

Use of Social Media for Internal and External Collaboration:
Evidence from US Local Governments

by

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ABSTRACT

This dissertation examines the use of social media technologies by US local governments for internal and external collaboration. Collaboration is defined as the process of working together, pooling resources, sharing information and jointly making decisions to address common issues. The need for greater collaboration is evident from numerous examples in which public agencies have failed to effectively collaborate and address complex challenges. Meanwhile, the rise of social computing promises the development of ‘cultures of participation’ that enhance collaborative learning and knowledge production as part of everyday work. But beyond these gaps and expectations, there has been little systematic empirical research investigating the use of these powerful and flexible technologies for collaboration purposes. In line with prior research, my dissertation draws on sociotechnical and resource dependence theoretical approaches to examine how the interaction between technological and social context of an organization determine the adoption and use of a technology for a task. However, in a break with prior work that often aggregates social media technologies as one class of technology, this dissertation theorizes different classes of social media based on their functionality and purpose. As a result, it develops more explicit means by which organization, technical, and environmental context matter for effective collaboration. Based on the aforementioned theoretical approaches, the dissertation develops a theoretical model and several hypotheses, which it tests using a unique 2012 national survey of local governments in the US conducted by the Center for Science, Technology and Environmental Policy Studies at ASU. Overall, the findings of this dissertation highlight that the adoption and use of social media technologies for collaboration purposes can be

understood as an outcome of stakeholder participation, innovativeness, and social media type. Insights from this dissertation contribute both to our theoretical understanding about social media technology adoption and use in government and provide useful information for agencies.

DEDICATION

Dedicated to my mom and dad.

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1. INTRODUCTION

1.1 Significance of this study

This dissertation examines the use of social media technologies by US local governments for internal and external collaboration purposes. Collaboration is a process where stakeholders work together, pool resources, share information and co-create to address common issues (Gray, 1985; Hardy, Phillips, & Lawrence, 2003). Local government agencies are often expected to collaborate with other government entities, business, and non-profit organizations (NGOs) for providing services. As Warm (2011) notes, every local government in the US has formal partnerships with schools, hospitals, counties, and cities etc. to deliver services. Local authorities work across departments and jurisdictions to provide public goods (e.g. law enforcement, health services). A recent survey highlighted that collaboration across agencies and with citizen ranks as a top trend for US state and local government departments (“Top 2013 Trends for Local and State Governments”, 2013).

The need for greater collaboration is evident from numerous examples in which public agencies have failed to collaborate effectively and address complex social challenges (Mergel, 2010; Pendleton, 2010). Events such the attempted bombing of New York’s Time Square, the prevented terrorist attack in Detroit, and Hurricane Katrina have highlighted the inability of public agencies to connect the dots and effectively collaborate to address complex challenges (Mergel, 2010; Pendleton, 2010). Addressing crises of this scope is generally beyond the capacity of one agency, thus necessitates collaboration among agencies and sectors (Pendleton, 2010). As one public agency director aptly

noted, “collaboration is when everybody brings something to the table (expertise, money, ability to grant permission). They put it on the table, take their hands off and then the team creates from there” (Thomson & Perry, 2006, p. 20). In other words, during the process of collaboration, stakeholders are expected to work through their differences and create something new that each could not have produced alone.

While in theory, it is easier to expect that stakeholders addressing complex challenges are likely to share resources and knowledge; often the process of collaboration is riddled with problems and conflicts. Previous studies have often argued that the process of collaboration is non-linear, dynamic, and emergent in nature (Ansell & Gash, 2008). Further, several factors facilitate or hinder the process of collaboration (Ansell & Gash, 2008; O’Leary, Gazley, McGuire, & Bingham, 2008). For instance, the collaboration literature often agrees that organizational factors such as stakeholder participation, innovativeness, centralization, and routineness often predict the outcome of the collaboration process. And, this understanding is often based on face-to-face collaboration process (e.g. Ansell & Gash, 2008; Emerson, Nabatchi, & Balogh, 2011) and ignores the role of information technologies in facilitating collaboration among stakeholders.

Meanwhile, the rise of social computing promises the development of ‘cultures of participation’ that enhance collaborative learning and knowledge production as part of everyday work (Fisher, 2002, 2009; Hagel et al. 2009; DiMicco and Millen, 2008; Turner et al. 2010). A variety of studies point out that public agencies are increasingly adopting and using social media technologies for achieving organizational goals. Social media

technologies are web-based tools that allow the exchange of user-generated contents (Kaplan & Haenlein, 2012). Many expect that use of social media technologies in the public sector is likely to improve transparency, enhance participation, foster collaboration, and save costs (Bertot, Jaeger, and Grimes, 2010; Criado & Sandoval-Almazan, 2013; Hui & Hayllar, 2010).

Despite these promises, scholars are increasingly finding that public agencies are using social media technologies for disseminating information and not for participation and collaboration purposes (Meijer & Thanos, 2013; Oliveira & Welch, 2013; Zheng, 2014). Studies are reporting that public agencies are lagging behind in their adoption and use of social media technologies for improving participatory dialogue and collaboration among stakeholders (Bonsón, Torres, Royo, & Flores, 2012; Williamson & Parolin, 2013). It is often reported that the social context of public agencies influences the use of these technologies for organizational purposes. For example, rule-bound centralized organizational structure is anticipated to promote silo functioning that often prevents public employees from using social media technologies for two-way communications (Abdelsalam et al., 2013). But beyond these gaps and expectations, there has been little systematic empirical research investigating the use of these powerful and flexible technologies for internal and external collaboration purposes. Thus, this dissertation seeks to examine the following questions:

1. What organizational, technical, and environmental factors affect the use of social media technologies for internal and external collaboration in U.S. local governments?

2. How do different social media tools influence internal and external collaboration in U.S. local governments?
3. What organizational, technical, and environmental factors affect social media use for various tasks of collaboration via different social media tools in U.S. local governments?

In line with prior research, this dissertation integrates sociotechnical (Bostrom & Heinen, 1977; Kling & Lamb, 1999) and resource dependence (Pfeffer & Salanick, 1978) theoretical approaches for developing an integrative framework to examine the adoption and use of social media technologies for collaboration purposes. Sociotechnical theory asserts that the adoption, implementation, and use of a technology for achieving an organizational task are determined by the joint interaction between technological and social factors of the organization. Resource dependence theory argues that an organization depends on their environment for resources and often develops strategies and processes for obtaining resources for survival. The insights from sociotechnical and resource dependence theoretical approaches offer a foundation to develop a general framework for examining the influence of organizational, technical, and environmental factors on the adoption and use of a new technology for achieving organizational tasks. Particularly, it provides mechanisms to understand and examine how stakeholder participation, innovativeness, centralization, routineness, technical capacity, and external pressure directly and indirectly influence the adoption and use of social media technologies for collaboration purposes.

However, in a break from prior work that often aggregates social media

technologies as one class of technology, this dissertation theorizes different classes of social media functionality and purpose. Defining social media technologies as one class often obscures a nuanced understanding of how these technologies affect organizational outcomes (Treem & Lenonardi, 2012). In other words, categorizing social media technologies based on their features may offer more nuanced understanding to examine the usability of these technologies for achieving organizational tasks. Particularly, this understanding is likely to help explain how different social media technologies facilitate the process of collaboration.

The theoretical model and hypotheses are tested using unique 2012 national survey of US local governments conducted by the Center for Science, Technology and Environmental Policy Studies (C-STEPS), Arizona State University (ASU). The survey was designed to collect data on the use of specific social media technologies by the organization. It then collected data on the specific ways in which the different technologies are used for different types of agency work, including internal and external collaboration. Hence, there is a connection in the data between the specific social media technology adopted by the organization and the task for which it was used. The survey also collected well-established measures of stakeholder participation, innovativeness, centralization, routineness, technical capacity, and political pressure. Given the nature of hypothesized direct and indirect relationship between the organizational, technical, and environmental factors on the adoption and use of social media technologies for internal and external collaboration, structural equation modeling (SEM) is used. SEM is an extension of regression analysis and simultaneously estimates both direct and indirect

relationship between variables of interest.

1.2. Contributions of this study

Findings of this dissertation offer several contributions. First, this dissertation applies insights of sociotechnical theory to examine the adoption and use of social media technologies for collaboration purposes. Sociotechnical theorists argue that organizational and technical factors co-jointly determine the adoption and use of a technology for achieving a task. Although, previous studies have applied sociotechnical theoretical perspective to explain the adoption and use of social media technologies in the public sector, little research has systematically investigated the use of social media technologies for collaboration purposes. By applying a sociotechnical theoretical approach to examine the adoption and use of social media technologies for collaboration purposes, this dissertation contributes and extends emerging literature that focus on understanding the interactions between social and technical factors that explain the adoption and use of these technologies for collaboration purposes.

Second, this dissertation applies resource dependence theory to understand the influence of external pressures on the adoption and use of social media technologies in the public sector. As public organizations are accountable to citizens and political heads, previous literature often argues that these external actors play a critical role in pushing agencies towards adopting these new technologies. Moreover, given the participatory nature of social media technologies, it is often anticipated that public organizations are likely to leverage interactive and participatory nature of social media technologies for improving transparency, civic engagement, and collaboration. However, previous studies

are reporting that public agencies are using social media technologies for one-way information dissemination rather than two-way communication and collaboration. Thus, by investigating how political pressure influence the adoption and use of social media technologies, this dissertation makes a contribution to the literature on resource dependence theory, which argues that an organization strategically develop processes to manage their dependence on the external environment for survival.

Third, this dissertation integrates sociotechnical and resource dependence theoretical perspectives to develop an integrated framework for examining the influence of organizational, technical, and environmental factors on the adoption and use of social media technologies for collaboration purposes. Particularly, this integrated framework explains how stakeholder participation, innovativeness, centralization, routineness, technical capacity, and political pressure influence the adoption of social media technologies and subsequently result in the use of these technologies for collaboration purposes. Thus, the integrated theoretical framework offers a more robust model for examining the influence of different factors on the adoption and use of social media technologies for collaboration purposes.

Fourth, this research adds to the collaboration literature, which often focuses on face-to-face collaboration processes and ignores the complexities embedded in the use of technologies for achieving collaboration outcomes. Further, this dissertation discusses how several factors influence different types of collaboration: internal and external. While the collaboration literature discusses different types of collaborations, the literature often ignores how social media technologies may differentially influence internal vs.

external collaboration. Thus, this dissertation offers more comprehensive understanding of whether similar organizational, technical, and environmental factors predict the adoption and use of social media technologies for internal and external collaboration.

Fifth, this dissertation classifies social media technologies based on their features and usability. Previous literature on the adoption and use social media technologies often considers these technologies as a homogenous group without paying attention to their features and usability. The classification of social media technologies based on their features and usability allows one to capture the variation in social media technologies helps understand how these tools can be integrated into the organization for fostering collaboration. Thus, by classifying social media technologies based on their features and usability, this dissertation makes an important theoretical and empirical contribution to the emerging social media literature.

Finally, from a public administration perspective, the findings of this dissertation can highlight how public managers could adopt different social media technologies for achieving organizational tasks. Further, the findings may highlight how different organizational, technical, and environmental factors encourage internal and external collaborations. Particularly, how social and technical factors interact to result in successful (or unsuccessful) collaboration outcome. In other words, public managers could potentially use a particular subset of social media technologies for achieving a specific organizational task.

1.3. Organization of this dissertation

This dissertation includes a total of six chapters. The second chapter reviews

existing literature to develop a foundation for examining the adoption and use of social media technologies for collaboration purposes. Particularly, this chapter provides an overview of sociotechnical and resource dependence theoretical approaches to develop a general theoretical framework for examining the influence of organizational, technical, and environmental factors on the adoption and use of a technology for achieving organizational tasks. Then, the process of collaboration is discussed as an organizational task, and how different factors facilitate or hinder this process. Next, social media technologies are discussed as a genre of technology, and how social and technical factors influence the adoption and use of social media technologies in the public sector. Following this, social media technologies are categorized based on their features and how different social media technologies help various aspects embedded in the process of collaboration. Finally, an integrated theoretical framework is presented to examine how stakeholder participation, innovativeness, centralization, routineness, technical capacity, and political pressure directly and indirectly influence the adoption and use of social media technologies for collaboration purposes.

The third chapter builds on the theoretical model presented at the end of chapter two. Particularly, hypotheses are developed illustrating the influence of stakeholder participation, innovativeness, and technical capacity on the use of social media technologies for collaboration purposes. Next, hypotheses are presented highlighting how different classes of social media technologies – communication and work sharing tools - influence internal and external collaboration. Additionally, the chapter presents several propositions on how centralization and routineness influence stakeholder participation

and innovativeness and subsequently influence the adoption and use of social media technologies. Further, how political pressure indirectly influence the adoption and use of social media technologies via stakeholder participation.

The fourth chapter describes the data and methods. This dissertation uses 2012 national survey of US local governments in conducted by C-STEPS. The survey asked questions to gauge the influence of organizational, technical, and environmental factors on the adoption and use in information technologies. The respondents were asked about how emerging technologies are used to connect with peer agencies, stakeholders, and citizens. The survey was administered to a random sample of 2500 local government managers. After discussing the data collection strategy, an overview of missing data analysis is discussed and the strategy to handle missing data. Next, an overview of measures for dependent, independent, and control variables are discussed. Finally, SEM modeling is discussed to highlight the data analysis strategy.

The fifth chapter presents the finding of the data analysis. First, univariate and bivariate statistics are presented to highlight the distribution of data. Second, results from SEM are presented to illustrate the direct and indirect influence of organizational, technical, and environmental factors on the use of social media tools for collaboration purposes via communication and work sharing tools. Finally, several robustness checks are conducted to test the validity of these results. The sixth chapter discusses the theoretical and policy implications of the findings. This chapter interprets the results of the SEM analysis conducted in Chapter five. Further, the limitations and avenues for future research are also discussed in the final chapter.

Overall, the findings of this dissertation indicate that organizational structures, norms, practices, and social media type determine the adoption and use of social media technologies for internal and external collaboration. Particularly, stakeholder participation and innovativeness have an indirect effect on the use of social media technologies for collaboration purposes. Further, work sharing tools has a positive and significant influence on the use of social media technologies for internal collaboration. However, communication and work sharing tools have positive and significant influence on the use of social media technologies for external collaboration. In other words, the use of communication tools such as Facebook, Twitter, and YouTube do not aid in internal collaboration. The findings of this dissertation highlight that social media technologies are malleable to social and technical context of the organization.

2. THEORETICAL FRAMEWORK

The aim of this chapter is to develop a foundation for understanding how organizational, technical, and environmental factors influence the adoption and use of social media technologies for collaboration purposes. Particularly, this chapter explains how organizational structures, processes, and norms facilitate or hinder the adoption and use of social media technologies for collaboration. What follows is a discussion of five main goals to be achieved in this chapter.

First, this chapter presents an overview of sociotechnical theory to explain how different organizational and technical factors influence the adoption and use of a technology for achieving organizational tasks. In this dissertation, the organizational task component refers to the process of collaboration, and the technology component refers to social media technologies. Sociotechnical theorists argue that social and technical factors of an organization co-jointly determine the use of a technology for a task (Emery & Trist, 1972). The optimization of use of a technology for a task is determined by four key principles: stakeholder participation, innovativeness, decentralized structure, and routinized task environment (Cherns, 1976; Emery 1969; Pasmore, 1988).

Second, as an organization is embedded in its environment, resource dependence theory illustrates how environmental factors influence an organization's decision and thereby affects its adoption and use of new technologies. Resource dependence theory asserts that an organization depends on its environment for resources, and consequently, the organization is likely to strategize its use of processes for obtaining resources and managing its dependence (Pfeffer & Salanick, 1978). The insights from sociotechnical

and resource dependence theoretical perspectives provide a general framework to examine the influence of organizational, technical, and environmental factors on the adoption and use of social media technologies for collaboration purposes.

Third, this chapter discusses the concept of collaboration to highlight different factors influencing the collaboration process and its outcomes. The process of collaboration is defined as a joint activity among diverse stakeholders working together to achieve a common goal (Gary & Wood, 1991). The collaboration literature often agrees that the process of collaboration is nonlinear, dynamic, and evolutionary in nature. Moreover, it suggests that organizational factors such as stakeholder participation, innovativeness, centralization, and routineness predict the outcome of the collaboration process. The collaboration literature often focuses on face-to-face collaboration activities (e.g. Ansell & Gash, 2008) and ignores the complexities embedded in the adoption and use of information technologies for collaboration. Advancements made in social media technologies promise to aid in the process of collaboration.

Fourth, social media technologies are discussed as a new genre of technologies, with a specific focus on how organizational structures, processes, and norms predict the successful or unsuccessful adoption and use of these technologies for work outcomes in the public sector. Previous research findings support the predictions of sociotechnical theory that social media technologies are malleable to an organization's social and technical factors (Meijer & Thanes, 2013; Feeney & Welch, 2013). The emerging literature also suggests that political pressure plays a critical role in the adoption of these technologies (e.g. Wang & Feeney, 2014).

Fifth, much of the current literature on social media often treats these new technologies as a homogenous block and does not pay attention to their characteristics and purposes for which they are used (Oliveira & Welch, 2013). In a break from prior literature, different social media technologies are categorized based on their features and how these features relate to various aspects of embedded in the process of collaboration. Finally, this chapter integrates the above discussions to present a conceptual model that depicts how organizational, technical, and environmental factors influence the adoption and use of social media technologies for collaboration purposes. The conceptual model presented at the end of this chapter provides building blocks for developing hypotheses and empirical models to be discussed in chapter three.

2.1. Sociotechnical theory

Sociotechnical theory rejects that technology alone is the prime determinant of organizational outcomes; rather, the process of adoption and use of a new technology is codetermined by the social and technical factors of an organization (Emery & Trist, 1972; Kling & Lamb, 1999). Social factors consist “of the people who work in the organization and all that is human about their presence” (Pasmore, 1988, p. 25). They focus on attributes such as human attitudes, skills, values, norms, perceptions, and culture (Bostrom & Heinen, 1977; Cummings, 1978) and include relationships among employees (Kull et al., 2006). Technical factors include “the tools, techniques, artifacts, methods, configurations, procedures, and knowledge used by organizational employees to acquire inputs, transform inputs into outputs, and provide output or services to clients or customers” (Passmore, 1988, p. 55). The technical factors create a structure within which

members of the organization operate to achieve organizational tasks (Emery, 1959). Thus, the combined interactions among technology, people, process, and structure produce work outcomes. However, the interactions between social and technical factors could either result in successful or unsuccessful work outcomes (Bostrom & Heinen, 1977). According to sociotechnical theory, an organization can optimize its technical and social performance if its work environment addresses the following four key principles: stakeholder participation, innovativeness, decentralization, and non-routineness.

The first principle of sociotechnical theory is that organizational practices fostering participation among employees play a critical role in promoting the adoption and use of a new technology for accomplishing a task. It suggests that stakeholder participation encourages employees to interact and work with each other to get things done (Eason, Harker & Olphert, 1996). Further, as employees engage and deliberate, they are likely to understand their interdependence, which, in turn, promotes collaboration among employees to accomplish a task. However, scholars often report that the bureaucratic organizational design results in siloed functioning, where each unit within an organization performs specialized tasks with little opportunity to participate in the whole organization functioning. Thus, a lack of stakeholder participation often limits information sharing and exchange among units in an organization, resulting in a mismatch among how interrelated tasks are carried out (Cherns, 1976).

Sociotechnical theory's second principle contends that an innovation driven organizational outlook promotes the adoption and use of a new technology for a task. An innovative organization often supports its employees to take risks and search for novel

solutions for addressing organizational challenge (Awazu et al., 2009; Kanter, 1983). Further, employees working in an innovative organization are more likely to be amenable to adopting and using a new technology (Moon & Norris, 2005). Moreover, an organization that is innovative is likely to understand the value of innovation and experiment with new technologies (Tushman & O'Reilly, 1997).

The third principle of sociotechnical theory posits that a decentralized organizational structure is critical for promoting innovation and maintaining continuous knowledge sharing among employees. In a decentralized organization, decision-making authority is dispersed across the organization, where employees are free to engage in peer-to-peer interactions (Trist & Bamforth, 1972). Peer-to-peer interactions are likely to facilitate rapid responses to challenges as they arise (Deckers, 2002) and promote cross-fertilization of ideas for effective problem solving (Aiken & Hage, 1971). Further, this form of interaction may promote active learning as employees have a chance to evaluate their work and learn from mistakes (Sandbergs, 1995). In comparison, a centralized organization is likely to limit participation among employees and potentially reduce the level of heterogeneous information available for addressing an issue. Moreover, a lack of information sharing could potentially hinder innovation as employees are not likely to hear different perspectives and may have limited knowledge about the issue at hand (Damanpour, 1996; Tornatzky & Fleischer, 1990).

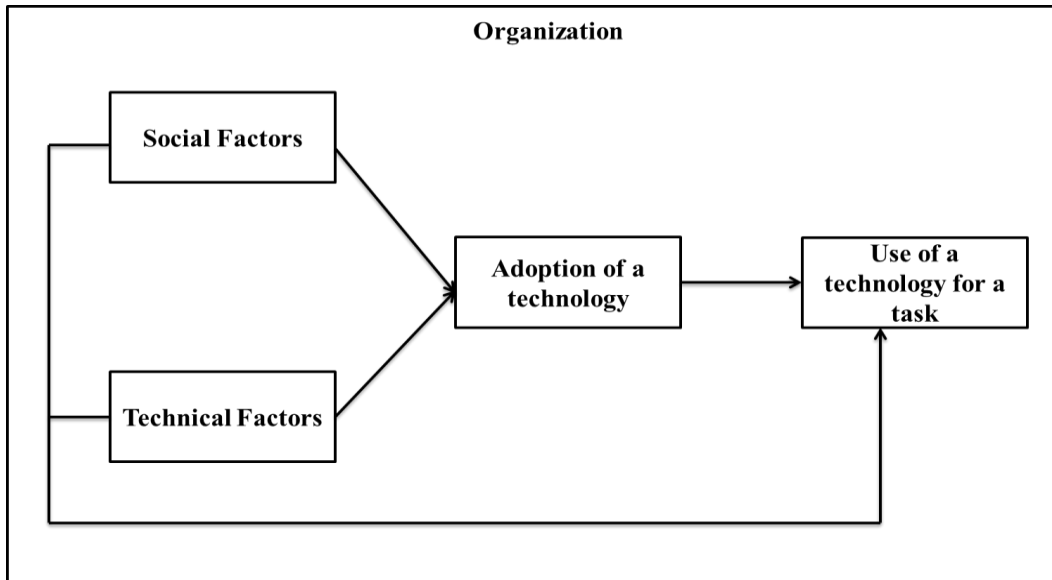
The final principle of sociotechnical theory argues against the traditional routinized organizational structure prevents employees from adapting and changing their responses in a constantly changing environment. Employees performing routinized tasks

are likely to carry out standard jobs and have specialized knowledge (Holmqvist, 2004). For instance, Emery (1959) argues that employees performing routine tasks often lack knowledge about the whole organization, and a small error could potentially create systemic effects. In comparison, an organization that encourages diversity of tasks is more likely to facilitate information sharing and exchange among units (Burns and Stalker, 1961). The efficient flow of information is likely to encourage cross-fertilization of ideas (Aiken & Hage, 1968; Tushman & Nadler, 1978). Further, employees performing a variety of tasks are more likely to be less resistant to adopting new perspectives.

2.1.2. Summary: Key concepts

Sociotechnical theory posits that social and technical factors codetermine the adoption and use of a new technology to accomplish a task in an organization. The social system focuses on attributes of a human such as their attitudes, skills, values, and perceptions. The technical system consists of processes, methods, and tools required to transform raw material into products or outputs. The joint interactions between social and technical factors determine the adoption and use of a technology for a task (Figure 1). Further, this joint interaction can be optimized depending on four key principles: stakeholder participation, innovativeness, decentralization, and non-routineness.

Figure 1: Sociotechnical theoretical approach



While sociotechnical theory offers a framework to understand the adoption and use of a new technology for achieving a task, the theory often focuses on internal organizational factors (Cleggs, 2000). An organization is embedded in its environment that consists of external pressures that can influence the behavior of the dependent organization. In the context of a public sector, public agencies are accountable to political executives and citizens, thus it is anticipated that these actors are likely to influence the decisions of the dependent agency (Wang & Feeney, 2014). In the next section, resource dependence theory explains the influence of external stakeholders on public organizations.

2.2. Resource dependence theory

Resource dependence theory argues that an organization is an open system that depends on its external environment for resources such as capital, information, and material (Emerson, 1962, Pfeffer & Salancik, 1978). According to Pfeffer and Salancik (1978) “to understand the behavior of an organization you must understand the context of

that behavior—that is, the ecology of the organization” (p. 1). In other words, an organization is likely to adapt and respond to changes in the external environment. The dependence on the external environment is likely to affect an organization’s internal arrangements (Tillquist, King, & Woo, 2002).

In addition, resource dependence theory proposes that the dependence on the external environment has three main impacts. The first impact is that the exchange of resources often results in power relations between the external environment and the dependent organization. The pattern of exchange often results in asymmetrical influence and power imbalances because the external environment controls the resources. Pfeffer (1992) theorizes that the external environment often uses these resources as a mechanism for instilling behaviors in the dependent organization. The mechanism of control often includes contractual agreements, administrative supervisions, and outcome evaluations (March & Simon, 1958; Ouchi & Maguire, 1974; Weber, 1947). Consequently, scholars argue that the external environment tracks and constrains the processes of the dependent organization (Malone & Crowston, 1994).

The second impact is that the external environment is likely to develop and negotiate mechanisms for managing, controlling, and tracking the dependent organization (Tillquist et al., 2002). The nature of control and tracking is likely to limit the functioning of the dependent organization (Pfeffer & Salanick, 1978). For instance, the external stakeholders may expect certain outcome from the dependent organization and they may demand certain processes that help them monitor the dependent organization. Thus, it is expected that the external environment is likely to negotiate mechanisms for controlling

the dependent organization and keep them accountable to the interests and demands of the external actors (Dastmalchian, 1986).

The third impact is that the dependent organization is expected to change and adopt for survival (Scott, 1998). It is anticipated that the dependent organization is constantly responding to the external environment and managing its internal processes for achieving organizational goals (Aldrich, 1999). In other words, a dependent organization is simultaneously managing the demands and interests of external actors for obtaining resources and achieving internal organizational goals for survival (Frooman, 1999). Thus, it is expected that managers are likely to develop strategies and processes that help them deal with demands of external actors and yet achieve their organizational interests. Towards this end, it is often assumed that managers strategically disclose information and manage dependencies for obtaining resources from the environment (Tillquist et al., 2002).

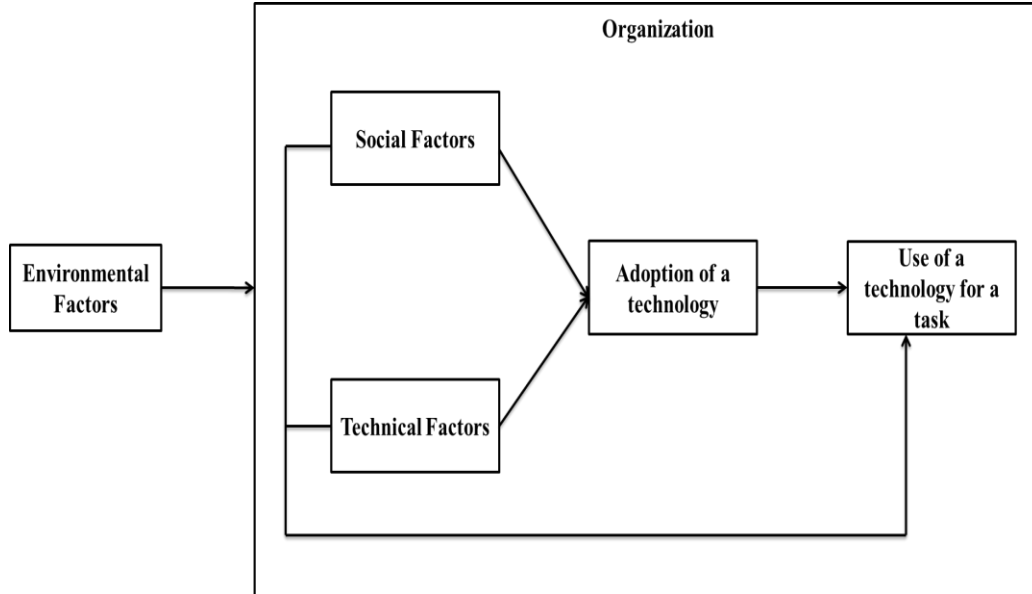
2.2. Summary & General Theoretical Framework

To summarize, resource dependence theory asserts that an organization depends on its environment for resources. The external environment uses its resources that support a dependent organization as a form of control for instilling desired behaviors in the dependent organization. As a result, the dependent organization is likely to change and adapt to these external pressures. Thus, the dependent organization has to simultaneously respond to the demands of the external actors and develop processes for accomplishing internal tasks.

The insights from resource dependence theory is integrated with sociotechnical theory to develop a general framework to explain how a public organization's organizational, technical, and environmental factors influence the adoption and use of a new technology for achieving a task. According to sociotechnical theory, an organization's social and technical factors influence the adoption and use of a new technology for accomplishing a task. Particularly, stakeholder participation and innovativeness tend to promote the adoption of new technologies for achieving organizational tasks. It is likely that the centralized control and routinized task environment of public agencies hinder the stakeholder participation and innovativeness. Additionally, the availability of technical resources predicts the adoption and use of a new technology for a task. And, according to resource dependence theory, an organization depends on their environment for resources. As a result, the dependent organization is likely to develop internal processes that satisfy the demands of the external environment.

