The Use of Social Media for Communication In Official Statistics at European Level

PhD Candidate, Ionela-Roxana GLĂVAN (roxana.glavan10@yahoo.com)
Bucharest University of Economic Studies,

Andreea MIRICĂ (miricaandreea89@gmail.com)
Bucharest University of Economic Studies,

Conf. univ. dr. Bogdan Narcis FÎRȚESCU (firtescu@uaic.ro)
Alexandru Ioan Cuza University of Iaşi,

ABSTRACT

Social media tools are wide spread in web communication and are gaining popularity in the communication process between public institutions and citizens. This study conducts an analysis on how social media is used by Official Statistical Institutes to interact with citizens and disseminate information. A linear regression technique is performed to examine which social media platforms (Twitter or Facebook) is a more effective tool in the communication process in the official statistics area. Our study suggests that Twitter is a more powerful tool than Facebook in enhancing the relationship between official statistics and citizens, complying with several other studies. Next, we performed an analysis on Twitter network characteristics discussing "official statistics" using NodeXL that revealed the unexploited potential of this network by official statistical agencies.

Keywords: *social media, Twitter, Facebook, official statistics, communication*
JEL Classification: *M3*

INTRODUCTION

Accurate and reliable information as well as its ease of access is crucial for democracy and democratic decision-making (Kavanaugh et al., 2016). The internet and particularly social media have a great potential to increase interactivity, transparency, openness and accountability of the public sector, gradually transforming public communication (Bonson et al., 2012, Zhong and Lu, 2013). The role of social media in public administration is essential in order to enhance the role of citizen as partner rather than customer in delivering public services (Linders, 2012). Although social media plays in important role in disseminating information, the adoption of social media as way of communication is still low and limited to little interaction (Abdelsalam

et al., 2013). Furthermore, as Warren et al. (2014) points out social media helps increasing trust in government institutions. Social media is successfully used by government institutions and also by other private entities in crisis communication to share messages that promotes maximum compliance (Freberg, 2012). Also, social media has become an essential tool for journalists and politicians not just for young adults (Kelling et al. 2013).

In order to achieve its mission to increase engagement and transparency, social media instruments must be carefully selected as there are various factors influencing the success of social media, including organizational characteristics (Oliveira and Welch, 2013). Also, one must understand that there are several stages of maturity in social media-based public engagement each facing its own challenges, management complexity and risks: the initial phase that presumes certain legal and technological conditions exist in public administration for the use of social media but social media is seldom used, data transparency phase when government institutions begin to exploit Big Data for their purposes, open participation, open collaboration and full engagement of government institutions and citizens (Lee and Kwak, 2012). Social media usage in government institutions is still in the beginning as information posted on official pages tend to be monotonous, rigid and formal (Zheng and Zheng, 2014). In order to succeed on social media, the contents posted must constantly evolve and must be as exciting as possible to the user (Kaplan, 2011). Moreover, the success of social media practice depends on the understanding of all its functionalities and the introduction of a multi-way online interaction (Jiang et al. 2016).

Nevertheless, as social media offers many opportunities for strategic communication (Zerfass and Schramm, 2014) a comprehensive study on this issue is of a great importance for nowadays communication. In this context, our study aims to analyse how social media is used by Official Statistical Institutes to interact with citizens and disseminate information. In order to achieve this scope, first we present the importance of social media, along with websites, in official statistics communication, as it was previously identified by the literature (section 1). Second, we will explore which social media channel is more effective in increasing interaction between users and Official Statistical Institutes (section 2). Third, we will analyse network characteristics of the most relevant social network for official statistics communication (section 3). Finally, conclusions and further research suggestions are stated.

