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## E-government services and social media adoption: Experience of small local governments in Nebraska state

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### ABSTRACT

Considering that social media as new tools complement existing e-government services, it is necessary to understand what types of e-government services better fit with different social media tools. The roles of e-government services in the adoption of social media in government are understudied and little is known about social media use in small local governments. This research addresses these research gaps by exploring the relationship between different types of e-government service and social media adoption by small local governments. It also explores how these small local governments use social media. Drawing from e-government and social media literature, it offers hypotheses by focusing on the relationship between e-government service characteristics and the adoption of Facebook and Twitter in the context of small local government. Using original survey and census data of local governments in Nebraska, it finds that transaction services are associated with the adoption of Facebook while information services are related to the adoption of Twitter.

### 1. Introduction

Primarily driven by citizen engagement and Open Government Initiatives, local governments are increasingly using social media for purposes such as distributing information, reaching the community, enhancing public service efficiency, reducing cost, and increasing interagency exchanges (Gulati & Williams, 2013; Mergel & Bretschneider, 2013; NASCIO, 2010; Reddick & Norris, 2013). Such prevalent use of social media represents an interactive tendency that embraces myriad benefits, yet it also has potential risks. For example, unlike traditional e-government services, social media applications are provided by third parties that are outside the direct control of government organizations (Mergel, 2013a). Moreover, the current state of social media use might harm governments' reputations since many governments see these platforms merely as additional channels to broadcast information, rather than a way for bidirectional communication (McNutt, 2008). Also, problems such as security, privacy, records management, employee use/abuse, and time free for staff constrain active use of social media in local governments (McNutt, 2008).

Most social media studies have connected to Web 2.0 or Government 2.0 concepts, such as: open government and transparency, citizen participation, interagency collaboration, and trust in government (Linders, 2012). They follow multiple theoretical frameworks such as: impact of information technology in the public sector, socio-technical and structuration theories, strategic business alignment, and

innovation and diffusion (Criado, Sandoval-Almazan, & Gil-Garcia, 2013). Several gaps emerged from these studies. Among them, the apparent first one is that most studies focus on social media experiences of large cities, although the majority of local governments in the U.S. are small (Cassell & Mullaly, 2012; Feeney & Welch, 2014; Li & Feeney, 2014; Mossberger & Wu, 2012). Second, the relationship between e-government and social media technologies is poorly-defined. Some emphasize the difference by stating social media is capable of engaging citizens in collaborative and transactional activities in ways not possible with e-government (Bryer, 2011; Li & Feeney, 2014). Others, however, find that the use of social media follows the pathway of e-government, but the interactive nature continues to be overlooked (Feeney & Welch, 2014; Mossberger & Wu, 2012). Third, previous studies tend to consider Web 2.0 tools as a homogeneous block, "without fully recognizing the diversity of their technical characteristics and variation in purposes for which they are applied" (Oliveira & Welch, 2013).

As a response to these gaps, this study focuses on social media adoption by small local governments and explores the relationship between existing e-government services and the adoption of two different social media tools: Facebook and Twitter. It also touches on the question of how small local governments are using social media tools to communicate with the public.

The following section introduces a conceptual framework and four hypotheses. Data and methods used to test these hypotheses are then

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presented. This is followed by the results of two logistic regression models and descriptive analysis of survey data, from which the connections between e-government services and the adoption of Facebook and Twitter are illustrated. This paper concludes with a discussion of results and implications.

## 2. Conceptual framework

### 2.1. E-government service types

E-government is defined as “the use of information and communication technologies (ICTs) for a better government or to improve the quality of its services, especially through the use of the Internet and Web technologies” (OECD, 2003). Under e-government platforms, government is the main technology adopter, content contributor, and system manager (Mergel, 2013b; Reddick & Norris, 2013). As a result, the introduction of new platforms is “traditionally top-down driven following organizational needs, technological innovations, as was the case with PCs, email or Internet use” (Mergel, 2013b, p. 125). Engines for the e-government wave are a set of purely asynchronous Web 1.0 tools characterized by “passive users consuming static content functioning as a publishing medium with limited interactive capacity” (McNutt, 2014, p. 52).

Informed by the increasingly extensive e-government practice, scholars identified multiple types of e-government services, such as e-services and communication technologies (Li & Feeney, 2014), e-government services and policies (Haller, Li, & Mossberger, 2011), information services, transactional services, and policy services (Nam, 2014). Despite the existence of various service types, users are using e-government platforms mainly for general information, transaction, and policy search (Nam, 2014). This study adopts the same typology. Specifically, government websites are the main channels for providing information services such as downloading forms, searching government jobs, and navigating potential benefits. Also, they offer an array of transaction services, such as renewing driver's licenses or permits, paying property taxes or fines, and applying for recreational licenses. Policy services are important for sharing information on government organizations, processes, legislations, elected officials, and budgets (Nam, 2014). Under e-government platforms, governments have a better record for providing these three types of services than actively engaging users (Mossberger, Wu, & Crawford, 2013; Nam, 2014).

