From e-government to social government: 
Twitter use by Korea’s central government

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**Abstract**

**Purpose** – This study explores Twitter use by Korea’s central government by classifying the government’s Twitter-based networking strategies into government-to-citizen (G2C) and government-to-government (G2G) strategies.

**Design/methodology/approach** – The study investigates the nature of social media interactions and networking strategies in the Korean government by extracting tweets, follower/following relationships, and hyperlinks for 32 ministries. Network patterns and
networking strategies are reviewed through descriptive statistical analysis and social network
analysis to map the government’s Twitter activity.

**Findings** – The results indicate that the government’s direct networking strategy targeting
citizens does not necessarily motivate their participation in the government’s social media
activities but that it plays an instrumental role in reinforcing G2G relationships.

**Originality** – This study investigates the social media use patterns (e.g. network properties
and co-link analyses) and strategies (e.g. the reciprocity of relationships and content-push
strategies) in the context of G2C and G2G relationships in Korea’s public sector.

**Keywords** Government, Social media, Social government, Twitter, Networking, South Korea

**Article classification** Research paper

**Introduction**

Public administration scholars, particularly those in the field of e-government, have focused
on mediating technologies designed to support interactions between governments and citizens
and between government agencies. Such intermediaries include social media and other web
2.0 technologies, which represent a relatively new but emerging platform for interactions
between governments and their clients, e.g. citizens, firms, and government organisations
(Sandoval-Almazan and Gil-Garcia, 2012). The term “social media” generally refers to
websites and online tools that facilitate interactions between users by providing them with
opportunities to share information, opinions, and interests (Hansen *et al.*, 2010). Interactions
facilitated by social media have become an integral part of people’s daily lives in
contemporary society and are gradually penetrating the public sector (Effing *et al.*, 2011;

The introduction of web 2.0 has elevated the discussion on government 2.0 (Chun *et
al.*, 2010) or social government (s-government) (Khan *et al.*, 2012). In contrast to its
predecessor, government 1.0, which focuses on the information delivery system, government
2.0 (or s-government) emphasises the interactive dimension in the government’s online
activities. For example Australia’s Government 2.0 Taskforce (Gruen, 2009, p. 87) explained
that “the aim of the Government 2.0 is … to make government more consultative,
participatory and transparent … and to promote collaboration across agencies in online and
information initiatives”. Accordingly government 2.0 requires the development of online
platforms and strategies that can effectively facilitate interactions between government and citizens, and in this regard, social media are considered to satisfy this requirement.

Social media represent a powerful instrument for promoting interactions between governments and citizens. Bertot et al. (2010) stated that the strength of social media lies in their ability to connect users with one another and thus foster user communities. For the government this means that the successful use of social media depends on how they are incorporated into networks of citizens and how they communicate with them regarding activities to motivate their participation in public services and administration. That is, social media use in the public sector is about how communication and interaction structures can be encouraged and formed within social media through the relationship between the government and citizens and cooperation between government agencies for the facilitation of the government’s online activities and the provision of public services.

Scholars believe that because of their collaborative and participatory nature, social media can play an instrumental role in promoting open governance and foster transparency in the public sector by giving citizens a voice (Bertot et al., 2010). Under e-government social media and web 2.0 tools can promote open governance at various levels (see Table 1), including government-to-government (G2G), government-to-citizen (G2C), government-to-business (G2B), and government-to-employee (G2E) relationships (Khan et al., 2012; Sandoval-Almazan and Gil-Garcia, 2012). For G2G and G2E relationships, for example, social media and web 2.0 tools (e.g. blogs and social networking sites such as Facebook and Twitter) can be used within and between public organisations for collaboration, communication, and information sharing (Chun et al., 2010). Similarly G2C relationships can be reinforced using tools such as blogs and discussion groups. Here citizens can participate in the policy deliberation process (for more examples, see Table 1).

In this sense there is a need for a more systematic examination of the government’s social media activities from the perspective of its everyday connections and the use of those connections to interact with citizens. Although many studies have highlighted the success and limits of social media use by governments, they have paid excessive attention to individual agencies’ activities or to specific domains such as disasters and politics, illuminating the effectiveness and/or efficacy of social media instead of the ordinary government’s social media use. Nevertheless engaging in G2C, G2G, G2B, and G2E relationships represents a key mandate of e-governance based on either conventional or new technologies.
In this regard this study examines the role of social media in G2G and G2C interactions. Although many studies have considered social media use in the public sector by focusing on G2C interactions (e.g. Brainard and McNutt, 2010), few have investigated G2G interactions in the context of social media, including those between government institutions (Cho and Park, 2012), or in non-Korean contexts (Sandoval-Almazan and Gil-Garcia, 2012). In contrast the present study examines the patterns of social media use and networking strategies for government agencies in their everyday social media activities with respect to G2G and G2C relationships. To this end the study considers the case of Twitter use by Korea’s central government and addresses the following research questions:

- Does the government’s networking strategy targeting citizens motivate them to participate in the government’s social media activity?
- Does a government agency’s networking strategy targeting other agencies motivate them to participate in the agency’s social media activity?