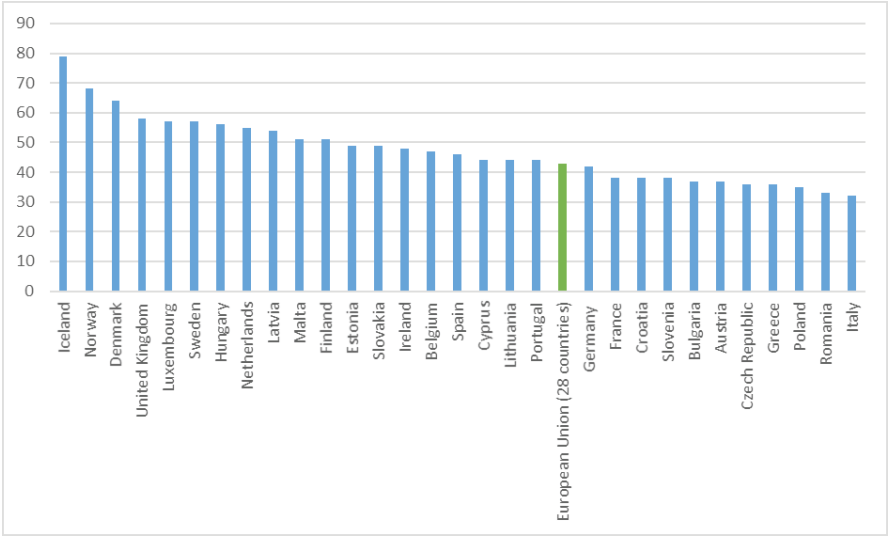
SOCIAL MEDIA IN OFFICIAL STATISTICS COMMUNICATION

According to Statista (2016), the number of social media users around the globe will reach 2.95 billion users, almost three times higher compared to 2010. Moreover, according to the same source, social networking is one of the most popular online activities, offering countless possibilities of user engagement.

Figure 1 below shows the percentage of individuals participating in social networks to the total number of internet users at European level. As one can observe, the lowest value was registered for Italy (32% of the individuals) and the highest for Iceland (79%). In recent years, it became essential for National Statistical Institutes to be visible on social media platforms and to define clear objectives and steps to fallow in this regard (Eurostat, 2011). The presence of statistical agencies on social media complies with the European Code of Practice as follows (Government Statistical Service, 2012): alerting the users to newly released statistics and engaging in discussion with them helps respecting principle 1; announcing users in a timely fashion with regard to changes in methods, classifications, in the release of statistics or errors complies with principle 2; engaging users at minimum costs complies with principle 6.

Percentage of individuals participating in social networks to the total number of internet users for 2013

Figure 1



Data source : Eurostat

In the context of online behaviour, statistical institutes must empathize with the evolution of online media, and the admission that statistical user counts to communicate via interactive online media platforms (Eurostat 2011). The presence and access of more and more citizens to modern mobile devices increase the interest to consume more and more online information in a shorter time comparing to the traditional internet access (Derks and Bakker, 2010).

Social media usage in Official Statistics has been developing quickly and is certainly evolving fast (Weststrom et al., 2011). Yet, the most important mean of communication in official statistics is the web page, often seen as one of the most important page in the country (Dewis, 2015). In Official Statistics, the need to use social media is closely linked to the desire to increase statistical literacy, in order to spread information and support the use of statistics with the aim of social interaction (United Nations Economic Commission for Europe, 2014).

WHICH SOCIAL MEDIA NETWORK IS MORE EFFICIENT IN INCREASING THE WEBSITE TRAFFIC?

Two most important social media tools used in official statistics communication are Facebook and Twitter, as 25 out of 32 EU official statistics agencies have a Twitter account and 9 have a Facebook account. Other social media channels such as YouTube or Google+ are used but they are less popular. Twitter pages are relatively new across the studied agencies, as in most cases the first post on the Twitter page occurred in 2015 or 2016. Facebook pages, although new across the EU are relatively older, as first posts usually occurred in 2012 and 2013. The official statistics team in Estonia is pioneer in this area, as its first post on Twitter occurred on 14-Dec-09 while on 17-Feb-10 posted on Facebook. Only seven countries use both of the social media tools.

Next, we examine the relationship between the social media platforms (Twitter and Facebook) of National Institutes of Statistics, as the two most important social media tools used by EU official statistical agencies, and the popularity of their official sites, as the most important mean of communication in official statistics. We used a sample of data obtained from 32 Twitter and Facebook official pages of the National Institutes of Statistics in Europe. The data was collected between 1st and 2nd of June 2016 and it reveals characteristics in keen relation to that moment in time. Also, we gathered data about the websites of these institutes using the "http://www.alexa.com/" platform on the same days.