### 2.2. Relationships between E-government and social media

Changes to the top-down driven e-government adoption procedure occurred with the advent of Web 2.0 technologies such as social media tools (Mergel, 2013b; Reddick & Norris, 2013). The Federal Web Managers Council defined social media as an “umbrella term that encompasses the various activities that integrate technology, social interaction, and content creation” (U.S. General Services Administration, 2009, p. 1). In contrast to this definition, social media have also been regarded as forms of technology “that facilitate social interaction, make possible collaboration, and enable deliberation across stakeholders” (Bryer & Zavattaro, 2011, p. 327).

Social media use emerged mostly through informal experimentation and rapidly gained traction (Mergel, 2013b; Mergel & Bretschneider, 2013). They have an unprecedented social and interactive nature and are committed to facilitating two-way communication as well as co-production (Linders, 2012). As of 2010, the two most popular social media tools used by state governments are Facebook and Twitter (NASCIO, 2010). In the case of local governments, for example, in the 75 largest U.S. cities, the adoption rate of Facebook skyrocketed from just 13% of the cities in 2009 to nearly 87% in 2011; similarly, the rate of Twitter adoption increased from 25% to 87% (Mossberger et al., 2013).

The prevalence of Facebook and Twitter in local governments has

aroused scrutiny for how these technologies are being used, how they differ from e-government technologies, what factors affect the adoption, and how local government managers perceive the outcomes of these technologies (Feeney & Welch, 2014; Li & Feeney, 2014; Mergel, 2013a). To answer these questions, researchers usually observed the experiences of large local governments, which tend to be more advanced in technology development (Mossberger et al., 2013; Reddick & Norris, 2013). They argued in favor of the distinction between e-government technologies and social media. For instance, the analysis of Mergel (2013b) illustrated that instead of driven by top management decisions, the decision to adopt social media practices was influenced by four informal input mechanisms: 1) observations of citizens use of social media; 2) passive observations of highly innovative departments and agencies; 3) active interaction with peers; and 4) formal guidelines developed by lead agencies. Related to this, government service, policy, and governance are usually one-way, going from the agency to the citizen in the case of e-government, while with social media applications “information is co-created, citizens demand services, policy is negotiable, and governance is shared” (Reddick & Norris, 2013, p. 498). Another important distinction is that social media applications are provided by third parties, where technological features are hosted outside government and communication on these applications, to some extent, is beyond direct control of government organizations. The latter fact necessitates different strategies and changes the role of governments from information controllers to dialogue facilitators (Hofmann, Beverungen, Räckers, & Becker, 2013).

Another group of studies argued that e-government and social media are not separate trends. They labeled social media applications as technological innovations in the public sector (Mergel, 2013b), a central component of e-government (Jaeger & Bertot, 2010), a step forward for local governments that makes more use of ICTs to provide information and services to external audiences (Bonsón, Torres, Royo, & Flores, 2012), and additional channels for governments' interactions with stakeholders (Mergel, 2013c). More specifically, social media adoption follows a similar diffusion curve as previous waves of e-government and ICT adoption (Mergel, 2016). This is because social media tools face similar problems of adaptation to the existing organizational culture and institutional structure of public sector organizations, though differing in their technical features (Criado et al., 2013). “Social media adoption is impacted by institutional and organizational mechanisms that direct the degree and extent of adoption.” (Mergel, 2016, p. 146). Case in point, the development of social media tools and Web 2.0 applications by EU local governments was found to not depend on citizen demand or the public administration style but followed a predictable development corresponding to that previously seen in e-government levels (Bonsón et al., 2012). Second, empirical evidence shows that the social/interactive capacity of social media may not be implemented by practitioners (Bryer & Zavattaro, 2011). Mergel (2013a) identifies social media tactics as push (provide government information), pull (invite citizens' inputs), and networking (respond to citizens' inputs). Following this typology, Mossberger et al. (2013) find the 75 largest U.S. cities use extensively the “push” strategy. Similarly, in Turkey and China, social media applications were adopted and used by governments primarily for the purposes of self-promotion and political marketing rather than for transparent, participatory and citizen-oriented public service delivery (Sobaci & Karkin, 2013; Zheng & Zheng, 2014). Third, like e-government, social media enactment is bound by issues involving records management, privacy, administration-specific requirements, and ethics (Jaeger & Bertot, 2010; Mergel, 2013c). Fourth, the use of social media may increase communication between citizens and government, yet it has nothing to do with citizens' skills required for participation. Citizens do not necessarily become more competent in their citizenship skills; they may still be reluctant to utilize social media as an interactive tool to connect with government (Bryer, 2011). Fifth, from the perspectives of innovation adoption and institutionalization, governments that have adopted e-government are