Integrating insights from sociotechnical and resource dependence theory, figure 1 depicts a general model for examining the adoption and use of a new technology for achieving a task. In this dissertation, the technology component consists of social media technologies (e.g. social networking sites, wikis) and the task component includes the collaboration purpose for which these tools can be applied. To provide a specific context for understanding the use of social media technologies for collaboration purposes, the following sections discuss how different factors affect the process of collaboration and use of social media technologies in the public sector.

Figure 2: Integrating sociotechnical and resource dependence theoretical approaches



2.3. Process of collaboration & its determinants

Though the concept of collaboration has been subjected to extensive research and discussion, it is difficult to find a commonly accepted definition or theoretical lens within which to derive a consistent approach for understanding it (O’Leary et al., 2008; O’Leary & Vij, 2012). The central argument in the literature concerning the process of collaboration regards specific factors that influence the nature in which this process of collaboration occurs. Before discussing those factors, it is important to note that scholars largely agree that collaboration is a process that consists of two or more stakeholders (e.g., persons, groups and/or organizations) that work together for addressing a common problem, which is beyond the ability of one stakeholder to do alone (Huxham, 1996; Prat et al., 1999).

During the process of collaboration, diverse stakeholders work through their differences, pool resources, share information, and combine capacities to achieve a

common goal (Bryson, Crosby, and Stone, 2006; Thomson & Perry, 2006). Towards this end, the collaboration process can be viewed as a joint activity where “parties who see different aspects of a problem can constructively explore their differences and search for solutions that go beyond their own limited vision of what is possible” (Gray, 1989, p. 5). In addition, during the process of collaboration stakeholders deliberate and negotiate with each other on an ongoing basis to co-create rules that govern their collective behavior (Ranade & Hudson, 2003). Subsequently, the collaboration process tends to be nonlinear, multidimensional, and dynamic in nature (Hardy et al., 2003; Gary & Wood, 1991; O’Leary et al., 2008; Thomson & Perry, 2006).

Oftentimes, the concept of collaboration is confused with the concept of cooperation and/or coordination. While, the process of collaboration is different than cooperation and coordination, previous studies have identified cooperation as a precursor to coordination and collaboration (Beer, Eisenstat, and Spector, 1990; Thomas, 1992). As Ouchi (1980) notes, cooperation between actors suggest a certain level of interdependence, where units share and use common resources without depending on others for input (Kumar & Van Dissel, 1996). During the process of cooperation, the level of interdependency among units (or organizations) is lower, where the action of one unit does not potentially harm the functioning of other departments in the network. As the interdependence is lower, each unit carries out their goals in an autonomous manner. In this form of arrangement, interaction between the departments (or organizations) is limited, thus reducing the need for managing conflict (Kumar & Van Dissel, 1996).

According to Malone & Crowston (1990) coordination is a process where two or

more actors harmoniously work together to complete interdependent work tasks. During the process of coordination, each unit (or organization) works in a sequential order (Kumar & Van Dissel, 1996). For example, businesses develop specific transactional relationship with nonprofits, where they sponsor a particular event or activity. In this case, the nonprofits depend upon directions from sponsoring organizations about what type of event or activity needs to be organized (Austin, 2000). In other words, coordination and cooperation are embedded in the process of collaboration (Thomson, 2001), as they take place during the early phases of the collaborative process (Thomson & Perry, 2006).

Previous studies have identified different types of collaboration processes: internal (e.g. collaboration within an organization), cross-agency (e.g. collaboration among organizations of similar types), and cross-sector (e.g. collaboration among public agencies, businesses, and citizens). Both cross-agency and cross-sector collaboration types contain elements of external collaboration activities between the subject organization and at least one other external entity (whether it be another organization, business, person, etc.). This dissertation focuses on two types of collaboration processes: internal and external. During the internal collaboration process, different units within an organization work together to address a common issue (Sanders, 2007; Schrage, 1990). The external collaboration process extends the traditional organizational boundaries to include activities where public agencies work with other public agencies, businesses, non-governmental organizations, and/or citizens to address a common problem (Sanders, 2007).

Scholars often discuss internal collaboration as a form of small-scale external collaboration because an organization consists of subunits or departments that perform specialized tasks (Tang & Maxwell, 2011). That is to say, each organizational unit functions as a sub-organization carrying out respective roles. For instance, units within an organization may compete for resources (Tsai, 2002) and differences between units could potentially lead to conflict and lack of collaboration (Huxman, 1993). Therefore, organizations can be perceived as a collection of inter-related subunits working together to achieve shared goals (Thomson, 1964). Despite similarities, scholars note that internal collaboration is less complex than external collaboration because stakeholders working within an organization are likely to share technologies, procedures, and cultures compared with stakeholders from different organizations (Jian & Jeffers, 2006). Members of an organization often share information and contribute to their organization's collective outcome for maintaining their organizational identities (Jian & Jeffers, 2006; William & Buelens, 2007).

While information sharing and collaboration within an organization may be different than information sharing across organizational boundaries (Desouza, 2009), scholars argue that internal collaboration can influence external collaboration and vice versa. For example, Gimenez and Ventura (2005) found that integration within an organization is positively associated with an organization's ability to develop external integration because internal integration helps to better coordinate across companies. Moreover, as members understand the values of working together, they tend collaborate with other units within the organization. In other words, external collaboration influences

internal collaboration. Similarly, Sanders (2007) found that external collaboration is positively associated with internal collaboration and enhances an organization's economic performance through its effect on internal collaboration. In addition, scholars have found that similar factors facilitate or hinder different types of collaboration (Munkvold, 1999).

2.3.1. Determinants of collaboration process

There are four critical determinants of the collaboration process. The first critical factor is stakeholder participation (Ansell & Gash, 2008, Fung and Wright 2001; Imperial, 2005). Participation among diverse stakeholders is often seen as an important activity for creating conditions that encourage information disclosure and feedback solicitation (Imperial, 2005). As stakeholders share information and deliberate with each other about tasks, feedback from other stakeholders may potentially lead to the generation of new ideas or perspectives (Dawes, 1996). Also, stakeholders share resources and skills during the process of collaboration (O'Leary et al., 2008; Hardy et al., 2003, Pfeffer & Salancik, 1978), which could subsequently improve their capacity to address complex problems (Gray, 1989). Additionally, as stakeholders share resources and knowledge, they are likely to learn different aspects of the issue at hand (Gulati, 1991; Lei & Slocum, 1992). Selden and colleagues (2002) looked at collaboration among early care and education providers and found that the process of collaboration allowed these agencies to link scarce resources and services together to develop a more comprehensive and multifaceted delivery system.

Another factor that facilitates the process of collaboration is innovativeness - the

ability to understand and absorb new knowledge for creating a novel solution (O’Leary et al., 2008). The availability of new knowledge may result in experimentation and creation of improved products (Amara, 1990; Dyer, 1996; Gazley & Brundey, 2007). For instance, Pratt and colleagues (1999) argue that intractable social challenges—such as homelessness or unemployment—have persisted for decades because addressing these challenges are beyond the scope of a single individual or agency. Developing and implementing a solution to a problem of this magnitude requires whole systems thinking, where agencies share knowledge, expertise, and resources to create something new (Pratt et al., 1999; Ranade & Hudson, 2003). However, centralized and routinized organizational structure prevents public agencies from adopting participatory and innovative management approaches (McCaffrey, Faerman, and Hart, 1995).

While in theory, it is easier to assume that agencies addressing a common challenge will pool resources and share knowledge, a central question in the collaboration literature is: how can a centralized organizational structure influence stakeholder participation and innovativeness in the public sector (Selden et al., 2002; Thomson & Perry, 2006). For instance, stakeholders working in departmental siloes may have developed their way of thinking or perceiving challenges, which could prevent them from understanding diverse perspectives (Schein, 1984). Moreover, specific goals and interests may prevent stakeholders from sharing information and learning (Romzek, LeRouz, Johnston, Kempf, & Piatak, 2013). Differences in aims, objectives, and norms may also prevent stakeholders from understanding others’ viewpoints and can potentially create conflict and reduce information sharing (Huxham, 1996).

As the collaboration process is non-linear, iterative, and emergent in nature, scholars argue that the interactions among stakeholders are difficult to predefine and routinize (Robey & Sales, 1994). The process of collaboration is likely to be unstructured, necessitating ongoing communication among diverse stakeholders (Kumar & Van Dissel, 1996). A routine task environment can prevent employees from developing skills that promote open knowledge sharing (Ansell & Gash, 2008).

2.3.2. Summary & Gaps in the literature

Collaboration is a complex process that involves two or more stakeholders working together to address a common challenge. The process of collaboration promises several benefits including access to new resources, skills, and expertise. Moreover, the process of collaboration could potentially reduce fragmentation, redundancy, cost, and duplication (Martin, Chackerian, Imerchein, & Frumkin, 1983; O'Leary et al., 2008). Whether the process of collaboration results in successful outcome depends upon organizational structures, processes, and norms. It is important to note that this understanding of collaboration is often based on scholars evaluating in-person group deliberations as compared to collaboration via technological mediums.

While most scholars see collaboration as a process influenced by stakeholder participation, innovativeness, centralization, and routineness, they often neglect the complexity technology creates in assessing what this process is when conducted through a technological platform. Recent advances in information technologies such as social media technologies are providing new interactive and participatory platforms for collaborating. Public agencies can potentially adopt and use social media technologies to

share information, integrate services, engage stakeholders, and develop collaborations for delivering services (O’Leary & Vij, 2012). For example, public agencies can leverage social media, such as Facebook and Twitter, to share information about agency performance or to solicit feedback on services. Additionally, because of the extensive use of social media by the general population, it is likely public agencies could use these new interactive and participatory mediums to navigate the challenges and risks associated with the process of collaboration (Perlman, 2012). To understand the use of social media technologies for collaboration purposes, the next section discusses the emergence of social media technologies. It also illustrates different factors that influence the adoption of social media for collaboration purposes.

2.4. Social media technologies in the public sector

Social media technologies are defined as a group of “internet based applications that are built on the ideological and technological foundations of Web 2.0, and allow the creation and exchange of user-generated content” (Kaplan & Haenlein, 2012, p. 61). In the context of public sector, “social media technologies can be defined as a group of technologies that allow public agencies to foster engagement with citizens and other organizations using the philosophy of Web 2.0” (Criado & Sandoval-Almazan, 2013, p. 320). In other words, it is anticipated that the interactive nature of social media technologies is likely to open up new possibilities such as extend government services, increase civic participation, solicit new ideas, improve decision-making, and solve complex problems (Chun & Reyes, 2012; Criado & Sandoval-Almazan, 2013; Hui & Hayllar, 2010). Moreover, it is expected that public agencies will adopt and implement

social media technologies for becoming more transparent, open, participatory, and interactive (Curtis et al., 2010; DiStaso, McCorkindaleb, & Wright, 2011, Sandoval-Almazan & Gil-Garcia, 2012). The following section discusses how different factors influence the adoption and use of social media technologies.

2.4.1. External pressure & adoption of social media technologies

The influence of external actors (e.g. political heads and citizens) and policy directives (e.g. Open Government Agenda) on public agencies' decision to adopt and use social media is a constant theme in the literature. It is often expected that external actors such as political heads and citizen groups are likely to demand the adoption and use of social media technologies for monitoring public agencies. In other words, social media technologies are often viewed as tool for improving transparency in the public sector (Bonsón et al., 2012; Sandoval-Almazan & Gil-Garcia, 2012). In general, public organizations are often expected to meet the transparency demands of advocacy groups and citizens (Chun et al., 2012). And, providing information to public is often viewed as a prerequisite for improving accountability and gaining legitimacy (Novek, 2009).

In theory, by engaging citizens in the processes of governance, public agencies can increase trust (Kim et al., 2005), promote accountability (La Porte, Demchack, & Dejong, 2002), and improve democratization (Bonsón et al., 2012). For instance, by increasing citizen participation, public agencies are likely to gain their support and improve service delivery (Dixon, 2010; Osimo, 2008). Typically, it is expected that the adoption and use of social media technologies are likely to increase citizen engagement and participation (Bertot et al., 2010; Hofman et al., 2013). Further, citizens and elected officials may use

social media technologies as a channel to monitor the functioning of public agencies (Wang & Feeney, 2014).

Studies have consistently reported that increased political pressure (e.g. political executives, citizens, businesses) is positively associated with the adoption and use of social media in the public sector (Feeney & Welch, 2014; Hofman et al., 2013). It is anticipated that external actors push the adoption of new technology (Edmiston, 2003). For instance, Ho & Ni (2004) found that the increased pressures from citizens and businesses are positively associated with the adoption of computer technologies in local governments. Similarly, West & Burman (2001) found that pressures from citizens positively predicted the usage of computer technologies in city governments. Further, political actors develop government directives and policies that influence the adoption and use of social media technologies (e.g. Kanguvahugh et al., 2012; Hofmann, Beverungen, Räckers, & Becker, 2013; Sobaci & Karkin, 2013). In line with resource dependence theory, these studies support that environmental factors play an important role in pushing public agencies to adopt mechanisms (e.g. social media technologies) for monitoring and tracking their functioning.

2.4.2. Internal organizational factors & adoption of social media technologies

In addition to environmental pressures, studies report that several organizational factors determine the adoption and use of social media technologies (e.g. Oliveira & Welch, 2014; Meijer & Thanos, 2014). It is often reported that organizational structures, and processes influence the adoption and use of social media technologies. Scholars have found that factors such as stakeholder participation, innovativeness, centralization, and

routineness often influence an public agency's decision to adopt and use social media for organizational purposes (Bertot et al., 2012; Curtis et al., 2010; Hofmann, et al., 2013; Kavanuagh, et al., 2013; Snead, 2013; Wang & Feeney, 2014; Yuvaz & Welch, 2014).

The interactive, communicative, and participatory nature of social media is often seen as a challenge to traditional top-down and centralized structure of public agencies (Mergel, 2010). In a centralized organization, the decision-making power is concentrated at the top and do not encourage employee participation (Yuvaz & Welch, 2014). Lack of stakeholder participation often limits employees from openly sharing ideas with peers and hinders flow of information within the organization (Wang & Feeney, 2014). Moreover, employees in a centralized organization often perform routinized tasks that are well defined and rule-bound. Individuals performing routine tasks lack opportunities to adopt new ideas for innovation (Yuvaz & Welch, 2014). Performing routine tasks is found to be negatively associated with the adoption of social media technologies (Li & Feeney, 2014).

Risk taking and innovativeness is an important determinant of adoption and use of social media because social media technologies introduce uncertainty, unforeseen risks and challenges (Bonsón et al. 2012). For instance, Breindhl & Francq (2008) found that while the adoption of social media technologies positively influences information dissemination, the adoption of these technologies also aggravate the spread of false information. The perception of risks associated with the adoption and use of social media technologies in the public sector often influences how these technologies are used for organizational purposes (Freeman & Loo, 2009; Picazo-Vela et al., 2012).

2.4.3. Summary & Gaps in the literature

Social media technologies promise several benefits. It is expected that public agencies are likely to use social media technologies for improving internal operation and connecting with other agencies, business, NGOs, and citizens. For instance, it is anticipated that public sector employees are likely to use social media tools for increasing awareness, locating knowledge and expertise, fostering transparency, connecting with new people, and developing collaborative relationships (Falsini et al., 2012; Marra et al., 2012). While earlier studies predicted that the adoption of social media technologies is likely to deliver several benefits, recent findings are in line with the predictions of sociotechnical theory. An organization's structures, processes, and norms play an important role in influencing the adoption and use of social media technologies for organizational purposes.

Although, these findings provide useful insights to understand how different factors influence the adoption and use of social media in the public sector, often social media studies either focus on a single tool or define social media technologies too broadly, which obscures examination of these technologies in affecting behavior and their influence on organizational processes and outcomes (Treem & Lenonardi, 2012). Defining social media based on their features and usability within an organization may promote a nuanced examination of how these technologies are used for achieving work goals. Particularly, how different social media technologies facilitate the process of collaboration. In the following section, the social media technologies are divided into different categories based on their features and usability and how these technologies

relate to different aspects embedded in the process of collaboration.

2.5. Types of social media tools & collaboration

Organizations can adopt and use different types of social media technologies for improving work processes (Table 1 lists different types of social media technologies and their features). Commonly, social media technologies are classified into the following: social networking sites, blogs, wikis, and media sharing platforms.

- **Social networking sites:** Social networking sites are web and mobile-based applications that allow an individual to meet and connect with others (Chun et al. 2010). Popular social media networking sites include Facebook, MySpace, GovLoop, and LinkedIn, etc. An individual can use social networking sites to create a profile, publish status updates and express opinions (e.g. like and comment on other's post). In other words, an individual can use these platforms to socialize, share, and exchange information with other users. For instance, Lampe, Ellison, & Steinfield (2006) found that the use of social networking sites at an organization enabled employees to track other users' activities. Once employees befriended other employees, they were able to connect and follow what other employees were doing. Social networking sites allowed employees' to reach out to other employees with whom they had little or no interactions and connect with people across department who has similar interests (DiMicco, Millen, Geyer, Dugan, Brownholtz, & Muller, 2008).
- **Wiki:** Wiki is an Internet-based interlinked web page that enables a user to create, edit, and modify contents over time (Kosonen & Kianto, 2009). Some common

wikis are Wikipedia, WikiHow, and WikiTravel. Wiki's are configured to support entries, where a user creates an entry and others can add, modify, and correct information in a controlled manner. In other words, wiki is a collaboration tool that allows users to contribute and generate knowledge (Chun et al. 2010). As Kosonen & Kianto (2009) noted, the use of wiki promotes knowledge sharing as it eliminates decisions about who to include. Further, open knowledge sharing fosters new avenues for collaboration among employees. Wiki is "a flexible knowledge repository" that aids employees to share, add, edit, and reuse information (White & Lutters 2007, p. 2).

- **Blogs:** Blogs are online web contents that allow a user to create and record information in a chronological order (Treem & Leonardi, 2012). Popular blogging sites include Wordpress, Blogger, Tumblr, Squarespace, and so on. A user can use blogs to create and comment on contents. Further, a user can record and share information in the form of text, video, and photos. In other words, blogs are date stamped journal contents on issues often used by individuals groups, and organizations to record and share information in the form of text, video, and photos (Chun et al., 2010). In addition to creating contents, users can comment on contents created by others. Efimova & Grudin (2008) found that blogging enabled employees to self-publish and communicate about their work. Further, the use of blogs not only allowed employees to communicate and share ideas that were previously hidden or stored in personal archives, but also helped them track, search, and interlink organizational knowledge. The use of blogs allows

employees to create scale free networks and connect with others who have similar interests and ideas (Kolari et al. 2007).

- **Microblogs:** Microblogs are special types of blogs that allow a user to share, exchange, and comment on ideas in constrained number of characters (Chun et al., 2010). A famous example of microblog is Twitter. Twitter is commonly used to share and exchange information in 140 characters or less. A microblog allows a user to create a profile, follow others, and express opinions (e.g. favorite and comment on a tweet). Microblogging allows users to track what is going on in the organizations (Zhao & Rosson, 2009).
- **Media sharing platforms:** Media sharing platforms allow a user to share and disseminate certain types of information (Bonsón et al., 2012). For instance, a user can use these platforms to share videos (YouTube), pictures (Flickr), and presentations (SlideShare). These sites also allow users to comment, subscribe, and rate these contents (Bonsón et al., 2012). For example, photo-sharing sites such as Flickr shape communal experiences as people connect and share pictures (Dijck, 2010). Further, photo sharing allows users to collect information, which eventually provides information about the past. In other words, these websites create “collective memories” and “cultural heritage” (Dijck, 2010, p. 1).

Table 1: Categorizing social media technologies based on features

Social media technology	Applications	Features	References
Social networking sites	Facebook	An user can create personal profile	Chun et al. (2010), DiMicco et al. (2008), Lampe et al. (2006)
	GovLoop	An user can connect, share, and exchange information with friends and colleagues	
	LinkedIn	Allows users to update status	
	MySpace	An user can comment on posts Contents can include pictures, videos, and texts Allows user to subscribe	
Wikis	Wikipedia	An user can create, edit, and modify contents	Chun et al. (2010), Kosonen & Kianto, (2009), White & Lutters (2007)
	WikiHow	Supports creation of configured entries	
	WikiTravel	Users can search and manage edits Alerts user to new information	
Blogs	Word Press	An user can create and share information	Chun et al. (2010), Efimova & Grudin (2008), Kolari et al. 2007
	Blogger	Helps record information in chronological order (date and time stamped)	
	Squarespace	Allows user to comment Alerts user about new contents	
Microblogging	Twitter	Users can create, share, comment, and exchange information in about 140 characters. An user can create personal profile Allows to search information Alerts user about new contents Allows user to favorite tweets and create lists	Chun et al. (2010), Riemer & Richter (2010), Zhao & Rosson, (2009)
Media sharing	YouTube	An user can share particular type of information (e.g. photos, videos)	Bonsón et al. (2012), Dijck, (2010)
	Flickr		
	Slide Share	Users can comment and rate information Allows users to subscribe and search for information Alerts subscribers of new information	

The next step is to examine how different social media technologies afford the process of collaboration. As noted earlier, collaboration is a process where two or more stakeholders work together to address a common challenge. The process of collaboration involves on-going interactions among stakeholders, where they communicate, deliberate and exchange information for co-creating a product or service. Thus, based on the aspects embedded in the process of collaboration, the features of the aforementioned social media technologies can be divided into two broad categories.

First, social media technologies such as social networking sites, microblogs, and media sharing platforms promote information dissemination and communication. While there are subtle differences, in general, social networking sites, microblogs, and media sharing platforms allow a user to share, exchange and communicate information. These platforms allow a user to create a profile, connect with others, and express opinions. Studies have reported that social media technologies afford users to learn more about other users such as their background and interests and can be potentially used to identify experts and locate critical information (DiMicco, Millen, Geyer, Dugan, Brownholtz, & Muller, 2008; Shami, Ehrlich, Gay & Hancock, 2006). Steinfield et al. (2008) reported that social networking sites provide an employee with a platform to quickly find and request information. Social media technologies such as Facebook and Twitter can be used to reach out to people within and across organizational boundaries (DiMicco et al., 2008). Further, these technologies may help a user track what is going on in the organization (Zhao & Rosson, 2009). For instance, Ehrlich & Shami (2010) found that the use of microblogs facilitated social connections among distributed employees and increased a

sense of belonging. In other words, use of social networking sites, microblogs, and media sharing platforms are likely to forge connections among stakeholders as they have the potential for improving on-going interactions.

Second, social media technologies such as Wikis afford co-creation of a product or service. Wikis help employees to create, share, add, edit, and reuse information (White & Lutters 2007). Studies find that wiki allows individuals to work over a long period in an asynchronous manner because individuals contribute and incrementally build contents (Holtzbatt et al., 2010; Wagner, 2004). In other words, a wiki is an indexed knowledge repository (Majchrzak et al., 2006). Moreover, studies found that the ability of a wiki to create content and maintain revisions promotes collaboration for co-creating a product (Arazy, Gellay, Soobeak, and Patterson, 2009; Danis & Singer, 2008).

Further, given the nature in which collaboration occurs, it is possible that traditional computer-mediated technologies (CMCs) including shared databases and work documents may facilitate co-creation of a product or service. For instance, similar to a wiki, shared word documents may allow employees to share, add and edit content for co-creating a product. A shared database may provide employees with a platform for collecting and sharing information about a project (Treem & Leonardi, 2010). The use of shared work documents and databases may enable stakeholders to control the versions of work-in-progress and potentially prevent information overload. For instance, Danis and Singer (2008) found that employees often used shared repositories to store work-in-progress. Moreover, the use of shared drive helps manage unfinished content and reduce

confusions (Holtzbatt et al., 2010; Treem & Lionardi, 2010). Thus, it is possible that the use of traditional CMCs may help in the process of collaboration.

Moreover, it is possible that depending on the context of collaboration - internal versus external – stakeholder may utilize these technologies differently. For instance, during the process of internal collaboration, employees within an organization work together for achieving an outcome. It is often expected that the employees working in an organization often share similar work practices, technologies, and norms (Willem and Buelens, 2007). Thus, they are more likely to share common work tools. Moreover, it is anticipated that employees working in an organization are likely to share social identity and likely to contribute for achieving common goals (Jian and Jeffres, 2006). In comparison, during the process of external collaboration, diverse stakeholders (e.g. public employees, citizens, businesses) work together for addressing a common challenge. However, it is often expected that during external collaboration, stakeholders may spend time building common identify and norms for understanding each other’s perspectives. As a result, they may deploy information technologies for building collective identity. For instance, Green, Contractor, and Yao (2006) reported that the use of social networking sites promoted cross-agency collaboration because it helped diverse stakeholders know about each other’s interest and expertise. Once stakeholders understood that others are interested in similar topics and issues, they were more likely to work through cross-agency differences such as culture, work practices, and norms for getting things done. In other words, use of communication tools may aid in developing social identity in the context of external collaboration, and subsequently help

stakeholders share work tools for achieving a task. While in the case of internal collaboration, the use of communication tools may help employees share on-going information about projects, but not necessarily for building social identity. As a result, it is anticipated that the use of communication tools may differently affect internal versus external collaboration.

Table 2 lists different social media technologies and traditional CMCs and how they relate to the process of collaboration. As noted in the table, various social media technologies and CMCs afford certain aspects embedded in the process of collaboration. For instance, wiki and shared document promote co-creation of a product. However, Facebook and Twitter do not promote co-creation of a product, but rather facilitate on-going communications. Thus, for the purposes of this research, the technologies are divided into two broad categories: communication (e.g. Facebook, Twitter, and YouTube) and work sharing (e.g. Wiki, shared databases and document) tools.

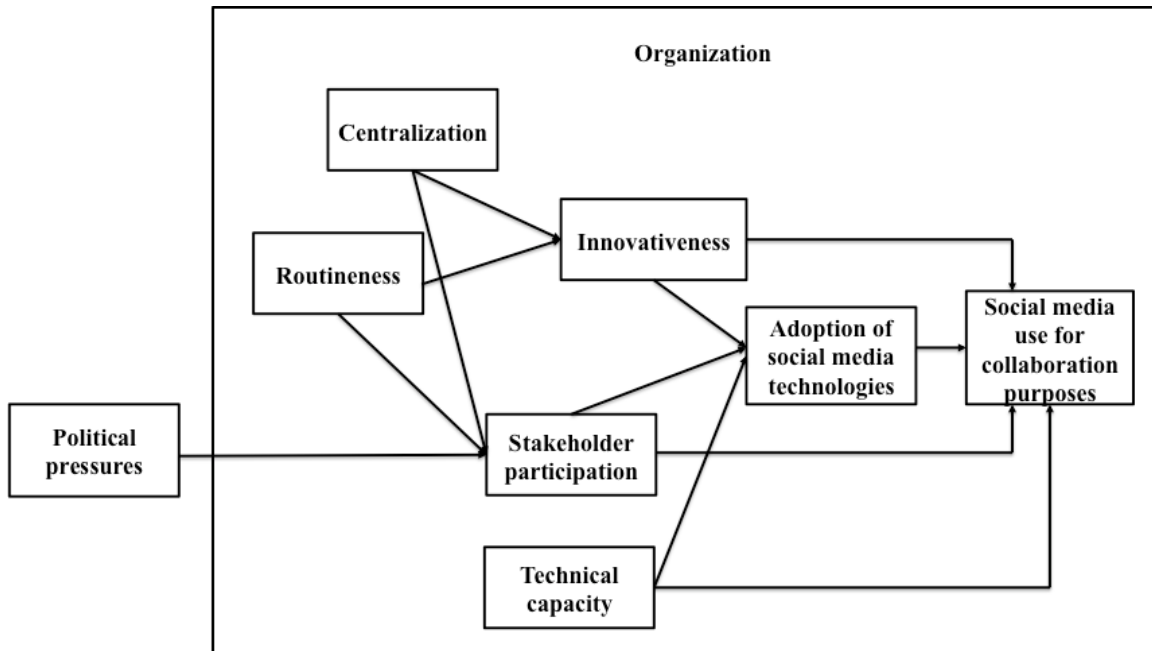
Table 2: Combining technology feasibility and task usability

Features	Technologies	Aspects embedded within the process of Collaboration		
		On-going communication	Share information	Co-create
Communication tools	Facebook	Yes	Yes	No
	Twitter	Yes	Yes	No
	YouTube	Yes	Yes	No
Work sharing tools	Wiki	Yes	Yes	Yes
	Shared database	No	Yes	Yes
	Shared work document	Yes	Yes	Yes

2.6. Integrated theoretical framework for examining the use of social media for collaboration

Based on the insights from theoretical approaches discussed in this chapter, figure 3 outlines how organizational, technical, and environmental factors influence the adoption and use of social media technologies for collaboration purposes. The theoretical model depicts the direct and indirect influence of stakeholder participation, innovativeness, technical capacity, centralization, routineness, and political pressure on the adoption and use of social media for collaboration purposes. As predicted by sociotechnical theory, social and technical factors of an organization promote the adoption and use of social media technologies for collaboration purposes. Particularly, stakeholder participation and innovativeness promote the adoption and use of social media technologies for collaboration. However, centralized structure and routinized task environment hinder participation and innovativeness and indirectly affect the adoption of social media technologies for collaboration purpose. In addition to social factors, higher technical capacity facilitates the adoption of social media technologies for collaboration purposes. Further, as resource dependence theory posits, an organization depends on its environment for resources. External political actors are likely to participate in the dependent organization and indirectly influence the adoption and use of social media technologies.

