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IMPROVING ORGANIZATIONAL EFFECTIVENESS VIA LOGIC DIVERSITY: THE ROLE OF SOCIAL MEDIA NARRATIVES AND USE IN THE ENERGY SECTOR

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IMPROVING ORGANIZATIONAL EFFECTIVENESS VIA LOGIC DIVERSITY: THE ROLE OF SOCIAL MEDIA NARRATIVES AND USE IN THE ENERGY SECTOR

A DISSERTATION APPROVED FOR THE
MICHAEL F. PRICE COLLEGE OF BUSINESS

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This dissertation is dedicated to my parents,
Mr. Hyungjun Kim and Mrs. Hoisik Kim.

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Abstract

Over the last decade, social media has diffused widely through society, increasingly impacting aspects of our lives. In the private sphere, we use social media to develop and maintain personal relationships. In the civic arena, activists use social media to raise awareness of social ills and mobilize collective action. Politicians use social media to represent their platforms, solicit citizens' input, mobilize financial support, and get out votes. Emergency responders use social media to collect and disseminate information about natural and man-made disasters. Mass media uses social media to extend its information gathering reach, relying on citizen journalists for the copy, photographs, and video footage they share through social media, and its information dissemination reach as media organizations raise awareness and draw audiences through social media.

Against this backdrop of private and civic use of social media, businesses have increasingly begun to adopt and use social media for a range of purposes including internal communication and knowledge sharing, marketing and product promotion, recruiting, and engaging in and representing their social responsibility activities. Despite extensive organizational use of social media, however, our systematic understanding of the impact of such use on organizational effectiveness is still limited. In particular, it is not clear *why/how* social media might impact organizations' financial performance and legitimacy—crucial organizational effectiveness that determines organization survival. In my dissertation, I therefore propose a mechanism that addresses this *why/how* question. In particular, I propose that *organizational logic*

diversity is a key mechanism through which organizational social media use can enhance organizations' legitimacy and financial performance. I further propose that the *comprehensiveness of organizational narratives* influences organizational social media use and moderates the effect of firms' social media use on logic diversity.

I examine my proposed research model within the context of the energy sector. Because of its geopolitical significance, the energy sector is being buffeted by activities in the civic arena—by activists challenging firms' practices, politicians and government regulators for whom the energy sector serves as a platform, emergency responders dealing with the fallout of disasters, and mass media for whom the sector provides rich copy. Using archival data in conjunction with novel data extraction approaches—including machine learning, I constructed a panel dataset of 83 firms across five years. I then tested my research model on this dataset using a Prais-Winsten regression to account for panel heteroscedasticity and panel-specific autocorrelations. Findings largely support my proposed model. I conclude by discussing the meaning and salience of these findings to ongoing research on social media and the business value of IT.

Keywords: *Narratives, social media, logics, legitimacy, financial performance, IT impact, diversity*

Chapter 1: Introduction

Social media refers to *Internet-based applications that allow users to interact with each other and to participate in building and maintaining web contents* (Chui et al. 2012; Kaplan and Haenlein 2010). Because social media permeates almost all aspects of our lives, be it personal or professional, it has become an important antecedent of societal and organizational changes. In my second-year paper, I first examined the *adverse effects of social media* on organizations, which occurs through societal changes. I argued that social media erodes organizational buffers (e.g., practices and structures that help firms protect their technical or administrative cores from external stakeholders) and provides external stakeholders tools for voicing and acting on their concerns or contention toward organizations. With 10 years of patents and news articles of energy firms, I found that in the social media era, stakeholders' contention cycles, previously unrelated to firms' patenting activities, have become aligned (or "entrained") with firms' cycles of patenting activities. These findings suggest that managers should enhance organizational buffers in the social media era if they wish to protect their cores from unwanted external pressures (e.g., hydro-fracturing controversy). Appendix A provides key findings of the study.

For my dissertation, I examine the flip side of social media effects. That is, I examine the possibility for *beneficial effects of social media* on organizations. More and more organizations use social media for diverse purposes. The 2012 McKinsey Report on social media shows that 72% of companies are now using social media (Chui et al. 2012). These companies use the technology for internal coordination and

communication (Aoun and Vatanasakdakul 2012) and market information gathering (Chui et al. 2012) to name a few.

Inspired by this much use of social media by organizations, IS scholars have examined its impacts on diverse individual and group phenomena such as employee engagement (Koch et al. 2012), employee innovativeness (Gray et al. 2011), ecommerce spending (Goh et al. 2013; Rishika et al. 2013), online review posting (Dellarocas et al. 2011), knowledge reuse (Majchrzak et al. 2013), and decision making (Choi et al. 2010). Researchers have also examined organizational impacts focusing on, for instance, equity value (Luo et al. 2013), blog readership (Aggarwal et al. 2012), and Facebook posting counts and nature (Miller and Tucker 2013). However, these organizational impact studies tend to focus on the impact of the social media use by "customers" (Chintagunta et al. 2010; Dellarocas et al. 2007; Dewan and Ramaprasad 2012; Dhar and Chang 2009; Duan et al. 2008, Luo 2007, 2009; Luo et al. 2013), rather than by "organizations". Moreover, as Rishika et al. (2013: 109) argue, we still know little about whether and how social media helps to create "sustainable firm value." Kane et al. (2010: iii) also says, "precisely how to measure the impact of social media remains elusive." Appendix B summarizes these social media studies.

From the traditional economic-rationalistic perspective, firm value is represented by organizations' financial performance (Wang 2010); from the institutional perspective, which complements the traditional view, such firm value is represented by organizational legitimacy (Suchman 1995). More importantly, both

measures represent the ultimate organizational effectiveness that determines organization survival (Meyer and Zucker 1989).

