. Scholars have argued that bridging social capital is augmented through the use of Social Network Sites (SNSs) because these applications allow users to create and maintain larger, diffuse networks of relationships from which they could potentially draw resources. In fact, there is evidence that participation in SNSs provides a new setting for tie formation and maintenance, contributing to larger and more diverse social networks [45]. Others have studied the social and technical affordances of Facebook [8], and argued that the rich collection of social context cues, such as mutual friends or shared interests, support the conversion of latent ties to weak ties, which enables flows from person-to-person and from tie-to-tie, enabling a higher access to social capital (bridging function). Research shows that tools such as friend lists, wall posting, messaging, and tagging help SNS' users to maintain distant relationships and weak ties, since they facilitate social surveillance (through aggregated streams of social news) and provide social and technical support for social interaction [16]. These findings show that there are unique affordances in these SNSs related to social capital that are not an artifact of general Internet activity [11].

2.3 Size matters: Social Capital and Social Network Sites

Research has consistently found a positive relationship between the size of the network in which individuals participate and political knowledge [30]. Previous studies explain that as network size increases, the probability of a user's interaction with sources of new information grows, since they are also more likely to encounter a higher number of politically active individuals [41]. Other studies have noted that larger networks tend to introduce more mobilizing information for participants, such as details on an upcoming neighborhood meeting or an online protest against a multinational company that violates labor rights [14]. Similarly, researchers have argued that larger networks are more likely to stimulate discussion since people have more possibilities to find individuals with whom they share interests and feel comfortable

interacting [30,41]. Recent research has confirmed this positive relationship between network size and civic and political engagement [3,14,41].

Similarly, Putnam explains that civic life is easier in communities with a substantial stock of networks since communication between their members promotes norms of reciprocity and encourages the emergence of social trust [37]. These networks allow better coordination and communication between members, and thus it is also more likely they will be able to resolve dilemmas of collective action. Social capital scholars explain that networks, norms and trust are essential parts of the theory of social capital. Trust enhances cooperation, and the higher the level of trust, the greater the likelihood of cooperation among these people. Based on these ideas, Putnam claims that there are three main characteristics able to influence the stock of social capital in networks: first, more horizontal networks add to social capital; second, the denseness of networks of social interactions (in terms of number of participants); and third, volume of interaction (in terms of amount of information interchanged). Consequently, we expect that more informal communication channels in Facebook government agency-managed accounts will serve as catalysts for extensive conversations with individuals in the form of *ad hoc* social groups, which, in turn, will foster social capital in communities, and contribute to community-building and increased levels of participation. Furthermore, this study hypothesizes that the three conditions established by Putnam [37] as able to influence the stock of social capital in networks, will moderate this positive relationship: horizontality within the network, its density, and the number of messages interchanged between networks' members. Based on these ideas, two hypotheses are proposed:

H1a: The higher the number of fans participating in federal agencies' Facebook accounts, the higher the number of comments received on threads initiated by the agency.

H1b: The higher the number of horizontal messages posted by fans, the higher the number of comments received on threads initiated by the agency.

2.4 Vertical information as a predictor of participation

Traditionally, research on political communication has argued that the cost and accessibility of political information are related to citizens' level of engagement with political affairs [8], as Bimber [2] claims "the lower the cost and higher the accessibility of political information, the higher should be the aggregate level of citizen engagement" (p.45). The positive impact on participation projected by this cost perspective also resonates with cognitive models of participation in organizational settings, which consider flow and use of information as the main element to enhance participants' engagement [27]. On the other hand, research has demonstrated how the Internet has dramatically reduced costs of information acquisition and communication, and how these changes impact participatory behaviors. Scholars have found positive relationships between lower costs and variety of online information available and political engagement [55]. In a study of politically interested Internet users during the 1996 elections, [18] found Internet use substantially related to political engagement. Other studies also concluded that exposure and attention to online political information is positively related to campaign knowledge and interest [9]. Moreover, social media further lowers the behavioral costs of finding, storing, and communicating specific and personally relevant political information at convenient, timely intervals. This is because it enables new interactive and flexible applications that allow users to access information on demand, and delve more deeply into issues of perceived importance [42]. Consequently, according to this instrumental perspective it may be expected:

H2a: A positive relationship exists between the number of threads initiated by federal agencies and the number of comments posted by users.