Figure 3: An integrated theoretical model for examining the adoption and use of social media for collaboration purposes



2.6. Summary of the chapter

This chapter integrated sociotechnical and resource dependence theoretical approaches to develop a general framework for examining the adoption of a technology for achieving a task. The sociotechnical and resource dependence theories complement each other and provide an explanation to understand how different organizational, technical, and environmental factors facilitate or hinder the adoption and use of social media technologies for collaboration purposes. Towards this end, this chapter discusses the concept of collaboration and its determinants. Collaboration is a process where two or more stakeholders jointly pool resources, skills, and expertise for addressing a common problem. Further, the process of collaboration is non-linear and dynamic in nature. The central argument in the collaboration literature regards how stakeholder participation, innovativeness, centralization, and routineness influence the process of collaboration. While the literature on collaboration offers useful insights about nature within which

collaboration occurs, the literature largely ignores the complexities associated with the use of technology for collaboration purposes.

Social media technologies are often seen as potential tools for promoting and fostering collaboration in the public sector. Social media technologies are defined as a group of Internet based technologies that facilitate and encourage stakeholder engagement and participation. Despite perceived benefits, previous studies are increasingly finding that social media technologies are used for information dissemination purposes but not for increasing participation and collaboration. Further, the literature on social media often treats these technologies as a homogenous group. This dissertation theorized different classes of social media technologies and these technologies are distinguished based on their features and usability. It is argued that different classes of social media technologies afford various aspects embedded in the process of collaboration (e.g. on-going interactions, co-creation of a product). Finally, an integrated theoretical model is presented to examine how organizational, technical, and environmental factors influence the adoption and use of social media technologies for collaboration purposes. And, this integrated model is used as a building block for developing hypotheses and empirical model presented in chapter three.

HYPOTHESES

The previous chapter integrated insights from sociotechnical and resource dependence theories to propose a general theoretical framework for examining the adoption and use of social media technologies for collaboration purposes. According to the framework several organizational, technical, and environmental factors influence the adoption and use of social media technologies for collaboration purposes. Particularly, stakeholder participation and innovativeness facilitate the adoption and use of social media technologies for collaboration purposes. However, organizational factors such as centralization and routineness hinder stakeholder participation and innovativeness, and subsequently affect the adoption and use of social media technologies for collaboration purposes. In addition to organizational factors, technical capacity facilitates the adoption and use of social media technologies for collaboration purposes. Further, as an organization is dependent on its environment for resources, external actors are likely to participate in the decision-making processes of the organization and subsequently influence the adoption and use of social media technologies.

In the following section, the aforementioned variables are used as a building block to develop specific hypotheses that influence the adoption and use of social media technologies for collaboration purposes. Each of these variables, directly and indirectly, influences the use of social media for different types of collaboration. After discussing the hypotheses, an empirical model is presented, which will be tested in the subsequent chapters.

3.1. Factors influencing the adoption and use of social media for collaboration purposes

3.1.1. Stakeholder participation

Stakeholder participation refers to the involvement of key stakeholders affected by the issue in the decision-making process (Ansell & Gash, 2008). In other words, stakeholder participation in the decision-making process involves how members of an organization engage, deliberate, and share information for collectively addressing a challenge. Information is often considered as a critical asset for an organization, and it is often assumed that organizational practices and norms promote open knowledge sharing (Javenpaa & Staples, 2008). Zhang et al. (2005) reported that lack of stakeholder participation is negatively associated with information sharing and knowledge exchange. Thus, stakeholder participation in the decision-making processes is likely to encourage an open and on-going exchange of information among key stakeholders for addressing a common challenge.

Social media technologies are often viewed as game changers in the public sector because they have the potential to increase citizen and external stakeholder participation in government decision-making (Mergel & Bretschneider, 2013). According to Sandoval-Almazan & Gil-Garcia (2012), social media technologies provide channels to disseminate information and engage diverse stakeholders in the decision-making processes of the government. The authors argue that the adoption of these technologies is likely to increase interactions among stakeholders and consequently result in developing a collaborative relationship. However, it is often reported that public agencies are using social media technologies for information dissemination, not for participation and

collaboration purposes (Bonson et al., 2012; Craido et al., 2013). For instance, Bonson et al. (2012) found that local governments in Europe are largely using social media technologies for information dissemination purposes, and not for e-participation purposes.

As sociotechnical theory predicts, the adoption of a new technology alone is not sufficient for enabling use of a technology for a task. In other words, the adoption and use of technology for a task is jointly determined by the social and technical factors of an organization. Confirming this assertion, Javenpaa & Staples (2000) found that employees working in an organization that promotes participation of key stakeholders are likely to deploy collaboration technologies for information sharing and working together. In other words, an employee is likely to use a technology that confirms organizational norms. Thus, it is expected that employees working in a public agency that promotes and encourages stakeholder participation are likely to adopt and use of social media technologies for knowledge sharing and collaboration purposes. In other words, social media technologies are malleable to organizational environment. Therefore, I hypothesize that:

H1: Stakeholder participation is positively associated with the use of social media technologies for collaboration purposes.

3.1.2. Innovativeness

Previous studies have consistently reported that innovative governments are more likely to adopt and use of new technologies for organizational purposes (Moon & Norris, 2005; Khan, Swar, & Lee, 2014). Innovativeness can be defined as “the generation,

acceptance, and implementation of new ideas, processes, products or services” (Thompson, 1965, p. 2). In other words, public agencies that are innovative are likely to encourage employees to experiment with new ideas for addressing social problems. Further, as employees experiment with different solutions to address an issue, they are likely to develop risk tolerance and entrepreneurial outlook.

The adoption and use of social media often introduce unforeseeable risks and concerns. For instance, Freeman and Loo (2009) reported that the use of social media technologies often result in loss of control over information dissemination and authenticity. Public agencies often find it difficult to manage how information is broadcasted, interpreted and reused across social media platforms (Khan et al., 2014). In other words, the adoption of social media could potentially aggregate the spread of false information (Breindhl & Francq, 2008). As there are potential risks associated with the adoption and use of social media technologies, a public agency that promotes innovativeness in terms of risk tolerance is more likely to adopt and use these technologies for organizational tasks.

Further, innovative public agencies are likely to be receptive to change. Moon & Nooris (2005) found that innovative governments are more likely to adopt and use new information technologies because employees in these agencies are open to change. The interactive and participatory nature of social media technologies is often expected to increase stakeholder involvement in the decision-making processes of the organization. Thus, the use of social media technologies in a public agency is likely to make them more open to external feedback. The increased level of transparency may require a change in

the organization functioning. Employees working in an innovative public agency may be less resistance towards changes introduced by the adoption and use of social media technologies. Oliveira & Welch (2013) found that innovativeness is positively associated with the adoption and use of social media technologies in local governments. Therefore, I hypothesize that:

H2: Innovativeness is positively associated with the use of social media technologies for collaboration purposes.

3.1.3. Technical capacity

Technical capacity of an organization includes technology infrastructure and human resources (Matt et al. 1995; Munkvold, 1999). Technology infrastructure consists of hardware, software, and wide-area networking etc. that are used to deploy Internet-based services. And, human resources refer to the availability of information technology (IT) staff that has skills to implement Internet-based services (Zhu & Krmaer, 2005). In other words, an organization's capacity to map its technical infrastructure with human resource and knowledge is critical for the adoption and use of new technologies. As sociotechnical theory points, an organization's physical asset and human resources conjointly determine the implementation of new technologies for meeting organizational needs. Further, it can be expected that an organization with higher technical capacity are more likely to possess both technical and human resources that can be devoted to adopt new technologies (Yuvaz & Welch, 2014).

The use of social media technologies is likely to increase contact with external actors and flow of information. Previous studies have consistently reported that the

availability of IT staff is critical for continued use of social media technologies in the public sector (Curtis et al., 2010; Gil-Garcia et al., 2007). Kavanugh et al. (2013) reported that public agencies find it difficult to manage and analyze massive flow of information exchange generated via social media platforms. It is often reported that citizens are increasingly using social media for communicating with public agencies (Snead, 2013). However, the lack of internal IT support could potentially result in lost opportunity, where information generated via social media technologies are not integrated into the organizational decision-making (Yuvaz & Welch, 2014). Thus, agencies with dedicated internal IT support staff are more likely to adopt and use social media for organizational tasks (Curtis et al., 2010; Reddick & Norris, 2013).

Further, as social media technologies are Internet-based technologies application, the appropriate computing infrastructure is likely to play a critical in the adoption and use of these technologies (Dawes, Pardo, & DiCaterino, 1999, Zu & Kramer, 2005). It is often anticipated that lack of appropriate computing infrastructures is likely to prevent an organization from adopting new technologies. For instance, Dawes et al. (1999) found that lack of access to Internet limited employees from using web-based services for internal use and service delivery. In the context of social media technologies, it can be expected that Internet access is likely to facilitate the use of these technologies for collaboration purposes. Thus, an agency with higher technical capacity in terms of the availability of IT staff and access to the Internet is likely to adopt and use social media technologies for collaboration purposes. Therefore, I propose the following hypotheses:

H3a: Availability of IT staff is positively associated with the use of social media

technologies for collaboration purposes.

H3b: Access to Internet is positively associated with the use of social media technologies for collaboration purposes.

3.1.4. Different classes of social media technologies and collaboration

As noted in chapter two, for the purposes of this dissertation, social media technologies are classified into two categories: communication and work sharing tools. Communication tools include Facebook, Twitter, and YouTube, etc., which allows employees to create a profile, share information, and connect with others. Previous studies have consistently reported that the use of social media technologies provide avenues to maintain existing relationships, develop new connections, and locate expertise (DiMicco, Ellison, & Lampe, 2009; Ferron, Shami et al., 2009; Steinfield et al., 2009). Thus, employees are likely to use social networking sites for maintaining and forging new connections. Additionally, an employee can potentially use these sites to know about others' interests and track their activities (Lampe et al., 2006). For instance, Ferron et al. (2010) found the use of social networking sites allowed employees to track work activities of colleagues and stay in touch with what is happening in the organization.

In the context of collaboration, the use of social media technologies is likely to facilitate on-going communication and deliberation among stakeholders. Further, it can be expected that stakeholders are likely to use these social media technologies for locating expertise and knowledge. Thus, it can be expected that stakeholders are likely to adopt and use social media technologies such as Facebook, Twitter, and YouTube for staying in touch with other stakeholders and sharing updates about collaborative projects

on an on-going basis. Further, the use of social media tools are likely to help employees understand each other's interests and may help in building collective identity. As Shami, Ehrlich, Gay, and Hancock (2009) noted, social networking sites often help employees locate expertise and reach out to individuals with whom they have limited or no interactions. Moreover, the use of social media technologies such as Facebook and Twitter often help employees understand each other's perspective and aid in building social identity. As employees develop associations, they are more likely to work through their differences in terms of work practices and norms (Green et al., 2006)

Work sharing tools include wikis, shared documents, and databases. These work-sharing tools allow stakeholders collectively work together and co-create a product. For example, stakeholders can use a wiki to collectively share information and build a knowledge repository. Further, stakeholders can add, edit, and modify contents of a wiki to create a common product (Kane & Fichman, 2009). Using the wiki as a platform, stakeholders can control revisions and simultaneously work on documents avoiding duplication of work.

Previous studies have reported that the use of wiki in an organization promotes information sharing and encourages collaboration (Holtzblatt et al., 2010; Kosonen & Kianto, 2009). Hasan & Paff (2006) found that employees often use wiki as a channel to disseminate information about on-going work and solicit feedback. In addition to wiki, it is often expected that stakeholders are likely to use shared databases and documents to manage supplementary materials. Thus, it is expected work sharing tools are likely to facilitate knowledge sharing among diverse stakeholders for co-creating a common

product. In other words, different social media tools are likely to afford various aspects embedded in the process of collaboration. Therefore, I propose the following hypotheses and proposition:

H4: Adoption of social media technologies will be positively associated with collaboration purposes.

P3: Different classes of social media technologies will differentially influence external collaboration and internal collaboration.

3.1.5. Centralization and Routineness

A constant theme in the public administration and management literature is to examine the influence of centralization on stakeholder participation and innovativeness. Centralization can be understood as the locus of authority in an organization (Pfeffer, 1981; Thomson, 1965). In a centralized organization, individuals lack power and authority to communicate freely and share information (Wang & Feeney, 2014). For example, Kim & Lee (2006) found that centralization is negatively associated with information sharing. The authors argue that employees in a centralized organization constantly seek their supervisor's permission to communicate with others. Further, the lack of information sharing practice is likely to create knowledge silos in an organization (Tsai, 2002).

The rule-bound and centralized structures of public agencies are often cited as an obstacle to promoting open knowledge sharing (Wang & Feeney, 2014). Bureaucratic organizations are highly rule-bound, control-driven, and hierarchical systems that are designed to implement policies, where members have limited autonomy (Hall & Tolbert,

2004; Welch & Pandey, 2007). Thus, centralized structure is likely to prevent employees from sharing information. The lack of information sharing is likely to hinder cross-fertilization of ideas among employees for addressing a common issue. As predicted by sociotechnical theory, a centralized organizational structure will be negatively associated with stakeholder participation and innovativeness. In other words, a centralized organization structure is likely to indirectly hinder the adoption and use of social media technologies.

Another critical factor that is commonly discussed in the public administration and management literature is the influence of routineness on stakeholder participation and innovativeness. Routine tasks consist of structured goals and objectives that are predictable in nature (Hage & Aiken, 1969). Moreover, it is often reported that employees performing routine tasks develop specialized knowledge and lack innovativeness (Holmqvist, 2004). The bureaucratic structure of public organizations often promotes technocracy and specialization, which prevent employees from developing an entrepreneurial and innovative outlook (Whitford, 2002). In comparison, employees performing diversity of tasks are open to change and innovation (Burns & Staker, 1967).

Further, employees performing routine tasks are likely to have limited capacity to share and exchange information because the nature of the task environment often prevents information sharing (Li & Feeney, 2012). Thus, employees may have limited skills and capacity to participate and share ideas. As sociotechnical theory predicts, employees performing routine tasks are likely to have limited knowledge about other

parts of the organization, and an error in one part of the organization could potentially result in systemic failure (Emery, 1969). In other words, routine task environment is likely to be negatively associated with stakeholder participation and innovativeness and subsequently hinder the adoption and use of social media technologies. Although, I do not formally hypothesize the influence of centralization and routineness on the adoption and use of social media technologies for collaboration purposes, I propose the following proposition:

P1a: Centralization is negatively associated with stakeholder participation and subsequently influences the adoption and use of social media technologies.

P1b: Centralization is negatively associated with innovativeness and subsequently influences the adoption and use of social media technologies.

P2a: Routineness is negatively associated with stakeholder participation and subsequently influences the adoption and use of social media technologies.

P2b: Routineness is negatively associated with innovativeness and subsequently influences the adoption and use of social media technologies.

3.1.6. Political influence

As resource dependence theory asserts an organization is dependent on its environment for resources and external environment uses this dependence as a mechanism to install behaviors in the dependent organization. Public agencies are accountable to political heads and citizens. It is often expected that public agencies are simultaneously managing their internal environment and responding to their external pressures (Welch, 2012). Previous studies have consistently reported that political

pressures influence internal decision-making in the public sector (Ahn, 2011; Ho & Ni, 2004). Moreover, these studies commonly categorize political influences into two main categories: other government agencies (e.g. state government, the federal government, and other local governments) and civil society (e.g. citizens, businesses, interest groups).

It is often expected that political heads are likely to force administrative and legal constraints over public agencies. Studies have consistently reported that political officials demands are positively associated with public agencies' decisions to adopt and use information technologies (West & Berman, 2011; Yang & Callahan, 2009). For instance, the Obama administration sanctioned several memorandums mandating federal agencies to publish administrative data online and adopt social media technologies for fostering collaboration. While the legal directives mandated agencies to publish data online and adopt social media technologies, research findings show that agencies are often using social media technologies for information dissemination and not for facilitating stakeholder participation. These findings indicate that it is possible that managers may strategically develop internal processes that respond to the external pressures (Welch, 2012).

Another form of external influence is civil society, which includes citizens, businesses, NGOs, and interest groups, etc. Previous studies have reported that civil society participation in decision-making processes of public agency is positively associated with the adoption and use of new technologies (Ho & Ni, 2004; Hofman et al., 2013). In other words, the frequency of civil society involvement in the decision-making process is likely to influence the adoption and use of social media technologies. For

instance, it is often expected that as citizens are more likely to push public agencies to adopt and use social media technologies for service delivery (Ho & Ni, 2004).

Confirming this assertion, West & Berman (2011) found the increased pressures from citizens is positively associated with the adoption and use new information technologies in local governments. Further, it is reported that citizens, businesses, and interest groups often push the adoption of social media technologies as a channel to monitor, track and participate in the functioning of the government (Snead, 2013). Thus, as resource dependence theory predicts, political actors may participate in the decision-making processes of a public agency and push the adoption and use of social media technologies for organizational purposes. While, I do not formalize these expectations into hypotheses, I propose the following proposition:

P3: Political influences in the decision-making processes are positively associated with the adoption and use of social media technologies.

3.2. Empirical Model

Based on the above discussions, figure 4 represents the empirical model to be analyzed in the subsequent chapters. As illustrated in the model, stakeholder participation, innovativeness, Internet use, and availability of IT support staff positively influences the adoption and use of social media technologies for collaboration purposes. Moreover, organizational factors including centralization and routineness have an indirect effect on the adoption of social of media technologies via stakeholder participation and innovativeness. In addition to organizational and technical factors, external stakeholders

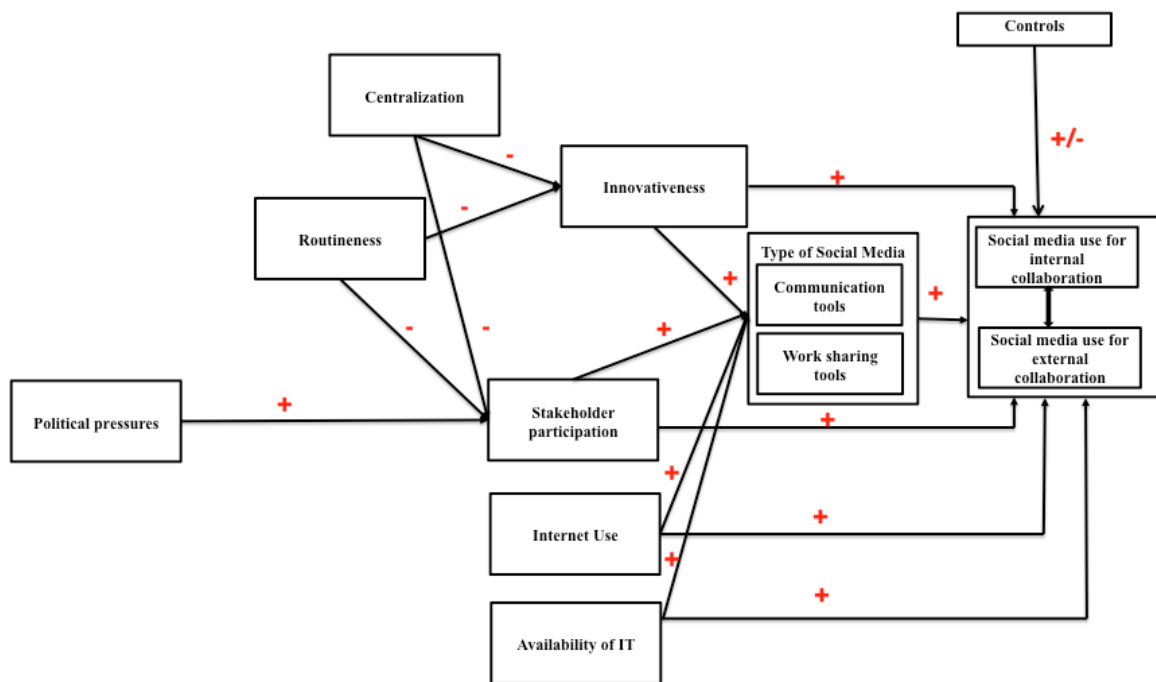
participate in the organization's decision-making processes and subsequently influence the adoption of social media technologies.

Further, as shown in figure 4, this study will conduct an exploratory analysis to understand how external and internal collaboration co-vary. As discussed in chapter two, internal collaboration is often viewed as a small-scale form of external collaboration. In other words, as an organization develops external integration, members of the organizations are likely to understand the value of collaboration and consequently, may develop internal collaborations for addressing complex problems. Thus, it is anticipated that use of social media technologies for external collaboration is likely to promote the use of social media technologies for internal collaboration, and vice versa. And, as scholars have also reported that similar factors influence different types of collaboration, this study examines how organizational, technical, and environmental factors influence the adoption and use of social media technologies for internal and external collaboration.

Additionally, other factors that are likely to influence the adoption and use of social media technologies for collaboration purposes are included as controls. First, previous studies have found that size of the organization is a likely predictor of an organization's ability to adopt and use new technologies for achieving tasks (Damanpour, 1996). It is often expected that larger organizations have technical and human resources that can be deployed to adopt and use new technologies for achieving a task. Second, public organizations may vary in their operating context, which may influence the adoption and use of social media technologies for collaboration purposes (Yuvaz & Welch, 2013). For instance, some organizations may function in a highly politicized

environment (e.g. Mayor’s office) versus other organizations that may function in a highly technical environment (e.g. Police Department). Third, the size of the city is likely to constrain the amount of resources available at the disposal of local governments (Moon, 2002). It is often anticipated that larger cities may have access to slack resources, which may be made available to the public agencies for carrying out their operations (e.g. experimenting with new technologies for achieving organizational tasks). Thus, the size of the organization, type of department, and size of the city are used as control variables.

Figure 4. Influence of organizational, technical, and environmental factors on the use of social media for collaboration purposes.



3.5. Summary of the chapter

This chapter developed specific hypotheses to examine the adoption and use of social media technologies for collaboration purposes. Particularly, stakeholder

participation, innovativeness, availability of IT, and internet use is likely to be positively associated with the adoption and use of social media technologies for collaboration purposes. Additionally, adoption of communication tools and work sharing tools are likely to be positively associated with the use of social media technologies for collaboration purposes. Further, it is also anticipated that communication tools will differently affect external collaboration than internal collaboration. After presenting the key hypotheses, the empirical model was presented which forms the basis for analysis to be conducted in the subsequent chapters.

DATA AND METHODS

At the end of the previous chapter a framework was presented, which integrated insights from sociotechnical and resource dependence theoretical approaches to examine the adoption and use of social media technologies for collaboration purposes. Particularly, the framework highlighted how organizational, technical, and environmental factors influence the adoption and use of social media technologies for collaboration purposes. The goal of this chapter is to discuss the data collection method, variables construct, and data analysis procedure. Thus, this chapter is divided into the following sections. Next section discusses data collection method. The subsequent section outlines operationalization of dependent, independent, and control variables. The following section discusses pattern and extend of missing data. Finally the chapter concludes with the data analysis strategy.

4.1. Data collection method

Data for this research comes from 2012 national survey of local governments conducted by C-STEPS at ASU. The survey was designed to collect information about the adoption and use of information technologies in local governments for civic engagement and service delivery. The survey asked questions to gauge the influence of organizational, technical, and environmental factors on the adoption and use of information technologies in U.S. local governments. The respondents were asked about how information technologies are used to connect with peer agencies, stakeholders, and citizens.

The survey was administered to a random sample of 2500 local government managers. The research team began by taking a stratified sample of 500 local governments in the US, which ranged in population from 25,000 to 250,000. All 184 US cities with populations of 100,000 or more were included in the sample. For cities with populations under 25,000 to 100,000, random samples of 316 out of 1,002 cities were selected. From each of the 500 cities, the research team selected a sample of lead managers from five departments: City Manager/Administrator, Director of Community Development, Director of Finance, Deputy Police Chief, and Director of Parks and Recreation.

The survey was administered using Sawtooth Software. The survey was posted online and participants were invited via email. Each participant was provided with personalized user id and password to access the survey. Several follow-up emails were sent to increase participation rate. The survey was designed to collect data on the use of specific social media technologies by local governments. It then collected data on the specific ways in which different social technologies are used for different types of agency work, including internal and external collaboration. Hence, there is a connection in the data between the specific social media technology adopted by the organization and the task for which it was used. The survey took about 20 minutes to complete.

The survey was administered from February 21, 2012 to May 5, 2012. A total of 2498 participants were invited to complete the survey (email addresses were not available for two respondents). Of 2498, 70 participants were removed from the sample because they were no longer working in the position or had retired. The final adjusted sample was

2428. A total of 893 responses were received. Of the 893 responses, 199 responses were incomplete. Of the 199 incomplete responses, 43 responses were deleted because no data were entered; and four responses were removed because they completed only first 7 items of the questionnaire. Thus, the sample size is reduced to 845.

The 845 responses were received from 429 cities. Of the 429 cities, one participant responded from 167 cities, two participants from 146 cities, three participants from 83 cities, four participants from 28 cities, and all five participants responded from 5 cities. The respondents city size and department type were compared with the non-respondents to examine non-response bias and no statistical differences were found. See Appendix A for the list of cities included in the study. The Association of Public Opinion Research Response Rate Calculator was used to calculate the response rate, which is 34.8%. Table 3 shows the description of overall response rate.

Table 3. Overall response rate

Final response rate	
Original Sample	2500
No Email Address	-2
Not Working / Retired	-70
Adjusted Sample	2428
Responses	845
Response Rate	34.8%

The overall distribution of survey is reported in Table 4. The distribution of response by department type is as follows: mayor’s office (17%), community development (22.1%), finance (15.6%), parks and recreation (21.3%), and police (23.9%). Weights were calculated based on the respondent city size to account for sampling procedure. The percentage of individuals per city in the population and

percentage of individuals from the cities in the sample was used to calculate the sampling weights.

Table 4. Department wise distribution of response

Variable	Frequency	Percentage
Mayor's Office	144	17
Community Development	187	22.1
Finance	132	15.6
Parks & Recreation	180	21.3
Police	202	23.9
Total	845	100

Of the 845 responses, 696 responded “yes” to using social media for any purpose in the organization (Survey question: to the best of your knowledge, does your organization use social media for any purpose?). Because the goal of this dissertation is to examine how organizational, technical, and environmental factors influence the adoption and use of social media for collaboration purposes, only respondents who reported using social media in their organization will be included in the data analysis. Thus, the sample size for analysis is 696. However, due to missing data for dependent and independent variables, the sample size for analysis is less than 696.

4.2. Description of measure for dependent, independent, and control variables

4.2.1. Dependent variables

The following question captures the use of social media for internal collaboration: *Please indicate which of the following social media tools your organization uses for any purpose: to enable internal collaboration on work tasks.* The respondents were asked to select all that applied from a list of 10 types of social media: Facebook, Twitter, YouTube, LinkedIn, Gov Loop, Skype, Flickr, instant messaging tools (Google talk,

blackberry messenger, MSN, or others), MySpace, and Google Docs. In the survey, “Social Media is defined as having the characteristic of being social and interactive in nature — allowing, but not requiring, two-way information exchange between individuals or groups of individuals, such as between individual public employees and citizens”. The use of social media for internal collaboration is coded as 1 if the respondent selected any one of the 10 social media tools and 0 otherwise. Descriptive statistics suggest that in the sample, 41 percent of the departments use social media for internal collaboration.

The following question captures the use of social media for external collaboration: *Please indicate which of the following social media tools your organization uses for any purpose: to enable coordination and collaboration on projects with citizens and stakeholders.* The respondents were asked to select all that applied from a list of 10 types of social media: Facebook, Twitter, YouTube, LinkedIn, Gov Loop, Skype, Flickr, instant messaging tools (Google talk, blackberry messenger, MSN, or others), MySpace, and Google Docs. The use of social media for external collaboration is coded as 1 if the respondent selected any one of the 10 social media tools and 0 otherwise. Descriptive statistics suggest that in the study sample, 46 percent of the departments use social media for external collaboration.

4.2.2. Independent variables

Stakeholder participation: The following survey question is used to measure stakeholder participation. *Over the last year, how often did the following citizen and stakeholder groups participate in your organization’s decision and policymaking?* Responses include: individual citizens, neighborhood associations, news media, interests

groups, urban civil groups, religious groups, consultants or paid experts, and professional associations. Response categories range from 1= never to 5= very often. Confirmatory factor analysis (CFA) technique was used to determine whether these eight observed variables significantly measure stakeholder participation. CFA test was conducted using MPlus software version 7. The results of CFA test suggest that the eight observed variables (individual citizens, neighborhood associations, news media, interests groups, urban civil groups, religious groups, consultants or paid experts, and professional associations) significantly contribute to measure stakeholder participation and the factor loading scores are 0.64, 0.61, 0.64, 0.73, 0.63, 0.58, 0.41, and 0.59 respectively. The eight variables yielded a Cronbach's alpha of 0.85. And, in the sample the average values for individual citizens, neighborhood associations, news media, interests groups, urban civil groups, religious groups, consultants or paid experts, and professional associations are 3.40, 3.21, 2.65, 3.05, 2.69, 2.28, 3.11, and 2.77 respectively.

Innovativeness: The degree of innovativeness is measured by three survey questions (Oliveira & Welch, 2013): ***(1) most employees in this organization are not afraid to take risks; (2) employees in this organization are rewarded for developing innovative solutions to problems and; (3) this organization is a very dynamic and entrepreneurial place.*** Response categories range from 1 = strongly disagree to 5 = strongly agree. The results of CFA test suggest that the three observed variables (most employees in this organization are not afraid to take risks, employees in this organization are rewarded for developing innovative solutions to problems and, and organization is a very dynamic and entrepreneurial place) significantly contribute to measure

innovativeness. The factor loading scores are 0.66, 0.81, and 0.75 respectively. A reliability analysis of three questions yielded a Cronbach's alpha of 0.75. Descriptive statistics suggests that in the sample the average values for most employees in this organization are not afraid to take risks, employees in this organization are rewarded for developing innovative solutions to problems and, and organization is a very dynamic and entrepreneurial place are 3.14, 3.34, and 2.91 respectively.