The rest of this paper is organised as follows. The next section provides an overview of previous research on e-government, government 2.0, and social media strategies of governments. This is followed by the study’s methodology and a discussion of the results. Finally the study concludes with a summary of the main findings.

**Literature review**

**From e-government to s-government**

The primary purpose of deploying mediating technologies and systems in the public sector is to increase transparency (e.g. by providing citizens with information on government activities), participation (e.g. by providing citizens with opportunities to participate in policymaking so that the government can benefit from their collective knowledge), and collaboration (Patrice, 2010). In the last decade one of the most studied mediating systems/technologies for achieving the underlying objectives of good governance (i.e. open, transparent, and collaborative governance) has been the e-government initiative (Jean and Juri, 2000; Layne and Lee, 2001; Silcock, 2001; Heeks and Bailur, 2007; Khan et al., 2011; Yildiz, 2007). E-government from the perspective of citizens or the demand side is the “practice of public service provisioning to citizens, businesses, and other government agencies where government services can be accessed through the internet, mobile, fax, mail, telephone, and personal visits” (Khan et al., 2010, p. 1). E-government is a stage-based developmental process shifting gradually from the initial stage (i.e. the establishment of back-
office databases and the provision of static information through the internet) to transactional and full-integration stages (i.e. the final stage in which systems and services are integrated both horizontally and vertically within and between government agencies and citizens access government services through portals) (Andersen and Henriksen, 2006; Layne and Lee, 2001). However, in addition to the known stages in the literature, there are ex ante and ex post e-government stages (Khan et al., 2011). The ex ante stage of the e-government developmental process deals with the feasibility study of e-government implementation, whereas the ex post stage involves the impact and assessment of e-government (Khan et al., 2011).

The e-government initiative has been considered and implemented in many developed and developing countries for an open, transparent, and collaborative government (UN, 2010) and entails various sociotechnical challenges (Khan et al., 2011; Jaeger and Thompson, 2003) as well as benefits (Brown, 2007). However the quest to find better ways to enhance governance continues with the advent of new technologies and systems. In this regard scholars worldwide have explored the potential of social media in the public sector (Sæbø, 2011; Cho and Park, 2012; Effing et al., 2011; Brainard and McNutt, 2010; Bertot et al., 2010; Sandoval-Almazan and Gil-Garcia, 2012; Chun et al., 2010; Lim and Park, 2011).

Recently, under the umbrella of e-government, public organisations have started to explore the potential of social media as a mediating technology/system for facilitating their relationships with clients (Effing et al., 2011).

Social media and other web 2.0 tools include a wide range of technologies, systems, and phenomena originating from the internet, which has been widely used to maintain social and professional ties (e.g. Facebook and LinkedIn), facilitate knowledge sharing (e.g. Wikipedia and blogs), create awareness (e.g. Twitter), and exchange information in the form of text, audio files, videos, or images (Khan et al., 2012). Khan et al. (2012) referred to the interactions between governments and citizens/firms and between government organisations driven by social media as s-government, which, under e-government, depends mainly on social media phenomena and technologies such as social software (Bächle, 2006) and web 2.0 platforms (e.g. Twitter and blogs) for daily interactions between governments and clients (Khan et al., 2012). Some scholars have referred to s-government as “open government” or “government 2.0” (Chun et al., 2010).

The shift toward the use of interactions mediated by social media can be justified by their collaborative and participatory nature (Bertot et al., 2010; Chun et al., 2010) and their wide diffusion and adoption in contemporary society. Some studies have examined social
Some researchers have been optimistic about social media use in the public sector and suggested that social media can serve as an effective tool for information sharing in that sector (Cho and Park, 2012). For example, some studies have shown that social media are widely used by governments worldwide for the purposes of regulation, cross-agency collaboration, knowledge management, political participation, transparency, service provision, and law enforcement (Osimo, 2008). Chua et al. (2012) investigated 200 government websites and suggested that the use of social media and web 2.0 applications in government websites is correlated to the overall quality of websites and services. Similarly, Sweetser and Kelleher (2011) examined Twitter use by public relations professionals and found a positive relationship between Twitter leadership and internal motivation. Other studies have found that social media use is not yet widespread in the public sector. Golbeck et al. (2010) investigated Twitter use in the US Congress by analysing more than 6,000 tweets and found that congressional members used Twitter mainly to promote themselves and report their daily activities. Cho and Park (2012) investigated Twitter use by the Korean Ministry for Food, Agriculture, Forestry and Fisheries (MFAFF) and found that Twitter was used mainly for socialising, not for providing information on its policies and activities. Similarly, Andersen et al. (2012) investigated the effects of social media on capabilities, interactions, orientations, and value distributions in the context of Danish public health care and found that social media can empower patients (e.g. by providing access to more information) and that social media use can be a cost driver and hindered by legal and privacy concerns (Andersen et al., 2012).

