Social Network Analysis of Prominent Communicators of Agricultural and Natural Resources Issues

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Introduction

In today's world, social media is more than a form of entertainment: it is a heavily utilized form communication within both the public and private sectors. Public relations professionals believe social media have changed the way their organizations communicate and how social media is used by organizations should be measured (Wright & Hinson, 2017). Twitter is the second most-used social media site among public relations professionals (Wright & Hinson, 2017) and offers the opportunity for communicators in agricultural organizations to interact directly with members of the public (Allen et al., 2010). This study assessed the social networks of organizations from the Settle et al. (2017) study about the public's trust of organizations that communicate about agricultural and natural resources issues. While organizations can interact directly with members of the public, there is not guarantee the organizations are interacting directly with members of the public. Additionally, past research has shown that the public exhibits varying levels of trust in types of organizations (Auger, 2011; Irani et al., 2001), so there is the potential different types of organizations interact with other accounts differently. Research is needed to address organizations' interactions online.

Theoretical Framework

Social network theory focuses on the interactions between actors, which can be individuals or organizations (Scott, 2017) Social network theory goes beyond looking attributes to looking at relationships and providing context for interactions (Scott, 2017). While the theory is grounded in mathematical models that treat people and organizations as nodes and their interactions as edges, there are sociological implications stemming from factors that increase or decrease the likelihood two individuals or organizations will interact with each other (Kadushin, 2004). The interactions are not looked at in isolation but instead looked at in respect to the other relationships that exist within the network to help contextualize interactions (Borgatti & Ofem, 2010). Different actors are going to have more or less influence based on their position within the network (Borgatti & Ofem, 2010) Twitter is an inherently social environment, and how organizations that communicate about agricultural and natural resources interact with other actors has implications for how information spreads.

Methods

In order for a study to be feasible and meaningful, boundaries must be drawn for social network analysis. This study used the organizations from the Settle et al. (2017) study of the public's trust in organization, which included three broad groups: for profit, non-profit, and governmental organizations. The Twitter accounts of Tractor Supply, Tyson Foods, and Cargill were added to the original list to broaden the scope to include more types of for-profit organizations. Bayer was also added because of its merger with Monsanto After identifying the Twitter handles for each account listed in the Settle et al. study, the number of times an account tweeted or retweeted another account within the month of September 2019 was documented on a spreadsheet. September was chosen to avoid holidays that might spike online activity of agricultural

organizations, such as Thanksgiving and Christmas. This study was completed as part of an undergraduate research experience. Therefore, in order to keep the study manageable, a single month was selected. Accounts were then eliminated from the study if they tweeted or retweeted less than 20 times within that one-month span. Additionally, some of the accounts were found to be deleting tweets after a set amount of time, which meant that active accounts were eliminated from the study because they had deleted their tweets from September. The final list consisted of three governmental (United States Department of Agriculture [USDA], Food and Drug Administration [FDA], & Environmental Protection Agency [EPA]), five nonprofit (U.S. Farmers and Ranchers Alliance [USFRA], American Farm Bureau Federation[AFBF], Humane Society of the United States [HSUS], Environmental Working Group [EWG], & World Wildlife Fund [WWF]), and five for-profit governmental organizations (DuPont, Bayer, Tyson Foods, Tractor Supply, & Cargill). Each account was analyzed based on the tweets and retweets found on the "Tweets" tab on the account's Twitter page. For each tweet and retweet, other accounts tagged within the tweets and retweets were logged. Cytoscape was used to analyze the network.

Results

The network of these organizations had a lower cluster coefficient of .007. This network included the organizations targeted in this study and all of the accounts they tagged in tweets and retweets. While the majority of the accounts were connected to each other, the connections depended on intermediaries. The three governmental organizations had the highest betweenness centrality scores, indicating they were the most important in serving as a connection between other organizations in the study. This may have been because they were also the accounts that were most likely to be tagged by other accounts in the study. Cargill and Tractor Supply were outliers within the set, and were not connected to the greater web of networks found within the data. In looking at the edges, four of the nonprofits had the highest number of edges (i.e., interactions with other accounts). Interactions involving governmental accounts tended to have higher edge betweenness scores (i.e., the number of shortest paths between other accounts in the network that used that particular edge). The edges between USDA and FDA (96.5) and EPA and USDA (88) were the highest. The highest edge betweenness score between nonprofits was between AFBF and the WWF (39). None of the for-profit accounts directly interacted with each other.

Conclusions and Recommendations

In general, this group of agricultural organization was not that well connected to each other, but the government organizations served as a connecting hub between other organizations. Like government organizations being the most well-known among members of the public because they affect larger groups of people than private sector organizations (Settle et al., 2017), it makes sense that government organizations would also serve as a hub because their activities are more likely to affect the other organizations in the study. Public organizations have multiple roles and functions, whereas private sector organizations are generally more limited in their scope (Wæraas, 2008). Future research should expand the scope of the study, both in terms of number of accounts and the time frame assessed. Additionally, this study only looked at which accounts mentioned each other, not whether the mentions were positive or negative.

References

Allen, K., Abrams, K., Meyers, C., & Shultz, A. (2010). A little birdie told me about agriculture: Best practices and future uses of Twitter in agricultural communications. *Journal of Applied Communications, 94*(3), 6-21.

Auger, G. A. (2011). *An experimental analysis of the effect of transparency on charitable nonprofit and for-profit business organizations* (Unpublished doctoral dissertation). University of Florida, Gainesville, FL.

Borgatti, S. P., & Ofem, B. (2010). Overview: social network theory and analysis. In A. J. Daly (Ed.), *The ties of change: social network theory and application in education* (pp. 17–30). Harvard Press.

Irani, T., Sinclair, J., & O'Malley, M. (2001). *Whom do you trust? The influence of culture, gender, geography on consumer perceptions*. Paper presented at 2001 Association of International Agricultural and Extension Education Conference, Baton Rouge, LA.

Kadushin, C. (2004). *Introduction to social network theory*.

Scott, J. (2017) *Social Network Analysis* (4th ed.). SAGE Publications Inc.

Settle, Q., Rumble, J. N., McCarty, K., & Ruth, T. K. (2017). Public knowledge and trust of agricultural and natural resources organizations. Journal of Applied Communications, *101*(2). https://doi.org/10.4148/1051-0834.1007

Wæraas, A. (2008). Can public sector organizations be coherent corporate brands? *Marketing Theory, 8*(2), 205-221. https://doi.org/10.1177%2F1470593108093325

Wright, D. W., & Hinson, M. D. (2017). Tracking how social and other digital media are being used in public relations practice: A twelve-year study. *Public Relations Journal*, *11*(2).