In this dissertation, I therefore examine "organizational" social media use and its impact on financial performance and legitimacy. When organizations use social media, in many cases they actually tap into social media big data. Social media messages demonstrate the four characteristics of big data: velocity, volume, variety, and veracity (Goes 2014). Social media big data contains diverse views, demands, and expectations coming from diverse stakeholders such as customers, activists, employees, and government agencies. For examples, through its own FB and Twitter, the Price College of Business hears from diverse stakeholders such as students, student athletes, parents, and possibly the governor. Most likely colleges also monitor what their stakeholders say about them on social media. Then,

Research Questions 1: What happens especially to legitimacy and financial performance when organizations use social media?

I propose that organizations' cognition change—in particular, *organizational logic diversity*—helps explain and enrich our understanding of what happens when organizations use social media. Such a mechanism helps understand *why/how* a certain phenomenon unfolds, which is the core of theory development (Sutton and Staw 1995; Whetten 1989). Organizational logics are defined as *an organization's belief systems that furnish guidelines for practical action* (Friedland and Alford 1991; Van de Ven et al. 2007). I propose that organizational use of social media diversifies

organizational logics and that this diversity ultimately increases organizational legitimacy and financial performance.

In addition to my investigation into what happens when organizations use social media, I also examine the following related research question:

Research Questions 2: What influences organizations' social media use?

There is a large volume of literature that examines the antecedents of individuals' use of social media (e.g., Boton et al. 2013; Correa et al. 2009; Hughes et al. 2013; Orchard et al. 2014; Ross et al. 2009; Zuniga et al. 2011). However, organizations' social media use is at least as important, which impacts hundreds and thousands of employees and communities. By looking through again a cognitive perspective, I propose that organizations' narratives about social media, one type of organizational symbolic activity, can be an antecedent of organizations' social media use. Narratives are a form of sensemaking and sensegiving and thus often facilitate innovation adoption and use (Lounsbury and Glynn 2001; Maitlis and Lawrence 2007; Sonenshien 2010; Swanson and Ramiller 1997). Surprisingly, despite this potential theoretical and practical importance for IT innovation, IS scholars have paid little attention to the role of narratives. Thus, as an initial step to improving our understanding of the narrative role, I also take into account organizational narratives and examine the relationship between the narratives and organizational social media use.

The empirical setting of this study is the energy sector, which is typically comprised of the following five industries: utility, oil and gas exploration, refining, oil field services, and pipelines. The geopolitical significance of the sector results in diverse stakeholders (e.g., activists, consumers, and government agencies) imposing considerable pressure on energy organizations. Consequently, the diverse logics held by those stakeholders are likely to affect the energy organizations. Then, the energy sector provides a good empirical setting where companies with diverse logics can possibly be observed. Moreover, stakeholders often leverage social media to exert their influence on energy companies (Kim and Miranda 2013). On the one hand, early investigations of corporate social media use suggest the energy sector was a late adopter (e.g., Culnan et al. 2010). On the other, my own research, which found that the social media era has eroded buffers in the energy sector (Kim and Miranda 2013), provides evidence of the salience of social media to this sector. There is also considerable within-sector variance in social media use and perspective (McKinsey 2012); some energy companies are actively using social media, such as Chevron (e.g., Sernovitz 2010).

By examining the impacts of organizations' social media use along with public organizational narratives in the energy sector, I make three key contributions. First, I provide a fundamental cognitive mechanism though which organizational social media increases integral organizational effectiveness. Despite much attention to social media, we still know little about "organizational" social media use and its impact on financial performance and, particularly, on legitimacy (c.f. Luo et al. 2013). In particular, *"why/how"* this impact fundamentally occurs is not well understood.

Addressing this why/how question contributes to the developing theorization of organizational social media impacts (Treem and Leonardi 2012; Urquhart and Vaast 2012). Further, this mechanism informs managers of what happens when organizations tap into social media big data and how social media helps to increase crucial organizational effectiveness. Second, I explain how narratives influence organizational social media use and its further impact. In doing so, I add to the under-developed knowledge of the role of narratives in technology use and impact. Third, I demonstrate an important role of technology in logic evolution: fostering organizational logic diversity. This contributes to our enduring interests in how logics change over time (see Thornton et al. (2012) for a review).

In the following chapters, I first review the literatures on organizational logic diversity, social media use, and narratives. I then develop a research model delineating my hypotheses. Then, I outline research methods and analysis strategy. Next, I present my findings from hypothesis testing. Finally, I conclude by explicating my contributions, study limitations, and suggestions for future research.

Chapter 2: Theoretical Underpinnings

In this chapter, I review and synthesize literature relevant to my investigation of social media effects on organizational effectiveness in order to develop a model of social media and organizational effectiveness. First, I review the literature on organizational logics and organizational social media use in order to provide literature background for the first research question regarding *how/why* organizations' social media use impacts organizational effectiveness. Next, I review the literature on organizational narratives to set up the background for the second research question regarding how narratives impact organizations' social media use.

2.1 Organizational Logic Diversity

In this study, I propose that organizational logic diversity can play a significant mediating role between organizational social media use and its impact. Organizational logics are *organization's belief systems that furnish guidelines for practical action* (Friedland and Alford 1991; Thornton 2002; Van de Ven et al. 2007). Simply put, logics are a set of beliefs, values, and assumptions that guide actions. To illustrate, in academia, we want to be (and we want others to be) creative, productive, and a good citizen; these are some of the logics we have—creativity, productivity, and good citizens.