H2b: A positive relationship exists between the number of threads initiated by federal agencies and the increase in the number of "likers" in their Facebook accounts.

2.5 Civic Participation and the traditional two-way communication model

Research has suggested that the rhetorical form in which participants in online communities frame their contributions influences the response of others in the community. Rafaeli and Sudweeks for instance [13], found that questions and personal histories emphasizing legitimacy are often included in initial posts by newcomers seeking to interact with online support groups. Likewise, other studies have found that higher levels of interactivity in online communities, especially when users ask for information from other participants, increase the engagement of users, whereas in communities featuring comments that relate back to earlier messages in discussions elicit greater intent to participate in users than communities featuring non-interactive messages [39, 53]. In organizational contexts, it has been argued that participation leads to greater attainment of high-order needs, such as self-expression, respect, independence, and equality, which in turn increase morale and satisfaction. Research has found that when organizational members are asked to participate, they feel higher motivation towards and greater identification with the organization, increasing their productivity [27]. Similar results have been found in terms of the Internet and federal agencies. Stanley and Weare [44] examined how employees' participation is affected after been solicited to make comments through a website, and they found that when users were asked to give their opinions online, the breadth of voices in the agency's strategic planning process was expanded, mobilizing politically inactive individuals to participate. Additionally, according to promoters of participative and consultative models of e-government, ICT such as Web-based surveys, e-consultation and deliberative polling can stimulate public participation. Consequently, we expect that:

H3a: Posts from government agencies that explicitly ask for opinions will receive a higher number of comments by users than other types of messages.

H3b: Government agencies that post participative and consultative oriented messages will increase their number of fans.

3. METHODS

3.1 Sample

To address these hypotheses, we first determined how many agencies had Facebook accounts and the number of users who participated in these accounts, and then we conducted a content analysis to study how they were interacting with their contacts in this social media. In a first stage a list detailing the Facebook accounts managed by the 580 federal agencies listed in the Index of U.S. Government Departments and Agencies was developed. The population figure was taken from the list of government

agencies and departments developed by the U.S. Government Website (www.gov.com). Additionally, the number of fans (users who "like" the organization) was recorded. Data collected on February 1st 2010 showed that 82 federal agencies had Facebook accounts. On February 1st 2011, one year after we developed the list of agencies with Facebook accounts, the number of users who "like" the federal agencies was again recorded. Subsequently, an isolated period of messages was identified for analysis. We decided to analyze messages posted during the last six months of the selected period, from August 1st 2010 to January 31st 2011. This particular timeframe was selected because, on the one hand, it represents half of the period selected, and, on the other hand, it is difficult to retrieve messages older than six months from organizations. A sample of 8 messages per month was utilized for the analysis in order to represent the period, which gave a total of 48 messages per agency during the six months. Since some agencies always post "the photo of the day" as their first message, we decided to download one post per each four days in a progressive sequence to minimize bias. In this way, we would select the first post of the first day of the month, then the second one of the fourth day, then the third of the eighth day, and so forth, until the 28th day of each month. If the agency didn't post a message on the selected day, we would go to the next closest day (the 3rd or the 5th).

After checking the number of messages posted and users who liked each agency, we decided to omit from analysis those agencies that had fewer than 30 messages per month and fewer than 1,000 users who liked them, because substantial conclusions cannot be drawn from analyzing just a few messages and/or comments posted by only a few users. In total, an analysis of 48 Facebook agency-managed accounts was performed. To ensure intercoder reliability and to test the consistency of the categorization scheme, two coders were trained to analyze the data and they independently categorized messages of each federal agency. A third coder (one of the authors) was used to resolve discrepancies.