We estimate a predictive model using statistical regression technique in investigating the relationship among variables. The general model is defined as below:

response = operator1 term1

where *response* is the outcome or dependent variable and *term* is the predictor variables and *operator* is an operator that indicates how the terms that fallows are included in the model. Furthermore, for the data processing we use R software and *minipack.lm* package to determine the linear model. Therefore, the main element to build a regression model in R is *lm* function. The variable used in this study are listed and defined below:

List of variables used

Table 1

Variable	Variable description
Traffic_rank_in_country	site popularity in a specific country
Nr_likes_Twitter	total number of likes on Twitter page
Nr_likes_Facebook	total number of likes on Facebook page

According to our research based on the previous literature, we carried out two hypotheses focusing on two possible situations that can affect the site popularity of National Institutes of Statistics – Twitter or Facebook official profiles.

The hypotheses are presented below:

1. The total number of likes on Twitter profile has a positive effect on traffic site rank in that country.
2. The total number of likes on Facebook profile has a positive effect on traffic site rank in that country.

The results for the first hypothesis are based on a simple regression model in which the total number of likes on Twitter profile predicted site popularity was significant. The F-statistic test performs is F=5.483 resulting a p-value probability $p < 0.05$ and R-squared=0.13. In this case we can say that in our model the total number of likes on Twitter is a significant predictor of site rank in the country.

Linear regression analysis model (dependent variable - traffic rank in country)

Table 2

	Model 1	Model 2
Dependent variable	Nr_likes_Twitter	Nr_likes_Facebook
Adj. R2	0.126	-0.019
F	5.483	0.412
β	2.459	0.024
t	2.342	0.642
Sig.	0.026 *	0.526
Signif. codes: '*' 0.05		

Studying the second model we can conclude that hypothesis two is rejected. There is no significant relationship between total number of likes on Facebook official pages and the traffic site rank, confirming that hypothesis two is not true and the predictor traffic site rank is not significant in this model.

WHAT ARE THE CHARACTERISTICS OF THE TWITTER NETWORK DISCUSSING OFFICIAL STATISTICS?

As one could observe from the previous section, Twitter is a powerful tool in increasing website traffic in the case of official statistics organisations. Next, we will conduct a brief analysis on the characteristics of the Twitter network discussing official statistics. It is crucial for any organisation to analyse such network characteristics as well as independent people characteristics, because the way of interacting with people present on social media affects their attitude towards the organisation's products (Jiao et.al., 2013). Furthermore, integrating a brand within a community is easier to be performed via social media (Chou, 2014).

For the scope of our analysis, we will use NodeXL. NodeXL is a free and open source extension of Microsoft Excel that can perform powerful analysis on the networks characteristics on various social media platforms including Youtube, Facebook, Twitter and Flickr, providing various types of graph analysis and metrics (Hansen and Smith, 2010). In order to perform the analysis we used NodeXL as follows:

- The search limit was set for 18000 Tweets, yet one must take into account that Twitter rarely exceeds this limit as there is an age limit of one week that the social network imposes (Pewreasearch, 2011).
- We imported tweets from Twitter Search Network using the Basic network type of research. According to NodeXL information menu this means the following:
    - A vertex is created for each unique user who tweeted one

of the tweets, was replied to in one of the tweets or was mentioned in one of the tweets.

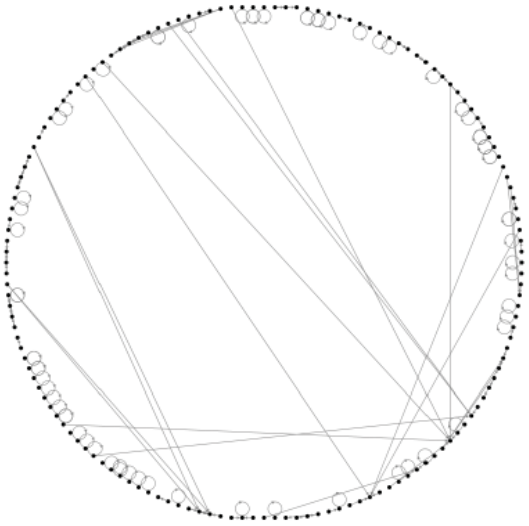
- An edge is created between these vertices displaying the relationships between them as follows: "Tweet" displays a relationship that was neither a reply nor a mention (self-loop edge); "Mentions" displays a relationship that describes a tweet that mentioned someone else; "Replies-to" displays a relationship that describes a tweet that replies to a user.