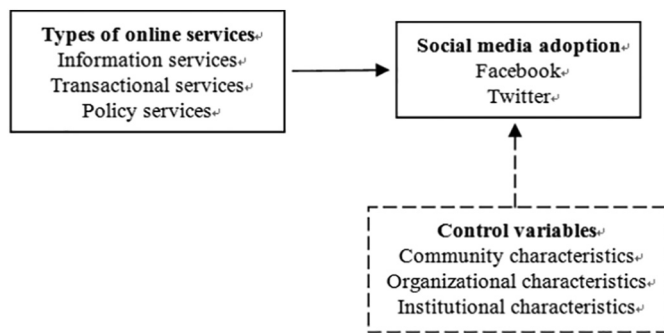


Fig. 1. A conceptual model of social media adoption.

more likely to adopt more advanced technologies (Norris & Kraemer, 1996; Reddick & Norris, 2013). One recent study tested the relationship between institutionalization and social media adoption and found the existence of formal, clear rules actually encourage increases in social media use (Guillamón, Ríos, Gesuele, & Metallo, 2016).

This study follows the arguments that emphasize connections between e-government and social media and takes it as a starting point to explore the relationship between different e-government services and different social media tools.

Fig. 1 shows the conceptual model of social media adoption. It focuses on the connections between different e-government services and adoption of the two most popular social media tools: Facebook and Twitter. It also consists of a set of control variables, which are grouped into community, institutional, and organizational characteristics.

Although social media platforms share similarities in functionalities, they evolve to be different assemblages with distinguishing socio-material characteristics (Panagiotopoulos, Bigdeli, & Sams, 2014). Facebook and Twitter are different regarding their primary purpose. Facebook is mainly considered as a social networking platform for users to build their communities online. Meanwhile, Twitter is primarily considered as a microblogging service that allows users to create short text messages (i.e. 140 characters) and distribute them to others (Mergel, 2013a). In this regard, Facebook is more convenient than Twitter for connecting and reconnecting those who have already established relationships (Kim, 2015). Facebook is preferred among people close to one another (e.g. friends) because it allows them to maintain and strengthen their existing relationships by sharing information and interests (Kim, 2015). Meanwhile, Twitter provides a more interactive and open communication platform in that Twitter users are allowed to follow others without their approval as well as trending topics without having to login (Kim, 2015). For these reasons, Twitter is preferred among those who want to communicate with others who have similar interests, regardless of whether users know each other, and disseminate information to a broad range of communities.

Another difference is that Facebook is more popular than Twitter. As of 1st quarter 2017, there are 1.94 billion monthly active Facebook users (Facebook, n.d.) while there are 328 million monthly active Twitter users around the world (Twitter, n.d). In the United States, the number of active Facebook users is estimated at 196.5 million people (Statista (Digital Market Outlook), n.d.) while that of active Twitter users is estimated at 56.8 million people as of the end of 2016 (The Motley Fool, n.d). Moreover, the user profiles of Facebook and Twitter are somewhat different.

Facebook is adopted by governments in order to complement existing website information and services (Mergel, 2013a). Users can “like”, “follow”, and/or “share” governments’ Facebook pages, and simply leave comments on its posts if they want to. It is the platform that enables governments to inform people faster than traditional websites do. Previous studies have found that when adopting Facebook, governments often do not exploit the full potential of it, but merely copy their e-government behaviors, such as providing information

(Hofmann et al., 2013; Mergel, 2013a). For example, large local governments in Germany use Facebook to provide up-to-date information. Their findings also suggested that governments post topics concerned with leisure activities like the botanical garden or zoo. In contrast, government-specific topics such as policies and reports are seldom discussed. Therefore, this study hypothesizes that.