Organizational logics are developed and adopted from the organization's environment, or institutional field (Thornton 2004; Thornton and Ocasio 1999), defined as *"those organizations that, in the aggregate, constitute a recognized area of*

institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products" (DiMaggio and Powell 1983: 148). That is, organizational logics are largely shaped by the logics that the relevant institutional fields hold. These institutional logics are defined as *"broad cultural beliefs and rules that structure cognition and fundamentally shape decision making and action in a field"* (Marquis and Lounsbury 2007: 799). They are taken-for-granted social prescriptions that guide actors' decision-making and behavior (Ocasio 1997; Thornton 2004; Lounsbury 2007).

As an institutional field consists of diverse social actors holding diverse beliefs and perspectives, one field often exhibits plural and often conflicting institutional logics (Greenwood et al. 2011; Kraats and Block 2008). Even when a certain logic dominates one institutional field, other logics tend to permeate the institutional field, making the field's logic plural and diverse (Friedland and Alford 1991; Murray 2010; Townley 2002).

Organizations adopt these diverse institutional logics mainly through the following six pathways: replacement, blending, segregation, assimilation, elaboration, and extension/contraction (Thornton et al. 2012). An organization may be able to replace most of its logics with new ones—note that, however, "[e]ven in cases where one dominant logic is replaced by another, original logics may continue to exist" (Thornton et al. 2012: 169). It can also blend or assimilate new logics into existing ones—e.g., blending of a market logics with musicians' professional logics (Glynn and Lounsbury 2005). An organization can also maintain segregation between new and existing logics (e.g., Purdy and Gray 2009). It can also elaborate and extend or

contract existing ones in light of new logics (e.g., Edelman 1992; Nigam and Ocasio 2010).

Although an organization adopts diverse institutional logics through theses aforementioned ways, it does not mean all of the existing institutional logics are reflected in the organization's logics. Because organizations are cognitively limited (Ocasio 1997; Simon 1991), only those institutional logics that are *available* and *accessible* to the organization are likely to be reflected in the organizational logics (Thornton et al. 2012). Therefore, the more available and accessible institutional logics are to an organization, the more likely the organization is to adopt or at least consider those logics, possibly leading to more diverse organizational logics. Then, if there is a medium that can make institutional logics more available and accessible to an organization, its organizational logics can become more diverse—i.e., organizational logic diversity. Social media may be able to carry out this task.

2.2 Organizational Social Media Use

Organizational use of social media is now extensive (Chui et al. 2012; Majchrzak et al. 2013; Miller and Tucker 2013). For example, social media is used as internal and external coordination conduits (e.g., McKinsey & Company Report 2009), for customer insight generation (e.g., Culnan et al. 2010), and for sales and brand promotion (e.g., Miranda et al. 2015). All of these uses are possible, I argue, because social media offers unique interaction capabilities—*namely, quick, wide, and equal interaction.* Table 1 lists the capabilities and their brief descriptions.

Table 1 Social Media Capabilities

Capabilities	Descriptions	Illustration in Literature
Quick Interactivity	Real time user interaction	Dunn (2010); Gallaugher and Ransbotham (2010); Javenpaa and Tuunainen (2013); Kane et al. (2009); Majchrzak and More (2011); Oh et al. (2013); Vaast et al. (2012)
Wide Interactivity	Interaction across diverse demographics.	Di Gangi et al. (2010); Ellison and boyd (2013); Gallaugher and Ransbotham (2010); Jarvenpaa and Tuunainen (2013); Kiron et al. (2012); Rishika et al. (2013); Treem and Leonardi (2012); Wattal et al. (2010); Wright (2013)
Equal Interactivity	Leveling of status hierarchies (e.g., media, CEOs, ordinary people)	Aggarwal et al. (2009); Gallaugher and Ransbotham (2010); Heath et al. (2013); Jarvenpaa and Tuunainen (2013); Kane et al. (2010); Kietzman et al. (201); Yetgin et al. (2012)

Social media enables n-to-n ***quick interaction*** between users (e.g., Dunn 2010; Gallaugher and Ransbotham 2010; Javenpaa and Tuunainen 2013; Kane et al. 2009; Majchrzak and More 2011; Oh et al. 2013). For example, customers can praise or criticize the moment organizations did something right or wrong (Gallaugher and Ransbotham 2010). Organizations then can quickly broadcast their opinions or solutions through social media (Gallaugher and Ransbotham 2010). Moreover, customers, and users in general, can interact with each other real time (Jarvenpaa and Tuunainen 2013). For example, it took less than three months for the anti-SOPA movement to mobilize enough grassroots support to kill the bill (Yetgin et al. 2012). Moreover, during the Boston bombing, social media greatly helped distribute crucial information in real time (Kane 2013). The Twitter blocking incident in Turkey also

shows the quick interactivity affordance of social media. It took only less than 12 hours for the issue to spread across the world (BBC 2014b). Table 2 summarizes the studies that demonstrate social media' quick interaction capabilities.

Table 2. Social Media Quick Interaction Capabilities

Studies	Illustrations of Capability
Dunn (2010)	"By monitoring the feed, we're able to learn a lot about what our customers are doing and to help them with problems in real time." (p. 48)
Gallaugher and Ransbotham (2010)	"Firms can respond to customer ideas quickly and engage customers." (p. 199)
Jarvenpaa and Tuunainen (2013)	"Finnair set up a 24/7 Facebook support staff that rapidly responded to queries." (p. 129) "The blogs and Facebook page communicated Finnair's new image and enabled real-time interaction between customers and the company." (p. 129)
Kane et al. (2009)	"In no small part, online activism drove powerful community opposition, A single-issue website, teopthebiolab.org, quickly galvanized a community of staunch resistance." (p. 2)