- We used the keyword "official statistics" as search query. This keyword was chosen for accuracy but one should take into account that people thinking at official statistics may actually post about statistics. A further comparative analysis should be performed in order to compare the networks characteristics discussing "statistics" vs. "official statistics".
- The search was performed on 30th October 2016.

The search results show that there is a high number of Tweets (74) and Mentions (83) and a low level of Replies (9). This shows that the usually the topic is the subject of only one way communication, rather than a bilateral one. Figure one below, representing a direct graph, emphasizes this result.

Twitter network characteristics graph for "official statistics" query provided by NodeXL Version 1.0.1.361, retrieved on 30th October 2016

Figure 2



Next, some basic metrics for this network have been calculated. These metrics help us characterise even further our network. The interpretations of these metrics are made according to the results in table 3 and based on the definitions provided by NodeXL information menu.

- *Graph Type: directed.* We chose the direct graph type as the communication via Twitter can be in both ways and a user can mention another user even without following.
- For our network 148 vertices and 131 unique edges resulted. Moreover, there were 35 edges with duplicates, meaning approximately 21% of the total edges (166 edges).
- The number of self-loops resulted is 74, that is half of the total number of vertices. This shows that approximately half of the number of users that tweeted about "official statistics" were actually isolated.
- The Reciprocated Vertex Pair Ratio is approximately 0.03 meaning that only 3 out 100 users actually had a mutual communication about the topic discussed. The Reciprocated Edge Ratio is approximately 0.07 meaning that only 7 out 100 edges were in both ways. Although, this is a little bit higher than the Reciprocated Vertex Pair Ratio, it also shows a low popularity of the topic among users.
- The number of connected components for our network is 78, more than half of the resulted vertices, while the number of single vertex connected components for our network is 47. This means the topic is usually discussed among isolated groups of users.
- The number of maximum vertices in a connected component is 7, meaning that the largest number of vertices in a component that is connected to the rest of the graph is 7. The number of maximum edges in a connected component is 12, meaning that the largest number of edges in a component that is connected to the rest of the graph is 12.
- The maximum geodesic distance is 2 while the average geodesic distance is 0.95. A small average and maximum geodesic distance usually indicates that the network is not complicated, facilitating the information transfer (Albert and Barbasi, 2002). Yet, based on the fact that there is a small number of connected components, we conclude that these values should be interpreted as low connectivity.
- For this network, the graph density is very low, of only 0.004, meaning that the network is far from being developed to its full potential.

Network basic characteristics for Twitter network query "official statistics" provided by NodeXL Version 1.0.1.361, retrieved on 30th October 2016

Table 3

Graph Type	Directed
Vertices	148
Unique Edges	131
Edges With Duplicates	35
Total Edges	166
Self-Loops	74
Reciprocated Vertex Pair Ratio	0.034482759
Reciprocated Edge Ratio	0.066666667
Connected Components	78
Single-Vertex Connected Components	47
Maximum Vertices in a Connected Component	7
Maximum Edges in a Connected Component	12
Maximum Geodesic Distance (Diameter)	2
Average Geodesic Distance	0.955556
Graph Density	0.00413679
NodeXL Version	1.0.1.361

CONCLUSIONS AND FURTHER RESEARCH

Based on research conducted by Paniagua and Sapena it is found out that Twitter is a more powerful tool in enhancing the performance of an organization than Facebook (Paniagua and Sapena, 2014). This is due to the fact that Twitter is one of the easiest ways to make "Word of Mouth" marketing (Mucan and Özeltürkay, 2014). For government agencies, particularly, Twitter has the most powerful impact for the citizens (Sweetnam, 2015). Furthermore, considering official statistics, Twitter, compared to Facebook has several advantages: it does not require too much time for posting and creating messages and the questions from the followers are easy to manage (Brunet, 2015). Our research complies with these studies, as we found out that the number of likes on Twitter is a good predictor for the traffic rank of official statistics websites, while for Facebook is not.

Next, our study performed a basic analysis on the Twitter network discussing "official statistics" using NodeXL. All the accounted metrics as well as the network graph revealed that the subject is not popular among Twitter users being discussed in small groups, at best. However, basic network statistics revealed that it has great growing potential. It is mandatory public administration institutions to harness the unexploited potential of social media networks, as "*presence and activity on social media is no longer a matter of choice for most governments as these platforms are used by large parts of the*

population and both formal and informal interest groups" (OECD, p. 146).