Some studies have suggested the wide application of social media in the public sector (Osimo, 2008). Chun et al. (2010) provided a list of social media applications in the public sector. Khan et al. (2012) reorganised that list by adding more examples in terms of G2G, G2C, and G2B relationships (see Table 1). As shown in Table 1 s-government is used mainly for providing information (e.g. in the form of tweets and hyperlinks to public services), increasing awareness of public services, and facilitating citizens’ active engagement in shaping policy development. This suggests that further advances in social media technologies may allow s-government to proceed to the transactional stage (i.e. providing citizens with opportunities to use social media for two-way transactions with government agencies, e.g. an integrated service provided by Facebook for receiving a birth certificate).
Before the use of social media and its adoption by governments became worldwide phenomena, s-government or government 2.0 tended to reflect changes in the behaviour of governments, rather than being a principle for the delivery of public administration and services (Eggers, 2005; Mergel, 2010). Because the nature of social media involves collaboration and participation, their appropriate use by governments is expected to facilitate open governance (Bertot et al., 2010; Bonsón et al., 2012), citizen engagement (Osimo, 2008), and new forms of e-governance (Dadashzadeh, 2010). Although governments’ social media use cannot guarantee complete transparency and engagement (Bonsón et al., 2012), it sometimes reflects an information channel instead of something fundamentally different in practice. However there are some areas showing substantial improvements through social media use. For example governments have made effective use of social media to respond to and raise situational awareness of crises (Jaeger and Bertot, 2010; Jaeger and Thompson, 2003; Lindsay, 2011). Municipal governments’ efforts in public administration based on information/opinion/feedback gathering through social media also represent a good example. This raises the question of which government strategies based on social media can facilitate effective governance.

<table>
<thead>
<tr>
<th>E-govt. relationships</th>
<th>Examples of social media use</th>
</tr>
</thead>
<tbody>
<tr>
<td>G2C</td>
<td>Blogs</td>
</tr>
<tr>
<td></td>
<td>These attract new audiences for government information and services; put a human face on the government; and motivate discussions. Examples: Federal agencies’ public blogs, elected officials’ blogs, blogs about interesting topics, pandemic leadership blogs.</td>
</tr>
<tr>
<td>Wikis</td>
<td>These provide community support (e.g. GSA collaborative work environments) and facilitate knowledge sharing with citizens.</td>
</tr>
<tr>
<td>Social networking sites</td>
<td>These serve as a channel of communication with citizens (e.g., Twitter) and can attract new audiences for government information and services and reach people where they are (e.g. CIA’s Facebook account for recruiting).</td>
</tr>
<tr>
<td>Multimedia</td>
<td>These allow the government to share its multimedia data with citizens in a coordinated manner and to train and educate citizens by using multimedia content. Example: providing training and enhancing awareness of e-government services by posting video tutorials on YouTube for those citizens lacking online skills.</td>
</tr>
<tr>
<td>G2G</td>
<td>These have certain advantages: sharing and building relationships, sharing knowledge, providing better access to experts, avoiding duplicate efforts, and encouraging innovation.</td>
</tr>
<tr>
<td>G2B</td>
<td>These are specialised blogs targeting businesses for knowledge sharing.</td>
</tr>
<tr>
<td>G2E</td>
<td>These contribute to idea management and innovation. Example: platforms for idea generation and innovation among employees (e.g. an employee voice portal in Lincolnshire).</td>
</tr>
</tbody>
</table>

**Social media and the government’s strategy**

Governments typically employ a threefold social media strategy: push, pull, and networking (Mergel, 2010). The push and pull strategies consider social media simply as another...
communication channel complementing existing channels. The push strategy serves mainly as a speaker reaching out to citizens. For example it is used to inform citizens of new policies and information, whereas the pull strategy uses social media as a promotional channel to route citizen traffic to government websites or blogs. The networking strategy uses social media as a way to connect directly to citizens so that they can be involved in the political process, e.g. citizens’ participation in political discourse through comments and feedback. In short the push and pull strategies are content-driven and only facilitate one-way communication, while the networking strategy is action-driven and promotes two-way social interactions between the government and citizens.

Governments generally employ all these strategies because they are not mutually exclusive. However their effectiveness may vary according to the situation. For example the push and pull strategies are effective mainly in information sharing, particularly about public safety and services. For example these strategies make effective use of social media to disseminate one-way information on weather, traffic, diseases, and natural disasters (Jaeger and Bertot, 2010; Lindsay, 2011; Huang et al., 2010). In contrast the networking strategy is an effective way to establish relationships with citizens and encourage their participation and input in the policymaking process.