3.2 Facebook as a civic participation channel

This channel was selected because it is a platform that allows users to interact with organizations through two different modalities: in the organizational wall users can comment on messages posted by the federal agency (we call this modality **vertical communication**), and in a secondary wall users can initiate their own threads posting messages and interact freely with other "likers" of the organization, without a vertical intervention. We call this latter modality **horizontal communication**. We believe that allowing users to post individual messages on the walls managed by the agencies, they are creating a sort of virtual community with its fans in their Facebook accounts, where users not only have the opportunity to interact directly with the organization, but also between them. As was discussed in the literature review, this feature is expected to play a central role in affecting the level of participation of users, since it represents a horizontal channel.

3.3 Defining Citizen Participation

Civic participation refers to individuals' active engagement in their communities. Some definitions emphasize the collective action that the participation involves, and restrict the term to actions taken collectively to influence or improve society [1]. Similarly, the term has also been used to include any type of participation in voluntary service to one's local community, either by an individual acting independently or as a participant in a group [56]. Some scholars also have limited the term's meaning to activities that are not only collective but are specifically political (for example, related to voting), while others include aspects of cultural participation, such as arts or communal storytelling [1].

This paper, however, follows [56] by conceptualizing the term as an "organized voluntary activity focused on problem-solving and helping others." It includes "a wide range of work undertaken alone, or in concert with others, to effect change" [56, p. 7]. This definition also was used by others [47], and for the purposes of this study, a most important element of participation was "public-voice" involvement, or activities through which "citizens give expression to their views on public issues" [56, p. 54].

3.4 Dependent variables

Difference in the number of "likers" (users who "like" the organization). This variable measures the difference in the number of users who "like" the organizations between the two periods.

Number of comments posted by users. This variable measures whether users respond to the threads initiated by the agencies, and it was calculated dividing the total of messages posted in 48 threads by the number of likers that the agencies had in 2011.

3.5 Independent variables

Types of messages. Based on the models of e-government, this variable (Kappa= 0.82) was operationalized by assessing the presence of the three main concepts upon which we previously elaborated:

One way messages. Posts in this category are considered one-way communication that either informed or promoted activities related or unrelated to the agency. Examples of one-way messages include stories from members of the organization that promote or inform users about activities related to the agency.

Two-way messages. Solicit user response and opinions about activities related and not related to the agency. More specifically, this category pertained to messages that, in question form, request feedback from users or to assess some of the resources/services/activities offered by the organization, as the consultative model of e-government proposes.

Participative Messages. Posts grouped in this category invite online discussion in the form of chats or video-chats. We differentiated these posts from regular two-way messages because online discussions give citizens opportunities to engage in and contribute opinions to decision-making processes, closer to the active-participation model of e-government.

Vertical Communication. This variable considers the sample of 48 messages posted by the organization in the six-month period.

Horizontal Communication. This variable considers the total number of messages posted by users on the wall of the organization in a random ten-day period during the last 10 weeks of the year (from October 17th to December 30th). We decided to analyze one day per week in a progressive sequence in order to avoid any type of bias. In this way, we would select Monday of the first week, then Tuesday of the second week, then Wednesday of the third week, and so forth, until the 30th of December, which included the last week of 2010. Although obviously not a truly random sample, this method was chosen for practical reasons in that it balanced ease of sampling with a reduction in systematic bias.

3.6 Control variables

Research has documented that the topic of debate has an important effect on deliberative outcomes. Highly sensitive issues such as discussions centered on the Iraq war or gay marriage generally provoke more discussion between participants. Similarly, previous studies have demonstrated that more meaningful threads for community of users have a strong impact on conversations. As well as, there is an effect on participation when posts are supported by audiovisual material. Consequently we control for these variables.