Centralization: The variable centralization is measured by three survey questions (Aiken & Hage, 1971; Li & Feeney, 2014): (1) *there can be little action taken here until a supervisor approves a decision;* (2) *in general, a person who wants to make his own decisions would be quickly discouraged in this agency;* and (3) *even small matters have to be referred to someone higher up for a final answer.* The respondents were asked: *Please indicate your level of agreement or disagreement with each of the following statements.* Response categories range from 1 = strongly disagree to 5 = strongly agree. The results of CFA test suggest that the three observed variables (there can be little action taken here until a supervisor approves a decision, in general, a person who wants to make his own decisions would be quickly discouraged in this agency, and even small matters have to be referred to someone higher up for a final answer) significantly contribute to measure centralization and the factor loading scores are 0.77, 0.76, and 0.69 respectively. A reliability analysis of three questions yielded a Cronbach's alpha of 0.77. Descriptive statistics suggests that in the sample the average values for there can be little action taken here until a supervisor approves a decision, in general, a person who wants to make his own decisions would be quickly discouraged in this agency, and even small matters have

to be referred to someone higher up for a final answer are 2.45, 2.34, and 2.19 respectively.

Routineness: The variable routineness is measured by three survey questions (Aiken & Hage, 1971): *(1) people here do the same job in the same way every day; (2) one thing people like around here is the variety of work (reverse coded); and (3) most jobs have something new happening every day (reverse coded)*. The respondents were asked: *Please indicate your level of agreement or disagreement with each of the following statements*. Response categories were five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The results of CFA test suggest that the three observed variables (people here do the same job in the same way every day, one thing people like around here is the variety of work (reverse coded), and most jobs have something new happening every day (reverse coded)) contribute to measure routineness and the factor loading scores are 0.67, 0.54, and 0.54 respectively. A reliability analysis of three questions yielded a Cronbach's alpha of 0.64. Descriptive statistics suggests that in the sample the average values for people here do the same job in the same way every day, one thing people like around here is the variety of work (reverse coded), and most jobs have something new happening every day (reverse coded) are 2.82, 2.23, and 2.48 respectively.

Availability of internal IT staff: The following survey question is used to operationalize the availability of IT staff (Oliveira & Welch, 2013): *Responsible for maintaining and improving your department website: designated person*. The variable of availability of internal IT staff is coded as 1 if the respondents indicated that there is a

designated person for maintaining and improving department website and e-government services. On average, 65 percent of the departments in the sample have a designated person for maintaining and improving department website and e-government services.

Internet use: The following survey question is used to operationalize the level of Internet use to complete tasks in the departments: *Approximately what proportion of the employees in your department use the Internet for their work.* The variable of Internet use ranges between 0 and 1 (percent internet use/100). On average, 74 percent of the work in the department is accomplished using Internet.

Political pressure: The political pressure is measured by three variables: civil society, city government, and other governments. To measure civil society pressure, the following survey question is used: *Please indicate the level of influence the following institutions or individuals exert over your organization.* Responses include: business groups, advocacy groups, public opinion, and media. Response categories range from 1= no influence to 5= strong influence. The results of CFA test suggest that the four observed variables (business groups, advocacy groups, public opinion, and media) significantly contribute to measure civil society pressure. The factor loading scores are 0.82, 0.75, 0.65, and 0.75 respectively. A reliability analysis of four observed variables yielded a Cronbach's alpha of 0.86. Descriptive statistics suggests that in the sample the average values for business groups, advocacy groups, public opinion, and media are 2.52, 2.58, 3.23, and 2.51 respectively. To measure city government pressure, the following survey question is used. *Please indicate the level of influence the following institutions or individuals exert over your organization.* Responses include: Mayor, Mayor's

Council, and other city departments. Response categories range from 1= no influence to 5= strong influence. The results of CFA test suggest that the three observed variables (Mayor, Mayor's Council, and other city departments) contribute to measure city department pressure. The factor loading scores are 0.55, 0.69, and 0.67 respectively. A reliability analysis of four observed variables yielded a Cronbach's alpha of 0.73. Descriptive statistics suggests that in the sample the average values for Mayor, Mayor's Council, and other city departments are 3.78, 3.72, and 3.11 respectively. And, to measure other government pressure, the following survey question is used. *Please indicate the level of influence the following institutions or individuals exert over your organization.* Responses include: Governor, State legislature, State courts, and Federal government. Response categories range from 1= no influence to 5= strong influence. The results of CFA test suggest that the four observed variables (Governor, State legislature, State courts, and Federal government) significantly contribute to measure other government pressure. The factor loading scores are 0.76, 0.89, 0.76, and 0.70 respectively. A reliability analysis of four questions yielded a Cronbach's alpha of 0.84. Descriptive statistics suggests that in the sample the average values for Governor, State legislature, State courts, and Federal governments are 2.15, 2.49, 2.55, and 2.50 respectively.

4.2.3. Mediating variable: Different classes of social media

Communication tools: Three variables were used to capture communication tools: *(1) Facebook, (2) Twitter, and (3) YouTube* . The variable facebook is coded as 1 if the respondent organization used Facebook and 0 otherwise. The variable twitter is

coded as 1 if the respondent organization used Twitter and 0 otherwise. The variable YouTube is coded as 1 if the respondent organization used YouTube and 0 otherwise. The results of CFA test suggest that the three observed variables (Facebook, Twitter, and YouTube) contribute to measure communication tools. The factor loading scores are 0.60, 0.59, and 0.89 respectively. A reliability analysis of four questions yielded a Cronbach's alpha of 0.52. Descriptive statistics suggests that in the sample the average values for Facebook, Twitter, and YouTube are 91 percent, 74 percent, and 53 percent respectively.

Work sharing tools: Four variables were used to capture work sharing tools: *(1) wikis, (2) document collaboration tools, (3) work coordination tools, and (4) file sharing tools.* The variable wikis is coded as 1 if the respondent organization used Wikis and 0 otherwise. The variable docoll is coded as 1 if the respondent organization used document collaboration tools and 0 otherwise. The variable workcord is coded as 1 if the respondent organization used work coordination tools and 0 otherwise. The variable dropbox is coded as 1 if the respondent organization used file sharing tools and 0 otherwise. The results of CFA test suggest that the four observed variables (wikis, document collaboration tools, work coordination tools, and file sharing tools) contribute to measure work sharing tools and the factor loading scores are 0.63, 0.81, 0.77, and 0.60 respectively. A reliability analysis of four questions yielded a Cronbach's alpha of 0.58. Descriptive statistics suggests that in the sample the average values for wikis, document collaboration tools, work coordination tools, and file sharing tools are nine percent, 22 percent, 50 percent, and 38 percent respectively.

4.2.4. Controls: Department size, type of department, and city size

In addition to organizational, technical, and environmental factors, several other variables may influence the use of social media technologies for internal and external collaboration. Previous studies indicate that department size and type influence IT adoption and use (Moon, 2002; Oliveira & Welch, 2013). Department size is measured as the natural log of department size. The survey asked respondents to indicate: *about how many full-time employees work in your department?* Five dichotomous variables are included to indicate respondent's department of employment: *City Manager/Administrator, Director of Community Development, Director of Finance, Deputy Police Chief, and Director of Parks and Recreation*. Larger cities have more slack resources to adopt and implement new technologies (Moon, 2002). To control for city size, the natural log of city population is included. Measures for dependent, independent, and control variables are reported in Tables 5. And, Table 6 reports the summary statistics for dependent, independent, and control variables.

Table 5: Variable description

Variable name	Survey Question	Measure
Use of social media for internal collaboration	Please indicate which of the following social media tools your organization uses for any purpose: to enable internal collaboration on work tasks.	
	The respondents were asked to select all that applied from a list of 10 types of social media: Facebook, Twitter, YouTube, LinkedIn, Gov Loop, Skype, Flickr, instant messaging tools (Google talk, blackberry messenger, MSN, or others), MySpace, and Google Docs.	Coded as 1= Yes; 0 = No
Use of social media for external collaboration	Please indicate which of the following social media tools your organization uses for any purpose: to enable coordination and collaboration on projects with citizens and stakeholders	
	The respondents were asked to select all that applied from a list of 10 types of social media: Facebook, Twitter, YouTube, LinkedIn, Gov Loop, Skype, Flickr, instant messaging tools (Google talk, blackberry messenger, MSN, or others), MySpace, and Google Docs.	Coded as 1= Yes; 0 = No
Stakeholder participation	Over the last year, how often did the following citizen and stakeholder groups participate in your organization's decision and policymaking?	
Individual citizens	Individual citizens	1 = never; 5 = very often
Neighborhood Associations	Neighborhood Associations	1 = never; 5 = very often
News media	News media	1 = never; 5 = very often
Interest groups	Interest groups	1 = never; 5 = very often
Urban civic groups	Urban civic groups	1 = never; 5 = very often
Religious groups	Religious groups	1 = never; 5 = very often
Consultants or paid experts	Consultants or paid experts	1 = never; 5 = very often
Professional associations	Professional associations	1 = never; 5 = very often
Innovativeness	Please indicate your level of agreement or disagreement with each of the following statements.	
Employees not afraid to take risks	Most employees in this organization are not afraid to take risks.	1 = strongly disagree; 5 = strongly agree
Employees rewarded for innovation	Employees in this organization are rewarded for developing innovative solutions to problems.	1 = strongly disagree; 5 = strongly agree
Organization is dynamic & entrepreneurial place	This organization is a very dynamic and entrepreneurial place	1 = strongly disagree; 5 = strongly agree

Centralization	Please indicate your level of agreement or disagreement with each of the following statements.	
Little action taken until a supervisor approves	There can be little action taken here until a supervisor approves a decision.	1 = strongly disagree; 5 = strongly agree
Person cannot make his own decisions	In general, a person who wants to make his own decisions would be quickly discouraged in this agency.	1 = strongly disagree; 5 = strongly agree
Even small matters have to be referred to higher up	Even small matters have to be referred to someone higher up for a final answer.	1 = strongly disagree; 5 = strongly agree
Routineness	Please indicate the extent to which you agree or disagree with the following statements.	
People here do the same job every day	People here do the same job in the same way every day.	1 = strongly disagree; 5 = strongly agree
Variety of work	One thing people like around here is the variety of work (reverse coded).	1 = strongly disagree; 5 = strongly agree
Jobs have something new happening every day	Most jobs have something new happening every day (reverse coded).	1 = strongly disagree; 5 = strongly agree
A designated IT staff	Responsible for maintaining and improving your department website - Designated person	Coded as 1= Yes; 0 = No
Percent Internet use	% Internet use	
Citizen Participation	Please indicate the level of influence the following institutions or individuals exert over your organization	
Business groups	Business groups	1 = no influence; 5 = very strong influence
Advocacy groups	Advocacy groups	1 = no influence; 5 = very strong influence
Public opinion	Public opinion	1 = no influence; 5 = very strong influence
Media	Media	1 = no influence; 5 = very strong influence
City Government Influence	Please indicate the level of influence the following institutions or individuals exert over your organization	
Mayor	Mayor's office	1 = no influence; 5 = very strong influence
Mayor's Council	Mayor's Council	1 = no influence; 5 = very strong influence
Other city departments	Other city departments	1 = no influence; 5 = very strong influence

Other Government Participation	Please indicate the level of influence the following institutions or individuals exert over your organization	
Governor	Governor	1 = no influence; 5 = very strong influence
State legislature	State legislature	1 = no influence; 5 = very strong influence
State courts	State courts	1 = no influence; 5 = very strong influence
Federal government	Federal government	1 = no influence; 5 = very strong influence
Communication tools	Please indicate which of the following social media tools your organization uses for any purpose:	
Facebook	Facebook	Coded as 1= Yes; 0 = No
Twitter	Twitter	Coded as 1= Yes; 0 = No
YouTube	YouTube	Coded as 1= Yes; 0 = No
Work sharing tools	To the best of your knowledge does your organization use any of these other technologies for any purpose?	
Wikis	Wikis	Coded as 1= Yes; 0 = No
Document sharing tools	Document collaboration tools	Coded as 1= Yes; 0 = No
Work coordination tools	Work coordination tools	Coded as 1= Yes; 0 = No
File sharing tools	File sharing tools	Coded as 1= Yes; 0 = No
Department size	Department size	Log of the whole number
City population	City population	Log of the whole number
Mayor's office	Mayor's office	Coded as 1= Yes; 0 = No
Community Development Department	Community Development	Coded as 1= Yes; 0 = No
Finance Department	Finance	Coded as 1= Yes; 0 = No
Police Department	Police	Coded as 1= Yes; 0 = No

Table 6: Summary statistics

Variable	N	Mean	Std. Dev.	Min	Max
Use of social media for internal collaboration	648	0.41	0.49	0	1
Use of social media for external collaboration	648	0.46	0.50	0	1
Individual citizens	694	3.40	1.06	1	5
Neighborhood Associations	692	3.21	1.09	1	5
News media	693	2.65	1.17	1	5
Interest groups	694	3.05	1.03	1	5
Urban civic groups	693	2.69	1.10	1	5
Religious groups	692	2.28	0.93	1	5
Consultants or paid experts	692	3.11	0.93	1	5
Professional associations	687	2.77	0.96	1	5
Employees not afraid to take risks	612	3.14	0.95	1	5
Employees rewarded for innovation	609	3.34	0.95	1	5
Organization is dynamic & entrepreneurial place	609	2.91	0.99	1	5
Little action taken until a supervisor approves	602	2.45	0.89	1	5
Person cannot make his own decisions	601	2.34	0.80	1	5
Even small matters have to be referred to higher up	602	2.19	0.84	1	5
People here do the same job every day	604	2.82	0.96	1	5
Variety of work	603	2.23	0.72	1	4
Jobs have something new happening every day	602	2.48	0.83	1	5
A designated IT staff	659	0.65	0.48	0	1
Percent Internet use	595	0.74	0.30	0	1
Business groups	613	2.52	0.90	1	5
Advocacy groups	611	2.58	0.88	1	5
Public opinion	613	3.23	0.92	1	5
Media	613	2.51	1.00	1	5
Mayor	613	3.78	1.12	1	5
Mayor's Council	608	3.72	1.09	1	5
Other city departments	612	3.11	0.93	1	5
Governor	612	2.15	1.01	1	5
State legislature	614	2.49	1.07	1	5
State courts	614	2.55	1.19	1	5
Federal government	611	2.50	1.06	1	5
Facebook	691	0.91	0.29	0	1
Twitter	669	0.74	0.44	0	1
YouTube	636	0.53	0.50	0	1
Wikis	652	0.09	0.29	0	1
Document sharing tools	660	0.22	0.42	0	1
Work coordination tools	666	0.50	0.50	0	1
File sharing tools	668	0.38	0.49	0	1

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4.3. Missing data pattern

Missing data is a common problem in research studies (Schafer & Graham, 2002), especially in survey data. Missing data can be defined as no information for some variables or cases. The issue of missing data is problematic and creates two main problems: loss of statistical power and bias in parameter estimation. First, statistical power is critical for discovering and testing relationship among variables in the sample. Missing data compounds the issue of power and reduces sample size, which results in loss of statistical power. Second, missing data also increases estimation bias. In most cases, missing data results in downward bias in coefficient estimation. The downward bias constraints variance in one variable and decreases correlation in another variable (Roth, 1994).

Survey methodologists distinguish between two types of nonresponses: unit and item nonresponse. Unit nonresponse occurs when an individual in the sample refuses to participate or is not available. One of the common strategies used to address unit nonresponse is including weights in the data analysis. Item nonresponse occurs when partial information is available (because the respondent answered few questions but choose to skip certain questions) (Schafer & Graham, 2002).

Several statistical techniques (e.g. deletion, imputation) can be applied to address the issue of missing data due to item nonresponse (Schafer & Graham, 2002). For example, listwise deletion drops all cases with missing data from analysis. While this approach is commonly used, it results in loss of data and reduces sample size. Mean substitution replaces mean value of the variable for missing information. This approach

solves the issue of loss of data, but it decreases variance estimates of the variable.

Growing number of researchers are adopting multiple regression imputation techniques to address the issue of missing data. Multiple regression imputation creates different estimates for missing data. Multiple regression imputation technique is considered better than listwise deletion because it saves loss of data. Further, it does not decrease the variance estimates for the variable. However before deciding the appropriate statistical technique to address missing data, it is important to examine the extent and pattern of missing data (Roth, 1994).

Table 7 reports the extent of missing data for key variables in the study. The dependent and independent variables have less than about 20% missing data. The two dependent variables – use social media for internal collaboration and use of social media for external collaboration – have missing information for about 6.9% and 6.9% respectively. For social media types, about 10% of data are missing. For organizational factors, 15% of cases are missing. For technical factors, about 15% cases are missing. Moreover, for environmental factors 15% data is missing. According to Roth (1994), when less than 20% cases of data are missing multiple imputation techniques can be used.

Table 7: Extend of missing data in percentages for dependent and independent variables

Variable	N	Number Missing	Percentage Missing
Use of social media for external collaboration	648	48	6.9
Use of social media for internal collaboration	648	48	6.9
Individual citizens	694	2	0.3
Neighborhood Associations	692	4	0.6
News media	693	3	0.4
Interest groups	694	2	0.3
Urban civic groups	693	3	0.4
Religious groups	692	4	0.6
Consultants or paid experts	692	4	0.6
Professional associations	687	9	1.3
Mayor	613	83	11.9
Mayor's Council	608	88	12.6
Other city departments	612	84	12.1
Governor	612	84	12.1
State legislature	614	82	11.8
State courts	614	82	11.8
Federal government	611	85	12.2
Business groups	613	83	11.9
Advocacy groups	611	85	12.2
Public opinion	613	83	11.9
Media	613	83	11.9
A designated IT staff	659	37	5.3
Percent Internet use	595	101	14.5
Employees not afraid to take risks	612	84	12.1
Employees rewarded for innovation	609	87	12.5
Organization is dynamic & entrepreneurial place	609	87	12.5
Little action taken until a supervisor approves	602	94	13.5
Person cannot make his own decisions	601	95	13.6
Even small matters have to be referred to higher up	602	94	13.5
People here do the same job every day	604	92	13.2
Variety of work	603	93	13.4
Jobs have something new happening every day	602	94	13.5
Facebook	691	5	0.7
Twitter	669	27	3.9
YouTube	636	60	8.6
Wikis	652	44	6.3
Document sharing tools	660	36	5.2
Work coordination tools	666	30	4.3
File sharing tools	668	28	4

The second factor before applying missing data technique is to determine the pattern of missing information. Rubin (1976) proposed three typologies to examine the pattern of missing data: missing at random (MAR), missing completely at random (MCAR), and missing not at random (MNAR). MAR occurs when the probability of missing data does not depend on missing data, but depend on observed data. MAR is also known as an ignorable nonresponse. MCAR is a special case of MAR, where the distribution of missingness does not either depends on missing data or observed data. MNAR occurs when the distribution of missing data is dependent on missing information. In other words, the important information is missing from the sample data. MNAR is known as nonignorable (Schafer & Graham, 2002). One approach to test the pattern of missing data is to create a dummy variable (non-missing value = 0 and missing value = 1) and correlated it with other variables in the dataset. A significant correlation indicated that the pattern of missing data in not MCAR.

The above approach was adopted to test the pattern of missing data. First, dummy variables were created for key independent variables. For example, Variety of work is coded as 1 = missing and 0 otherwise. And, then each dummy variable was correlated with the dependent variables: use of social media for internal collaboration and use of social media for external collaboration. Correlation findings are reported in Table 8. The results suggest most variables in the sample (e.g. People here do the same job every day, Variety of work, Jobs have something new happening every day) are highly correlated with the use of social media for internal collaboration and the use of social media for external collaboration. Thus, it can be concluded that the variables are not MCAR.

A second approach is to create a dummy variable (non-missing value = 0 and missing value = 1) and then run t-test comparisons between respondents and non-respondents (Acock, 1997). Missing data codes were created for key independent variables and then a chi-square test comparing participants who responded yes to using social media technologies for internal collaboration and did not respond to key dependent variables were computed. Similarly, chi-square test was computed for participants who responded yes to using social media technologies for external collaboration and did not respond to key dependent variables. The results are reported in Table 9. For most part, the results indicate that respondent differ significantly from non-respondents. Thus, the data is not MCAR.

Table 8: Correlation between missing key independent variables and use of social media for internal and external collaborations

	1	2	3	4	5	6	7	8	9	10
1 Use of social media for internal collaboration	1.00									
2 Use of social media for external collaboration	0.30***	1.00								
3 Individual citizens	-0.05	-0.05	1.00							
4 Neighborhood Associations	-0.07	-0.07	0.71***	1.00						
5 News media	-0.06	-0.06	0.82***	0.58***	1.00					
6 Interest groups	-0.05	-0.05	1.00	0.71***	0.82***	1.00				
7 Urban civic groups	-0.01	-0.02	0.82***	0.58***	0.67***	0.82***	1.00			
8 Religious groups	-0.03	-0.03	0.71***	0.50***	0.58***	0.71***	0.58***	1.00		
9 Consultants or paid experts	-0.03	-0.03	0.71***	0.50***	0.58***	0.71***	0.58***	0.50***	1.00	
10 Professional associations	0.03	-0.03	0.47***	0.33***	0.38***	0.47***	0.38***	0.33***	0.33***	1.00
11 Mayor	-0.12**	-0.14***	0.15***	0.09*	0.11**	0.15***	0.11**	0.09*	0.09*	0.08*
12 Mayor's Council	-0.12**	-0.13**	0.14***	0.09*	0.11**	0.14***	0.11**	0.09*	0.09*	0.11**
13 Other city departments	-0.11**	-0.14***	0.14***	0.09*	0.11**	0.14***	0.11**	0.09*	0.09*	0.07*
14 Governor	-0.09*	-0.13***	0.14***	0.09*	0.11**	0.14***	0.11**	0.09*	0.09*	0.07*
15 State legislature	-0.10**	-0.13***	0.15***	0.09*	0.11**	0.15***	0.11**	0.09*	0.09*	0.08*
16 State courts	-0.10**	-0.13***	0.15***	0.09*	0.11**	0.15***	0.11**	0.09*	0.09*	0.08*
17 Federal government	-0.10**	-0.14***	0.14***	0.09*	0.11**	0.14***	0.11**	0.09*	0.09*	0.07
18 Business groups	-0.11**	-0.14***	0.15***	0.09*	0.11**	0.15***	0.11**	0.09*	0.09*	0.08*
19 Advocacy groups	-0.10**	-0.12**	0.14***	0.09*	0.11**	0.14***	0.11**	0.09*	0.09*	0.07
20 Public opinion	-0.11**	-0.14***	0.15***	0.09*	0.11**	0.15***	0.11**	0.09*	0.09*	0.08*
21 Media	-0.11**	-0.14***	0.15***	0.09*	0.11**	0.15***	0.11**	0.09*	0.09*	0.08*
22 A designated IT staff	-0.04	-0.06	-0.01	-0.02	-0.02	-0.01	-0.02	-0.02	-0.02	-0.03
23 Percent Internet use	-0.11**	-0.15***	0.05	0.08*	0.04	0.05	0.04	0.02	0.02	-0.01
24 Employees not afraid to take risks	-0.13***	-0.15***	0.14***	0.09*	0.11**	0.14***	0.11**	0.09*	0.09*	0.04
25 Employees rewarded for innovation	-0.12**	-0.14***	0.14***	0.09*	0.11**	0.14***	0.11**	0.09*	0.09*	0.03
26 Organization is dynamic & entrepreneurial place	-0.12**	-0.13***	0.14***	0.09*	0.11**	0.14***	0.11**	0.09*	0.09*	0.03
27 Little action taken until a supervisor approves	-0.13**	-0.13**	0.14***	0.14***	0.10**	0.14***	0.10**	0.08*	0.08*	0.07
28 Person cannot make his own decisions	-0.11**	-0.13***	0.14***	0.14***	0.10**	0.14***	0.10**	0.08*	0.08*	0.07
29 Even small matters have to be referred to higher up	-0.13**	-0.13**	0.14***	0.14***	0.10**	0.14***	0.10**	0.08*	0.08*	0.07
30 People here do the same job every day	-0.12**	-0.14***	0.14***	0.14***	0.10**	0.14***	0.10**	0.08*	0.08*	0.07
31 Variety of work	-0.12**	-0.14***	0.14***	0.14***	0.10**	0.14***	0.10**	0.08*	0.08*	0.07
32 Jobs have something new happening every day	-0.12**	-0.13**	0.14***	0.14***	0.10**	0.14***	0.10**	0.08*	0.08*	0.07
33 Facebook	0.05	0.05	-0.00	-0.01	-0.01	-0.00	-0.01	-0.01	-0.01	-0.01
34 Twitter	-0.03	0.00	-0.01	-0.02	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02
35 YouTube	-0.09*	-0.12**	0.08*	0.04	0.06	0.08*	0.06	0.04	0.04	0.01
36 Wikis	-0.07	-0.07	-0.01	-0.02	-0.02	-0.01	-0.02	-0.02	-0.02	-0.03
37 Document sharing tools	-0.07	-0.07	-0.01	-0.02	-0.02	-0.01	-0.02	-0.02	-0.02	-0.03
38 Work coordination tools	-0.12**	-0.09*	-0.01	-0.02	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02
39 File sharing tools	-0.07	-0.08*	-0.01	-0.02	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 8: Correlation between missing key independent variables and use of social media for internal and external collaborations (Continued)

		11	12	13	14	15	16	17	18	19	20
11	Mayor	1.00									
12	Mayor's Council	0.95***	1.00								
13	Other city departments	0.97***	0.93***	1.00							
14	Governor	0.97***	0.93***	0.97***	1.00						
15	State legislature	0.98***	0.95***	0.99***	0.99***	1.00					
16	State courts	0.98***	0.95***	0.99***	0.99***	1.00	1.00				
17	Federal government	0.96***	0.93***	0.97***	0.97***	0.98***	0.98***	1.00			
18	Business groups	0.97***	0.94***	0.98***	0.98***	0.99***	0.99***	0.97***	1.00		
19	Advocacy groups	0.96***	0.93***	0.97***	0.97***	0.98***	0.98***	0.96***	0.99***	1.00	
20	Public opinion	0.97***	0.94***	0.98***	0.98***	0.99***	0.99***	0.97***	1.00	0.99***	1.00
21	Media	0.97***	0.94***	0.98***	0.98***	0.99***	0.99***	0.97***	1.00	0.99***	1.00
22	A designated IT staff	0.64***	0.62***	0.64***	0.64***	0.65***	0.65***	0.64***	0.64***	0.64***	0.64***
23	Percent Internet use	0.84***	0.81***	0.82***	0.82***	0.84***	0.84***	0.83***	0.84***	0.83***	0.84***
24	Employees not afraid to take risks	0.94***	0.91***	0.95***	0.93***	0.95***	0.95***	0.93***	0.94***	0.93***	0.94***
25	Employees rewarded for innovation	0.92***	0.89***	0.94***	0.93***	0.94***	0.94***	0.92***	0.93***	0.92***	0.93***
26	Organization is dynamic & entrepreneurial place	0.92***	0.89***	0.94***	0.93***	0.94***	0.94***	0.92***	0.93***	0.92***	0.93***
27	Little action taken until a supervisor approves	0.88***	0.85***	0.90***	0.89***	0.90***	0.90***	0.88***	0.89***	0.88***	0.89***
28	Person cannot make his own decisions	0.87***	0.84***	0.89***	0.88***	0.89***	0.89***	0.87***	0.89***	0.87***	0.89***
29	Even small matters have to be referred to higher up	0.88***	0.85***	0.90***	0.89***	0.90***	0.90***	0.88***	0.89***	0.88***	0.89***
30	People here do the same job every day	0.89***	0.86***	0.91***	0.90***	0.91***	0.91***	0.89***	0.90***	0.89***	0.90***
31	Variety of work	0.88***	0.85***	0.90***	0.89***	0.90***	0.90***	0.89***	0.90***	0.89***	0.90***
32	Jobs have something new happening every day	0.88***	0.85***	0.90***	0.89***	0.90***	0.90***	0.88***	0.89***	0.88***	0.89***
33	Facebook	-0.03	-0.03	-0.03	0.02	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
34	Twitter	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
35	YouTube	0.06	0.04	0.04	0.04	0.05	0.05	0.04	0.06	0.06	0.06
36	Wikis	-0.00	-0.01	-0.01	-0.01	-0.00	-0.00	0.01	0.01	0.01	0.01
37	Document sharing tools	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.03	0.03	0.03
38	Work coordination tools	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.05	0.05	0.05
39	File sharing tools	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	0.01	0.01	0.01

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 8: Correlation between missing key independent variables and use of social media for internal and external collaborations (Continued)