Social media also enables ***wide interaction*** (e.g., Di Gangi et al. 2010; Ellison and boyd 2013; Gallaugher and Ransbotham 2010; Jarvenpaa and Tuunainen 2013; Kiron et al. 2012; Plangger 2012; Rishika et al. 2013; Treem and Leonardi 2012; Wattal et al. 2010). Social media user characteristics demonstrate diverse user regions, a variety of user types (e.g., politicians, businesses, general public), and different user status (e.g., CEOs vs. employees, wealthy vs. less-fortunate people). As a result, users' reach and influence go beyond geographical, temporal, or simple demographical boundaries (e.g., ages) (Gallaugher and Ransbotham 2010). For example, a Finnair recruitment event on social media generated applications from different groups of people from 90 countries (Jarvenppa and Tuunainen 2013). In

addition, again, the Twitter block incident in Turkey shows a good example of this affordance. The tweets including #twitterisblockedinturkey trended around the globe (BBC 2014c). Table 3 summarizes the studies that demonstrate social media' wide interaction capabilities.

Table 3. Social Media Wide Interaction Capabilities

Studies	Illustrations of Capability
Di Gangi et al. (2010)	"UICs [User Innovation Communities] enable organizations to more fully engage with a distributed network of customers through "crowdsourcing"—the use of a very large, undefined group of people who collectively respond to an open call for input to accomplish a job typically allocated to an individual or group within an organization." (p. 213)
Ellison and boyd (2013)	"From a social perspective, it [social networking services] allowed people to easily see the relationships between others, to reconnect with old friends and acquaintances, and to travel through the network in a way that enhanced social interactions." (p. 6)
Gallaugher and Ransbotham (2010)	"[C]ustomer influence extends beyond geographically proximate contacts, amplifies other customers' actions, shapes product success, and molds markets." (p. 197)
Jarvenpaa and Tuunainen (2013)	"The recruitment campaign for the QHs (Quality Hunters) was open for a month and generated 5,300 applications from 90 countries." (p. 130)
Kiron et al. (2012)	"Organizations are using social software, social media and social networking to improve their relationship with customers in a number of ways: monitoring online communities …. fostering a wide range of customer engagements, including coupons, contests and other sponsored events." (p. 55)

Finally, social media also enables ***equal interaction*** (Agarwal et al. 2009; Gallaugher and Ransbotham 2010; Heath et al. 2013; Jarvenpaa and Tuunainen 2013; Yetgin et al. 2012). There is no hierarchy in using social media; not just media or people with status but also ordinary people and employees can use social media and

raise their voice (e.g., through Twitter or petition websites). Ordinary people are not simply forced to receive information either; they also create, modify, and distribute information. They influence others' (e.g., organizations) decision-making processes as well (Gallaugher and Ransbotham 2010; Heath et al. 2013). For example, anyone can successfully lead a petition on Change.org (e.g., Lohr 2012; Rattray 2012). The petition, "Mattel: Please make enough "Ella" chemotherapy Barbies for all kids with cancer", was launched on Change.org by an ordinary citizen, the mother of Melissa who was asking Mattel to make more Ella Barbies—a brand of dolls depicting the experience of having chemotherapy. The petition ended with a victory primarily due to additional equal interaction—other ordinary citizens' participation. Table 4 summarizes the studies that demonstrate social media' equal interaction capabilities.

Table 4. Social Media Equal Interaction Capabilities

Studies	**Illustrations of Capability**
Aggarwal et al. (2009)	"Realizing the potential of blogs, many companies encourage their employees to maintain blogs." (p. 1)
Gallaugher and Ransbotham (2010)	"Modern social media technologies offer communication paths that enable an individual to consume, produce, and redistribute content." (p. 198)
Heath et al. (2013)	"In social media, the organization is one among many peers—an equal." (p. 86)
Jarvenpaa and Tuunainen (2013)	"SMTs [Social Media Technologies] were no longer used just to convey structured and uniform messages, but also to generate informal, unstructured and peer-based communication." (p. 129)

As I will elaborate later when developing my hypotheses, it is these very interaction capabilities that make intuitional logics more available and accessible to organizations. These capabilities, however, only tapped when organizations utilize

social media. Surprisingly, even though there are a number of practical guidelines for organizational social media use (e.g., Di Gangi et al. 2010; Jarvenppa and Tuunainen 2013; Kane et al. 2009; Kaplan 2012; Kaplan and Haenlein 2010; Kietzmann et al. 2011; Leidner et al. 2010) (see Appendix C for a summary), our systematic knowledge of the antecedents of organizational social media use is rather limited. I therefore turn to a promising potential antecedent: organizational narratives about social media.

2.3 Organizational Narratives

Narratives have been associated or equated with discourse, accounts, stories, living stories, sagas, myths, antenarratives, composite narratives, provisional narratives, or structured narratives (Pentland 1999; Sonenshien 2010). Table 5 lists widely-used definitions of narratives.

Table 5. Canonical Definitions of Narrative

Studies	Narrative construct	Definitions
Bartel and Garud (2009)	Narratives (two types: structured and provision)	Structured narratives: "portray events in a structured manner and offer a particular point of view on a situation through the use of plot" (p. 110) Provision narratives: "capture fragments of activity without a clear plot" (p. 110).
Barry and Elmes (1997)	Narrative (or story)	"[T]hematic, sequenced accounts that convey meaning from implied author to implied reader" (p.431)
Boje (2001)	Antenarrative	"The fragmented, non-linear, incoherent, collective, unplotted, and pre-narrative speculation, a bet, a proper narrative can be constituted" (p. 1)

For example, structured narratives "portray events in a structured manner and offer a particular point of view on a situation through the use of plot (Bartel and Garud