Community oriented messages. (Kappa= 0.72) This item measures whether the message is oriented to the community of Facebook users. A sample message in this category could be: "Hey folks… we welcome your continue [*sic*]comments on DADT but please keep them clean and keep the debate and personal attacks off your wall" (from the U.S. Army Facebook account).

*Polemic/debate oriented. (*Kappa= 0.74) This category includes messages that are polemic or more debate oriented, trying to encourage a discussion thread and engage users in political conversations. This class of messages presents thoughts (mostly in the form of quotes) capable of initiating debate between the site members about social issues. Examples of these messages are: "I Stand [*sic*] by what I said: Allowing homosexuals to serve openly is the right thing to do. Comes down to integrity" (by Administer Mike Mullen of the Joint Chiefs' Facebook account).

Messages including photos and videos. Posts whose main focus was a video or a photo were also distinguished as a dichotomous variable in order to control for these two aspects.

Size of the Agency. Since organizations with higher numbers of employees are expected to concentrate higher number of "likers" and comments, our research also controlled by workforce.

Federal Agency Sector. Five sectors were established to differentiate among federal agencies: science/environment, administration/government, defense/military, educational/cultural and others. Included within the military sector were government agencies such as the U.S. Air Force, U.S. Navy, and the Department of Defense. The administration/government sector included agencies such as the White House and the Department of Justice. Included within the educational/cultural sector were agencies such as the Department of Education and Smithsonian Institution. For the science/environment sector, agencies such as the National Aeronautics and Space Administration, the National Weather Service and Department of Energy were considered. The "others" sector included statistics-oriented agencies such as the Census Bureau and health-related ones such as the Food Safety and Inspection Service.

3.4 Data Analyses

Hierarchical multivariate ordinary least squares (OLS) regression models were employed to explore the relationship between types of messages, number of comments, and horizontality. The models were controlled by variables recognized as significant predictors by previous research, and they were divided in three blocks: first, structural variables related to the agencies, such as number of employees (workforce) and number of fans; the second considers two factors that may affect Facebook users' reaction to the original posts: messages with photos and/or videos, and the types of message. The third block includes the number of messages exchanged between the networks' members, and the number of threads posted by the agency. Regression analyses were performed to assess the contribution of each variable and block of predictors. To test our hypotheses and determine whether the number of comments posted by users to the initial threads and the difference in the number of "likers" in the year-earlier period are affected by our predictors, both variables were entered in the models as dependent variables.

4. RESULTS

4.1 Descriptive Statistics and Bivariate Analysis

Overall, 2,152 threads from 48 federal agencies were analyzed. Not surprisingly, the data confirms the high preference for one-way communication messages, as the managerial model of e-government predicts. As detailed in Table 1, 89.8 % of the posts were one-way messages, followed by 8.9% two-way messages; and only about 1% of participative dialogues or invitations had online conversations. To illustrate the results and see possible differences between agencies, Table 1 also shows per sector the types of messages posted by the agencies.

Sector	One Way	Two ways	Chat
Administration	88%	6.8%	5.1%
Cultural/Education	89.1%	9.1%	13.1%
Defense/Military	86.4%	13.1%	.5%
Science/Environment	92.2%	7.1%	.7%
Other	96.7%	2.7%	.6%
Total	**89.8%**	**8.9%**	**1.2%**

Table 1. Types and direction of communication in messages posted by agencies differentiated by sector. *Note:* Presented as percentage of total messages (N=2,152)

These findings converge with previous studies of politics on the Internet, which have shown that political parties, states' gubernatorial candidates and federal agencies utilize their websites primarily as an instrument to flow information downward [19], to promote particular views [46] or as managerial tools to improve quality of service, reduce costs and downsize workforces, but not as channels for collecting feedback from citizens [28].