One further research possibility is to make a more in-depth investigation on the aspects of increasing traffic on social media pages (Ballings et al. 2016) in keen relation with the behavioural key events of the users, as literature within this area is rather scarce. A relevant study in this area is the one done by Allagui and Breslow (2016, p.20) who concluded that *social media campaigns should employ digital storytelling techniques that are both immersive and emotive, and that promote various forms of content sharing*. As found out in their study (Allagui and Breslow, 2016) these stories should involve members of the target audience in at least one form of open-ended offline engagement that involves sharing behaviours. It is therefore essential for the content to be optimized for mobile displays and controls and, finally, the content to be delivered in a timely fashion. Although their study did not involve campaigns designed by public entities there is also another aspect to be considered when moving in this research direction. A recent study that examines user's motivation to interact via government social media pages shows that information seeking is one of the most important drivers on their will to visualize such social media pages (Guo et al., 2016). Taking in consideration these aspects, in order to increase traffic on National Institutes of Statistics web pages firstly there should be seen an improved model for targeting social media pages with specific content adapted to the motivation of their users. Such campaigns are to be delivered in such a format that can be easy, accessible and correlated with the social environment at that time. Nevertheless a behavioural study on how the information is perceived by the users is necessary in order to improve the quality of the content that is delivered and ultimately impacting the visibility of the National Institute of Statistics in the online environment. As our society is furthermore interconnected and moving forward in this direction, new metrics should be considered for measuring the content relevance with direct impact amongst online visibility.

References

1. **Abdelsalam, H. M., Reddick, C. G., Gamal, S., & Al-Shaar, A.**, 2013, *Social media in Egyptian government websites: Presence, usage, and effectiveness*. Government Information Quarterly, 30(4), 406-416.
2. **Albert, R., & Barabási, A. L.**, 2002, *Statistical mechanics of complex networks*. Reviews of modern physics, 74(1), 47.
3. **Allagui, I., & Breslow, H.**, 2016, *Social media for public relations: Lessons from four effective cases.* Public Relations Review, 42(1), 20-30.
4. **Ballings, M., Van den Poel, D., & Bogaert, M.**, 2016, *Social media optimization: Identifying an optimal strategy for increasing network size on Facebook*. Omega, 59, 15-25.

5. **Bonsón, E., Torres, L., Royo, S., & Flores, F.**, 2012, *Local e-government 2.0: Social media and corporate transparency in municipalities*. Government information quarterly, 29(2), 123-132.
6. **Brunet, F.**, 2015, *Twitter and other social media for official statistics: why, what and how.* Workshop on the Communication of Statistics 27–29 April 2015, Washington D.C., United States of America, http://www.unece.org/index.php?id=37217#/
7. **Chou, C. M.**, 2014, *Social Media Characteristics, Customer Relationship and Brand Equity.* The Journal of Applied Business and Economics, 16(1), 128.
8. **Derks, D., & Bakker, A.**, 2010, *The Impact of E-mail Communication on Organizational Life.* Cyberpsychology: Journal of Psychosocial Research on Cyberspace, 4(1), article 1.
9. **Dewis, L.**, 2015, **Building a website, a Digital Publishing capability and a reputation**. Workshop on the Communication of Statistics 27–29 April 2015, Washington D.C., United States of America, http://www.unece.org/index.php?id=37217#/
10. **Eurostat,** 2011, *Social Media in Statistical Agencies*, online available at http://ec.europa.eu/eurostat/documents/42577/43978/Social-Media-Guidelines-09-2011 accessed 31 October 2016
11. **Freberg, K.**, 2012, *Intention to comply with crisis messages communicated via social media*. Public Relations Review, 38(3), 416-421.
12. **Government Statistical Service**, 2012, **UK Statistics Authority advice on complying with the Code of Practice**, available online at https://gss.civilservice.gov.uk/statistics/presentation-and-dissemination/
13. **Guo, J., Liu, Z., & Liu, Y.**, 2016, **Key success factors for the launch of government social media platform: Identifying the formation mechanism of continuance intention**. Computers in Human Behavior, 55, 750-763.
14. **Hansen, D., Shneiderman, B., & Smith, M. A.**, 2010, *Analyzing social media networks with NodeXL: Insights from a connected world*. Morgan Kaufmann.
15. **Jiang, H., Luo, Y., & Kulemeka, O.**, 2016, *Leading in the digital age: A study of how social media are transforming the work of communication professionals*. Telematics and Informatics, 33(2), 493-499.
16. **Jiao, Y., Yang, J., & Xu, S.**, 2013, *A study of the impact of social media characteristics on customer adoption intention of social media*. Proc. 2013 Int. Acad. Work. Soc. Sci. Atlantis Press, 1095-1099.
17. **Kaplan, A. M.**, 2012, *If you love something, let it go mobile: Mobile marketing and mobile social media 4x4*. Business horizons, 55(2), 129-139.
18. **Kavanaugh, A. L., Sheetz, S. D., Sandoval-Almazan, R., Tedesco, J. C., & Fox, E. A.,** 2016, *Media use during conflicts: Information seeking and political efficacy during the 2012 Mexican elections*. Government Information Quarterly.
19. **Kelling, N. J., Kelling, A. S., & Lennon, J. F.**, 2013, *The tweets that killed a university: A case study investigating the use of traditional and social media in the closure of a state university*. Computers in Human Behavior, 29(6), 2656-2664.
20. **Lee, G., & Kwak, Y. H.**, 2012, *An open government maturity model for social media-based public engagement.* Government Information Quarterly, 29(4), 492-503.
21. **Linders, D.**, 2012, *From e-government to we-government: Defining a typology for citizen coproduction in the age of social media*. Government Information Quarterly, 29(4), 446-454.
22. **Mucan, B., & Özeltürkay, E. Y.**, 2014, *Social Media Creates Competitive Advantages: How Turkish Banks Use This Power? A Content Analysis of Turkish Banks through their Webpages*. Procedia-Social and Behavioral Sciences, 148, 137-145.