However one of the major concerns regarding these success stories is that governments may view their social media networks targeting citizens as sufficient and thus they may not perceive the need or pressure to expand their networks. In other words, although the success of a government’s use of social media depends on its relationship with citizens in terms of the distribution of information and the promotion of communication, in-depth analyses reveal weak government-citizen networks in reality.

**Networking between government agencies**

Another issue in governments’ networking strategies is how cross-agency networking and cooperation are facilitated by social media. The government’s provision of public administration and services often requires cooperation between government agencies. Such cooperation has been based on social media technologies such as wikis and other web 2.0 technologies (Osimo, 2008) and has facilitated openness under government 2.0. For example data.gov is based on contributions from several government agencies.

Despite the aforementioned discussion, social media success stories often come from individual agencies’ efforts to use social media or relationships with citizens instead of cooperation between government agencies. This may be explained by the fact that most
success stories are found at the level of local governments, which tend to emphasise networking between governments and citizens. This limits knowledge of how cooperation between government agencies is facilitated through social media.

This suggests a need for a better understanding of governments’ networking strategies based on social media in terms of the extent to which they are connected with citizens, how this connection is related to the area of public administration and the type of service, and how government agencies are connected and cooperate with one another. This understanding should provide important insights into how governments use social media to achieve positive outcomes through web 2.0 technologies.

**Methodology**

**Data**

We considered Twitter use by the Korean government to examine its networking strategy. The Korean government has quickly adopted social networking sites (Lim and Park, 2011; Park *et al.*, 2011) and instituted an official position called the “online speaker” in all government agencies to enhance their management of social media.

We obtained data on Twitter use by using an API-based Twitter application (Sams *et al.*, 2011) and the NodeXL program (Hansen *et al.*, 2010) from January to August 2011. For the analysis of the Korean government’s networking strategy, we collected data on an intermittent basis because the Twitter API limited the collection of data. That is, we could not collect any data accumulated for more than seven days or 3,200 Tweets, whichever was reached first, at any given point in time.

The data included Twitter accounts of a total of 35 government organisations composed of ministries and other agencies under the central government. However the API denied access to three of these accounts, and therefore the final sample comprised 32 agencies. The data included basic information on Twitter accounts such as the numbers of followers, followings, tweets, listed, and favourites. In addition we extracted the content of tweets, and to measure the strength of Twitter networks, we averaged these statistics across the data collection period. When collecting data we assumed that the date of the first tweet was the date on which the Twitter account was created because we could not determine the exact date of account creation.

**Method**
We employed statistical and social network analysis techniques (Hanneman and Riddle, 2005) to analyse the government’s networking strategy. Although each method is explained in greater detail when the results are presented, the following points are noteworthy. First we measured the effects of the government’s networking strategy targeting citizens by considering the reciprocal following-follower relationship. Because governments cannot know each individual Twitter account, they tend to focus on expanding their networks by following other users’ followers. Second we measured the G2G networking strategy based on retweets between government institutions. Therefore we employed retweets as a proxy for the G2G networking strategy. As discussed later the Korean government maintained a highly reciprocal relationship with its followers. In this regard it is useful to investigate the following-follower relationships. Third we followed each analysis by interviewing government institutions and conducting a semantic analysis.

Results

Overall network structure

Table 2 provides the network level characteristics of Korean Twitter networks. From the network level properties, it is clear that Korean ministries are well connected in a dense network of the follower-following relations. The density of the network (0.84), i.e. the number of actual links divided by the number of possible links, shows that the network is very condensed. Moreover the clustering coefficient (i.e. the degree to which nodes in a network tend to cluster together) was much higher (0.86) compared to the indication that the network has a greater tendency to form “cliques”. In other words Korean ministries tended to be embedded in dense local neighbourhoods (clusters). This is also indicated by the average degree (the average number of ministries each ministry follows), which is very high (33); this shows that almost every Korean ministry is following all other ministries.

Table 2. Network level properties of Korean Twitter networks

<table>
<thead>
<tr>
<th>No. of nodes</th>
<th>No. of links</th>
<th>Density</th>
<th>Average geodesic distance</th>
<th>Average degree</th>
<th>Average centrality</th>
<th>Clustering coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>1348</td>
<td>0.84</td>
<td>1.0</td>
<td>33</td>
<td>3.6</td>
<td>0.86</td>
</tr>
</tbody>
</table>

Twitter adoption and use by government institutions
The government institutions adopted Twitter at a moderate pace. Figure 1 shows a linear adoption curve, not an S-shaped one (which is often observed in research on technology adoption), indicating that each institution carefully planned its Twitter adoption without engaging in central coordination with other institutions. In fact the results show largely uneven variances in the institutions’ Twitter activities. For example the number of tweets by the Ministry of Food, Agriculture, Forestry and Fisheries (MFAFF) was more than twice that for the Ministry of Land, Transport and Maritime Affairs, although there was only a one week difference in their start date (Table 3). In addition there were substantial differences in citizens’ interest and response. As shown in Table 3 the MFAFF had 52,496 followers, whereas the Ministry of Foreign Affairs and Trade and the Ministry of Environment had only 7,366 and 2,833 followers, respectively.