Agency	Likers 2010	Likers 2011	Difference	Growing Percent.
Marine Corps	7,068	1,183,193	1,176,845	16,650
National Guard	6,827	712,064	705,237	10,330
NOAA	4,044	42,366	38,322	948
Bureau Census	9,785	101,469	91,684	937
NASA	33,280	326,317	293,037	881
Air Force	33,937	328,564	294,627	868
Agency Inter. Development	1,750	15,651	13,901	794
TRICARE	1,911	12,503	10,592	554
Veteran Affairs	17,050	95,765	78,715	462
Dep. Transportation	1,138	5,870	4,732	416
Total Agencies	**1,111,395**	**5,431,331**	**4,319,936**	**389**

Table 2. Agencies with the highest percentage of increase in the number of fans from January 2010 to January 2011.

Regarding the number of users that are interacting with these 48 agencies through Facebook, in January 2010 there were 1,111,395 of "likers," increasing to 5,431,331 after one year. Regarding growth, federal agencies had 308.9% more fans than they did in

the year-earlier period, going from 24,921 in 2010, to 105,077 in 2011.

Concerning the differences in the number of fans, it is also interesting to consider those agencies that experienced the highest increase, as shown in Table 2. It presents the top ten agencies, led by the Marine Corps that in a year increased from 7,068 likers to 1,183,913. The White House and the Army did not experience a high growth in the number of likers from 2010 to 2011 (only 93% and 105% respectively), but both have a large pre-existing base number of participants (respectively 915,971 and 632,281 Facebook subscribers participate).

4.2 Multivariate Analysis

After testing all independent variables for heteroskedasticity, some were log transformed to correct for non-normal distribution. The log of workforce, number and growing percentage of fans, vertical and horizontal posts were used because none of these variables were normally distributed. Table 3 shows three different models representing the relationship between types of messages used in threads by federal agencies and how users respond to these initial posts, controlling for the effects that photos and videos have on users, and also if the messages were debated and/or community oriented. The total variance in the number of comments explained by the regression model was 33.5 %.

	Model 1	Model 2	Model 3
	Comments	Comments	Comments
Fans 2011	.637***	.62***	.38***
	(.009)	(.008)	(.004)
Workforce	-.02	.01	.01
	(.22)	(.13)	(.2)
R^2 change (%)	20.2		
Type of Posts		3.95	1.74
(1= two-ways or chat)		(2.89)	(1.05)
Main story a photo		4.89	6.44
(1= Yes)		(7.63)	(6.87)
Main story a video		11.24	8.6
(1= Yes)		(7.54)	(6.83)
Community posts		.27***	.28***
(1= Yes)		(.012)	(.011)
Debate oriented posts		1.38***	.129***
(1= Yes)		(.042)	(.041)
R^2 change (%)		2.3	
Number of Threads			-.031*
			(.014)
Horizontal Posts			.026***
			(.001)
R^2 change (%)			11
Constant	-3.02	-11.06	-.99
Adjusted R^2	20.2	22.5	33.5

Table 3 OLS Regression Predicting Number of Vertical Comments Posted by Users. *Notes: b*=unstandardized regression coefficients with standard error in parentheses are presented. R^2 change refers to the contribution of each block of variables. *$p \leq$ .05, **$p \leq$ .01, ***$p \leq$ .001.

As expected, the block of structural oriented variables had a larger explanatory power than the combined balance of the variables (20.2 % vs. 13.3 %), which might be related to the fact that the size of the organization and the number of fans were the most significant predictors for the number of comments. Indeed, results show that the number of likers participating in Facebook was positively associated with the number of comments received on threads initiated by the agency (β = .637, p < .001), as predicted by H1a, even after controlling for workforce and dividing the total of messages posted in the 48 threads by the number of likers that the agencies had in 2011.We also hypothesized in H1b that the number of horizontal messages posted by fans would have a positive effect on the number of comments received on threads initiated by the agency. Results confirmed this relationship (β = .26, p < .001), showing that the higher the number messages interchanged between fans, the higher is the number of comments received on threads initiated by the agency. Regarding the effect that messages posted by agencies has on participation, contrary to what was predicted in H2a the number of threads was negatively related to the number of comments posted by users (β = -.031, p < .05), which means that agencies that initiate more threads receive significantly less posts on average from their fans. In terms of the relationship between the number of threads initiated by agencies and the increase of users who like these accounts, we did not find a significant relationship as predicted by H2b (Table 4).