	21	22	23	24	25	26	27	28	29	30
21 Media	1.00									
22 A designated IT staff	0.64***	1.00								
23 Percent Internet use	0.84***	0.58***	1.00							
24 Employees not afraid to take risks	0.94***	0.64***	0.86***	1.00						
25 Employees rewarded for innovation	0.93***	0.63***	0.86***	0.98***	1.00					
26 Organization is dynamic & entrepreneurial place	0.93***	0.63***	0.86***	0.98***	0.97***	1.00				
27 Little action taken until a supervisor approves	0.89***	0.60***	0.85***	0.94***	0.93***	0.93***	1.00			
28 Person cannot make his own decisions	0.89***	0.60***	0.86***	0.93***	0.93***	0.93***	0.98***	1.00		
29 Even small matters have to be referred to higher up	0.89***	0.60***	0.85***	0.94***	0.93***	0.93***	0.99***	0.98***	1.00	
30 People here do the same job every day	0.90***	0.61***	0.86***	0.95***	0.94***	0.94***	0.99***	0.98***	0.99***	1.00
31 Variety of work	0.90***	0.60***	0.86***	0.94***	0.94***	0.94***	0.99***	0.99***	0.99***	0.99***
32 Jobs have something new happening every day	0.89***	0.60***	0.85***	0.94***	0.93***	0.93***	0.99***	0.98***	0.99***	0.99***
33 Facebook	-0.03	-0.02	-0.04	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
34 Twitter	-0.05	-0.05	-0.06	-0.05	-0.05	-0.05	-0.06	-0.06	-0.06	-0.06
35 YouTube	0.06	-0.03	0.03	0.06	0.05	0.07	0.04	0.04	0.04	0.05
36 Wikis	0.01	0.02	0.03	0.01	0.01	0.01	0.00	-0.00	0.00	0.00
37 Document sharing tools	0.03	0.03	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
38 Work coordination tools	0.05	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02
39 File sharing tools	0.01	-0.02	-0.00	-0.01	-0.01	-0.01	-0.02	-0.02	-0.02	-0.02

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

	31	32	33	34	35	36	37	38	39
31 Variety of work	1.00								
32 Jobs have something new happening every day	0.99***	1.00							
33 Facebook	-0.03	-0.03	1.00						
34 Twitter	-0.06	-0.06	0.16***	1.00					
35 YouTube	0.04	0.04	0.16***	0.39***	1.00				
36 Wikis	0.00	0.00	0.05	0.31***	0.38***	1.00			
37 Document sharing tools	0.00	0.00	0.06	0.32***	0.34***	0.74***	1.00		
38 Work coordination tools	0.02	0.02	0.07	0.29***	0.39***	0.76***	0.81***	1.00	
39 File sharing tools	-0.02	-0.02	0.07	0.34***	0.35***	0.79***	0.74***	0.75***	1.00

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Table 9: Comparing participants who responded to use of social media for internal and external collaborations and did not respond for key independent variables

Variable	Use of social media for internal collaboration		Use of social media for external collaboration	
	Pearson chi2(1)	p-value	Pearson chi2(1)	p-value
Individual citizens	1.40	0.24	1.72	0.19
Neighborhood Associations	2.80	0.09	3.45	0.06
News media	2.10	0.15	2.58	0.11
Interest groups	1.40	0.24	1.72	0.19
Urban civic groups	0.07	0.79	0.20	0.66
Religious groups	0.43	0.51	0.72	0.40
Consultants or paid experts	0.43	0.51	0.72	0.40
Professional associations	0.79	0.37	0.60	0.44
Mayor	9.14	0.00	12.41	0.00
Mayor's Council	8.57	0.00	10.31	0.00
Other city departments	8.05	0.01	13.12	0.00
Governor	5.21	0.02	11.21	0.00
State legislature	7.02	0.01	11.71	0.00
State courts	7.02	0.01	11.71	0.00
Federal government	7.04	0.01	11.89	0.00
Business groups	7.53	0.01	12.41	0.00
Advocacy groups	7.04	0.01	10.09	0.00
Public opinion	7.53	0.01	12.41	0.00
Media	7.53	0.01	12.41	0.00
A designated IT staff	1.30	0.25	2.20	0.14
Percent Internet use	7.72	0.01	15.49	0.00
Employees not afraid to take risks	11.51	0.00	15.18	0.00
Employees rewarded for innovation	9.66	0.00	13.29	0.00
Organization is dynamic & entrepreneurial place	9.66	0.00	11.41	0.00
Little action taken until a supervisor approves	10.18	0.00	10.76	0.00
Person cannot make his own decisions	7.63	0.01	11.40	0.00
Even small matters have to be referred to higher up	10.18	0.00	10.76	0.00
People here do the same job every day	9.10	0.00	12.97	0.00
Variety of work	9.64	0.00	11.83	0.00
Jobs have something new happening every day	8.60	0.00	10.76	0.00
Facebook	1.92	0.17	1.35	0.25
Twitter	0.46	0.50	0.00	1.00
YouTube	5.21	0.02	9.45	0.00
Wikis	2.89	0.09	2.96	0.09
Document sharing tools	3.15	0.08	2.75	0.10
Work coordination tools	8.66	0.00	5.26	0.02
File sharing tools	3.62	0.06	4.03	0.05

Finally, Little MCAR test in STATA was conducted to examine the pattern of missingness. Table 10 reports the results of the Little MCAR test. The Little MCAR test results are significant at $p < 0.05$. The results indicate that the sample is not MCAR. However, there are no significant tests available to test whether the data is MAR or MNAR (Treiman, 2009). As Roth noted, when the extent of missing data is less than 20%, any missing data technique can be used. Thus, for the analysis listwise deletion technique will be used. Further, multiple imputation will be used to check the robustness of estimated results.

Table 10: Little MCAR test

Number of observations	696
Chi-square distance	2650.769
Degrees of freedom	2460
p-value	0.0039

4.4. Data analysis methods

The first step in data analysis is to review univariate and bivariate statistics for the sample. Univariate statistics will provide information about variables mean, median, mode, and standard deviation. Specifically, descriptive statistics will provide an overall picture about the distribution of the key variables in the sample. Bivariate statistics will provide directionality between independent and dependent variables. Correlation (a form of bivariate statistics) will illustrate (1) positive or negative relationship between two variables and (2) weak, moderate, or strong relationship between two variables. The correlation coefficient ranges between -1 and +1, and closer to 1, the relationship is stronger.

Path analysis will be used to test the direct and indirect relationship between the use of social media technologies for collaboration purposes and various organizational, technical, and environmental factors (theorized in chapter three). Path analysis is a form of structural equation (SEM) modeling that allows one to estimate both direct and indirect relationship between variables of interest. As Trieman (2009) noted, path analysis provides useful insights about relative importance between different paths linking the variables. SEM is an extension of regression analysis, but can be used to simultaneously estimate both direct and indirect relation between key variables of interest. According to Byrne (2010), “because (a) regression equations represent the influence of one or more variables on another, and (b) this influence, conventionally in SEM, is symbolized by a single-headed arrow pointing from the variable of influence to the variable of interest, we can think of each equation as summarizing the impact of all relevant variables in the model (observed and unobserved) on one specific variable (observed or unobserved)” (p. 11).

While working with SEM, it is important to understand two types of variables: latent and observed. Latent variables are constructed that cannot be measured or observed directly and are linked to an observed set of variables (Byre, 2010). For example, innovativeness variable used in this study is a latent variable, which is linked to (1) most employees in this organization are not afraid to take risks; (2) employees in this organization are rewarded for developing innovative solutions to problems and; (3) this organization is a very dynamic and entrepreneurial place. These three observed variables

are used to infer innovativeness (latent variable of interest, but cannot be measured directly).

Further, there are two types of latent variables: exogenous and endogenous (Byre, 2010; Garson, 2008). Exogenous latent variables are independent variables that cause changes in values of other latent variables. For instance, stakeholder participation, centralization, and routineness are exogenous latent variables in this study. Endogenous latent variables are dependent variables that are influenced by exogenous latent variables. The communication and work sharing tools are endogenous latent variables in this study.

There are several steps to conduct SEM analysis. First, it is necessary to develop a path diagram that specifies the relationship between exogenous latent and endogenous latent variables. The one-way arrow between two variables represents the effect of one variable on the other. This relationship should be grounded in theory, and the researcher should have some understanding of underlying phenomena of how latent variables are connected with each other. Second, once the model is identified, it is important to constrain the model before estimating the coefficients. As the dependent variables are categorical, weighted least squares means and variance adjusted (WLSMV) estimation is performed. While Maximum Likelihood is a common method of analysis for data with multivariate normal distribution, WLSMV is a method for estimating categorical dependent variables. Further, WLSMV is better alternative than weighted least squares (WLS) because WLS requires large samples, whereas WLSMV can be estimated for samples that are 200 or more (Beauducel & Herzberg, 2009). Thus, WLSMV function will be imposed to constrain the model. Third, the model will be estimated. In addition to

estimating the direct effect, both total and indirect effect will be estimated. As Alwin & Hauser (1975) noted, “a total effect tells us how much change in a consequent variable is induced by a given shift in an antecedent variable” and “indirect effects are those parts of a variable's total effect that are transmitted or mediated by variables specified as intervening between the cause and effect of interest in a model” (p. 39). Finally, the model will be tested for goodness of fit to determine how the hypothesized model fits the sample data. Several goodness-of-fit indices can be used as a measure to estimate the model fit: root mean square error of approximation (RMSEA), Comparative fit index (CFI), Model Chi-Square (χ^2) and so on (Hooper, Coughlan, & Mullen, 2008). MPlus software version 7 is used to run SEM analysis and test hypothesized relationship between exogenous (organizational, technical, and environmental) and endogenous variables (use of social media for collaboration purposes) through mediating variables (communication and work sharing tools).

ANALYSIS

The goal of this chapter is to test hypotheses presented in chapter three. To address this goal, the next section discusses empirical model that highlights the relationship between organizational, technical, and environmental factors on the adoption and use of social media technologies for internal and external collaboration. Then, I discuss the results of correlation analysis. The next section presents and interprets the findings of SEM analysis examining the influence of organizational, technical, and environmental factors on the adoption and use of social media technologies for internal and external collaboration via communication and work sharing tools. Finally, the chapter includes the findings of several robustness checks.

5.1. Empirical model

Figures 5 and 6 depict the hypothesized relationship in two models. The first model predicts the influence of organizational, technical, and environmental factors on the adoption and use of social media technologies for internal and external collaboration via consolidated social media tools. The second model predicts the influence of organizational, technical, and environmental factors on the adoption and use of social media technologies for internal and external collaboration via communication and work sharing tools.

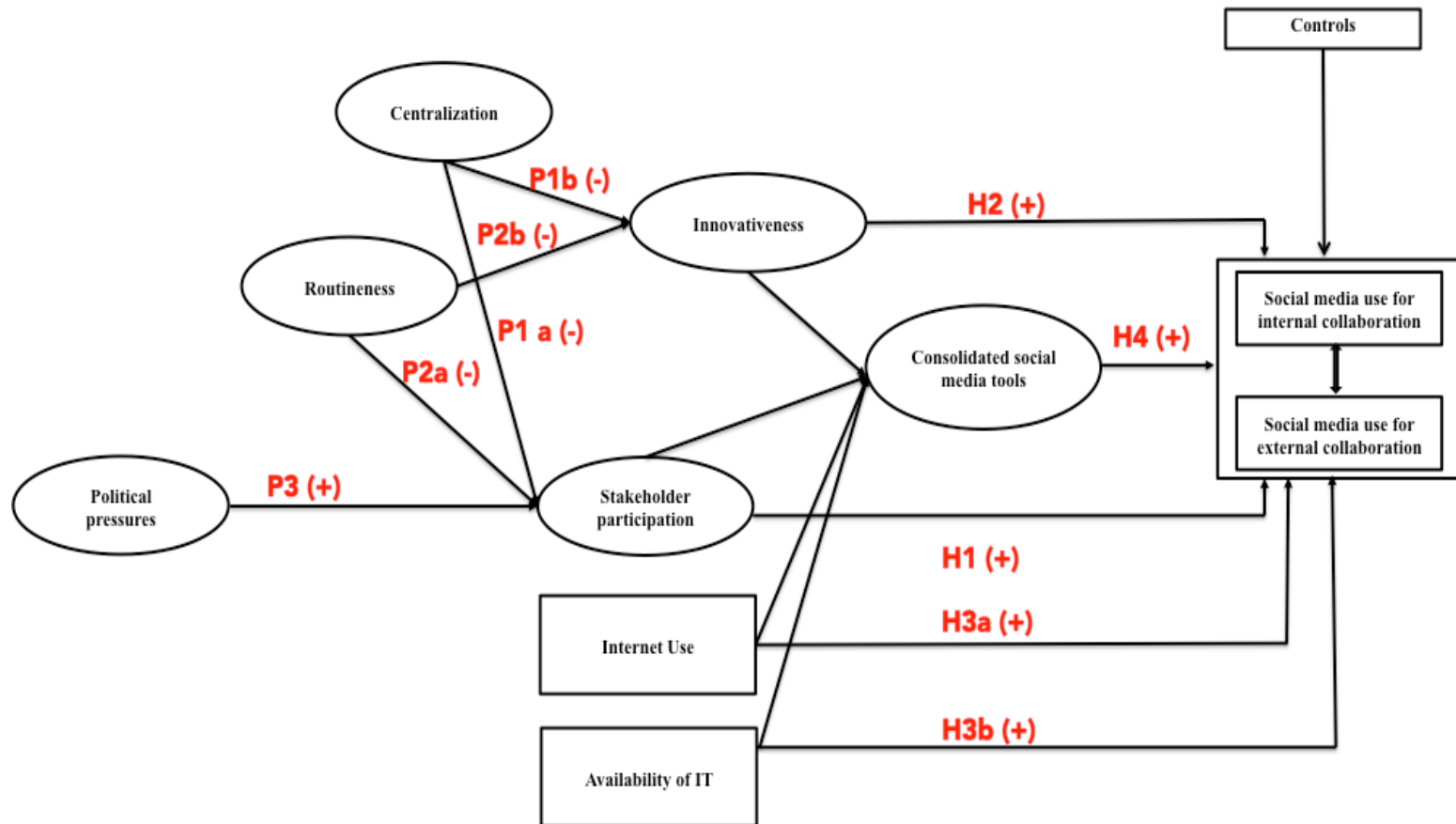
Figure 5 includes three hypotheses regarding the direct effect of stakeholder participation, innovativeness, and technical capacity (availability of IT staff and Internet use) on the use of social media technologies for collaboration purposes. The model also shows the indirect effect of stakeholder participation, innovativeness, and technical

capacity on the use of social media technologies for collaboration purposes through consolidated social media tools. The empirical model includes four hypotheses depicting the relationship between adoption of types of social media tools and internal and external collaboration. In addition to four hypotheses, the empirical model also includes three propositions showing the indirect effect influence of centralization, routineness, and political pressures on the adoption of social media technologies. While the control variables were not formally hypothesized, they are still shown in the model.

Figure 6 shows three hypotheses regarding the direct effect of stakeholder participation, innovativeness, and technical capacity on the use of social media technologies for collaboration purposes. The model also shows indirect effect of stakeholder participation, innovativeness, and technical capacity on the use of social media technologies for collaboration purposes via communication and work sharing tools. The model includes four hypotheses depicting the relationship between communication and work sharing tools and collaboration purposes.

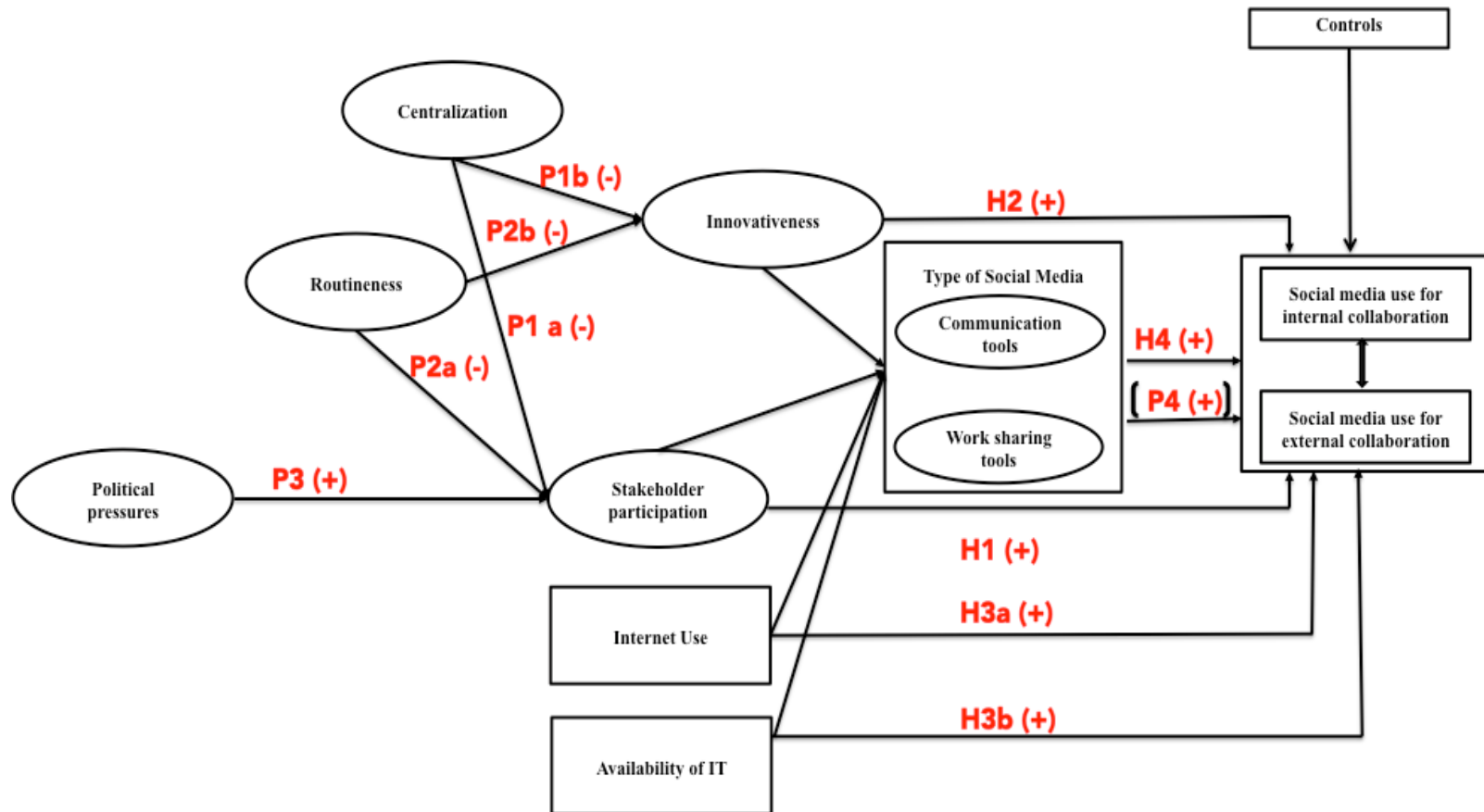
Figure 6 also includes three propositions showing the indirect influence of centralization, routineness, and political pressures on the adoption of social media technologies. Further, Figure 6 also includes an exploratory proposition (P4) representing the differential effect of different classes of social media technologies on internal and external collaboration. While the control variables were not formally hypothesized, they are still shown in the model.

Figure 5: Use of social media for collaboration purposes via consolidated social media tools (Empirical model)



*P1a through P3 (propositions) represent indirect effects.
 Oval represent latent variables and rectangle represent observed variables.

Figure 6: Use of social media for collaboration purposes via communication and work sharing tools (Empirical model)



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*P1a through P3 (propositions) represent indirect effects.

P4 represents differential effect different classes of social media technologies on internal and external collaboration

Oval represent latent variables and rectangle represent observed variables.

5.2. Correlation analysis

Correlation analysis is conducted to achieve two main goals. First, correlation analysis is done to determine whether independent variables are significantly related with each other. Higher correlation between independent variables indicates multicollinearity, i.e. two independent variables measure similar construct. According to Allison (1990), the correlation value of 0.8 between two independent variables indicates that they measure the same construct. Thus, only one of the variables should be included in the estimation model. As per correlation results displayed in Table 11, the correlation values between independent variables are less than 0.8, which means there is no issue of multicollinearity.

Second, correlation can provide initial support (or disconfirm) for the hypothesized relationship between dependent and independent variables. Eight observed variables (individual citizens, neighborhood associations, news media, interests groups, urban civil groups, religious groups, consultants or paid experts, and professional associations) representing stakeholder participation are positively correlated with the two dependent variables – use of social media for internal collaboration and use of social media for external collaboration. The positive correlation suggests that increase in stakeholder participation is likely to result in the use of social media technologies for internal and external collaboration purposes.

Three observed variables (most employees in this organization are not afraid to take risks, employees in this organization are rewarded for developing innovative solutions to problems and, and organization is a very dynamic and entrepreneurial place)

measuring innovativeness is positively correlated with the use of social media for internal and external collaboration. The positive relationship correlation may suggest that innovative local governments are more likely to use social media technologies for internal and external collaboration purposes. Further, the availability of IT staff and percentage of Internet use is also positively correlated with the use of social media technologies for internal and external collaboration purposes. The positive relationship suggests that local governments with higher technical capacity in terms of availability of IT staff and percentage of Internet use are more likely to use of social media technologies for internal and external collaboration purposes.

Of the three (Facebook, Twitter, and YouTube) variables measuring communication tools, the variable adoption of Facebook is negatively correlated with the use of social media for internal collaboration. However, the variable adoption of Facebook is positively correlated with the use of social media for external collaboration. Perhaps, this result may suggest that adoption of Facebook may be useful for external collaboration but not for internal collaboration. In other words, the usability of Facebook may differ based on the type of collaboration, i.e., internal vs. external.

Other two variables (Twitter, and YouTube) representing communication tools are positively correlated with the use of social for media internal and external collaboration purposes. The positive relationship suggests that adoption of Twitter and YouTube are likely to result in use of these technologies for internal and external collaboration purposes. Four variables (wikis, document collaboration tools, work coordination tools, and file sharing tools) measuring work sharing tools are positively

correlated with the use of social media for internal and external collaboration. The positive correlation shows that the increase in adoption of these tools is likely to result in the use of social media technologies for internal and external collaboration.

Table 11: Correlation analysis

	1	2	3	4	5	6	7	8	9	10
1 Use of social media for internal collaboration	1.00									
2 Use of social media for external collaboration	0.30***	1.00								
3 Individual citizens	0.06	0.10**	1.00							
4 Neighborhood Associations	0.11***	0.12***	0.57***	1.00						
5 News media	0.11***	0.11***	0.43***	0.39***	1.00					
6 Interest groups	0.05	0.05	0.56***	0.46***	0.63***	1.00				
7 Urban civic groups	0.13***	0.08**	0.41***	0.46***	0.45***	0.62***	1.00			
8 Religious groups	0.15***	0.08**	0.35***	0.39***	0.47***	0.50***	0.56***	1.00		
9 Consultants or paid experts	0.07*	0.04	0.30***	0.18***	0.31***	0.40***	0.31***	0.26***	1.00	
10 Professional associations	0.18***	0.13***	0.29***	0.27***	0.32***	0.35***	0.39***	0.40***	0.46***	1.00
11 Mayor	0.03	0.05	0.07*	0.07*	0.10**	0.02	0.04	0.07*	0.09**	0.02
12 Mayor's Council	0.04	0.01	0.09**	0.09**	0.10**	0.11***	0.09**	0.08**	0.08*	-0.00
13 Other city departments	0.01	-0.01	0.23***	0.17***	0.22***	0.27***	0.15***	0.12***	0.21***	0.08**
14 Governor	0.04	0.05	-0.06	0.02	0.06	-0.02	0.04	0.10**	-0.03	0.05
15 State legislature	0.04	0.06	-0.08*	0.01	0.06	-0.05	0.01	0.05	-0.00	0.06
16 State courts	0.07	0.05	-0.15***	-0.02	0.01	-0.08*	-0.01	0.03	-0.07*	0.09**
17 Federal government	0.05	0.04	-0.08**	0.06	0.06	-0.08*	0.03	0.03	-0.01	0.01
18 Business groups	0.08**	0.07*	0.24***	0.23***	0.26***	0.34***	0.26***	0.25***	0.26***	0.23***
19 Advocacy groups	0.05	0.07*	0.25***	0.24***	0.23***	0.39***	0.32***	0.26***	0.24***	0.25***
20 Public opinion	0.03	0.06	0.29***	0.19***	0.21***	0.27***	0.15***	0.12***	0.21***	0.18***
21 Media	0.05	0.08*	0.11***	0.15***	0.34***	0.28***	0.23***	0.24***	0.16***	0.20***
22 A designated IT staff	0.03	0.01	0.02	-0.01	-0.04	0.01	-0.00	-0.03	-0.02	-0.02
23 Percent Internet use	0.05	0.01	0.07*	0.01	0.06	-0.00	-0.03	0.04	0.08**	0.04
24 Employees not afraid to take risks	0.14***	0.13***	0.05	0.04	-0.07*	-0.01	0.05	0.04	-0.05	0.08**
25 Employees rewarded for innovation	0.03	0.06	0.12***	0.15***	-0.02	0.04	0.08**	0.06	0.09**	0.17***
26 Organization is dynamic & entrepreneurial place	0.07	0.08**	0.16***	0.13***	-0.01	0.08**	0.08**	0.05	0.08**	0.15***
27 Little action taken until a supervisor approves	-0.06	-0.04	-0.01	-0.02	0.06	0.02	-0.01	0.04	-0.01	-0.05
28 Person cannot make his own decisions	-0.05	-0.10**	-0.06	-0.07*	-0.02	-0.03	-0.02	-0.07	-0.01	-0.09**
29 Even small matters have to be referred to higher up	-0.08*	-0.05	-0.10**	-0.02	0.09**	-0.02	-0.01	0.03	-0.03	-0.06
30 People here do the same job every day	-0.05	-0.02	-0.11***	-0.12***	0.01	-0.05	-0.02	-0.06	-0.02	-0.08*
31 Variety of work	-0.04	-0.03	-0.11***	-0.11***	-0.01	-0.09**	-0.08**	-0.03	0.03	-0.09**
32 Jobs have something new happening every day	-0.07*	-0.05	-0.09**	-0.14***	-0.04	-0.06	-0.10**	-0.04	-0.06	-0.13***
33 Facebook	-0.05	0.02	0.09**	0.01	0.05	0.06	0.00	0.02	0.06	0.01
34 Twitter	0.01	0.06	0.16***	0.17***	0.03	0.11***	0.09**	0.05	0.05	0.06
35 YouTube	0.09**	0.16***	0.16***	0.15***	0.05	0.15***	0.12***	0.10**	0.15***	0.16***
36 Wikis	0.09**	0.12***	0.14***	0.16***	0.10***	0.10**	0.05	0.08**	0.10**	0.10***
37 Document sharing tools	0.22***	0.08**	0.20***	0.14***	0.16***	0.17***	0.15***	0.11***	0.15***	0.17***
38 Work coordination tools	0.21***	0.11***	0.23***	0.21***	0.17***	0.21***	0.17***	0.11***	0.17***	0.14***
39 File sharing tools	0.16***	0.08*	0.16***	0.11***	0.16***	0.12***	0.10***	0.10***	0.15***	0.13***

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Table 11: Correlation analysis (Continued)

		11	12	13	14	15	16	17	18	19	20
11	Mayor	1.00									
12	Mayor's Council	0.63***	1.00								
13	Other city departments	0.38***	0.44***	1.00							
14	Governor	0.30***	0.28***	0.24***	1.00						
15	State legislature	0.25***	0.30***	0.25***	0.76***	1.00					
16	State courts	0.14***	0.17***	0.11***	0.55***	0.65***	1.00				
17	Federal government	0.25***	0.24***	0.12***	0.58***	0.59***	0.59***	1.00			
18	Business groups	0.26***	0.31***	0.40***	0.27***	0.29***	0.24***	0.23***	1.00		
19	Advocacy groups	0.22***	0.27***	0.34***	0.22***	0.23***	0.21***	0.24***	0.74***	1.00	
20	Public opinion	0.20***	0.28***	0.29***	0.12***	0.18***	0.16***	0.18***	0.48***	0.53***	1.00
21	Media	0.24***	0.30***	0.29***	0.28***	0.32***	0.30***	0.31***	0.53***	0.57***	0.56***
22	A designated IT staff	-0.08*	0.00	-0.04	-0.02	-0.02	0.04	0.03	-0.01	0.01	0.05
23	Percent Internet use	0.06	0.08*	0.13***	0.04	0.06	0.09**	0.10**	0.09**	0.02	0.02
24	Employees not afraid to take risks	-0.05	-0.03	-0.05	0.07*	0.12***	0.15***	0.10**	0.04	-0.00	0.06
25	Employees rewarded for innovation	-0.10**	-0.00	0.01	0.01	0.06	0.12***	0.02	0.08**	0.04	0.14***
26	Organization is dynamic & entrepreneurial place	-0.08*	-0.01	0.03	0.00	0.01	-0.00	-0.00	0.10**	0.05	0.09**
27	Little action taken until a supervisor approves	0.09**	0.05	0.00	0.02	-0.03	-0.10**	-0.04	0.01	-0.00	-0.10**
28	Person cannot make his own decisions	0.10**	0.06	0.02	-0.02	-0.07	-0.09**	-0.00	-0.00	0.02	-0.09**
29	Even small matters have to be referred to higher up	0.10**	0.03	-0.00	0.09**	0.00	-0.04	0.07*	0.03	0.04	-0.09**
30	People here do the same job every day	0.03	-0.03	-0.09**	-0.07*	-0.13***	-0.14***	-0.07*	-0.10**	-0.11***	-0.19***
31	Variety of work	0.06	-0.01	-0.00	0.02	-0.03	-0.10**	-0.03	-0.04	-0.09**	-0.16***
32	Jobs have something new happening every day	0.04	0.01	0.01	-0.00	-0.06	-0.11***	-0.05	-0.12***	-0.12***	-0.18***
33	Facebook	-0.01	-0.03	-0.02	-0.05	-0.10**	-0.14***	-0.06	0.02	-0.01	0.04
34	Twitter	-0.08**	-0.03	0.00	-0.11**	-0.12***	-0.07*	-0.06	0.07*	0.04	0.06
35	YouTube	0.02	0.04	0.01	-0.03	-0.04	-0.02	-0.01	0.13***	0.13***	0.14***
36	Wikis	-0.01	0.01	0.06	0.03	0.01	0.02	0.01	0.12***	0.09**	0.07*
37	Document sharing tools	-0.03	0.02	0.11***	0.03	0.05	0.02	0.05	0.13***	0.08**	0.09**
38	Work coordination tools	-0.03	0.04	0.12***	0.04	0.05	-0.01	0.04	0.14***	0.11***	0.13***
39	File sharing tools	0.02	0.04	0.18***	0.04	0.08*	-0.02	-0.00	0.13***	0.09**	0.12***