2009: 110). This type of narratives are regarded as equivalent to narratives (e.g., Barry and Elmes 1997; Boje 2001; Chatman 1978), stories (e.g., Czarniawska 1997), and composite narratives (e.g., Dunford and Jones 2000). The other type, provision narratives "capture fragments of activity without a clear plot (Bartel and Garud 2009: 110)." These narratives are essentially the same as narratives (e.g., Lounsbury and Glynn 2001; Martens et al. 2007), discourse (e.g., Currie and Brown 2003), stories (e.g., Chatman 1987; Derrida 1979), accounts (e.g., Quinn and Worline 2008), antenarratives (e.g., Boje 2001; Vassra and Tienari 2011), and living stories (e.g., Boje 2001). As can be seen from these studies and as Cunliffe et al. (2004) note, narratives and the other similar concepts have been used interchangeably. Moreover, as with Sonenshien (2010; 479) "theses nuanced differences are not important" for my argument. Therefore, as with Sonenshien, I group all of these concepts under narrative and broadly conceptualize it as accounts or fragments of accounts.

"Narratives exist at both individual and *collective* levels" (Sonenshien 2010: 479, emphasis added). For example, in her study of organizations' narratives in reaction to controversial events in the cattle industry, Elsbach (1994) observed the denial narratives i.e., organizations' discourse distancing themselves from the events, and the acknowledgement narratives, i.e., organizations concede the event but disclaim responsibility. Such organizational narratives are also seen in newspapers, annual reports, news releases, magazines, and company websites and blogs. (Rutherford 2005; Schneider and Dunbar 1992). Narratives can be fictional or non-fictional (Polkinghorne 1988) and forward-looking or retrospective.

Narratives facilitate both sense-making and sense-giving (Fiss and Hirsch 2005; Gioia and Chittipeddi 1991). For example, by perusing white papers and business magazines, organizations can make sense of IT innovations (Swanson and Ramiller 1997). Through annual reports and news releases, organizations help stakeholders to make sense of the company's activities (i.e., managers' sense giving) (Maitlis and Lawrence 2007). Organizations also recursively engage in sensemaking while creating narratives (Sonenshien 2010). Thus, in line with Sonenshien (2010: 480) and other scholars (e.g., Gabriel 1995; Maitlis and Lawrence 2007), I view a narrative as a discursive construction that actors use as a tool to shape their own understanding (sensemaking), as a tool to influence others' understandings (sensegiving).

In this dissertation, I particularly focus on the "comprehensiveness" of narratives. Comprehensive narratives provide "substantial new understanding" of the people, objects, and events being illustrated (Barry and Crant 2000: 649) through more complete elements of narratives. (The "new understanding" to which Barry and Crant allude entails information that illuminates the audience to the meanings associated with the IT artifact; it does not imply a novel deployment of the IT artifact.) Depending on their comprehensiveness, organizational narratives may exert different effects on organizational outcomes such as legitimacy. For example, when organizations are involved in controversies as described in Elsbach (1994), well-developed denial narratives might be more effective than their less convincing counterparts, less-comprehensive narratives, for protecting organizational legitimacy. Yet, current narrative studies almost exclusively focus on the contents of narratives

(e.g., Elsbach 1994 Lounsbury and Glynn 2001; Soneshien 2010; Vaara and Tienari 2011). Thus, in this dissertation I attempt to demonstrate the usability of the narrative comprehensiveness construct in organizational research, particularly by explaining organizational social media use and its impact.

Pentland (1999) put forward five general characteristics of narratives: time sequence, focal actor, voice, evaluative frame, and notable context. Time sequence (i.e., when) refers to sequential patterns of events (e.g., beginning, middle, and end) described or implied in a narrative. Focal actors (i.e., who) refer to a narrative's main actors or objects. Voice refers to who is telling a narrative. Evaluative frame refers to cultural values and assumptions suggested in a narrative. Notable context (i.e., where) refers to the main context in which events are described. I conceptualize a comprehensive narrative, then, as containing these five characteristics of narratives. To be more specific, the comprehensiveness of organizational narratives about social media is determined by whether a narrative contains when, where, or by whom social media was, or can be, used or viewed. In the next section, I develop a model that demonstrates how this narrative comprehensiveness can eventually lead to crucial organization effectiveness: legitimacy and financial performance.

Chapter 3: Research Model and Hypotheses

Figure 1 depicts my research model. It shows that the comprehensiveness of an organization's narratives about social media leads to the organization's social media use, defined as *the extent to which an organization uses social media to interact with stakeholders.* The intensity is then proposed to influence the diversity of the organization's logics; this influence is, however, affected by the narrative comprehensiveness. Finally, the logic diversity is proposed to enhance the organization's legitimacy and financial performance—the ultimate organizational effectiveness that determines organizational survival (Meyer and Zucker 1989) and that encompasses both rationalistic and institutional perspectives (Wang 2010).

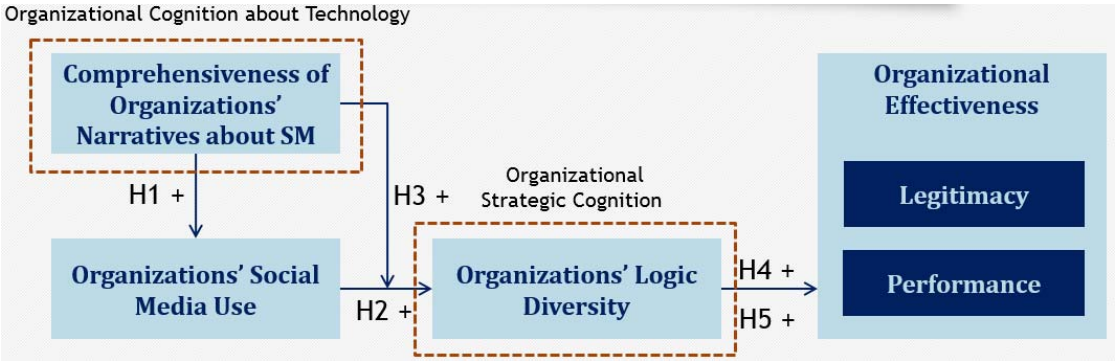

Figure 1. Research Model

3.1 Construct Definitions

I first define each of the five constructs. Table 6 provides the definitions. I then discuss the proposed relationships in detail in the following sections.