	Percentage of Growing
Type of Posts	-71.84***
(1= two-ways or chat)	(17.8)
Main story a photo	25.7
(1= Yes)	(15.2)
Main story a video	9.4
(1= Yes)	(15.5)
Community posts	-42.85
(1= Yes)	(32.5)
Debate oriented posts	-.036
(1= Yes)	(.03)
Number of Threads	-.004
	(.021)
Constant	347.49
Adjusted R^2	5.4

Table 4 OLS Regression Predicting Percentage of Growing in Agencies Facebook's accounts. *Notes: b*=unstandardized regression coefficients with standard error in parentheses are presented. *$p \leq$ .05, **$p \leq$ .01, ***$p \leq$ .001.

Table 3 shows three different models representing the relationship between types of messages used in threads by federal agencies and how users respond to these initial posts, controlling for the effects that photos and videos have on users, and also if the messages were debated and/or community oriented. The total variance in the number of comments explained by the regression model was 33.5 %. H3a predicted that posts which explicitly ask for opinions or invite users to have a chat/video conference conversation would receive a higher number of comments by users than other types of messages. Nevertheless, no significant relationship between these variables was found. However, debate-oriented messages posted by the agencies (β =1.38, p < .001) and community-oriented messages (β = .27, p < .001) were positively associated with users' participation, but had much weaker explanatory power than the other two blocks of predictors (only 2.3%).

Regarding the growing percentage of fans, Table 4 shows that, as predicted in H3b, the type of messages employed by federal agencies to communicate with their fans had a significant effect.

Contrary to expectations, however, two-way messages and posts inviting users to have an online conversation were negatively associated with the growing percentage of fans (β =-71.8, $p < .001$), although it is necessary to clarify that the variables selected were only able to explain a small percentage of the variance (5.4%).

5. DISCUSSION

The purpose of this research was twofold. First, it aimed to examine how federal agencies interact with their audiences in Facebook by analyzing the types of comments posted by agencies and how users responded to these initial threads. Second, we wanted to test whether the additional communication channels (specifically, horizontal conversations) that Facebook offers within the formal accounts influence users' participation. Three important contributions stemming from this inquiry should be noted.

First, we found a positive relationship between the number of fans and messages interchanged between them, with the number of posts by users in threads initiated by the agencies. Moreover, results show a very strong relationship between horizontal communication and vertical participation, as revealed by the meaningful percentage of variance explained by the regression models (11%). This conclusion was sustained even after accounting for the effects of other relevant structural variables, such as organizations' size and number of fans.

From a theoretical standpoint, two main arguments might be used to support this first set of results. On the one hand, following Putnam [37], it may be argued that increased levels of communication between members of networks promote norms of reciprocity and encourage the emergence of social trust. These networks allow better coordination between members, and thus it is also more likely they will be able to resolve dilemmas of collective action. Similarly, networks of civic engagement can take advantage of previous successes in collaboration, which can serve as a future base for participation. Similarly, as per the literature review, it is also possible to explain that the use of this informal communication channel, where users can have conversations with each other without vertical interventions, may serve as a catalyst for extensive conversation among users. This in turn may help reinvigorate civic life since by participating in political discussions as a type of civic conversation, users would augment their political engagement.