23. **OECD**, 2015, *"Social media use by governments"*, in Government at a Glance 2015, OECD Publishing, Paris. DOI: http://dx.doi.org/10.1787/gov_glance-2015-46-en
24. **Oliveira, G. H. M., & Welch, E. W.**, 2013, *Social media use in local government: Linkage of technology, task, and organizational context*. Government Information Quarterly, 30(4), 397-405.
25. **Paniagua, J., & Sapena, J.**, 2014, *Business performance and social media: Love or hate?*. Business Horizons, 57(6), 719-728.
26. **Pewreasearch**, 2011, *How we analysed Twitter social media networks with Node XL*; http://www.pewinternet.org/files/2014/02/How-we-analyzed-Twitter-social-media-networks.pdf
27. **Statista**, 2016, *Number of social media users worldwide from 2010 to 2020 (in billions)* available online at https://www.statista.com/statistics/278414/number-of-worldwide-social-network-users/n
28. **Sweetnam, D.**, 2015, *Breathing life into your social media program: strategy, planning and experimentation*. Workshop on the Communication of Statistics 27–29 April 2015, Washington D.C., United States of America, http://www.unece.org/index.php?id=37217#/
29. **United Nations Economic Commission for Europe**, *2014 Making data Meaningful Part 4: Improving Statistical Literacy*, available online at http://www.unece.org/fileadmin/DAM/stats/publications/2013/Making_Data_Meaningful_4.pdf accessed 31 October 2016
30. **Warren, A. M., Sulaiman, A., & Jaafar, N. I.,** 2014, *Social media effects on fostering online civic engagement and building citizen trust and trust in institutions*. Government Information Quarterly, 31(2), 291-301.
31. **Westström, C., Bradbury, J., Grossenbacher, A. & von Oppeln-Bronikowski, S.**, 2011, *Social Media in Statistical Agencies*, http://ec.europa.eu/eurostat/documents/42577/43978/Social-Media-Guidelines-09-2011 accessed 25.06.2016
32. **Zerfass, A., & Schramm, D. M.**, 2014, *Social Media Newsrooms in public relations: A conceptual framework and corporate practices in three countries*. Public Relations Review, 40(1), 79-91.
33. **Zheng, L., & Zheng, T.**, 2014, *Innovation through social media in the public sector: Information and interactions.* Government Information Quarterly, 31, S106-S117.
34. **Zhong, X., & Lu, J.**, 2013, *Public diplomacy meets social media: A study of the US Embassy's blogs and micro-blogs*. Public Relations Review, 39(5), 542-548.