![Figure 1](image.png)

**Figure 1.** Twitter adoption by 35 government institutions

*Note:* X-axis: number of days from the date on which the first Twitter account was created. Y-axis: number of government institutions with Twitter accounts.

Nonetheless the institutions tended to maintain large numbers of mutual connections and engage in close cooperation. According to the results for their network indices, the network density of the following-follower relationship between the institutions was 0.84, and the clustering coefficient was 0.86, implying that in four out of five cases, they were mutually connected and these mutual connections existed across their whole networks. In addition the
co-link analysis of their tweets reveals that the government institutions tended to post the same messages as in Figure 2. The network in Figure 2 illustrates the connection between two institutions if one institution’s hyperlink in its own tweet was also shown in the other institution’s tweet. The width of the line indicates the frequency of such hyperlinks.

![Figure 2. Co-link diagram of ministries with Twitter accounts](image)

This raises the question of whether these government institutions’ Twitter activities for connecting citizens and facilitating G2G cooperation motivated citizens to participate in the government’s Twitter accounts.

**Examination of the government’s networking strategy**

To examine the effectiveness of the government institutions’ networking strategy targeting citizens, we first determined whether maintaining reciprocal following-follower relationships would increase the number of followers in their Twitter accounts. This analysis was motivated by the so-called “transitivity effect” of social networks, which suggests that a friend of one’s friend often becomes one’s friend.
According to the results the government institutions placed great emphasis on reciprocal relationships with their followers. For example 71.8 percent of the agencies showed a reciprocity rate exceeding 80 percent in their relationships with followers. In fact 40.6 percent recorded a reciprocity rate exceeding 95 percent. Here we calculated the reciprocal relationship between a government institution’s Twitter account and its followers (“reciprocity” in Table 3) by tracing the dyadic relationships between the two, not by simply dividing the number of followings by that of followers. That is, once a Twitter user followed a government’s Twitter account, the user was highly likely to be followed by that account. This raises the question of whether this active pursuit of reciprocal relationships increased the number of followers for the government’s Twitter accounts, that is, whether there was a transitivity effect.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Start date</th>
<th>Followers</th>
<th>Followings</th>
<th>Tweets</th>
<th>Reciprocity</th>
<th>Listed</th>
<th>Favourites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry for Food, Agriculture, Forestry and Fisheries</td>
<td>10 Feb. 2010</td>
<td>52496</td>
<td>55531</td>
<td>2966</td>
<td>99.5</td>
<td>1346.78</td>
<td>206.67</td>
</tr>
<tr>
<td>Ministry for Health, Welfare and Family Affairs</td>
<td>17 Nov. 2009</td>
<td>26367</td>
<td>28730</td>
<td>4124</td>
<td>99.8</td>
<td>856.56</td>
<td>4</td>
</tr>
<tr>
<td>Ministry of Land, Transport and Maritime Affairs</td>
<td>10 Sept. 2010</td>
<td>21094</td>
<td>22028</td>
<td>1454</td>
<td>96.8</td>
<td>428.89</td>
<td>3.33</td>
</tr>
<tr>
<td>Office of the President</td>
<td>16 June 2009</td>
<td>18349</td>
<td>18770</td>
<td>7097</td>
<td>99.8</td>
<td>914.44</td>
<td>5.22</td>
</tr>
<tr>
<td>Ministry of Justice</td>
<td>30 July 2009</td>
<td>11561</td>
<td>10579</td>
<td>2096</td>
<td>86.8</td>
<td>369.22</td>
<td>11.89</td>
</tr>
<tr>
<td>Korean National Police Agency</td>
<td>23 June 2009</td>
<td>10205</td>
<td>10476</td>
<td>5429</td>
<td>98.1</td>
<td>461.44</td>
<td>24.11</td>
</tr>
<tr>
<td>Ministry of National Defence</td>
<td>27 Apr. 2010</td>
<td>10029</td>
<td>10641</td>
<td>1983</td>
<td>93.6</td>
<td>660.89</td>
<td>86</td>
</tr>
<tr>
<td>Prime Minister's Office</td>
<td>23 Mar. 2010</td>
<td>9673</td>
<td>9669</td>
<td>1380</td>
<td>99.9</td>
<td>322.44</td>
<td>1.89</td>
</tr>
<tr>
<td>National Emergency Management Agency</td>
<td>2 Sept 2009</td>
<td>8623</td>
<td>8922</td>
<td>3444</td>
<td>90.8</td>
<td>308.44</td>
<td>18.44</td>
</tr>
<tr>
<td>Korea Forest Service</td>
<td>8 Oct 2009</td>
<td>8430</td>
<td>9075</td>
<td>621</td>
<td>89.2</td>
<td>605</td>
<td>48.78</td>
</tr>
<tr>
<td>Korea Communications Commission</td>
<td>27 Apr. 2010</td>
<td>8158</td>
<td>6345</td>
<td>1043</td>
<td>63.8</td>
<td>685.78</td>
<td>3</td>
</tr>
<tr>
<td>Ministry of Strategy and Finance</td>
<td>31 Mar. 2010</td>
<td>8116</td>
<td>8141</td>
<td>1762</td>
<td>93.4</td>
<td>758.22</td>
<td>0.78</td>
</tr>
<tr>
<td>Small and Medium Business Administration</td>
<td>26 June 2009</td>
<td>7950</td>
<td>8257</td>
<td>2702</td>
<td>82.1</td>
<td>381</td>
<td>53.22</td>
</tr>
<tr>
<td>Ministry of Public Administration and Security</td>
<td>31 Mar. 2010</td>
<td>7938</td>
<td>8705</td>
<td>3633</td>
<td>95.4</td>
<td>719.89</td>
<td>13.67</td>
</tr>
<tr>
<td>National Tax Service</td>
<td>17 May 2010</td>
<td>7457</td>
<td>7762</td>
<td>2016</td>
<td>97.9</td>
<td>354.78</td>
<td>0.33</td>
</tr>
<tr>
<td>Ministry of Foreign Affairs and Trade</td>
<td>19 June 2010</td>
<td>7366</td>
<td>5489</td>
<td>1460</td>
<td>69.7</td>
<td>350.56</td>
<td>6.33</td>
</tr>
<tr>
<td>Ministry of Culture, Sports and Tourism</td>
<td>7 May 2010</td>
<td>7168</td>
<td>7727</td>
<td>1589</td>
<td>98.5</td>
<td>568.78</td>
<td>3.33</td>
</tr>
<tr>
<td>Ministry of Unification</td>
<td>6 May 2010</td>
<td>7058</td>
<td>6688</td>
<td>2802</td>
<td>89.8</td>
<td>414.89</td>
<td>7.56</td>
</tr>
<tr>
<td>Ministry of Patriots and Veterans Affairs</td>
<td>13 April 2010</td>
<td>6343</td>
<td>6844</td>
<td>1445</td>
<td>99.2</td>
<td>119.67</td>
<td>2</td>
</tr>
</tbody>
</table>
* We calculated the reciprocity rate by tracing the dyadic follower-following relationship, not by dividing the number of followings by that of followers. For example the reciprocity rate for the Rural Development Administration was 26.2 percent, not (502/1229)=40.8 percent.