Table 6. Construct Definitions

Constructs	Definitions	Source Literature
Comprehensiveness of Organizations' Narratives about Social Media	The extent to which an organization' accounts regarding social media contain time sequence, focal actor, voice, evaluative frame, and notable context	Barry and Crant (2000); Pentland (1999)
Organizations' Social Media Use	The extent to which an organization uses social media to interact with stakeholders	Gallaugher and Ransbotham (2010)
Organizations' Logic Diversity	The extent to which an organization holds different belief systems, such as values, beliefs, assumptions	Van de Ven et al. (2007)
Legitimacy	Stakeholders' "[g]eneralized perception or assumption that the actions of an entity are desirable, proper, or appropriate, within some socially constructed system of norms, values, beliefs, and definitions"	Suchman (1995: 574)
Performance	Organizations' financial effectiveness	Dehning et al. (2007)

3.2 Social Media Narrative Comprehensiveness and Social Media Use

An organization's narratives are not just simple accounts. Those reflect collective sensemaking as well as sensegiving (Bartel and Garud 2008; Weick 1995). Most importantly, by creating narratives, organizations go through *recursive* sensemaking (Schneider and Dunbar 1992; Sonenshien 2010) where organizations once again deliberate on the purposes, features, and uses of the sensemaking target, such as a technology. Through this process, organizations clarify, modify, and fortify their thinking from their previous sensemaking (Starkey and Crane 2003). This process also tends to reveal new purposes, features, and connections as well as bringing up ignored or forgotten details (Weick and Roberts 1993). Thus, the process

of creating a narrative is likely to stimulate future use of a technology, provided that the narrative is positive. An organization's narratives tend to be positive about social media (Miranda et al. 2012) as positive narratives about fashionable technologies garner legitimacy for the firm (Swanson and Ramiller 1997; Wang 2010). Therefore, as organizational narratives about social media are typically positive, and creating comprehensive narratives includes more effortful and recursive sensemaking, an organization's comprehensive narratives about social media should be related with increased organizational social media use reflected in the increased number of organizations' social media posts.

Hypothesis 1: *As organizational narratives about social media become more comprehensive, organizational social media use will increase, reflected in the increased number of organizations' social media posts.*

3.3 Social Media Use and Logic Diversity

Social media enables an organization to interact widely, even beyond an organization's traditional institutional field. Social media is used by 1.5 billion people around the world (Chui et al. 2012), and these users represent a wide variety of demographics (Duggan and Brenner 2012; Nielsen 2012). For instance, different age groups interact through social media. Moreover, there are various social actors on social media, such as politicians (Wattal et al. 2010); activists (Tufekci and Wilson 2012); governments (Brabham 2012); businesses and customers (Kim and Miranda 2011); and doctors and patients (e.g., Hawn 2009). Surely, these diverse social actors typically hold different norms and values as well as disparate world views (Glynn et

al. 2000). For example, some may believe that business firms should operate only for shareholder welfare, but others may believe otherwise that those firms should also look after society (Battilana and Dorado 2010).

Organizations actively using social media, then, are likely to encounter a wide range of ideas and perspectives held by their diverse social actors through real-time, equal interactions. To illustrate, through social media, customer services departments listen to a variety of suggestions and complaints (e.g., Gallaugher and Ransbotham 2010). Marketing departments carry out events in which a variety of groups of people can participate (e.g., Hoffman and Foder 2010; Plangger 2012) and gather participants' sentiments. PR departments observe various stakeholders' activities and opinions about their brands and products as well as those of the competitors (e.g., Chui et al. 2012; Heath et al. 2013). HR departments reach more diverse groups of applicants and gain opinions about their company—e.g., Jobvite and LinkedIn (e.g., Javenppa and Tuunainen 2013; Nilsson 2012). R&D and marketing departments solicit ideas from a wide range of stakeholders (e.g., Doan et al. 2011; Alexy et al. 2012). Finally, manufacturing departments streamline procurement processes with diverse suppliers (e.g., Andriole 2010).

Having learned diverse ideas and perspectives that stakeholders hold, organizations cannot simply ignore those views, especially when those views recur (Kraatz and Block 2008). Organizations need to gain or maintain legitimacy coming from those stakeholders (Dowling and Pfeffer 1975; Meyer and Rowan 1977; Suchman 1995). Moreover, stakeholder perspectives might actually help organizations to solve current organizational issues. Therefore, frequently

encountering stakeholders' diverse views, organizations are likely to incorporate those perspectives in their operational and strategic thinking, reflected in their practices, products, and services (Benner 2007; Glynn and Lounsbury 2005; Gonzalez 2010; Murry 2010; Tobert and Zucker 1983). As organizations learn diverse perspectives through social media, then an organization's social media use should be positively related to its logic diversity.