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

Table 11: Correlation analysis (Continued)

	21	22	23	24	25	26	27	28	29	30
21 Media	1.00									
22 A designated IT staff	0.02	1.00								
23 Percent Internet use	0.00	-0.05	1.00							
24 Employees not afraid to take risks	0.02	0.13***	0.08*	1.00						
25 Employees rewarded for innovation	0.06	0.08**	0.06	0.38***	1.00					
26 Organization is dynamic & entrepreneurial place	0.03	0.10**	0.05	0.61***	0.47***	1.00				
27 Little action taken until a supervisor approves	-0.02	-0.12***	-0.04	-0.35***	-0.32***	-0.38***	1.00			
28 Person cannot make his own decisions	-0.04	-0.06	-0.05	-0.35***	-0.35***	-0.37***	0.50***	1.00		
29 Even small matters have to be referred to higher up	0.03	-0.06	-0.03	-0.29***	-0.34***	-0.30***	0.57***	0.51***	1.00	
30 People here do the same job every day	-0.11***	-0.12***	-0.06	-0.36***	-0.30***	-0.40***	0.52***	0.33***	0.34***	1.00
31 Variety of work	-0.09**	-0.14***	-0.01	-0.32***	-0.29***	-0.33***	0.34***	0.25***	0.29***	0.42***
32 Jobs have something new happening every day	-0.13***	-0.06	-0.05	-0.32***	-0.24***	-0.34***	0.23***	0.26***	0.18***	0.33***
33 Facebook	0.03	0.10**	0.03	0.07	0.05	0.10**	-0.00	-0.03	-0.03	-0.04
34 Twitter	0.02	0.08**	-0.00	0.03	0.14***	0.12***	-0.08*	-0.12***	-0.10**	-0.08*
35 YouTube	0.12***	0.12***	0.09**	0.11***	0.11***	0.18***	-0.08**	-0.11**	-0.07	-0.12***
36 Wikis	0.05	0.04	0.03	0.07*	0.05	0.06	-0.07	-0.05	-0.08*	-0.02
37 Document sharing tools	0.04	0.09**	0.10**	0.15***	0.07*	0.17***	-0.06	-0.08**	-0.09**	-0.10**
38 Work coordination tools	0.05	0.02	-0.00	0.10**	0.10**	0.13***	-0.07*	-0.08*	-0.09**	-0.11***
39 File sharing tools	0.06	0.10**	0.03	0.09**	0.13***	0.15***	-0.06	-0.03	-0.04	-0.09**

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

	31	32	33	34	35	36	37	38	39
31 Variety of work	1.00								
32 Jobs have something new happening every day	0.43***	1.00							
33 Facebook	-0.06	-0.07	1.00						
34 Twitter	-0.07	-0.07*	0.28***	1.00					
35 YouTube	-0.12***	-0.12***	0.22***	0.31***	1.00				
36 Wikis	-0.01	-0.03	0.09**	0.09**	0.14***	1.00			
37 Document sharing tools	-0.03	-0.06	0.08**	0.16***	0.17***	0.19***	1.00		
38 Work coordination tools	-0.07*	-0.07*	0.05	0.05	0.13***	0.15***	0.40***	1.00	
39 File sharing tools	-0.04	-0.01	0.07*	0.11***	0.18***	0.18***	0.32***	0.31***	1.00

* $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$

5.3. Structural equation modeling: use of social media for collaboration purposes

This section discusses the findings of SEM predicting the influence of organizational, technical, and environmental factors on the adoption and use of social media technologies for collaboration purposes via consolidated social media tools. As noted in chapter four, there are several steps to conduct SEM analysis. The first important step is to specify the relationship between latent and observed variable. Theoretically, a latent variable represents the common variance among observed variables. The second step is to examine the goodness-of-fit for the estimated model. According to Hu & Bentler (1995), Yu & Muthen (2002), and Cook, Kallen & Amtmann (2009) the following have been suggested as an indicator of good fit for the SEM model: Chi-Square <0.05, CFI >0.95, RMSEA <0.06, and Weighted root mean square residual (WRMR) values <1.0. Moreover, for categorical dependent variable, it is important to pay attention to WRMR value because TFI and CFI may not work well for categorical dependent variables (Yu & Muthen, 2002). As A final step, path analysis is conducted to examine the direct and indirect relationship between key independent and dependent variables.

The following section presents the findings in the following order. The first section discusses the results of CFA for key independent variables and the goodness-of-fit statistics for the estimated model. The second section interprets the direct and indirect effects of organizational, technical, and environmental factors on the adoption and use of social media technologies for internal collaboration. The final section discusses the direct and indirect effects of organizational, technical, and environmental factors on the adoption and use of social media technologies for external collaboration.

5.3.1. Confirmatory factor analysis & goodness-of-fit statistics

In the SEM estimated to predict the influence of organizational, technical, and environmental factors on the adoption and use of social media technologies for collaboration purposes, there are six latent variables: stakeholder participation, innovativeness, centralization, routineness, political pressures (civil society, city government, and other government), and social media technologies.

Eight observed variables (individual citizens, neighborhood associations, news media, interests groups, urban civil groups, religious groups, consultants or paid experts, and professional associations) describe stakeholder participation. The factor loadings of these eight variables are 0.64, 0.61, 0.64, 0.73, 0.63, 0.58, 0.41, and 0.59 respectively. The variables individual citizens, neighborhood associations, news media, interests groups, urban civil groups, religious groups, consultants or paid experts, and professional associations explain 41 percent, 37 percent, 41 percent, 53 percent, 40 percent, 34 percent, 17 percent, and 35 percent variance in stakeholder participation respectively.

Three observed variables (most employees in this organization are not afraid to take risks, employees in this organization are rewarded for developing innovative solutions to problems and, and organization is a very dynamic and entrepreneurial place) explain innovativeness. The factor loading for these three variables are 0.66, 0.81, and 0.75 respectively. The variables most employees in this organization are not afraid to take risks, employees in this organization are rewarded for developing innovative solutions to problems and, and organization is a very dynamic and entrepreneurial place explain 45 percent, 37 percent, and 56 percent variance in innovativeness respectively.

Three observed variables (there can be little action taken here until a supervisor approves a decision, in general, a person who wants to make his own decisions would be quickly discouraged in this agency, and even small matters have to be referred to someone higher up for a final answer) measure centralization and the factor loading scores are 0.77, 0.76, and 0.69 respectively. The variables there can be little action taken here until a supervisor approves a decision, in general, a person who wants to make his own decisions would be quickly discouraged in this agency, and even small matters have to be referred to someone higher up for a final answer explain 60 percent, 57 percent, and 48 percent variance in centralization respectively.

Three observed variables (people here do the same job in the same way every day, one thing people like around here is the variety of work (reverse coded), and most jobs have something new happening every day (reverse coded)) explain routineness. The factor loadings scores of these three observed variables are 0.77, 0.76, and 0.69 respectively. The variables people here do the same job in the same way every day, one thing people like around here is the variety of work (reverse coded), and most jobs have something new happening every day (reverse coded) explain 46 percent, 29 percent, and 29 percent variance in routineness respectively.

Three latent variables (civil society, city government, and other governments) measure political pressures. Four observed variables (business groups, advocacy groups, public opinion, and media) explain civil society pressure and the factor loading scores are 0.82, 0.75, 0.65, and 0.75 respectively. And, the four variables explain 66 percent, 56 percent, 42 percent, and 56 percent variance in civil society influence respectively. Three

observed variables (Mayor, Mayor's Council, and other city departments) measure city department pressure. The factor loading scores are 0.55, 0.69, and 0.67 respectively. The variables Mayor, Mayor's Council, and other city departments explain 30 percent, 48 percent, and 45 percent variance in city department influence respectively. And, four observed variables (Governor, State legislature, State courts, and Federal government) measure other government pressure and the factor loading scores are 0.76, 0.89, 0.76, and 0.70 respectively. And, the four variables explain 58 percent, 79 percent, 58 percent, and 49 percent variance in other government pressure respectively.

Seven variables (Facebook, Twitter, YouTube, wikis, document collaboration tools, work coordination tools, and file sharing tools) measure consolidated social media tools. The factor loading scores are 0.30, 0.29, 0.50, 0.60, 0.78, 0.71, and 0.59 respectively. And, Facebook, Twitter, YouTube, wikis, document collaboration tools, work coordination tools, and file sharing tools observed variables explain nine percent, eight percent, 24.6 percent, 36 percent, 61 percent, 50 percent, and 35 percent variance in consolidated social media tools respectively.

The goodness-of-fit statistics for the influence of organizational, technical, and environmental factors on the adoption and use of social media technologies for collaboration purposes via consolidated social media tools are Chi-Square of 0.0, RMSEA of 0.039, CFI of 0.75, and WRMR of 1.44. While, model fit indices (Chi-Square <0.05, CFI >0.95, RMSEA <0.06, and WRMR <1.0) are generally regarded as cutoff values to assess model fit, some scholars' caution against relying on strict cutoff values (e.g. Hayduk, Cummings, Boadu, Pazderka-Robinson, & Boulianne, 2007; Kenny, 2015).

For instance, Kenny (2015) argues that good fitting models are “not necessarily valid models” and poor fitting model can produce valid and statistically significant parameters. Moreover, as noted earlier some of the fit indices may not work in the case of a categorical outcome variable. According to Yu (2002), WRMR <1.0 and RMSEA <0.06 can be considered as a good fit for a binary outcome variable, however, complex SEM models may behave differently. Thus, based on the model fit indices obtained for the influence of the organizational, technical, and environmental factors on the adoption and use of social media for collaboration purposes via consolidated social media tools, it can be concluded that the model has a reasonable fit. The model is run with sampling weights. The weights were calculated based on the percentage of individuals per city in the population and percentage of individuals from the cities in the sample to account for sampling bias.

5.3.2. SEM results: Use of social media for internal collaboration

The results of SEM analysis showed several direct (see Table 12) and indirect effects (see Table 13). Stakeholder participation is not significantly associated with the use of social media technologies for internal collaboration, which does not support H1. However, the finding reported in Table 13 indicates that stakeholder participation has a positive and significant (Std. Est = 0.14, S.E. = 0.04, z-score = 3.71, p = 0.00) effect on the use of social media technologies for internal collaboration via consolidated social media tools. This indirect effect suggests that local governments that encourage stakeholder participation in decision-making are more likely to adopt social media technologies and subsequently use these technologies for internal collaboration purposes.

Previous studies have reported that increase in stakeholder participation promotes adoption of new technologies and may in turn result in use of these technologies for achieving organizational tasks (e.g. Sandoval-Almazan & Gil-Garcia, 2012)

Innovativeness does not have a significant effect on the use of social media technologies for internal collaboration. This result does not support H2. However, the results reported in Table 13 suggest that innovativeness is positively and significantly (Std. Est. = 0.15, S.E. = 0.04, z-score = 3.85, p = 0.00) associated with the use of social media technologies for internal collaboration via consolidated social media tools. The significant indirect relationship shows that innovative governments are more likely to adopt social media technologies and consequently use these technologies for internal collaboration. This result supports Moon & Norris (2005) research findings, which found that innovative local governments are likely to adopt and use new technologies because employees in these organizations are entrepreneurial and receptive to change.

Availability of IT staff and access to Internet do not have significant effect on the use of social media technologies for internal collaboration. These results do not support H3a and H3b. However, the availability of IT staff has indirect effect on the use of social media technologies for internal collaboration. The availability of IT staff is positively and significantly (Std. Est. = 0.12, S.E. = 0.02, z-score = 1.98, p = 0.05) associated with the use of social media technologies for internal collaboration via consolidated social media tools. The positive indirect effect may suggest that the availability of IT staff results in the adoption of social media technologies and subsequently result in use of these technologies for internal collaboration purposes.

Control variables department size and city size are not significantly associated with the use of social media technologies for internal collaboration. Department types do not have significant effect on the use of social media technologies for internal collaboration, except the Finance department. The Finance department is negatively associated with the use of social media technologies for internal collaboration (Std. Est. = -0.38, S.E. = 0.21, z-score = -1.87, p = 0.06). The result may suggest that the finance department is less likely to use social media technologies for internal collaboration purposes compared to parks and recreation department (base group).

The consolidated social media tools variable is positively and significantly (Std. Est. = 0.48, S.E. = 0.06, z-score = 6.01, p = 0.00) associated with the use of social media technologies for internal collaboration, which supports H4. This positive result suggests that adoption of social media technologies may increase the use of these technologies for internal collaboration purposes. Perhaps, the adoption of social media technologies may create avenues for employees to engage in information sharing and foster internal collaboration.

Table 12: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via consolidated social media tools

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for internal collaboration	-0.01	0.07	-0.11	0.91
H2	Innovativeness → use of social media for internal collaboration	-0.07	0.07	-0.96	0.34
H3a	A designated IT staff → use of social media for internal collaboration	-0.15	0.12	-1.24	0.22
H3b	Percent Internet use → use of social media for internal collaboration	0.06	0.20	0.32	0.75
H4	Social media technologies → use of social media for internal collaboration	0.48	0.08	6.01	0.00
Controls	Department size → use of social media for internal collaboration	0.02	0.05	0.46	0.65
	City population → use of social media for internal collaboration	0.14	0.10	1.46	0.14
	Mayor's Office → use of social media for internal collaboration	-0.21	0.18	-1.15	0.25
	Community Development → use of social media for internal collaboration	0.03	0.18	0.16	0.87
	Finance → use of social media for internal collaboration	-0.38	0.21	-1.87	0.06
	Police → use of social media for internal collaboration	-0.01	0.19	-0.05	0.96

N= 587

Table 13: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via consolidated social media tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → adoption of social media → use of social media for internal collaboration	0.14	0.04	3.72	0.00
Innovativeness → adoption of social media → use of social media for internal collaboration	0.15	0.04	3.85	0.00
A designated IT staff → adoption of social media → use of social media for internal collaboration	0.12	0.06	1.98	0.05
Percent Internet use → adoption of social media → use of social media for internal collaboration	0.17	0.11	1.58	0.12

N= 587

5.3.3. SEM results: Use of social media for external collaboration

Table 14 shows that stakeholder participation is positively associated with the use of social media technologies for external collaboration (Std. Est. = 0.12, S.E. = 0.07, z-score = 1.68, $p=0.07$), partially supporting H1. Specifically, one standard deviation increase in stakeholder participation increases z scores by 0.12. Further, the result reported in Table 15 indicates that stakeholder participation has a positive and significant (Std. Est. = 0.08, S.E. = 0.03, z-score = 2.27, $p=0.01$) indirect effect on the use of social media technologies for external collaboration via consolidated social media tools. In other words, local governments that promote stakeholder participation are more likely to use social media technologies for external collaboration. This finding supports Javenpaa & Staples (2000) research which argues that employees working in an organization that promote participation of key stakeholders in the processes of decision making are more likely to deploy technologies for collaboration purposes.

Innovativeness does not have a significant direct effect on the use of social media technologies for external collaboration, which does not support H2. However, result reported in Table 15 indicates that innovativeness has a positive and significant (Std. Est. = 0.09, S.E. = 0.03, z-score = 2.83, $p=0.01$) indirect effect on the use of social media technologies for external collaboration via consolidated social media tools. The significant indirect effect may suggest that innovative local governments are likely to adopt social media technologies and consequently use these technologies for external collaboration purposes. This result supports previous findings that reported that innovative local governments are likely to adopt and use new technologies because

employees in these organizations more likely to be risk tolerant (Moon & Norris, 2005).

Surprisingly, the results indicate that the availability of IT staff is negatively associated (Std. Est. = -0.20, S.E. = 0.12, z-score = -1.63, $p=0.10$) with the use of social media technologies for external collaboration. This result does not support H3a. This finding contradicts findings of previous research. Previous studies found that availability of IT staff is important for continued and sustained use of social media technologies in the public sector (Cutis et al., 2010; Reddick & Norris, 2013). It may be possible that as the task of collaboration involves interactions among diverse stakeholder, the availability of IT staff to manage social media platform may slow down the continuous interactions among stakeholders and hinder the use of these technologies for external collaboration purposes. Further, given the risks associated with the use of social media technologies, IT staff may control how these technologies are utilized in the organization. In other words, they may monitor and prevent use of these technologies in the workplace. Another variable measuring technical capacity - the percentage use of Internet is not significantly associated with the use of social media technologies for external collaboration, which does not support H3b.

The control variables department size and city size do not have significant effect on the use of social media technologies for external collaboration. Department type does not have significant effect on the use of social media technologies for external collaboration, except department of Finance. The Department of Finance is negatively associated with the use of social media technologies for external collaboration (Std. Est. = -0.35, S.E. = 0.20, z-score = -1.72, $p<0.10$). The use of social media technologies for external

collaboration in the department of Finance versus department of Parks and Recreation decreases the z-scores by 0.35.

The consolidated social media tools variable is positively and significantly (Std. Est. = 0.29, S.E. = 0.09, z-score = 3.36, p = 0.00) associated with the use of social media technologies for external collaboration, which supports H4. This positive result suggests that adoption of social media technologies is likely to result in use of these tools for external collaboration. In other words, the increase in the adoption of social media technologies may result in utilization of these technologies for exchanging information among external stakeholders.

Figure 7 provides a summary of model predicting the influence of organizational, technical, and environmental factors on the use of social media technologies for collaboration purposes via consolidated social media tools. Only significant paths are shown in the model.

Table 14: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via consolidated social media tools

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for external collaboration	0.12	0.07	1.81	0.07
H2	Innovativeness → use of social media for external collaboration	-0.01	0.07	-0.10	0.92
H3a	A designated IT staff → use of social media for external collaboration	-0.20	0.12	-1.65	0.10
H3b	Percent Internet use → use of social media for external collaboration	-0.11	0.21	-0.51	0.61
H4	Social media technologies → use of social media for external collaboration	0.29	0.09	3.39	0.00
Controls	Department size → use of social media for external collaboration	-0.05	0.05	-1.00	0.32
	City population → use of social media for external collaboration	0.14	0.10	1.43	0.15
	Mayor's Office → use of social media for external collaboration	0.09	0.18	0.50	0.62
	Community Development → use of social media for external collaboration	-0.09	0.18	-0.50	0.62
	Finance → use of social media for external collaboration	-0.35	0.20	-1.72	0.09
	Police → use of social media for external collaboration	0.13	0.19	0.70	0.48

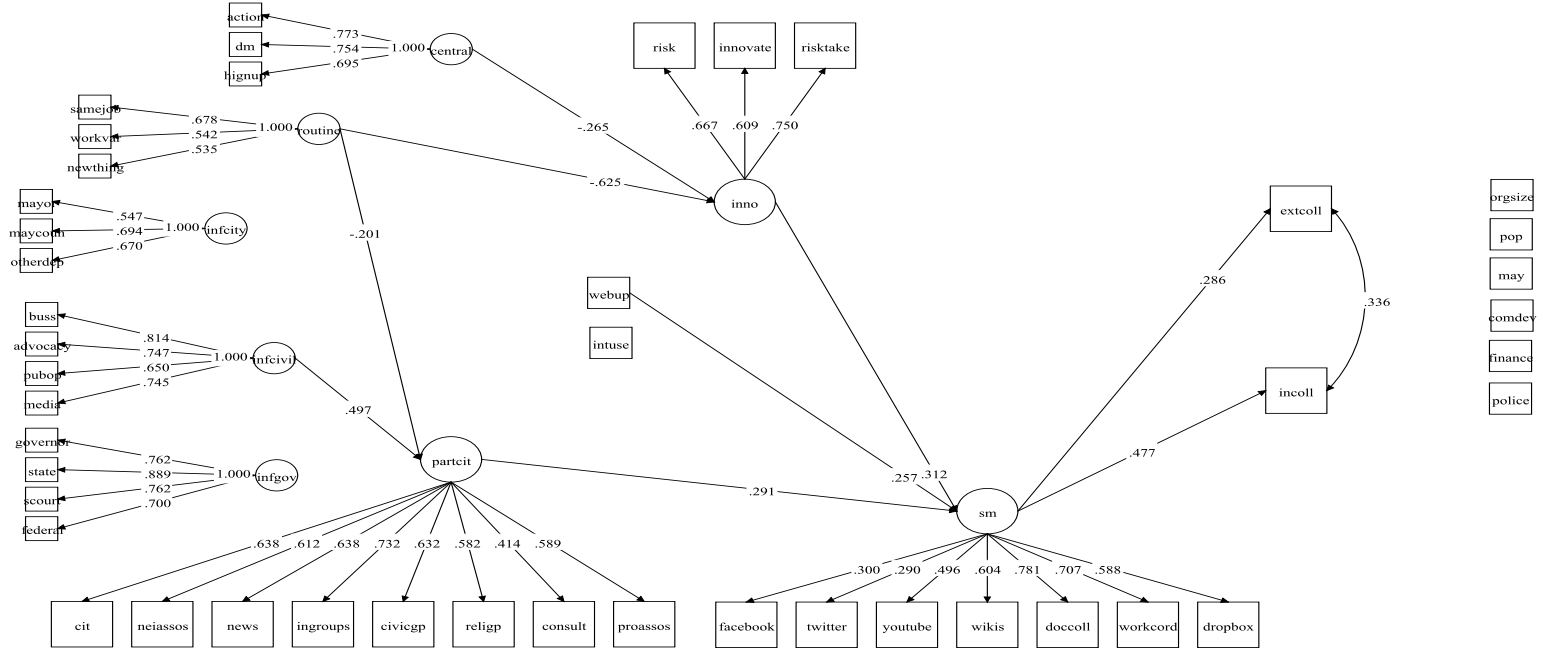
N= 587

Table 15: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via consolidated social media tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → adoption of social media → use of social media for external collaboration	0.08	0.03	2.73	0.01
Innovativeness → adoption of social media → use of social media for external collaboration	0.09	0.03	2.85	0.00
A designated IT staff → adoption of social media → use of social media for external collaboration	0.08	0.04	1.82	0.07
Percent Internet use → adoption of social media → use of social media for external collaboration	0.11	0.07	1.50	0.13

N= 587

Figure 7: Use of social media technologies for internal and external collaboration purposes via consolidated social media tools (only significant paths are shown)



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Diagram	Variable	Diagram	Variable	Diagram	Variable
mayor	Mayor	risktake	Organization is dynamic & entrepreneurial place	orgsize	Department size
maycoun	Mayor's Council	action	Little action taken until a supervisor approves	pop	City population
otherdep	Other city departments	dm	Person cannot make his own decisions	may	Mayor's office
buss	Business groups	hignup	Even small matters have to be referred to higher up	comdev	Community Development Department
advocacy	Advocacy groups	samejob	People here do the same job every day	finance	Finance Department
pubop	Public opinion	workvar	Variety of work	police	Police Department
media	Media	newthing	Jobs have something new happening every day	facebook	Facebook
governor	Governor	cit	Individual citizens	twitter	Twitter
state	State legislature	neiassos	Neighborhood Associations	youtube	YouTube
scourt	State courts	news	News media	wikis	Wikis
federal	Federal government	ingroups	Interest groups	doccoll	Document sharing tools
webup	A designated IT staff	civicgp	Urban civic groups	workcord	Work coordination tools
intuse	Percent Internet use	religp	Religious groups	dropbox	File sharing tools
risk	Employees not afraid to take risks	consult	Consultants or paid experts	incoll	Use of social media for internal collaboration
innovate	Employees rewarded for innovation	proassos	Professional associations	extcoll	Use of social media for external collaboration

5.4. Use of social media for collaboration purposes via communication & work sharing tools

The following section discusses the findings of SEM predicting the influence of organizational, technical, and environmental factors on the adoption and use of social media technologies for collaboration mediated through communication and work sharing tools. The model is run with sampling weights. Following the format used to interpret model 1, the findings are presented in the following order. First section discusses the CFA for key independent variables and the goodness-of-fit statistics for the estimated model. The second section interprets the direct and indirect effects of organizational, technical, and environmental factors on the adoption and use of social media technologies for internal collaboration via communication and work sharing tools. The third section discusses the direct and indirect effects of organizational, technical, and environmental factors on the adoption and use of social media technologies for external collaboration via communication and work sharing tools. The final section provides an overall summary of key findings.

5.4.1. Confirmatory factor analysis and goodness-of-fit

In the SEM estimated to predict the influence of organizational, technical, and environmental factors on the use of social media technologies for collaboration purposes via communication and work sharing tools, there are seven latent variables: stakeholder participation, innovativeness, centralization, routineness, external stakeholder influence, communication tools, and work sharing tools. The factor loading for stakeholder participation, innovativeness, centralization, routineness, and external stakeholder

influence are similar to Model 1, thus only CFA for communication tools and work sharing tools are discussed below.

Three factors (Facebook, Twitter, YouTube) measure communication tools. Their factor loadings are 0.60, 0.59, and 0.89 respectively. And, Facebook, Twitter, and YouTube explain 36 percent, 35 percent, and 79 percent variance in communication tools respectively.

Four variables (wikis, document collaboration tools, work coordination tools, and file sharing tools) measure work sharing tools and their factor loadings are 0.63, 0.81, 0.77, and 0.60 respectively. The observed variables wikis, document collaboration tools, work coordination tools, and file sharing tools explain 39 percent, 65 percent, 60 percent, and 37 percent variance in work sharing tools respectively.

The goodness-of-fit statistics for the influence of organizational, technical, and environmental factors on the adoption and use of social media technologies for internal and external collaboration are Chi-Square of 0.0, CFI of 0.77, RMSEA of 0.038, and WRMR of 1.40. Based on these values, it can be concluded that the model has a reasonable fit and but, has a better fit compared to Model 1 that consolidates social media tools. It is important to note that while Chi-Square <0.05 , CFI >0.95 , RMSEA <0.06 , and WRMR <1.0 are regarded as cutoff values to assess model fit, however, some scholars' caution against relying on strict cutoff values (e.g. Hayduk et al. 2007). Moreover, a statistically valid model may produce poor fitting indices (Kenny, 2015). In the case of binary outcome variables, the model fit indices may not work and further, complex SEM models may behave differently (Yu, 2002).

5.4.2. Use of social media for internal collaboration via communication and work sharing tools

Stakeholder participation is not significantly associated with the use of social media technologies for internal collaboration, which does not support H1 (Table 16). However, stakeholder participation has a significant indirect effect on the use of social media technologies via work sharing tools. The result reported in Table 18 shows that stakeholder participation has a positive and significant indirect effect (Std. Est. = 0.16, S.E. = 0.04, z-score = 3.91, p=0.00) on the use of social media technologies for internal collaboration purposes via work sharing tools. This indirect positive effect indicates that stakeholder participation is likely to result in the adoption of work sharing tools and subsequently result in use of these tools for internal collaboration purposes. In other words, stakeholders may push local governments to adopt work sharing tools, which may lead to utilization of social media technologies for internal collaboration (Sandoval-Almazan & Gil-Garcia, 2012).

Similar to Model 1, innovativeness is not significantly associated with the use of social media technologies for internal collaboration. The result does not support H2. However, innovativeness is positively and significantly (Std. Est. = 0.13, S.E. = 0.04, z-score = 3.42, p=0.00) associated with the use of social media technologies for internal collaboration via work sharing tools (Table 18). The positive and significant indirect effect suggests that innovative governments may adopt work sharing tools and consequently use these tools for internal collaboration purposes. Previous studies have reported that innovative local governments are more likely to take risks and experiment

with new technologies for achieving organizational goals (Moon & Norris, 2005).

Availability of IT staff and percentage of Internet use are not significantly associated with use of social media technologies for internal collaboration. The non-significant direct effect is consistent across models, which do not support H3a and H3b. Similar to Model 1, department size and city size are not significantly associated with the use of social media technologies for internal collaboration purposes. Also, except department of Finance, other department types do not have significant effect on the use of social media technologies for internal collaboration purposes. The Finance department is negatively associated with the use of social media technologies for internal collaboration (Std. Est. = -0.38, S.E. = 0.21, z-score = -1.87, $p=0.06$). These findings are consistent across models.

The adoption of communication tools does not have a significant influence on the use of social media technologies for internal collaboration (not supporting H4). The adoption of work sharing tools is positively associated with use of social media technologies for internal collaboration (Std. Est. = 0.52, S.E. = 0.08, z-score = 6.69, $p=0.00$), which partially supports H4. The positive relationship asserts that local governments that encourage employees to adopt work sharing tools such as Wiki, Google Docs, and Dropbox are likely to use social media technologies for internal collaboration. Hasan & Paff (2006) found that work sharing tools often help employees to share work-in-progress and solicit feedback. The authors argue that work sharing tools often provide platforms for co-creating a product.