We addressed this question through a generalised regression with a negative binomial distribution because of the overdispersion in the distribution of the number of followers of government accounts. For this model we included a variable for the existence of an employee in charge of the Twitter account to control for internal differences in the management of Twitter accounts between the institutions. Only 25 of the 32 institutions had managers in charge of Twitter accounts.

Also noteworthy is that, according to the results for Model 1 in Table 4, reciprocal relationships increased the number of followers, although only marginally (with all other variables controlled for, every 1 percent increase in the reciprocity rate produced a 0.001 percent increase in the number of followers). The results for the models in Table 4 indicate that latecomers had more followers, although the difference was minimal. This may be explained by the steep Twitter adoption curve for Twitter users in Korea between 2010 and 2011. However a more in-depth explanation is beyond the scope of this study. The variable for the number of tweets was non-significant. That is, the pursuit of reciprocal relationships with followers to motivate like-minded users around these followers had a positive effect on
the number of followers, but this effort was somewhat inefficient considering the infinitesimal size of this effect as opposed to the amount of time spent on following followers’ accounts. The factor that was most likely to have a positive effect on the number of followers was the existence of a Twitter manager. Those institutions with a Twitter manager attracted approximately twice as many followers than those without.

For a more in-depth analysis of these results, we interviewed staff in several institutions. As in Cho and Park (2012), who studied the MFAFF, this ministry had a manager in charge of its Twitter account as well as other accounts (e.g. Facebook, blogs, and YouTube). This manager managed the ministry’s online communication activity for two years. The MFAFF minister actively promoted social media interactions with the public, pressuring all staff members to monitor, participate in, and respond to the ministry’s Twitter account. The Ministry of Unification also had a high-ranking officer as the online spokesperson and designated some internal staff members as “Twitter reporters”. By contrast the Rural Development Administration, the most peripheral ministry, had no designated staff member for its Twitter account, and as a result, it placed the second lowest in terms of the number of followers.