Research related to participatory communication in computer-mediated groups also offers an applicable framework to understand why the higher number of horizontal messages interchanged by fans affects the interaction with thread initiated by the agency. Several studies have distinguished the role that interactivity plays in the social dynamics of mediated groups[39,53], arguing that the interaction attained is what keeps message threads and their authors together, and what makes the group tick. Researchers claim that higher levels of interactivity in online communities can increase the engagement of users and also lead to more sociability between them [39]. They explain that when the human need for interaction is satisfied, people use interactive media to bolster their favorable disposition toward interacting with others, increasing sociability. Similarly, interactivity engages users since it brings about additional qualities of interactive communication, turning these simultaneous and continuous communication exchanges into a binding social force. Our results are consistent with these findings concerning virtual communities, which may also explain in part the higher motivation found is users to give expression to their views on issues initiated by the agency.

Similarly, according to deliberative theories, in environments where people are allowed to express themselves and discuss ideas with other individuals, citizens become more confident in their views and willing to express their ideas to others, increasing their sense of self-efficacy in the political domain. This sense of self-efficacy is a personal-psychological mediator traditionally associated with civic engagement and democratic indicators [12], and which is thought to make citizens feel more capable of dealing with civic affairs. Research supports this positive relationship by the fact that after a political talk, deliberators generally emerge better informed, believing that they are more capable of contributing to collective activities with some chances of affecting policy outputs [12]. More specifically, we argue that the interchange of messages between users could motivate them to communicate and contribute their opinion to the threads initiated by the organization, as well. This same logic could also explain why community oriented messages posted by agencies elicit a higher number of comments by users.

Consistent with our literature review, the idea that horizontal communication may spark other comments under the threads initiated by the agency may be related to some of the features of SNSs, such as the "status update" that affords opportunities for "pervasive awareness," whereby individuals are regularly broadcasting and receiving information from "their networks" [12]. These types of affordances imply that when users post a comment on a thread initiated by the agency, the message becomes public not only to all the agency's contacts but also to the users' network. One participatory consequence could be related to the fact that although users might not be initially interested in participating in the thread, they may be tempted to reply to comments posted by their friends or contacts, thus participating indirectly in threads initiated by the agency but "mediated" by their contacts. In this way, users may become part of conversations that potentially can lead them to engage more with the information posted by the organization.

Second, we theorized that the use of two-way messages and invitations to participate in online conversations by federal agencies would elicit more participation from users. Results, however, did not support this hypothesis. Too, the use of these participatory oriented messages was negatively related to the growing percentage of fans in the Facebook accounts managed by federal agencies. Although we do not have an explanation for this negative relationship, it is possible to speculate that it is related to the current 2.0-social oriented environment, where horizontal interpersonal communication is highly embedded in the same channel that broadcast the vertical message posted by the agency. This facilitates citizens' ability to add personal commentaries and the capacity for discussion, engagement, and promotion of "two-step flow" of information [7,20], That is, users seem to react more to what others post about the vertical message broadcasted by the agency than the original post of the thread. Previous research supports this possibility. Scholars have found that comments in online newspapers affect readers' attitudes about the issues described in the news stories [24]. Walther et al. [49] found that when analyzing how effective were PSAs videos to convey the intended message in YouTube, users were influenced by the type of comments. Even more, the fact that in our study debate-oriented threads initiated by agencies had a positive effect on the number of comments posted by users, may also indicate that the

topic of debate has an important influence on deliberative outcomes.

Third, our findings show that not only the content in the threads initiated by agencies but also the number of them can influence user participation. Based on the idea that higher levels of participation in the Internet were linked to the lower cost of information available online reported by previous research [2], we theorized a positive relationship between the number of threads initiated by federal agencies and the number of comments posted by users. However, we found that federal agencies posting an elevated number of threads were less effective in eliciting responses by users than agencies which initiated a fewer number of threads. (As was explained before the quantity of posts was negatively related to the number of comments elicited by users.) The implication of this finding is that if too many messages are posted by agencies, then, instead of persuading users to participate, it can overload and discourage them. As literature in information science explains, when there is too much information at hand, exacerbated by the multiple formats and channels available for its communication, individual's efficiency in using information decreases. Future research should consider this variable in order to analyze through other techniques the "ideal" number of posts to maximize users' participation.

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