**H1.** Small local governments providing online information services are more likely to adopt Facebook.

Some businesses are also using Facebook as a channel to provide transactional services, called “F-transactions.” “Several forms of these ‘F-transactions’ have emerged, ranging from providing a link to external content on a Facebook page to completing the whole process on the platform itself” (Hofmann et al., 2013, p. 389). For governments, the idea of F-transactions is beneficial for the efficiency of services and the convenience of users. Transaction services, by nature, often require users to provide personal and financial information (e.g. phone number, credit card number). For some small local governments it is reasonable to adopt Facebook as an instrument for transaction services because Facebook provides diverse functions and stronger privacy and security measures (Kwon, Park, & Kim, 2014). Governments that are committed to improving transactional services can simply start F-transactions through offering a new service or redirecting users to the original service links. Therefore,

**H2.** Small local governments providing online transactional services are more likely to adopt Facebook.

Twitter, though also promoted as an interactive tool, has been primarily used as an additional channel for information and policies distribution, rather than a venue for citizen engagement (Dumont, 2013; Mossberger & Wu, 2012; Panagiotopoulos et al., 2014). For example, the three case cities in Mossberger et al. (2013) showed that Twitter use is primarily representation or “push,” though there is some evidence of two-way communication. Also, as was found in interviews with federal officials, in comparison to Facebook, Twitter is more likely to be used as an information-distribution tool (Mergel, 2013a). This is, in part, due to the nature of Twitter, which is a text-based and content-sharing service that allows for real-time information updates and feedback. Moreover, brief tweets may encourage more back-and-forth communication because of convenience (Mossberger et al., 2013). Beyond these, Twitter has the advantage of creating greater snowball effects than Facebook so that an unrestricted audience can be informed of government information and policies. For example, it is likely that a local government’s information services (e.g. employment information, newsletter) target not only local residents but also people who are potentially interested in them. Building on the above reasons, this paper proposes that:

**H3.** Small local governments providing online information services are more likely to adopt Twitter.

**H4.** Small local governments providing online policy services are more likely to adopt Twitter.

Variables controlled in this study are education attainment, housing value, population age, community size, population density, form of government, IT budget, and e-government barriers and drivers. Education attainment is positively associated with the likelihood that citizens and municipalities will adopt e-government (Reddick & Norris, 2013). Better education is also related to higher income, which contributes to citizens’ use of e-government services (Reddick & Norris, 2013). In the case of free and user-friendly social media applications, however, a negative relationship may be possible, as was found in a study of Italian and Spanish local governments (Guillamón et al., 2016). As a proxy measure of household income, median housing value is included in the model. It is expected that a small local government in a community with higher median housing values is more likely to adopt

Facebook and Twitter. Younger residents are more experienced and knowledgeable about new technologies, thus governments with large numbers of younger residents are likely to adopt social media tools. One illustration comes from the Facebook presence in Israeli municipalities, where median population age was found to be significantly related to Facebook presence (Lev-On & Steinfeld, 2015).

Organization or community size is the most important variable explaining the adoption of e-government (Lev-On & Steinfeld, 2015; Mossberger et al., 2013; Reddick & Norris, 2013). Local government in urban areas are more likely than those in rural areas to adopt Facebook or Twitter, as they may have higher broadband connectivity and more engaged residents than rural areas (Cassell & Mullaly, 2012). The same case would occur in densely populated areas as more communication would be required and social media tools have the potential to promote it. In contrast to mayor-council governments, the council–manager form of government has been found to associate with innovative practices (Feiock, Steinacker, & Park, 2009; Nelson & Svara, 2012). Therefore, the form of government variable is included in order to control the potential effects of characteristics of institutional design on the adoption of Facebook and Twitter. Though both Facebook and Twitter are free tools, the management of accounts requires a sufficient IT budget. Local governments with an IT budget are assumed to be more likely to adopt social media than their counterparts without an IT budget.

In addition, the e-government drivers and obstacles encountered by local governments may also affect their decision on social media adoption. In this study, three groups of e-government drivers were identified using factor analysis: Group1 (learn from other organizations) includes the activities of other local governments, innovative services from private and nonprofit organizations, and good practices disseminated by professional associations/networks such as ICMA. Group2 (directives from the top and media) covers federal government policies, state government policies, and external evaluation such as those from the media. Group3 (inner-jurisdictional supports) consists of policy priorities of local government elected officials, and users' and citizens' demands. There are multiple barriers to e-government development, such as lack of technology/web staff/expertise, lack of information about e-government applications, and issues regarding privacy/security. A summation of these was counted as the barriers variable.