Table 16: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via communication and work tools

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for internal collaboration	-0.03	0.07	-0.37	0.71
H2	Innovativeness → use of social media for internal collaboration	-0.04	0.08	-0.54	0.59
H3a	A designated IT staff → use of social media for internal collaboration	-0.11	0.12	-0.92	0.36
H3b	Percent Internet use → use of social media for internal collaboration	0.14	0.19	0.72	0.47
H4	Communication tools → use of social media for internal collaboration	-0.04	0.09	-0.42	0.68
	Word sharing tools → use of social media for internal collaboration	0.52	0.08	6.69	0.00
Controls	Department size → use of social media for internal collaboration	0.02	0.05	0.46	0.65
	City population → use of social media for internal collaboration	0.14	0.10	1.46	0.14
	Mayor's Office → use of social media for internal collaboration	-0.21	0.18	-1.15	0.25
	Community Development → use of social media for internal collaboration	0.03	0.18	0.16	0.87
	Finance → use of social media for internal collaboration	-0.38	0.21	-1.87	0.06
	Police → use of social media for internal collaboration	-0.01	0.19	-0.05	0.96

N= 587

Table 17: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via communication tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → communication tools → use of social media for internal collaboration	0.00	0.01	-0.39	0.70
Innovativeness → communication tools → use of social media for internal collaboration	-0.01	0.03	-0.41	0.68
A designated IT staff → communication tools → use of social media for internal collaboration	-0.01	0.02	-0.41	0.68
Percent Internet use → communication tools → use of social media for internal collaboration	-0.02	0.04	-0.41	0.69

N= 587

Table 18: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via work sharing tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → work sharing tools → use of social media for internal collaboration	0.16	0.04	3.91	0.00
Innovativeness → work sharing tools → use of social media for internal collaboration	0.13	0.04	3.42	0.00
A designated IT staff → work sharing tools → use of social media for internal collaboration	0.09	0.07	1.40	0.16
Percent Internet use → work sharing tools → use of social media for internal collaboration	0.12	0.12	0.92	0.36

N= 587

5.4.3. Use of social media for external Collaboration via communication and work sharing tools

As Table 19 shows, stakeholder participation is positively and significantly (Std. Est. = 0.12, S.E. = 0.07, z-score = 1.68, p=0.09) associated with the use of social media technologies for external collaboration. This finding partially supports H1. One standard deviation increase in stakeholder participation increases z-scores by 0.12. And, as Tables 20 and 21 indicates that stakeholder participation has an indirect effect on the use of social media technologies for external collaboration via communication and work sharing tools. Stakeholder participation is positively and significantly (Std. Est. = 0.05, S.E. = 0.03, z-score = 1.95, p=0.05) associated with the use of social media technologies for external collaboration via communication tools. And, stakeholder participation has a positive and significant (Std. Est. = 0.06, S.E. = 0.03, z-score = 2.33, p=0.02) indirect effect on the use of social media technologies for external collaboration via work sharing tools. In other words, stakeholder participation is likely to pressure local governments to adopt communication and work sharing tools, which may result in use of social media technologies for external collaboration. Previous studies have reported that employees working in an organization that supports stakeholder participation are likely to use new technologies for collaboration activities (Javenpaa & Staples, 2000)

Similar to previous models, innovativeness is not significantly associated with the use of social media technologies for external collaboration. However, the results reported in Tables 20 and 21 show that innovativeness has an indirect effect on the use of social media technologies for external collaboration via communication and work sharing tools.

Innovativeness has a positive and significant (Std. Est. = 0.05, S.E. = 0.03, z-score = 1.95, $p=0.05$) indirect effect on the use of social media technologies for external collaboration via communication tools. And, innovativeness is positively and significantly (Std. Est. = 0.06, S.E. = 0.03, z-score = 2.33, $p=0.02$) associated with the use of social media technologies for external collaboration via work sharing tools. This positive and significant indirect effect suggests that innovative local governments tend to be entrepreneurial in nature, where employees are more likely to experiment with new technologies for achieving organizational goals (Moon & Norris, 2005; Oliveira & Welch, 2013). Thus, innovative local government may experiment with communication and work sharing tools and subsequently use social media technologies for external collaboration.

Consistent with Model 1, the result reported in Table 19 shows that the availability of IT staff is negatively and significantly associated (Std. Est. = -0.22, S.E. = 0.12, z-score = -1.75, $p=0.08$) with the use of social media technologies for external collaboration, not supporting H3a. While previous studies have found that the availability of IT staff is critical for managing social media technologies in the public sector (Snead, 2013; Reddick & Norris, 2013), the negative effect may perhaps suggest that the task of collaboration is different. The task of collaboration often involves continued interactions among key stakeholders and a designated IT staff dedicated to manage social media interactions among stakeholders may slow down the process of collaboration. Moreover, designated IT staff may control the use of social media technologies in the department and hinder the open the use of these technologies for collaboration purposes.

Further consistent across models, percentage of Internet use is not significantly associated with the use of social media technologies for external collaboration, which does not support H3b. The control variables department size and city size are not significantly associated with the use of social media technologies for external collaboration. And, except Finance department, other departments are not significantly associated with the use of social media technologies for external collaboration. The finance department is less likely to use of social media technologies for external collaboration (Std. Est. = -0.35, S.E. = 0.20, z-score = -1.72, p=0.09) as compared to parks and recreation department.

The adoption of communication tools are positively associated with the use of social media technologies for external collaboration (Std. Est. = 0.18, S.E. = 0.09, z-score = 2.12, p=0.03), this finding supports H4a. The positive relationship may suggest that local governments that adopt social media technologies such as Facebook, Twitter, and YouTube are likely to use these technologies for external collaboration. This finding supports previous findings that assert that use of social media technologies (e.g. Facebook, Twitter, and YouTube) help stakeholders know about each other. And, once stakeholders discover common interests, they are more likely to work together towards solving a common challenge. In other words, social media technologies such as Facebook, Twitter, and YouTube are likely to stakeholders build relationships and foster cross-boundary collaborations (Green et al., 2006; Shami et al., 2009).

The adoption of work sharing tools are positively associated with use of social media technologies for external collaboration (Std. Est. = 0.24, S.E. = 0.09, z-score =

2.79, $p=0.01$), this finding supports H4. The positive relationship asserts that local governments that encourage employees to adopt work sharing tools such as Wiki, Google Docs, and Dropbox are likely to use social media technologies for external collaboration. This finding support previous studies (e.g. Holtzblatt et al., 2010; Kosonen & Kianto, 2009) that found that use of work sharing tools help stakeholders share knowledge and co-create a product. It is reported that the use of work sharing tools often help employees disseminate and share information on an on-going basis for creating a common product (Hasan & Paff, 2006).

Table 19: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via communication and work sharing tools

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for external collaboration	0.12	0.07	1.67	0.10
H2	Innovativeness → use of social media for external collaboration	-0.03	0.08	-0.40	0.69
H3a	A designated IT staff → use of social media for external collaboration	-0.22	0.12	-1.75	0.08
H3b	Percent Internet use → use of social media for external collaboration	-0.14	0.22	-0.63	0.53
H4	Communication tools → use of social media for external collaboration	0.18	0.09	2.12	0.03
	Word sharing tools → use of social media for external collaboration	0.24	0.09	2.79	0.01
Controls	Department size → use of social media for external collaboration	-0.05	0.05	-1.00	0.32
	City population → use of social media for external collaboration	0.14	0.10	1.43	0.15
	Mayor's Office → use of social media for external collaboration	0.09	0.18	0.51	0.61
	Community Development → use of social media for external collaboration	-0.09	0.18	-0.49	0.62
	Finance → use of social media for external collaboration	-0.35	0.20	-1.72	0.09
	Police → use of social media for external collaboration	0.13	0.19	0.70	0.48

N= 587

Table 20: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via communication tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → communication tools → use of social media for external collaboration	0.02	0.02	1.04	0.30
Innovativeness → communication tools → use of social media for external collaboration	0.05	0.03	1.95	0.05
A designated IT staff → communication tools → use of social media for external collaboration	0.05	0.03	1.44	0.15
Percent Internet use → communication tools → use of social media for external collaboration	0.08	0.06	1.40	0.16

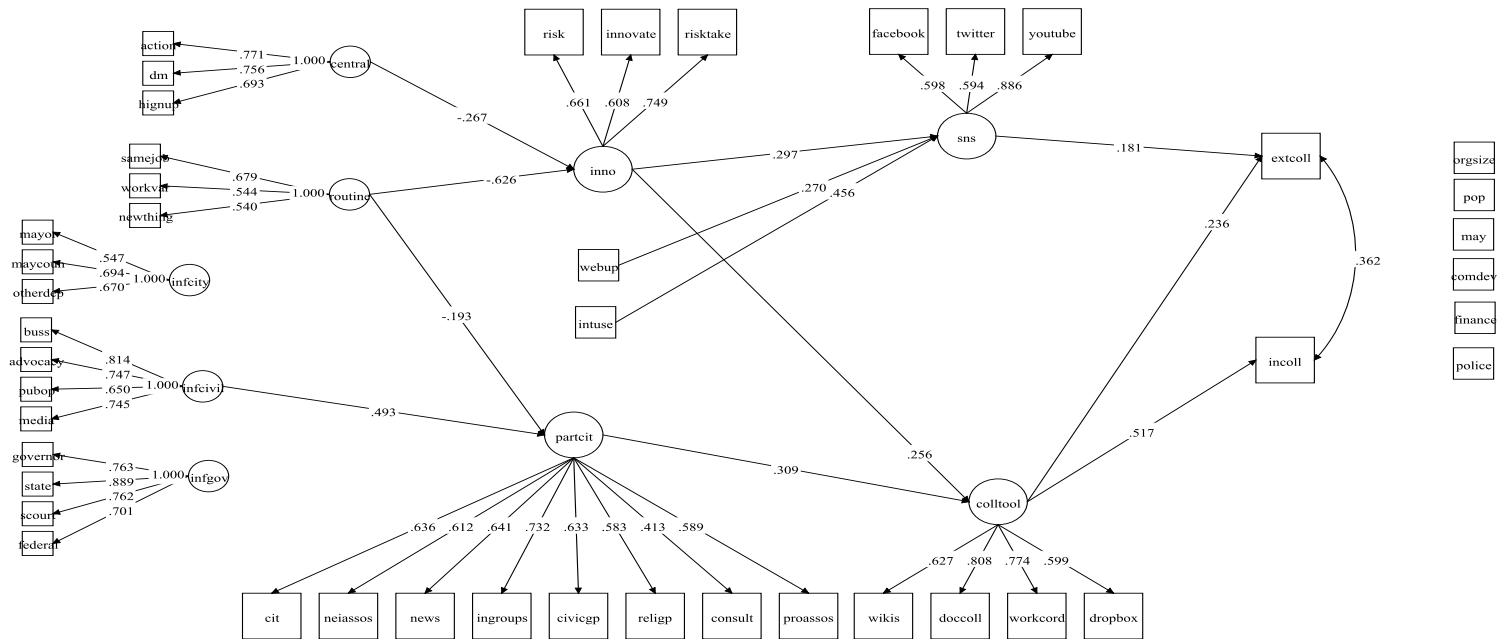
N= 587

Table 21: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via work sharing tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → work sharing tools → use of social media for external collaboration	0.07	0.03	2.35	0.02
Innovativeness → work sharing tools → use of social media for external collaboration	0.06	0.03	2.33	0.02
A designated IT staff → work sharing tools → use of social media for external collaboration	0.04	0.03	1.27	0.21
Percent Internet use → work sharing tools → use of social media for external collaboration	0.05	0.06	0.87	0.38

N= 587

Figure 8: Use of Social Media for collaboration purposes via communication tools and work sharing tools (only significant relations are shown)



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Diagram	Variable	Diagram	Variable	Diagram	Variable
mayor	Mayor	risktake	Organization is dynamic & entrepreneurial place	orgsize	Department size
maycoun	Mayor's Council	action	Little action taken until a supervisor approves	pop	City population
otherdep	Other city departments	dm	Person cannot make his own decisions	may	Mayor's office
buss	Business groups	hignup	Even small matters have to be referred to higher up	comdev	Community Development Department
advocacy	Advocacy groups	samejob	People here do the same job every day	finance	Finance Department
pubop	Public opinion	workvar	Variety of work	police	Police Department
media	Media	newthing	Jobs have something new happening every day	facebook	Facebook
governor	Governor	cit	Individual citizens	twitter	Twitter
state	State legislature	neiassos	Neighborhood Associations	youtube	YouTube
scourt	State courts	news	News media	wikis	Wikis
federal	Federal government	ingroups	Interest groups	docol	Document sharing tools
webup	A designated IT staff	civicgp	Urban civic groups	workcord	Work coordination tools
intuse	Percent Internet use	religp	Religious groups	dropbox	File sharing tools
risk	Employees not afraid to take risks	consult	Consultants or paid experts	incoll	Use of social media for internal collaboration
innovate	Employees rewarded for innovation	proassos	Professional associations	extcoll	Use of social media for external collaboration

5.3.4. Summary of main findings

Overall, the findings indicate that organizational dynamics and social media type predict the adoption and use of social media technologies for collaboration purposes. First, organizational factors such as stakeholder participation and innovativeness influence the adoption and use of social media technologies for internal and external collaboration purposes. For internal collaboration, the findings indicate that stakeholder participation, innovativeness, availability of IT staff, and Internet staff do not have a significant direct effect on the use of social media technologies for internal collaboration (not supporting H1, H2, H3a, and H3b). However, the findings indicate that stakeholder participation and innovativeness have a positive indirect effect on the use of social media technologies for internal collaboration via work sharing tools. In other words, local governments that encourage stakeholder participation and innovativeness are likely to adopt social media technologies, and subsequently use these technologies for internal collaboration purposes.

In the case of external collaboration, stakeholder participation has a positive significant influence on the use of social media technologies for external collaboration, supporting H1. Further, stakeholder participation has significant indirect effect on the use of social media technologies for external collaboration via work sharing tools. The positive direct and indirect effect of stakeholder participation on the use of social media technologies for external collaboration suggests that local governments that encourage participation among stakeholders are likely to adopt and use social media technologies for external collaboration purposes.

Innovativeness does not have direct effect on the use of social media technologies for external collaboration (not supporting H2), but has a significant and positive indirect effect on the use of social media technologies for external collaboration via communication tools and work sharing tools. In other words, innovative local governments are likely to encourage their employees to communication tools and work sharing tools, and subsequently use these technologies for external collaboration purposes

Interestingly, the results indicate that the availability of IT staff is negatively associated with the use of social media technologies for external collaboration, not supporting H3a. This unexpected finding may suggest that task of collaboration is different. It involves on-going communication among stakeholders and the availability of dedicated IT staff for managing social media technologies may slow down the activity of external collaboration. Moreover, the results suggest that Internet use does not have significant influence on the use of social media technologies for collaboration purposes and do not supporting H3b.

In addition to organizational processes and structures, communication and work sharing tools have a differential effect on the use of social media technologies for internal and external collaboration. Specifically, work sharing tools have a significant positive effect on the use of social media technologies for internal collaboration, partially supporting H4. Local governments that adopt work sharing tools such as Wiki, Google Docs, and Dropbox are likely to use social media technologies for internal collaboration. Interestingly, the finding indicates that communication tools do not have significant effect on the use of social media technologies for internal collaboration (not supporting

H4). In other words, the adoption of information dissemination technologies such as Facebook, Twitter, and YouTube are not likely to support internal collaboration.

However, the result suggests that the communication and work sharing tools have significant and positive effect on the use of social media technologies for external collaboration, supporting H4. In other words, local government that adopt communication and work sharing tools are likely to leverage social media technologies for external collaboration.

Thus, the results suggest that different classes of social media technologies have differential effect on internal vs. external collaboration. The communication tools have a differential effect on internal and external collaboration. Perhaps, as the task of external collaboration involves stakeholders that might have little or no interactions, it may be possible that the communication tools may help stakeholders build connections and associations. And, once they have built collective identity, they may be more willing to work through their differences in terms of norms and work practices to address a common challenge. In comparison, the non-significant influence of communication tools on internal collaboration may suggest that employees working in an organization are more likely to share technologies and norms. Further, they may have other means of communication such as face-to-face meeting that may help them exchange information on an on-going basis of getting things done, and may not necessarily utilize communication tools for developing relationships.

5.5. SEM model predicting use of social media for collaboration via communication and work sharing tools (with imputed data)

The models presented in previous sections were run without imputed missing data. As discussed in chapter four, missing data can result in biased estimation and loss of statistical power¹. To check for the robustness of results presented in previous sections, this section estimated the same model with imputed values for missing data. Multiple imputation technique is used to impute data. The results are presented in similar format. First section discusses the results of CFA and goodness-of-fit statistics. Second section interprets the direct and indirect effects of organizational, technical, and environmental factors on the adoption and use of social media technologies for internal collaboration. Final section discusses the direct and indirect effects of organizational, technical, and environmental factors on the adoption and use of social media technologies for external collaboration.

5.5.1. Influence of organizational, technical, and environmental factors on the use of social media for collaboration purpose via social media types (with imputed data)

The findings of the model run with imputed data has the following goodness-of fit statistics for the influence of organizational, technical, and environmental factors on the adoption and use of social media technologies for internal and external collaboration are: Chi-Square of 0.0, CFI of 0.761, RMSEA of 0.040, and WRMR of 1.50. Based on these values, it can be concluded that the model has a reasonable fit. Multiple imputations

¹ Missing data could result in biased estimates and multiple regression imputation is often viewed as viable technique to check for robustness of results estimated through listwise deletion. The models run with imputed data had an N of 587. The models run with imputed data resulted in a N of 648.

resulted in a sample size of 648. The findings reported in Table 21 confirm or reject hypotheses pattern found using non-imputed data.

For internal collaboration, stakeholder participation, innovativeness, availability of IT staff, and Internet staff do not have significant effect on the use of social media technologies for internal collaboration (not supporting H1, H2, H3a, and H3b). Further, the adoption of communication tools does not have significant effect on the use of social media technologies for internal collaboration, not supporting H4a. And, the adoption work sharing tools is significantly and positively associated with the use of social media technologies internal collaboration. However, there is one exception to the estimates between non-imputed and imputed data sets. The Mayor's office is negatively associated with the use of social media technologies for internal collaboration (Std. Est. = -0.32, S.E. = 0.17, z-score = -1.88, p=0.06).

Table 22: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration (with imputed data)

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for internal collaboration	0.01	0.07	0.18	0.86
H2	Innovativeness → use of social media for internal collaboration	-0.02	0.08	-0.24	0.81
H3a	A designated IT staff → use of social media for internal collaboration	-0.12	0.12	-0.98	0.33
H3b	Percent Internet use → use of social media for internal collaboration	0.14	0.20	0.67	0.50
H4	Communication tools → use of social media for internal collaboration	-0.03	0.08	-0.32	0.75
	Word sharing tools → use of social media for internal collaboration	0.43	0.08	5.24	0.00
Controls	Department size → use of social media for internal collaboration	0.03	0.05	0.53	0.60
	City population → use of social media for internal collaboration	0.08	0.09	0.87	0.38
	Mayor's Office → use of social media for internal collaboration	-0.32	0.17	-1.88	0.06
	Community Development → use of social media for internal collaboration	0.01	0.17	0.05	0.96
	Finance → use of social media for internal collaboration	-0.33	0.19	-1.74	0.08
	Police → use of social media for internal collaboration	-0.01	0.18	-0.06	0.95

N=648

Table 23: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration (with imputed data)

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for external collaboration	0.12	0.07	1.73	0.08
H2	Innovativeness → use of social media for external collaboration	0.01	0.08	0.07	0.95
H3a	A designated IT staff → use of social media for external collaboration	-0.21	0.12	-1.75	0.08
H3b	Percent Internet use → use of social media for external collaboration	-0.09	0.22	-0.40	0.69
H4	Communication tools → use of social media for external collaboration	0.15	0.08	1.89	0.06
	Word sharing tools → use of social media for external collaboration	0.15	0.09	1.69	0.09
Controls	Department size → use of social media for external collaboration	-0.04	0.05	-0.79	0.43
	City population → use of social media for external collaboration	0.09	0.09	0.93	0.35
	Mayor's Office → use of social media for external collaboration	-0.10	0.17	-0.57	0.57
	Community Development → use of social media for external collaboration	-0.13	0.17	-0.75	0.45
	Finance → use of social media for external collaboration	-0.34	0.19	-1.79	0.07
	Police → use of social media for external collaboration	0.02	0.18	0.13	0.90

N=648

5.6. Additional SEM efforts

In the previous sections, the results of two SEM models were presented. The first model predicted the influence of organizational, technical, and environmental factors on the use of social media technologies for collaboration purposes via consolidated social media tools. The second model predicted the influence of organizational, technical, and environmental factors on the use of social media technologies for collaboration purposes via communication and work sharing tools. In addition, models were run with imputed data.

Several additional models were estimated to check the robustness of the results (all model includes sampling weights). First, a model was estimated predicting the influence of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via consolidated social media tools. Second, a model was estimated predicting the influence of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via communication and work sharing tools. Third, a model was estimated predicting the influence of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via consolidated social media tools. Fourth, a model was estimated predicting the influence of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via communication and work sharing tools. Fifth, a model was ran to predict the influence of organizational, technical, and environmental factors on the use of social media for collaboration purpose via consolidated social media tools using different

stakeholder participation variable². Sixth, a model was ran to predict the influence of organizational, technical, and environmental factors on the use of social media for collaboration purpose via communication and work sharing tools using different stakeholder participation variable (as noted above).

The findings of the six models are reported in the Appendix of the dissertation (see Tables A1 through H2). The findings reported in Tables A1 through H2 confirm or reject hypotheses pattern found using imputed and non-imputed data.

Further, two models were run without weights. The first model predicted the influence of organizational, technical, and environmental factors on the use of social media technologies for collaboration purposes via consolidated social media tools (run without weights). The second model predicted the influence of organizational, technical, and environmental factors on the use of social media technologies for collaboration purposes via communication and work sharing tools (run without weights). The findings of the two models are reported in the Tables I1 through L3. While the findings confirm or reject hypotheses pattern found using imputed and non-imputed data, the estimated were larger in magnitude compared to models estimated with weights.

Overall the findings suggest that organizational dynamics and types of social media tools influence the use of social media technologies for collaboration purposes. Particularly, local governments that promote stakeholder participation and innovativeness are more likely to adopt social media technologies and subsequently use these

² The following survey question is used to measure different kind of stakeholder participation: Over the past year, how often did members of the public contribute the following to your organization? Responses include: (1) input on long range plans, (2) formal oversight of your organization, (3) feedback on department decisions, and (4) input on improving department management and operations.

technologies for collaboration purposes. Further, different classes of social media tools have differential effect on the use of social media technologies for internal vs. external collaboration. For instance, the adoption of communication tools is significantly and positively associated with the use of social media technologies for external collaboration. But, the adoption of communication tools is not significantly associated with the use of social media technologies for internal collaboration. However, the adoption of work sharing tools is significantly and positively associated with the use of social media technologies for internal and external collaboration.

6. CONCLUSION

This dissertation examines the influence of social and technical factors on the adoption and use of social media technologies for collaboration purposes. In doing so, the goal is to explain how organizational, technical, and environmental factors influence the adoption and use of social media technologies for collaboration purposes in a government setting. The study set out to explain the mechanisms through which the key variables of stakeholder participation, innovativeness, technical capacity, centralization, routineness, and political pressures influence the adoption and use of social media technologies for internal and external collaboration purposes, and the important theoretical and practical contributions associated with this understanding.

What follows is a breakdown of how this chapter proceeds. Section one provides an overview of the main research findings. The second section discusses the theoretical contributions of this dissertation, while the third section highlights its practical contributions. The final section contains a discussion on the limitations of this research and some suggestions for future study.

6.1. Overview

Drawing from sociotechnical and resource dependence theoretical approaches, the study developed an integrated theoretical framework to explain how organizational, technical, and environmental factors influence the use of social media technologies for collaboration purposes. As sociotechnical theory asserts that social and technical factors of an organization jointly determine the adoption and use of a technology for achieving a task, this study investigated key social and technical variables discussed in the literature

on emerging technologies. Specifically, how stakeholder participation, innovativeness, centralization, routineness, and technical capacity facilitate the adoption and use of a technology for a task. Since resource dependence theory argues that an organization depends on its environment for resources, an organization is likely to develop strategies and processes to obtain resources from the environment to survive. Consequently, the study looked at a critical variable associated with political pressures.

Based on the integrated theoretical model, this study developed and tested several hypotheses. Particular attention was paid to the direct influence of stakeholder participation, innovativeness, and technical capacity on the adoption and use of social media technologies for internal and external collaboration. Also, the indirect influence of centralized organization structure and routinized task environment on the adoption and use of social media technologies via stakeholder participation and innovativeness were examined. In addition to internal organizational and technical factors, the indirect influence of political pressures on the adoption and use of use of social media technologies via stakeholder participation was analyzed. Further discussion looked at social media technologies classifications based on their features and usability, and how they impact various aspects embedded in the process of collaboration. Broadly, the study classified social media technologies into communication and work sharing tools.

To test the direct and indirect influence of key variables, SEM analysis was conducted. The results indicate that stakeholder participation, innovativeness, and social media types explain the adoption and use of social media technologies for collaboration purposes. For internal collaboration, the results indicate that stakeholder participation and

innovativeness indirectly affect the use of social media technologies for internal collaboration via work sharing tools. The adoption of work sharing tools was found to be positively associated with the use of social media technologies for internal collaboration purposes. Interestingly, the adoption of communication tools did not have a significant influence on the use of social media technologies for internal collaboration.

In the case of external collaboration, the results indicate that stakeholder participation and innovativeness indirectly influence the use of social media technologies for external collaboration via communication and work sharing tools. The adoption of communication and work sharing tools were found to be positively associated with the use of social media technologies for external collaboration. The availability of internal IT staff is negatively associated with the use of social media technologies for external collaboration.

6.2. Theoretical implications

There are six theoretical contributions from this dissertation. The first theoretical contribution of this dissertation arises from testing the assertions of the sociotechnical framework. Consistent with the sociotechnical framework, the results indicate that organizational factors such as stakeholder participation and innovativeness play an important role in determining the adoption and use of social media technologies for collaboration purposes. For instance, employees working in an organization that promote participation of key stakeholders in the decision-making processes are likely to adopt and use social media technologies for collaboration purposes. Previous research found that employees working in an organization that encourages participation and open knowledge

sharing are likely to deploy collaboration technologies for working together (e.g. Javenpaa & Staples, 2000). In other words, an employee is likely to adopt and use social media technologies for collaboration purposes if it coincides with the organizational practices and norms.

The second theoretical contribution of this dissertation is supporting and extending the importance of paying attention to technical artifacts. As sociotechnical theory argues both social and technical factors determine the adoption and use of technology for achieving a task. While previous studies have examined the influence of technical factors in determining the adoption and use of social media technologies, these studies often define social media technologies as a homogenous group or focus on a single tool. This dissertation distinguishes and classifies social media technologies based on their features and usability. Specifically, this research divides social media technologies into two main types – communication and work sharing tools. The results show that communication tools have a significant influence on the use of social media technologies for external collaboration but do not support internal collaboration. These findings not only indicate the importance of classifying social media technologies based on their features and usability, but also provide initial explanation for understanding the differential use of social media technologies for achieving organizational goals. In a way, this dissertation contributes to the emerging social media and e-government literature and explains a mechanism to classify and test the usability of social media technologies based on their features.

Further, the findings of this dissertation highlight that different technical capacity

may be needed to internalize and routinize the use of social media technologies for collaboration purposes. For example, the result indicates that the availability of IT staff is negatively associated with the adoption and use of social media technologies for external collaboration. This finding contradicts previous studies, which found that availability of IT staff as important for sustained and continuous use of social media technologies in the public sector (e.g. Snead, 2013). As the task of collaboration requires on-going communication, the availability of IT staff to control the use of social media technologies may hinder the process of collaboration. In other words, the use of social media technologies for collaboration purpose might depend upon the ability of stakeholders to leverage and use these technologies for working together rather than depending upon a particular individual to manage and monitor interactions over social media sites. This does not mean that availability of internal staff is irrelevant for the adoption and use of social media technologies, but illustrates the importance of focusing on what types of tasks are performed using these technologies. Thus, paying attention to the task and technical characteristics is critical for understanding the use of social media technologies for achieving organizational goals.

The fourth theoretical contribution of this dissertation comes from examining the assertions of resource dependence theory. In line with the resource dependence theoretical approach, the findings of this dissertation highlight the importance of external influence in shaping organizational practices. They indicate that the external environment has a positive influence on the adoption and use of social media technologies via stakeholder participation. The indirect influence supports the view that public agencies

are embedded in their environment and these environmental forces shape organizational strategies and practices. Towards this end, the integrative theoretical framework developed in this dissertation is not only good at explaining the influence of organizational and technical factors on the adoption and use of social media technologies for collaboration purposes, but also highlights the importance of political pressures in shaping the adoption and use of these technologies in the public sector.

The fifth theoretical contribution of this dissertation is that it examines the influence of organizational, technical, and environmental factors on two types of collaboration: internal and external. By examining two types of collaboration, this dissertation takes a broader and comprehensive view of collaboration, which provides a better understanding of how organizational, technical, and environmental factors influence the use of social media technologies for internal and external collaboration. The findings indicate that these factors have differential effects depending on the collaboration type. For instance, stakeholder participation has a positive and significant effect on the use of social media technologies for external collaboration, but has no significant influence on the use of social media technologies for internal collaboration. Thus, this dissertation highlights different mechanisms through which organization, technical, and environmental factors influence the adoption and use of social media technologies for internal and external collaboration purposes.

The sixth theoretical contribution of this dissertation is explaining the mediating influence of social media technologies. Findings indicate that intervening variables such as social media tool type (communication and work sharing tools) mediate the influence

of organizational, technical, and environmental factors on the use of social media technologies for internal and external collaboration. The significant indirect effect illustrates the complex relationship between the use of social media technologies for organizational purposes and social factors in the public sector. In other words, this dissertation offers a more holistic mechanism through which organizational, technical, and environmental factors influence the adoption of social media tools and subsequently result in the use of these technologies for internal and external collaboration purposes.

To summarize, this dissertation integrates sociotechnical and resource dependence theoretical approaches to develop and test a comprehensive framework to understand the adoption and use of social media technologies for collaboration purposes. The findings of this dissertation not only support the assertions of sociotechnical and resource dependence theoretical frameworks, but also highlight the importance of classifying social media technologies based on their features and usability. Furthermore, the findings of this dissertation explain the mechanisms through which organizational, technical, and environmental factors influence the adoption and use of social media technologies for two types of collaboration: internal and external.