Hypothesis 2: *As organizational narratives about social media become more comprehensive, organizational social media use will become higher.*

Effects of social media use on organizations' logic diversity, however, are likely to be influenced by the comprehensiveness of organizational narratives. Through comprehensive narratives, organizations signal their current and future uses of social media along with the rationale for doing so, often soliciting stakeholder participation in their social media events. Organizations also signal their seriousness about and commitment to social media initiatives through comprehensive narratives. Stakeholders are, then, likely to feel more encouraged to offer inputs to those organizations because stakeholders' self-efficacy on being able to influence organizations increases with stakeholders' perceptions of organizations' commitment to using social media for outreach (Merlo et al. 2013; Gallup 2014). As a consequence, those organizations are likely to learn and obtain more diverse perspectives through their social media use.

In addition, creating comprehensive narratives indicate keen organizational interest in social media, especially when creating those takes time and effort and when issuing such narratives is not inexpensive. Such keen interest suggests that social media is also viewed positively and promoted actively inside the organization. In such an environment, employees and departments are also encouraged to share and talk about the perspectives learned from social media (Aoun and Vatanasakdakul 2012). For example, customer service departments would pass newly gained perspectives to top management teams or appropriate departments—e.g., R&D and Sales (Nilsson 2012). These newly gained views actively circulated in an organization are more likely to be added to organizational logics (Gonzalez 2010; Thornton et al. 2012).

Hypothesis 3: *Effects of organizational social media use on organizational logic diversity will be positively influenced by the comprehensiveness of organizational narratives about social media.*

3.4 Logic Diversity and Organizational Effectiveness

Legitimacy is defined as a *"generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate, within some socially constructed system of norms, values, beliefs, and definitions"* (Suchman 1995: 574). From the traditional view, an organization is simply either legitimate or illegitimate (Deephouse and Suchman 2008). However, an organization also tends to pursue higher legitimacy even after achieving the state of legitimacy (Staw and Epstein 2000).

Organizational logics reflect institutional logics, which consist of stakeholders' perspectives and thus their expectations. To stakeholders, then, those organizations showing diverse logics may at least appear to attempt to meet their diverse expectations (Kraatz and Block 2008). Even such ceremonial actions are useful to gain organizational legitimacy (Meyer and Rowan 1977; Rowan 1982). For example, Wang (2010) found that organizations increase their legitimacy by appearing to purchase or simply being associated with, in newspapers, the technologies that stakeholders had expected the organizations to adopt.

Moreover, organizations holding diverse logics may actually behave in line with their logics, which can actually meet diverse stakeholder demands (Kraatz and Block 2008). Such actual actions also improve organizational legitimacy (Suchman 1995). For example, Westphal et al. (1997) found that hospitals that implemented TQM gained legitimacy from their accreditation organization because the stakeholder had expected the hospitals to implement TQM. All in all, organizations holding diverse logics can actually, or at least appear to satisfy, various demands coming from their different stakeholders. Then, these organizations should enjoy higher legitimacy.

Hypothesis 4: *Logic diversity will be positively related with organizational legitimacy.*

Despite the fact that diverse logics can lead to negative outcomes such as conflict among organizational members and ambivalent firm strategies (Allison, 1971; Cyert and March 1963; Pratt and Dutton 2003), "group and organization theorists concur on the benefits of diversity" (Van de Ven et al. 2007: 336), be it demographic

diversity or cognitive diversity. Organizational logic diversity, a type of cognitive diversity, offers different perspectives and thus brings about diverse focuses, skills, information, and knowledge (Huber 1991; Van de Ven et al. 2007; Williams & O'Reilly 1998). As a consequence, logic diversity facilitates problem-solving (Cox and Blake 1991), improves productivity (Bantel and Jackson 1989; Van de Ven et al. 2007), stimulates innovation (Fiol 1994; Miller and Friesen 1983), and increases adaptability to different external demands (Fiol and Huff 1992; Harrison and Klein 2007; Pache and Santos 2010). Then, logic diversity should actually increase organizations' financial performance.

In fact, logic diversity particularly benefits organizations in turbulent environments, as Hogg and Terry (2000: 150) argue, *"diversity provides significant benefits to an organization in a complex and changing business and social environment."* For example, strategic ambivalence can actually be even more advantageous in such situations (Stark 1996); embracing disparate logics enhances the likelihood of organizations' fit with their rapidly changing environments (Stark 2009). Therefore in turbulent environments, to which the energy sector belongs (Standard and Poors 2003), diverse logics should engender a net positive impact on organizations' financial performance.

The energy sector faces constant changes due to regulatory changes (e.g., tax subsidiary, carbon emission laws), public demand on environmental issues, technological changes (e.g., horizontal drilling, renewable energies), and foreign market policy changes and political instability (e.g., Middle East, South America, China). This environmental turbulence is well reflected in "The energy industry faces

a dynamic and rapidly changing environment due to new oil and gas production from shale formations coming on line, and increasingly onerous emission regulations in many countries" (Standard and Poors 2013) and in "The global oil and gas industry, shaped by geo-political forces, energy policy, the growing impact of production from shale formations, as well as mergers and acquisitions, is a dynamic and ever changing sector" (Standard and Poors 2013).

Hypothesis 5*: Logic diversity will be positively related with organizational financial performance.*

Table 7 provides a summary of the hypotheses.

Table 7. Hypotheses

Hypothesis 1	As organizational narratives about social media become more comprehensive, organizational social media use will increase, reflected in the increased number of organizations' social media posts.
Hypothesis 2	As organizational narratives about social media become more comprehensive, organizational social media use will become higher.
Hypothesis 3	Effects of organizational social media use on organizational logic diversity will be positively influenced by the comprehensiveness of organizational narratives about social media.
Hypothesis 4	Logic diversity will be positively related with organizational legitimacy.
Hypothesis 5	Logic diversity will be positively related with organizational financial performance.

Chapter 4: Methods

In this chapter, I describe how I developed my study sample. I then describe my data sources and the procedures I used to develop the key metrics related to each of my hypotheses. I outline the control variables used in testing each hypothesis along with my rationale for including them in the analyses.