### 3. Methods

#### 3.1. Data collection

This study combines data from the 2015 Nebraska City E-government and Social Media Survey, 2010 American Census, 2015 Nebraska Directory of Municipal Officials, and content analysis of Nebraska local governments' official websites. The 2015 Nebraska City E-government and Social Media Survey aimed to assess small local governments' online services and use of social media. As of the 2013 Census Bureau estimates, there were 530 cities and villages in the State of Nebraska. Among them, a total of 523 cities and villages have a population of < 25,000 and are classified as small local governments, which make up the sampling framework of this study. According to the Small Communities Track for the 2015 ICMA Annual Conference in Seattle and the Local Unit Alignment, Reorganization, and Consolidation Commission (LUARCC, 2009), communities with a population of 25,000 or under are generally considered small. This classification is consistent with academic research (Cockrell, 2012; French, 2004; Rivenbark & Kelly, 2003; Rocheleau, 2005).

The survey was administered online using Google Forms between October and November 2015, with the help of liaison officials who are members of Nebraska City/County Management Association and Nebraska Municipal Clerk's Association. Two follow-up email reminders were sent out in early and middle November 2015. In total, 87 small

**Table 1**

Comparison between the 87 small local government respondents and the state as a whole.

	87 studied Nebraska small local governments	Nebraska state
Median household income	\$48,405	\$52,196
Median housing value	\$93,500	\$122,000
% of bachelor or higher degree	20%	27.7%
Median age	41.4	36.2

Source: Data reported by the 87 small local government respondents in the 2015 Nebraska City E-government and Social Media Survey and data collected in Census 2010.

local governments completed the survey, creating a response rate of approximately 17%. These respondents have an average population of 3625, with a median population of 1245. Table 1 compares these 87 small local government respondents with the state level data in terms of median household income, median housing value, education attainment (% of bachelor or higher degree), and median age. These small local governments have a larger group of older and less educated residents and meanwhile a relatively lower household income and housing value.

To examine the validity of survey responses, content analysis of these 87 small local governments' official websites were conducted. Specifically, to identify e-government services provided by small local governments, the survey instrument utilized a list of online services modified by the 2011 ICMA E-government Survey and asked respondents to check all the services available on their official government websites. An in-depth content analysis of websites was then performed to capture e-government services on the list. In the case that no service button appears on a government's homepage, there was a second look at department-level webpages. Similarly, to locate the official Facebook and Twitter pages of each respondent, the first step was to search for Facebook and Twitter icons on the homepage of each government's official website. If there were such icons, a click on them allowed a check of whether these were official Facebook or Twitter pages, as well as whether or not they were active. If no such icons were found on a homepage, Facebook's and Twitter's internal search functions were then used to search for the name of that government. A small local government would not be considered a Facebook or Twitter adopter if no official pages were found after the above two steps.

#### 3.2. Measurements

##### 3.2.1. Dependent variables

Two dependent variables of this study capture the adoption of Facebook and Twitter by Nebraska small local governments, with a code of 0 for "No, we don't use" and 1 for "Yes, we have an account".

##### 3.2.2. Independent variables

Independent variables in this study are three types of e-government services: information services, transactional services, and policy services. Each of them is a binary variable with 1 for Yes and 0 for No. Five online services were categorized as information services, including form download, online communication, employment info/application, e-newsletter, and e-alerts. The four policy services are local government record, GIS mapping data, council agendas and/or minutes, and code/ordinances. Under the umbrella of transactional services, there are services such as utility pay, tax pay, fine & fee pay, permit application, business license application, request for service, facilities/activities registration, voter registration, and property registration.

##### 3.2.3. Control variables

Variables controlled in this study include education attainment, housing value, median age of the population, size, population density, IT budget, form of government, and e-government development

**Table 2**  
Descriptive analysis of all variables.

Variables	Mean	Min.	Max.
Facebook adoption	0.4	0	1
Twitter adoption	0.3	0	1
Information services	0.6	0	1
Transactional services	0.5	0	1
Policy services	0.7	0	1
Urban (over 2500)	0.7	0	1
IT budget allocation	0.7	0	1
A form of government (Mayor-council = 1)	0.6	0	1
Median population age	40.8	23.3	57.8
Housing value (log)	11.4	10.5	12.4
Population density (per square mile)	1447.1	358.8	3680.1
Education attainment (% of bachelor or higher degree)	19.9	7.7	46.7
E-government barriers	3.8	0	10
E-government drivers			
Learn from other organizations	10.1	0	14
Directives from the top and media	9.4	0	15
Inner-jurisdictional supports	7.4	0	10

barriers and drivers. Data for control variables were collected mainly from the 2010 American Census, 2015 Nebraska City E-government and Social Media Survey, and 2015 Nebraska Directory of Municipal Officials.

**4. Results**

**4.1. Descriptive statistics**

Among the 87 survey respondents, 39 (44.8%) reported that their local governments are using Facebook, and 27 (31%) use Twitter (See Table 2). These adoption rates are relatively low compared with those reported by large municipalities in the 2011 ICMA E-government Survey and provide evidence to support the aforementioned argument that large local governments are more advanced in technology development (Lev-On & Steinfeld, 2015; Mossberger et al., 2013).