Table 4. Generalised linear regression with a negative binomial distribution
(dependent variable: number of followers)

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th></th>
<th></th>
<th>Model 2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Estimate</td>
<td>S.E</td>
<td>Exp.</td>
<td>Estimate</td>
<td>S.E</td>
<td>Exp.</td>
</tr>
<tr>
<td>Constant</td>
<td>7.225</td>
<td>0.675</td>
<td>7.128</td>
<td>0.661</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Joining date from the 1st adopted institution</td>
<td>0.004 ***</td>
<td>0.002 1.004</td>
<td>0.004 ***</td>
<td>0.001 1.004</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reciprocity</td>
<td>0.001 ***</td>
<td>0.000 1.001</td>
<td>0.001 ** 0.000 1.001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. Twitter managers</td>
<td>-0.610 * 0.247 0.543</td>
<td>-0.792 *** 0.220 0.453</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of tweets</td>
<td>0.002 0.008</td>
<td></td>
<td>0.008 0.007</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retweet category</td>
<td>Moderate</td>
<td>-0.821 ** 0.286 0.440</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>0.060 0.223</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full log-likelihood</td>
<td>-240.434</td>
<td></td>
<td>-236.571</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIC</td>
<td>500.180</td>
<td></td>
<td>498.142</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( \chi^2 )</td>
<td>23.444</td>
<td></td>
<td>23.526</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( df )</td>
<td>20</td>
<td></td>
<td>18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( P\text{-value} )</td>
<td>0.265</td>
<td></td>
<td>0.171</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
According to the initial analysis, a reciprocal following-follower relationship had little effect on the number of followers, and therefore we focused on the effects of G2G connections. As discussed earlier, because the government institutions placed great emphasis on their reciprocal relationships, there was no significant difference in the reciprocal relationship between these institutions. Therefore we examined whether the information flow between the institutions would increase the number of followers.

In particular we analysed whether retweeting of other institutions’ tweets contributes to an increase in the number of followers of a retweeting institution. Retweets involve the delivery of tweets by other users to one’s own followers by posting those tweets to one’s own Twitter account. Hence retweeting other government institutions’ tweets implies the existence of some cooperation between government institutions in the delivery of their messages. If this retweet-based networking method can increase the number of followers, then it can be regarded as the network externality effect. That is, followers of a government institution may be inspired to follow the institution that posted the original tweet.

To test this effect we first identified all retweets for each government institution and then selected those retweets that were retweeted by at least four institutions in our sample (about 10 percent).

This provided a total of 115 unique retweet messages and 26 institutions engaged in diffusing those 115 Twitter messages. Finally we classified institutions into moderate-retweet institutions and high-retweet institutions. If the proportion of retweet messages that are retweeted by at least 10 institutions is higher than that of retweet messages that are retweeted by less than 10 institutions, an institution is treated as a high-retweet institution. In other cases an institution is treated as a moderate-retweet institution. Based on this classification, there were 9 moderate and 17 high-retweet institutions, respectively. Excluding the institutions with a Twitter manager, these numbers decreased to 7 and 11, respectively. Note that, by definition, all these 26 institutions have retweeted 115 Twitter messages.

The results for Model 2 in Table 4 indicate that G2G cooperation based on retweets was positively related to the number of followers. When high-retweet institutions gain one follower, the moderate-retweet institutions gain 0.44 followers, controlling for other
variables. This implies that the information flow mobilising connections between the
government institutions through retweets was positively related to the number of followers. It
is noteworthy that this effect was almost as great as the effect of the Twitter manager.

For a more in-depth analysis of these results, we conducted content analysis of all
retweeted messages by government institutions. Figure 3 presents the network diagram based
on word co-occurrence according to the number of institutions engaged in retweeting. For the
convenience of contrast, we depicted the diagram on two levels. Here the connections
indicate the co-occurrence of terms in retweets. For example, if the terms “safety” and
“health” were presented in a certain institution’s retweet and also co-presented in other
institution’s retweet, we regard it as a connection between the word ‘safety’ and ‘health’,
drawing a line between them.

![Networks of co-occurring terms in retweets by government institutions](image)

(1) Terms used by at least two government institutions (2) Terms used by at least six
government institutions

**Figure 3.** Networks of co-occurring terms in retweets by government institutions

*Note:* Economy- and welfare-related terms: purple triangles; sociopolitical terms: yellow
squares; other: green circles.
Ordinary terms are found at the centre of the network diagram. Because this is a co-occurrence network, the terms such as “service”, “safety”, “support”, and “policy” were widely used and combined with sociopolitical terms in retweets. Some terms such as “health”, “education”, and “agenda” were sometimes used but were not likely to be linked to sociopolitical terms. This indicates that frequent terms in retweets tended to be those reflecting general information from the government on public support and safety, not institution-specific information.