6.3. Practical implications

This dissertation finds five practical implications for public administrators and managers as both social media technologies and collaboration are important concepts in the public sector. One of the key findings of this dissertation is differentiating and classifying social media technologies based on their features and use as either communication tools or work-sharing tools appear to produce different results on internal

and external collaboration efforts. Consequently, public managers must be clear about the intent of the collaboration purpose and ensure that the appropriate tool is being utilized in order to most effectively meet an anticipated end. Social media technologies come in different flavors. For example, social networking sites such as Facebook, YouTube, and Twitter are helpful for information sharing, whereas tools such as wikis and Google Docs provide platforms to co-create knowledge base.

A second finding illustrates the importance of paying attention to the technical characteristics of the organization. The availability of IT staff is negatively associated with the use of social media technologies for external collaboration. Employees engaged in collaboration activity may be required develop practices and capabilities for using social media technologies for communicating, deliberating, and exchanging information on an on-going basis rather than waiting for a dedicated IT staff for integrating the information exchanged via social media into decision-making. In other words, public managers wanting to leverage social media technologies for collaboration purpose may focus on developing the technical capacity of employees engaged in the process of collaboration.

A third finding of this dissertation suggests that the presence of certain organizational factors such as stakeholder participation and innovativeness are important for adopting and using social media technologies for collaboration. For instance, the results indicate that innovation driven local governments that promote risk taking and experimentation are more likely to adopt social media technologies and subsequently use these technologies for collaboration purposes. It may be the case that employees working

in an innovation driven organization are more open to experimenting with social media technologies for achieving organizational goals, despite unforeseen risks and concerns associated with the use of these technologies. Thus, public managers seeking to adopt and use social media technologies for collaboration purposes may focus on developing work practices and norms that encourage employees' to take risks and experiment with different solutions accomplishing organizational goals and challenges.

In addition to organizational practices and norms, a fourth finding of this dissertation illustrates that external environment plays an important role in the adoption of social media technologies. The indirect effect of political pressures on the adoption of social media technologies indicates that public agencies are embedded in their environment. However, external environment is likely to influence the adoption of social media technologies through certain organization characteristics. In other words, public managers may play an important role in filtering the influence of external environment.

A final finding of this dissertation is that organizational, technical, and environmental factors differentially influence different types of collaboration. For instance, social media technologies classified as communication tools have no significant effect on internal collaboration. However, they do have a significant and positive influence on external collaboration. Understanding task requirements is critical for deploying social media technologies most effectively.

6.3. Limitation and avenues for future research

While this dissertation offers several theoretical and practical contributions to the study of public administration, it is important to note there are at least six limitations of

this research. First, this study utilizes cross-sectional data to test the theoretical framework and hypotheses. The cross-sectional nature of data in this study does not allow one to test for how continued use of social media technologies facilitates collaboration over time because it does not capture how employees develop capacity to use social media technologies for collaboration purposes. Future research should consider longitudinal data to explore how social media technologies are adopted, internalized, and routinized in an organization for collaboration purposes over time.

Second, the process of collaboration is complex. It contains several aspects that are embedded such as cooperation and coordination. In fact, previous collaboration literatures have developed a continuum of the collaboration process to specify how organizations might move from one instance to another. This dissertation does not differentiate between different stages of collaboration. It may be possible that different classes of social media may facilitate various stages of collaboration. Future research should explore how organizational, technical, and environmental factors influence different aspects of the process of collaboration.

A third limitation is that the items used to conceptualize the variables and model are limited to the questions included in the survey. For example, the empirical model does not include variables to capture prior collaborative experiences, need for collaboration, and other modes of collaboration. As discussed in this study, collaboration is a complex phenomenon and several factors influence it among departments. Future research should collect other social and technical factors and examine how these variables influence the use of social media technologies for collaboration purposes.

Fourth, this dissertation does not examine the actual degree of use of social media technologies for collaboration purposes. It may be possible that public agencies included in the sample may report using social media technologies for internal and external collaboration but degree of use may vary across department or tasks. Future research should select a sub-sample of cities or departments included in this dissertation, and conduct in-depth interviews to gauge actual degree of use of social media technologies for collaboration purposes. Also, case study analysis can be conducted to understand the actual degree of use of these technologies in the workplace for collaboration purposes.

A fifth limitation is that the survey is based on the perception of managers and not the actual employees who use social media technologies for collaboration. Consequently, managers may not have adequate knowledge of how employees are utilizing social media tools for collaboration purposes. Future surveys can be administered to different levels of employees in the organization, such as mid- and lower-level employees, to examine if there is a differentiated use of social media technologies for collaboration purposes. Moreover, while this dissertation focuses on local governments, future research can administer survey to state and federal governments to understand how the use of social media technologies for collaboration purposes differ across different levels of government.

The sixth limitation identified is that the data used for this research comes from 2012 national survey of local governments. The technology landscape is changing at a rapid rate. It is possible that some of the social media technologies included in the survey may be outdated. Thus, future research should include items that reflect the current landscape

of social media technologies. However, it is important to note that while the landscape of social media technologies are fast changing, the use of the integrated theoretical framework developed in this dissertation will be helpful in testing new data.

To conclude, this dissertation offers a step towards understanding the complex relationships between social media technologies and organizational structures, processes, norms, and capacity. Overall, the findings of this dissertation highlight that complex combination of social and technical context of an organization determine the adoption and use of social media technologies for collaboration purposes. While public agencies around the world are increasingly adopting social media technologies, further research is needed to understand how these technologies are internalized and routinized for achieving different organizational goals.

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APPENDIX A

SEM: USE OF SOCIAL MEDIA TECHNOLOGIES FOR INTERNAL COLLABORATION VIA CONSOLIDATED SOCIAL MEDIA TOOLS

Table A1: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via consolidated social media tools

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for internal collaboration	-0.01	0.07	-0.11	0.91
H2	Innovativeness → use of social media for internal collaboration	-0.07	0.07	-0.96	0.34
H3a	A designated IT staff → use of social media for internal collaboration	-0.15	0.12	-1.24	0.22
H3b	Percent Internet use → use of social media for internal collaboration	0.06	0.20	0.32	0.75
H4	Social media technologies → use of social media for internal collaboration	0.48	0.08	6.01	0.00
Controls	Department size → use of social media for internal collaboration	0.02	0.05	0.46	0.65
	City population → use of social media for internal collaboration	0.14	0.10	1.46	0.14
	Mayor's Office → use of social media for internal collaboration	-0.21	0.18	-1.15	0.25
	Community Development → use of social media for internal collaboration	0.03	0.18	0.16	0.87
	Finance → use of social media for internal collaboration	-0.38	0.21	-1.87	0.06
	Police → use of social media for internal collaboration	-0.01	0.19	-0.05	0.96

N= 587

Table A2: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via consolidated social media tools

		Estimate	S.E.	z-Score	p-Value
	Stakeholder participation → adoption of social media → use of social media for internal collaboration	0.14	0.04	3.72	0.00
	Innovativeness → adoption of social media → use of social media for internal collaboration	0.15	0.04	3.85	0.00
	A designated IT staff → adoption of social media → use of social media for internal collaboration	0.12	0.06	1.98	0.05
	Percent Internet use → adoption of social media → use of social media for internal collaboration	0.17	0.11	1.58	0.12

N= 587

APPENDIX B

SEM: USE OF SOCIAL MEDIA TECHNOLOGIES FOR INTERNAL COLLABORATION VIA TYPES OF SOCIAL MEDIA TOOLS

Table B1: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via communication and work tools

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for internal collaboration	-0.03	0.07	-0.37	0.71
H2	Innovativeness → use of social media for internal collaboration	-0.04	0.08	-0.54	0.59
H3a	A designated IT staff → use of social media for internal collaboration	-0.11	0.12	-0.92	0.36
H3b	Percent Internet use → use of social media for internal collaboration	0.14	0.19	0.72	0.47
H4	Communication tools → use of social media for internal collaboration	-0.04	0.09	-0.42	0.68
	Word sharing tools → use of social media for internal collaboration	0.52	0.08	6.69	0.00
Controls	Department size → use of social media for internal collaboration	0.02	0.05	0.46	0.65
	City population → use of social media for internal collaboration	0.14	0.10	1.46	0.14
	Mayor's Office → use of social media for internal collaboration	-0.21	0.18	-1.15	0.25
	Community Development → use of social media for internal collaboration	0.03	0.18	0.16	0.87
	Finance → use of social media for internal collaboration	-0.38	0.21	-1.87	0.06
	Police → use of social media for internal collaboration	-0.01	0.19	-0.05	0.96

N= 587

Table B2: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via communication tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → communication tools → use of social media for internal collaboration	0.00	0.01	-0.39	0.70
Innovativeness → communication tools → use of social media for internal collaboration	-0.01	0.03	-0.41	0.68
A designated IT staff → communication tools → use of social media for internal collaboration	-0.01	0.02	-0.41	0.68
Percent Internet use → communication tools → use of social media for internal collaboration	-0.02	0.04	-0.41	0.69

N= 587

Table B3: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via work sharing tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → work sharing tools → use of social media for internal collaboration	0.16	0.04	3.91	0.00
Innovativeness → work sharing tools → use of social media for internal collaboration	0.13	0.04	3.42	0.00
A designated IT staff → work sharing tools → use of social media for internal collaboration	0.09	0.07	1.40	0.16
Percent Internet use → work sharing tools → use of social media for internal collaboration	0.12	0.12	0.92	0.36

N= 587

APPENDIX C

SEM: USE OF SOCIAL MEDIA TECHNOLOGIES FOR EXTERNAL COLLABORATION VIA CONSOLIDATED SOCIAL MEDIA TOOLS

Table C1: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via consolidated social media tools

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for external collaboration	0.12	0.07	1.81	0.07
H2	Innovativeness → use of social media for external collaboration	-0.01	0.07	-0.10	0.92
H3a	A designated IT staff → use of social media for external collaboration	-0.20	0.12	-1.65	0.10
H3b	Percent Internet use → use of social media for external collaboration	-0.11	0.21	-0.51	0.61
H4	Social media technologies → use of social media for external collaboration	0.29	0.09	3.39	0.00
Controls	Department size → use of social media for external collaboration	-0.05	0.05	-1.00	0.32
	City population → use of social media for external collaboration	0.14	0.10	1.43	0.15
	Mayor's Office → use of social media for external collaboration	0.09	0.18	0.50	0.62
	Community Development → use of social media for external collaboration	-0.09	0.18	-0.50	0.62
	Finance → use of social media for external collaboration	-0.35	0.20	-1.72	0.09
	Police → use of social media for external collaboration	0.13	0.19	0.70	0.48

N= 587

Table C2: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via consolidated social media tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → adoption of social media → use of social media for external collaboration	0.08	0.03	2.73	0.01
Innovativeness → adoption of social media → use of social media for external collaboration	0.09	0.03	2.85	0.00
A designated IT staff → adoption of social media → use of social media for external collaboration	0.08	0.04	1.82	0.07
Percent Internet use → adoption of social media → use of social media for external collaboration	0.11	0.07	1.50	0.13

N= 587

APPENDIX D

SEM: USE OF SOCIAL MEDIA TECHNOLOGIES FOR EXTERNAL COLLABORATION VIA TYPES OF SOCIAL MEDIA TOOLS

Table D1: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via communication and work sharing tools

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for external collaboration	0.12	0.07	1.67	0.10
H2	Innovativeness → use of social media for external collaboration	-0.03	0.08	-0.40	0.69
H3a	A designated IT staff → use of social media for external collaboration	-0.22	0.12	-1.75	0.08
H3b	Percent Internet use → use of social media for external collaboration	-0.14	0.22	-0.63	0.53
H4	Communication tools → use of social media for external collaboration	0.18	0.09	2.12	0.03
	Word sharing tools → use of social media for external collaboration	0.24	0.09	2.79	0.01
Controls	Department size → use of social media for external collaboration	-0.05	0.05	-1.00	0.32
	City population → use of social media for external collaboration	0.14	0.10	1.43	0.15
	Mayor's Office → use of social media for external collaboration	0.09	0.18	0.51	0.61
	Community Development → use of social media for external collaboration	-0.09	0.18	-0.49	0.62
	Finance → use of social media for external collaboration	-0.35	0.20	-1.72	0.09
	Police → use of social media for external collaboration	0.13	0.19	0.70	0.48

N= 587

Table D2: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via communication tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → communication tools → use of social media for external collaboration	0.02	0.02	1.04	0.30
Innovativeness → communication tools → use of social media for external collaboration	0.05	0.03	1.95	0.05
A designated IT staff → communication tools → use of social media for external collaboration	0.05	0.03	1.44	0.15
Percent Internet use → communication tools → use of social media for external collaboration	0.08	0.06	1.40	0.16

N= 587

Table D3: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via work sharing tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → work sharing tools → use of social media for external collaboration	0.07	0.03	2.35	0.02
Innovativeness → work sharing tools → use of social media for external collaboration	0.06	0.03	2.33	0.02
A designated IT staff → work sharing tools → use of social media for external collaboration	0.04	0.03	1.27	0.21
Percent Internet use → work sharing tools → use of social media for external collaboration	0.05	0.06	0.87	0.38

N= 587

APPENDIX E

SEM: USE OF SOCIAL MEDIA TECHNOLOGIES FOR INTERNAL COLLABORATION VIA CONSOLIDATED SOCIAL MEDIA TOOLS (DIFFERENT STAKEHOLDER PARTICIPATION)

Table E1: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via consolidated social media tools

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for internal collaboration	-0.01	0.07	-0.12	0.90
H2	Innovativeness → use of social media for internal collaboration	-0.06	0.07	-0.89	0.38
H3a	A designated IT staff → use of social media for internal collaboration	-0.15	0.12	-1.26	0.21
H3b	Percent Internet use → use of social media for internal collaboration	0.06	0.20	0.30	0.77
H4	Social media technologies → use of social media for internal collaboration	0.47	0.08	5.95	0.00
Controls	Department size → use of social media for internal collaboration	0.02	0.05	0.46	0.65
	City population → use of social media for internal collaboration	0.14	0.10	1.46	0.14
	Mayor's Office → use of social media for internal collaboration	-0.21	0.18	-1.15	0.25
	Community Development → use of social media for internal collaboration	0.03	0.18	0.16	0.87
	Finance → use of social media for internal collaboration	-0.38	0.21	-1.87	0.06
	Police → use of social media for internal collaboration	-0.01	0.19	-0.05	0.96

N= 587

Table E2: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via consolidated social media tools

		Estimate	S.E.	z-Score	p-Value
	Stakeholder participation → adoption of social media → use of social media for internal collaboration	0.13	0.04	3.48	0.00
	Innovativeness → adoption of social media → use of social media for internal collaboration	0.13	0.04	3.67	0.00
	A designated IT staff → adoption of social media → use of social media for internal collaboration	0.13	0.06	2.07	0.04
	Percent Internet use → adoption of social media → use of social media for internal collaboration	0.18	0.11	1.67	0.09

N= 587

APPENDIX F

SEM: USE OF SOCIAL MEDIA TECHNOLOGIES FOR EXTERNAL COLLABORATION VIA CONSOLIDATED SOCIAL MEDIA TOOLS (DIFFERENT STAKEHOLDER PARTICIPATION)

Table F1: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via consolidated social media tools

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for external collaboration	0.05	0.07	0.67	0.50
H2	Innovativeness → use of social media for external collaboration	0.00	0.07	0.05	0.96
H3a	A designated IT staff → use of social media for external collaboration	-0.21	0.12	-1.70	0.09
H3b	Percent Internet use → use of social media for external collaboration	-0.12	0.21	-0.56	0.58
H4	Social media technologies → use of social media for external collaboration	0.30	0.08	3.69	0.00
Controls	Department size → use of social media for external collaboration	-0.05	0.05	-1.00	0.32
	City population → use of social media for external collaboration	0.14	0.10	1.43	0.15
	Mayor's Office → use of social media for external collaboration	0.09	0.18	0.50	0.62
	Community Development → use of social media for external collaboration	-0.09	0.18	-0.50	0.62
	Finance → use of social media for external collaboration	-0.35	0.20	-1.72	0.09
	Police → use of social media for external collaboration	0.13	0.19	0.70	0.48

N= 587

Table F2: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via consolidated social media tools

		Estimate	S.E.	z-Score	p-Value
	Stakeholder participation → adoption of social media → use of social media for external collaboration	0.09	0.03	2.76	0.01
	Innovativeness → adoption of social media → use of social media for external collaboration	0.09	0.03	2.93	0.00
	A designated IT staff → adoption of social media → use of social media for external collaboration	0.08	0.04	1.90	0.06
	Percent Internet use → adoption of social media → use of social media for external collaboration	0.12	0.07	1.59	0.11

N= 587

APPENDIX G

SEM: USE OF SOCIAL MEDIA TECHNOLOGIES FOR INTERNAL
COLLABORATION VIA TYPES OF SOCIAL MEDIA TOOLS (DIFFERENT
STAKEHOLDER PARTICIPATION)

Table G1: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via communication and work tools

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for internal collaboration	-0.03	0.07	-0.37	0.71
H2	Innovativeness → use of social media for internal collaboration	-0.04	0.08	-0.55	0.58
H3a	A designated IT staff → use of social media for internal collaboration	-0.11	0.12	-0.92	0.36
H3b	Percent Internet use → use of social media for internal collaboration	0.14	0.19	0.71	0.48
H4	Communication tools → use of social media for internal collaboration	-0.04	0.09	-0.41	0.69
	Word sharing tools → use of social media for internal collaboration	0.52	0.08	6.69	0.00
Controls	Department size → use of social media for internal collaboration	0.02	0.05	0.46	0.65
	City population → use of social media for internal collaboration	0.14	0.1	1.46	0.14
	Mayor's Office → use of social media for internal collaboration	-0.21	0.18	-1.15	0.25
	Community Development → use of social media for internal collaboration	0.03	0.18	0.16	0.87
	Finance → use of social media for internal collaboration	-0.38	0.21	-1.87	0.06
	Police → use of social media for internal collaboration	-0.01	0.19	-0.05	0.96

N= 587

Table G2: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via communication tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → communication tools → use of social media for internal collaboration	0.00	0.01	-0.38	0.7
Innovativeness → communication tools → use of social media for internal collaboration	-0.01	0.03	-0.4	0.69
A designated IT staff → communication tools → use of social media for internal collaboration	-0.01	0.02	-0.4	0.69
Percent Internet use → communication tools → use of social media for internal collaboration	-0.02	0.04	-0.4	0.69

N= 587

Table G3: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via work sharing tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → work sharing tools → use of social media for internal collaboration	0.16	0.04	3.91	0.00
Innovativeness → work sharing tools → use of social media for internal collaboration	0.13	0.04	3.42	0.00
A designated IT staff → work sharing tools → use of social media for internal collaboration	0.09	0.07	1.40	0.16
Percent Internet use → work sharing tools → use of social media for internal collaboration	0.12	0.12	0.92	0.36

N= 587

APPENDIX H

SEM: USE OF SOCIAL MEDIA TECHNOLOGIES FOR EXTERNAL
COLLABORATION VIA TYPES OF SOCIAL MEDIA TOOLS (DIFFERENT
STAKEHOLDER PARTICIPATION)

Table H1: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via communication and work sharing tools

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for external collaboration	0.12	0.07	1.68	0.09
H2	Innovativeness → use of social media for external collaboration	-0.03	0.08	-0.39	0.69
H3a	A designated IT staff → use of social media for external collaboration	-0.22	0.12	-1.75	0.08
H3b	Percent Internet use → use of social media for external collaboration	-0.14	0.22	-0.64	0.53
H4	Communication tools → use of social media for external collaboration	0.18	0.09	2.12	0.03
	Word sharing tools → use of social media for external collaboration	0.24	0.09	2.79	0.01
Controls	Department size → use of social media for external collaboration	-0.05	0.05	-1.00	0.32
	City population → use of social media for external collaboration	0.14	0.10	1.43	0.15
	Mayor's Office → use of social media for external collaboration	0.09	0.18	0.50	0.61
	Community Development → use of social media for external collaboration	-0.09	0.18	-0.50	0.62
	Finance → use of social media for external collaboration	-0.35	0.20	-1.72	0.09
	Police → use of social media for external collaboration	0.13	0.19	0.70	0.48

N= 587

Table H2: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via communication tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → communication tools → use of social media for external collaboration	0.02	0.02	1.04	0.30
Innovativeness → communication tools → use of social media for external collaboration	0.05	0.03	1.95	0.05
A designated IT staff → communication tools → use of social media for external collaboration	0.05	0.03	1.44	0.15
Percent Internet use → communication tools → use of social media for external collaboration	0.08	0.06	1.40	0.16

N= 587

Table H3: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via work sharing tools

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → work sharing tools → use of social media for external collaboration	0.07	0.03	2.35	0.02
Innovativeness → work sharing tools → use of social media for external collaboration	0.06	0.03	2.33	0.02
A designated IT staff → work sharing tools → use of social media for external collaboration	0.04	0.03	1.26	0.21
Percent Internet use → work sharing tools → use of social media for external collaboration	0.05	0.06	0.89	0.37

N= 587

APPENDIX I

SEM: USE OF SOCIAL MEDIA TECHNOLOGIES FOR INTERNAL
COLLABORATION VIA CONSOLIDATED SOCIAL MEDIA TOOLS (WITHOUT
WEIGHTS)

Table I1: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via consolidated social media tools (without weights)

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for internal collaboration	0.06	0.06	0.90	0.37
H2	Innovativeness → use of social media for internal collaboration	-0.05	0.07	-0.77	0.44
H3a	A designated IT staff → use of social media for internal collaboration	-0.10	0.11	-0.87	0.38
H3b	Percent Internet use → use of social media for internal collaboration	0.07	0.19	0.35	0.73
H4	Social media technologies → use of social media for internal collaboration	0.42	0.07	5.81	0.00
Controls	Department size → use of social media for internal collaboration	0.03	0.05	0.60	0.55
	City population → use of social media for internal collaboration	0.19	0.09	2.06	0.04
	Mayor's Office → use of social media for internal collaboration	-0.12	0.17	-0.71	0.48
	Community Development → use of social media for internal collaboration	-0.07	0.16	-0.41	0.68
	Finance → use of social media for internal collaboration	-0.31	0.19	-1.64	0.10
	Police → use of social media for internal collaboration	0.05	0.17	0.27	0.79

N= 587

Table I2: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via consolidated social media tools (without weights)

		Estimate	S.E.	z-Score	p-Value
	Stakeholder participation → adoption of social media → use of social media for internal collaboration	0.11	0.03	3.60	0.00
	Innovativeness → adoption of social media → use of social media for internal collaboration	0.13	0.03	3.72	0.00
	A designated IT staff → adoption of social media → use of social media for internal collaboration	0.14	0.05	2.62	0.01
	Percent Internet use → adoption of social media → use of social media for internal collaboration	0.23	0.09	2.59	0.01

N= 587

APPENDIX J

SEM: USE OF SOCIAL MEDIA TECHNOLOGIES FOR EXTERNAL
COLLABORATION VIA CONSOLIDATED SOCIAL MEDIA TOOLS (WITHOUT
WEIGHTS)

Table J1: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via consolidated social media tools (without weights)

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for external collaboration	0.10	0.06	1.58	0.12
H2	Innovativeness → use of social media for external collaboration	0.00	0.07	0.00	1.00
H3a	A designated IT staff → use of social media for external collaboration	-0.08	0.11	-0.67	0.51
H3b	Percent Internet use → use of social media for external collaboration	-0.18	0.20	-0.92	0.36
H4	Social media technologies → use of social media for external collaboration	0.29	0.08	3.87	0.00
Controls	Department size → use of social media for external collaboration	-0.05	0.05	-1.04	0.30
	City population → use of social media for external collaboration	0.09	0.09	0.94	0.35
	Mayor's Office → use of social media for external collaboration	0.10	0.17	0.62	0.53
	Community Development → use of social media for external collaboration	-0.06	0.16	-0.38	0.70
	Finance → use of social media for external collaboration	-0.45	0.19	-2.43	0.02
	Police → use of social media for external collaboration	0.07	0.17	0.41	0.68

N= 587

Table J2: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via consolidated social media tools (without weights)

		Estimate	S.E.	z-Score	p-Value
	Stakeholder participation → adoption of social media → use of social media for external collaboration	0.07	0.03	2.91	0.00
	Innovativeness → adoption of social media → use of social media for external collaboration	0.09	0.03	3.03	0.00
	A designated IT staff → adoption of social media → use of social media for external collaboration	0.10	0.04	2.37	0.02
	Percent Internet use → adoption of social media → use of social media for external collaboration	-0.18	0.20	-0.92	0.36

N= 587

APPENDIX K

SEM: USE OF SOCIAL MEDIA TECHNOLOGIES FOR INTERNAL
COLLABORATION VIA TYPES OF SOCIAL MEDIA TOOLS (WITHOUT
WEIGHTS)

Table K1: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via communication and work tools (without weights)

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for internal collaboration	0.04	0.06	0.61	0.54
H2	Innovativeness → use of social media for internal collaboration	-0.04	0.07	-0.52	0.60
H3a	A designated IT staff → use of social media for internal collaboration	-0.07	0.12	-0.59	0.56
H3b	Percent Internet use → use of social media for internal collaboration	0.13	0.19	0.70	0.49
H4	Communication tools → use of social media for internal collaboration	-0.01	0.08	-0.13	0.89
	Word sharing tools → use of social media for internal collaboration	0.46	0.07	6.50	0.00
Controls	Department size → use of social media for internal collaboration	0.03	0.05	0.60	0.55
	City population → use of social media for internal collaboration	0.19	0.09	2.06	0.04
	Mayor's Office → use of social media for internal collaboration	-0.12	0.17	-0.70	0.48
	Community Development → use of social media for internal collaboration	-0.07	0.16	-0.42	0.68
	Finance → use of social media for internal collaboration	-0.31	0.19	-1.64	0.10
	Police → use of social media for internal collaboration	0.05	0.17	0.27	0.79

N= 587

Table K2: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via communication tools (without weights)

		Estimate	S.E.	z-Score	p-Value
	Stakeholder participation → communication tools → use of social media for internal collaboration	0.00	0.01	-0.13	0.90
	Innovativeness → communication tools → use of social media for internal collaboration	0.00	0.03	-0.13	0.89
	A designated IT staff → communication tools → use of social media for internal collaboration	0.00	0.03	-0.13	0.89
	Percent Internet use → communication tools → use of social media for internal collaboration	-0.01	0.05	-0.13	0.89

N= 587

Table K3: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for internal collaboration via work sharing tools (without weights)

		Estimate	S.E.	z-Score	p-Value
	Stakeholder participation → work sharing tools → use of social media for internal collaboration	0.12	0.03	3.85	0.00
	Innovativeness → work sharing tools → use of social media for internal collaboration	0.12	0.03	3.39	0.00
	A designated IT staff → work sharing tools → use of social media for internal collaboration	0.11	0.06	1.98	0.05
	Percent Internet use → work sharing tools → use of social media for internal collaboration	0.17	0.10	1.77	0.08

N= 587

APPENDIX L

SEM: USE OF SOCIAL MEDIA TECHNOLOGIES FOR EXTERNAL
COLLABORATION VIA TYPES OF SOCIAL MEDIA TOOLS (WITHOUT
WEIGHTS)

Table L1: Direct effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via communication and work sharing tools (without weights)

		Estimate	S.E.	z-Score	p-Value
H1	Stakeholder participation → use of social media for external collaboration	0.09	0.06	1.39	0.17
H2	Innovativeness → use of social media for external collaboration	-0.04	0.07	-0.57	0.57
H3a	A designated IT staff → use of social media for external collaboration	-0.12	0.12	-0.98	0.33
H3b	Percent Internet use → use of social media for external collaboration	-0.25	0.20	-1.24	0.21
H4	Communication tools → use of social media for external collaboration	0.24	0.08	2.95	0.00
	Word sharing tools → use of social media for external collaboration	0.22	0.08	2.91	0.00
Controls	Department size → use of social media for external collaboration	-0.05	0.05	-1.04	0.30
	City population → use of social media for external collaboration	0.09	0.09	0.94	0.35
	Mayor's Office → use of social media for external collaboration	0.10	0.17	0.63	0.53
	Community Development → use of social media for external collaboration	-0.06	0.16	-0.38	0.70
	Finance → use of social media for external collaboration	-0.45	0.19	-2.43	0.02
	Police → use of social media for external collaboration	0.07	0.17	0.41	0.68

N= 587

Table L2: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via communication tools (without weights)

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → communication tools → use of social media for external collaboration	0.02	0.02	1.31	0.19
Innovativeness → communication tools → use of social media for external collaboration	0.07	0.03	2.52	0.01
A designated IT staff → communication tools → use of social media for external collaboration	0.08	0.04	1.98	0.05
Percent Internet use → communication tools → use of social media for external collaboration	0.15	0.07	2.01	0.04

N= 587

Table L3: Indirect effects of organizational, technical, and environmental factors on the use of social media technologies for external collaboration via work sharing tools (without weights)

	Estimate	S.E.	z-Score	p-Value
Stakeholder participation → work sharing tools → use of social media for external collaboration	0.06	0.03	2.42	0.02
Innovativeness → work sharing tools → use of social media for external collaboration	0.06	0.02	2.39	0.02
A designated IT staff → work sharing tools → use of social media for external collaboration	0.06	0.03	1.70	0.09
Percent Internet use → work sharing tools → use of social media for external collaboration	0.08	0.06	1.54	0.13

N= 587