From a list of 18 online services (independent variables), respondents were asked to select the ones provided by their local governments on websites. Over half of them reported they are providing transactional services (54%), and around two-thirds offer information-related services (62.1%). Policy services are the most popular e-government services delivered on government websites (74.7%). This is consistent with predictions by previous e-government development models as well as empirical findings based on large local governments' experiences. Overall, small local governments in Nebraska are better characterized as information disseminators rather than transaction providers. Also, they are not big fans of new technologies such as Facebook or Twitter compared with large cities in the nation.

**4.2. Logistic regression analysis**

Two logistic regression models were built for the binary dependent variables: adoption of Facebook and Twitter. For each of them, the model measures how three different types of e-government services affect the adoption decision, controlling the influence of multiple community, institutional, and organizational factors (See Table 3). Both models are significant ( $p < 0.001$ ) and the Cox & Snell R Square and Nagelkerke R Square for both models hover between 30% and 55%, which are reasonable given the binary nature of the dependent variable and the exploratory nature of the study (Oliveira & Welch, 2013).

Given the fact that Facebook is much more popular than Twitter in the United States, it is expected that small local governments are likely to use a more popular social media tool as a complementary channel for information dissemination in general. In Table 3, however, Model 1 shows no significant relationship between information services and

**Table 3**  
Logistic models of Facebook and Twitter adoption.

	Model 1 Facebook adoption		Model 2 Twitter adoption	
	B	S.E	B	S.E
<b>Independent variables</b>				
Information services	- 0.61	1.00	2.24*	1.18
Policy services	0.66	1.00	- 0.57	1.18
Transactional services	1.94**	0.87	- 0.64	0.81
<b>Control variables</b>				
<b>Community characteristics</b>				
Median age	0.10	0.07	0.11	0.08
Educational attainment	- 0.01	0.07	0.04	0.05
Log housing value	0.14	1.24	1.46	1.13
Population density	0.002**	0.00	0.00	0.00
Urban/rural	- 1.08	0.89	- 1.15	0.83
<b>Institutional characteristics</b>				
Form of government	1.24	0.88	- 0.47	0.87
<b>Organizational characteristics</b>				
IT budget	- 0.28	0.94	0.56	0.83
E-government barriers	- 0.41**	0.20	- 0.25	0.18
Learn from other organizations	0.22	0.27	0.14	0.21
Directives from the top and media	- 0.41	0.26	- 0.37	0.23
Inner-jurisdictional supports	0.38	0.34	0.42	0.34
Constant	- 7.50	13.82	- 23*	13.49
<hr/>				
Number of observation	69		68	
Cox & Snell R Square	0.40		0.30	
Nagelkerke R Square	0.53		0.41	

\*  $p < 0.1$ .  
\*\*  $p < 0.05$ .

Facebook adoption, Hypothesis 1 is not supported by the data. This finding is inconsistent with previous studies that argued governments often do not exploit the full potential of Facebook but merely copy their e-government behaviors (Hofmann et al., 2013; Mergel, 2013a). In the case of Twitter, Model 2 shows Hypothesis 3 was supported by the data while Hypothesis 4 was not. The results imply that small local governments providing information-based e-government services tend to adopt Twitter, rather than Facebook, as an additional channel for information dissemination.

The Model 1 illustrates that Facebook adoption is significantly associated with the adoption of transactional services ( $\beta = 1.94$ ;  $p < 0.05$ ). Hypothesis 2 is thus supported, which proposes that small local governments providing transaction services through their e-government websites are likely to take advantage of Facebook as a complementary medium to deliver transaction services. Contrarily, Model 2 shows that the provision of transaction services is not significantly related to the use of Twitter. The results indicate that small local governments are more likely to use Facebook for transaction-based services.

Several examples of F-transactions can be found in Fig. 2, which are screenshots of the official Facebook page of the City of Papillion (pop = 21,921, according to Census Bureau, 2010 estimates), Beatrice (pop = 12,459), Genoa (pop = 1003), Albion (pop = 1650), Norfolk (pop = 24,210), and Alliance (pop = 8491). These governments were randomly chosen from the total 39 survey respondents that reported they have official Facebook accounts. All of them are online transactional services providers, according to the survey data. In the examples in Fig. 2, they provide links to external content on Facebook in order to redirect public users to the original government transactional service webpages. By using Facebook in this way, they were able to promote existing online services to a larger audience in a way that is free and



Fig. 2. Examples of F-transaction.

accessible to both governments and the public.