**Discussion**

In networked societies networks can emerge anytime, anywhere (van Dijk, 2012). An important communication mode in such a society is mediated communication. Government activities are increasingly based on social media networks. Decomposing every network represented by the structure of information sources (e.g. URLs), tweets (e.g. a semantic analysis), channel couplings (e.g. co-link diagrams), and online connections (e.g. following-follower relationships) is necessary for a more holistic view. Luna-Reyes and Chun (2012) emphasised that if e-government research does not consider both technological and human characteristics, then it is likely to face the pitfalls of monocausal simplification. A better understanding of the structural properties of several Twitter networks can provide a more comprehensive explanation of the way in which interactions mediated by social media influence the online sphere in the public sector. Traditional research methodologies adopting a single technique are not likely to provide a full understanding of the complex relationships between government agencies and citizens (Cox and Marshall, 2007). In addition relationships, which can be viewed as actions for communication, can be better captured by combining webometric and social network techniques. Using a mixed approach can help the researcher to discover the ongoing relationship-building process for government agencies as interactive and adaptive organisational entities (Park, 2010).

With the rise of social media as a major source of government information, policymakers in Korea have been under substantial pressure to search for new and more interactive methods for communicating with citizens, particularly through social media. According to Anderson and Rainie (2010) social relationships, social media (including email communication), social networks, and other online tools offer “low-friction” opportunities to create, enhance, and rediscover social ties that make a difference in people’s lives. The present study empirically explores a new form of government communication initiated
through social media, that is, two-way and non-linear, and how it can influence interactions between policymakers and citizens. The proliferation of social media is likely to change the ways in which individuals interact with government agencies and policy programmes are disseminated. That is, this phenomenon can facilitate the formation of a very different communication landscape in e-government practices. Kotler et al. (2007) suggested that the use of social media by government agencies can motive citizens to change their attitudes and/or behaviours toward public issues in a voluntary manner. That is, social media can be a positive force driving citizens to modify their perceptions, attitudes, and behaviours for the benefit of individuals, groups, and the society as a whole (Kotler et al., 2007), and people are likely to be more receptive to social media messages and perceive them as more honest. This suggests that Korean policymakers should make greater use of “soft power” (e.g. word-of-mouth communication and persuasion) through social media than “hard power” (e.g. legal or economic measures).

However the results indicate that the Korean government may have some difficulty connecting with citizens through Twitter. The results for G2C and G2G networking strategies and Twitter use patterns indicate that reciprocal Twitter relationships had a positive but negligible effect on the number of followers. The presence of a Twitter manager had a greater effect on the number of followers. This suggests that the government’s active approach to Twitter relationships with citizens was not effective. However in terms of G2G networking, by sharing the same content through retweets, the government successfully increased the number of followers. This cooperation between government institutions through Twitter was as important as having a Twitter manager. This suggests that the government should implement its networking strategy by mobilising Twitter accounts of various government institutions and promoting their cooperation instead of following Twitter accounts of citizens or networking with them. A two-way communication tool does not necessarily imply direct connections between users. The government’s Twitter activity is often criticised for being a one-way channel of information and communication.

The results have important practical implications. Structuring message content to satisfy citizens’ needs is more important than determining the direction of relationships. Indeed the results of the co-occurrence analysis verify that citizens paid close attention to those messages containing the term “safety”. Therefore disseminating appropriate message content by deploying mutual connections between government institutions should better inspire citizens’ participation in the government’s social media activities. Those government
institutions that are less visible can employ this strategy to attract greater attention from citizens and thus to better disseminate their messages.

This study has some limitations. We investigated Twitter use in only one country, and therefore the generalisation of the findings may be problematic. Although Asian countries are believed to share cultural similarities (Hofstede, 1984), social media use may vary even across similar cultures. In this regard future research should investigate social media use in the public sector by considering a wider range of countries as well as cultures. Similarly we investigated social media use in the public sector by considering only the current usage patterns, ignoring how and why these patterns emerge. For example future research should address the questions of what shapes the pattern of social media use in the public sector and how social networks are formed in that sector.

Conclusion
This study investigated the patterns of G2C and G2G social media use (e.g. network properties and co-link analyses) and associated strategies (e.g. the reciprocity of relationships and content-push strategies) in the public sector in Korea. The results indicate that government institutions in Korea made extensive use of Twitter in their daily interactions with citizens but that their networking strategy directly targeting the public did not necessarily motivate the public to participate in their social media activities. Instead managers in charge of Twitter accounts played a much more important role in this regard. This suggests that the government’s efforts to connect with citizens are less effective than those to communicate with citizens and respond to their needs. G2G connections had considerable influence on citizen engagement by serving as a source of public information on important topics such as safety and health. This suggests that individual government institutions should focus more on addressing citizens’ needs than on increasing followers. However for government institutions as a whole, connections between them do matter in attracting citizens’ attention. The results demonstrate that government agencies should formulate their social media strategies by taking a two-track approach to the management of social media.

References


Hanneman, R.A. and Riddle, M. (2005), *Introduction to Social Network Methods*, University of California, Riverside, CA.