Sources: Screenshots are captured on these local governments' official Facebook accounts between February 20th and June 20th, 2017.

Among the community characteristics, population density is found significant for Facebook adoption ( $\beta = 0.002$ ;  $p < 0.05$ ) while it is not significant for Twitter adoption in small local governments. Among organizational characteristics in Table 3, we found that e-government barriers are significantly related to the adoption of Facebook ( $\beta = -0.41$ ;  $p < 0.05$ ) while they are not significantly related to the adoption of Twitter. Examples of those barriers include a lack of technology/web staff/expertise, lack of information about e-government applications, staff resistance to change, and others. This finding verifies that, though differing in technical features, when adopting Facebook a small government might face similar difficulties as e-government adoption, such as adapting to the existing organizational culture and institutional structure of public sector organizations (Criado et al., 2013).

What is unexpected is that none of those community, organizational, or institutional characteristics are significantly related to Twitter adoption in small local governments. The findings imply that Twitter adoption in small local governments is somewhat independent of their community, institutional, and organizational characteristics.

Overall, the findings from two logistic regression models support some of the core arguments made in this paper earlier. First, for local governments, there are more connections than distinctions between e-government and social media technologies, as both are regarded as the

tools to connect government and the public. Consequently, their decision of adopting social media tools can be affected by the levels of e-government development. Second, although Facebook and Twitter share similarities in functionalities, the influence of different e-government services on them differs.

#### 4.3. Social media use patterns in small local governments

The studies on how social media applications have been utilized by local governments demonstrate that governments use social media tools as an additional way to disseminate public information, though in some cases they tend to engage citizens in interactive conversations and actions (Hofmann et al., 2013; Mergel, 2013b; Zheng & Zheng, 2014). In the case of Nebraska, as discussed earlier, 39 small local governments use Facebook, while 27 have official Twitter accounts. Using the Mergel (2013a) typology, these respondents were asked to indicate how often their local governments use Facebook and Twitter (1 for annually and 5 for daily) to provide information (push), invite citizens' inputs (pull) and respond to their inputs (networking).

Fig. 3 displays the daily and weekly use of Facebook and Twitter by small local governments to provide government information and invite and respond to citizens' inputs. For each of them, Facebook is more actively used than Twitter. This highlights small local governments' preference of Facebook over Twitter in general. Overall, Facebook and Twitter have been adopted as an additional broadcasting channel to get the message out. It is also noticeable, however, that nearly half of the

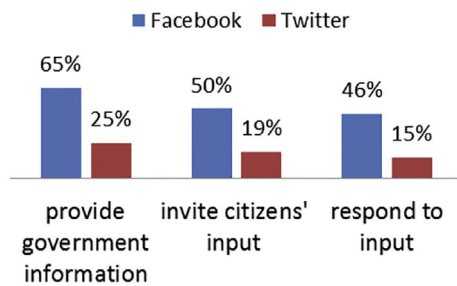


Fig. 3. Daily or weekly use of Facebook and Twitter.

small local governments are taking advantage of the interactive characteristics of Facebook and Twitter to promote two-way communication with the public.

## 5. Discussion and conclusion

This paper developed hypotheses on how different e-government services relate to the adoption of the two most popular social media tools: Facebook and Twitter. Firstly, it reviewed the debates on the relationship between e-government and social media technologies and followed the institutionalization theory to emphasize connections and consistency between e-government development and social media adoption. After identifying distinct features of Facebook and Twitter, a survey of small local governments in Nebraska was conducted to provide empirical evidence on the relationships and use of social media. Meanwhile, content analysis of these small local governments' official websites was conducted to ensure the validity of survey responses and to collect data on the use of Facebook and Twitter.

We found that transaction-based e-government services better fit to Facebook adoption while information services tend to facilitate Twitter adoption. In other words, small local governments are likely to use Facebook as a complementary means of providing transaction e-government services while using Twitter to supplement online information services. The findings imply that Facebook and Twitter use in small local governments do not equally serve as complementary channels for all types of e-government services. This is probably because the popularity and social networking features of Facebook better serve the primary customers of transaction-based e-government services. It is likely that residents within a local government's jurisdiction are the main customers of e-government transaction services provided by the local government (e.g. online voting registration, online registration of business license). As discussed earlier, the fact that Facebook is more popular than Twitter increases the probability that there are more local residents who use Facebook, rather than Twitter, in small community. If these local residents use Facebook, their connections can be better maintained and strengthened in a small community. Accordingly, a small local government providing online transaction services may want to take advantage of Facebook's popularity and strong social networking features to promote the use of existing e-government transaction services to local residents as potential customers because information about those transaction-based e-government services is likely to spread out quickly through networks of local residents.

We speculate, however, that the characteristics of Twitter as a more interactive and open communication tool and user profiles might better meet small local governments' needs to improve their capability of disseminating information to not only local residents in small community, but also people in larger communities who are potentially interested in a small community (e.g. job seekers, tourists). The findings suggest when developing social media strategies, attention should be put on the extent to which the characteristics of e-government services fit the features of specific social media tools.

The regression models also disclosed the influence of some community and organizational characteristics on Facebook adoption,

including population density and e-government barriers. In a small and densely populated community, it is likely that people know one another and are strongly connected. In comparison to Twitter, as a social networking service, Facebook is often used to strengthen existing social relationships, reconnect, and/or explore new relationships. Given that Facebook has been widely and rapidly used among people in rural areas as well as urban/suburban areas (Greenwood, Perrian and Guggan, 2016), a local government in a small and densely populated community is likely to use Facebook as a means of strengthening networks with people in that community.

Such factors, however, were found not to relate to Twitter adoption thus implying that Twitter adoption in small local governments is independent of community limitations, citizen demands or administrative influence. Twitter adoption follows a predictable development, corresponding to that already seen in e-government services. Due to the limited data, it is challenging to explain why those factors did not play a significant role in the adoption of Twitter by small local governments in Nebraska. It is speculated, however, that a small local government's Twitter adoption is more likely dependent on its Facebook adoption. In our sample, as discussed earlier, 31% (27) of the small local governments use Twitter while 45% (39) of them use Facebook. Most Twitter adopters (21 out of 27) also use Facebook though only about half of the Facebook adopters (21 out of 39) use Twitter. Given that Facebook is more popular and has stronger social networking features than Twitter, it may be preferred by small local governments.

This study also analyzed how Facebook and Twitter are used in small local governments. The survey showed that these governments are performing all three types of use, and for each type, Facebook is more popular than Twitter. Small local governments' use of Facebook and Twitter is not ending with publishing information. Instead, they are inviting the public to co-create, participate, or show interests with phrasing like "welcome to join," "please retweet," "need your attention," and "waiting for your participation." By using social media as a communication bridge, both small local governments and the public can benefit greatly: governments are more open and transparent with an expectation to communicate and the public becomes more willing to offer their comments and advice on public information and affairs (Mergel, 2013a). This two-way communication could also engage the younger generation, who may not actively engage in offline participation (Im, Cho, Porumbescu, & Park, 2014; King, Feltey, & Susel, 1998).

Among the limitations of this research, its external validity is limited because the data came from a single state, Nebraska. Considering that the adoption and use of Facebook and Twitter by small governments are historically, politically, and culturally constructed, the results could be uniquely affected by the State of Nebraska's historical, political, and cultural context. Accordingly, in-depth case studies in various states and/or nation-wide large N advance our understanding of social media adoption among small local governments.

A second limitation is that though this study did touch on the question of the use of social media in small local governments, it did not discuss strategies for government-citizen communication through social media tools. Several studies have concentrated on this topic and demonstrated interesting findings such as "multimedia features like photos and videos contribute to the success of communication" (Hofmann et al., 2013, p. 393) and a positive rather than neutral tone on social media sites will encourage citizen participation (Zavattaro, French, & Mohanty, 2015).

Community characteristics as proxy measures of citizens' demands for social media services were added to control for their effects on the adoption of social media by small governments. Due to limited resources, however, this study did not collect data that directly measure citizens' demands. In order to comprehensively understand the scenario of local government use of information technology, it is necessary to include both the supply and demand sides of e-government (Criado et al., 2013; Jaeger & Bertot, 2010). Therefore, a next step should be conducting a government social media users/followers survey to have a

complete picture of how they perceive government use of social media.

Theoretical implications of this study are significant as it demonstrates that Facebook and Twitter can contribute to different purposes of small local governments. Also, it provides support to the previous view that social media adoption is another step in e-government evolution. It contributes to this viewpoint by confirming small local governments' efforts toward more interactive use of social media tools, Facebook in particular. This study also contributes to the practice of social media adoption, because it discloses the influence of community and organizational factors on Facebook adoption while finding no such effects on Twitter adoption. For small local governments interested in social media adoption that have limited resources, this study can be helpful for their strategic decision making.

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## Endnote

A renewed survey, with additional departmental level questions on use of social media, has been successfully administered with counties in the State of Iowa between December 2016 and January 2017. Future research should enlarge the sample size and collect comparable data from more local governments on their use of interactive technology such as social media.

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