4.1 Sample

I developed a sample of firms that appeared on the Fortune 500 and the Global Fortune 500 from 2003 to 2012. Being publicly traded and experiencing a high level of stakeholder scrutiny, these firms are likely to reveal their logics of action in their shareholder communications. IT initiatives (e.g., adoption, implementation, and use) require substantial resource deployments, including financial deployment (Brynjolfsson and Hitt 1996); Fortune 500 firms have sufficiently abundant resources to pursue social media initiatives (i.e., social media use). Since these large firms have complex corporate structure and there is no clear methodology to identify their subsidiaries (Barnes et al. 2012), I focused only on the listed focal firms. Of those firms, I particularly focused on the energy firms. Due to its geopolitical significance, the energy sector is under considerable pressure from diverse stakeholders holding different logics (McColgan 2011)—e.g., NGOs, government agencies, foreign markets, customers, and the general public. Consequently, the diverse logics are likely to affect the energy organizations. Then, the energy sector provides a good empirical setting where companies with diverse logics can be observed. There is also

considerable within-sector variance in social media use and perspective (McKinsey 2012). For example, Chevron has been a proactive social media user, pioneering an online energy forum even in 2005 and being very active on major social media services (LinkedIn Report 2011; Barnes et al. 2012). In contrast, Sempra Energy engages with social media superficially, treating them as a unidirectional information conveyance tool rather than an interactive, multidirectional tool (Benitez 2011). Finally, focusing on a single sector controls for cross-sector differences in economic, social, and regulatory environments (Zhu and Kraemer 2005). There are 96 energy firms that appeared at least once on the Fortune 500 in the past decade. For the Global 500 firms, I selected only those that actively operates in the United States such as British Petroleum, Schlumberger and Royal Dutch Shell. In total, my sample originally consisted of 99 energy firms. Appendix D lists these firms. However, primarily through M&As, 15 firms went out of business before and around 2009, which is the first year of my sample. In addition, British Petroleum was removed to prevent possible noise in the data due to the BP oil spill in 2010[1] (Appendix E lists the 16 firms removed from the sample). As a result, the final sample consist of 83 firms. These firms span across several Fortune industry categories such as utility, oil and gas exploration, refining, oil field services, and pipelines.

[1] I also conducted analyses including BP data. Appendix P lists the results, which are largely consistent with the results reported in Chapter 6.

4.2 Data Sources and Metrics for the Main Constructs

I constructed a panel dataset containing five years of data from 2009 through 2013 for each firm in the sample. Organizations' narratives about social media first came out in 2009. Table 8 shows the periods for which data was analyzed. Due to the lag structure that I implemented in the data analysis, different periods were used for some variables.

Table 8 Data Analysis Periods

Data	Periods
Press releases (for narrative comprehensiveness)	2009 – 2012
Tweets, FB posts, Blogs (for social media use)	2009 – 2012
CEO letters (for logic diversity)	2009 – 2012
Reputation scores (for legitimacy)	2010 – 2013
KLD scores (for legitimacy)	2010 – 2013
ROA (for financial performance)	2010 – 2013
ROS (for financial performance)	2010 – 2013

Figure 2 depicts the research model with operationalized constructs. Table 9 provides a summary of operationalizations of the constructs. I then discuss them in detail in the following sections.

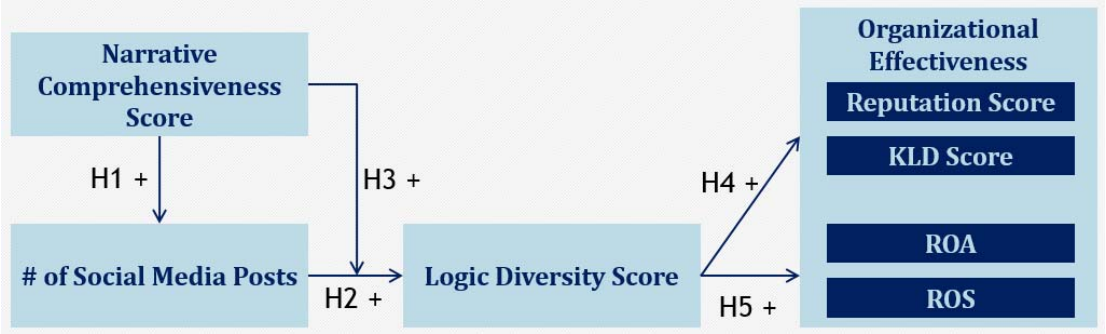

Figure 2. Research Model with Operationalizations

Table 9. Construct Operationalizations

Constructs	Operationalizations	Source Literature
Comprehensiveness of Organizations' Narratives about Social Media	Count of the number of the five possible narrative elements in each press release about social media—namely, time sequence, focal actor, voice, evaluative frame, and notable context	Pentland (1999)
Organizations' Social Media Use	Count of organizations' social media posts on Facebook, Twitter, and blogs	Miller and Tucker (2013)
Organizations' Logic Diversity	Blau's Diversity Index based on the six logics of action—namely, market, industrial, inspiration, renown, domestic, and civic logics	Boltanski and Thévenot (2006)
Legitimacy	Fortune's Most Admired Company score (i.e., Fortune reputation score)	King (2008)
	Kinder, Lydenberg, and Domini (KLD) social performance index	Sharfman (1996)
Performance	Return on Assets (ROA)	Dehning et al. 2007
	Return on Sales (ROS)	Dehning et al. 2007

4.2.1 Narrative Comprehensiveness

I assessed comprehensiveness of organizational narratives by searching firm's press releases for social media narratives. I exclude annual reports from this metric, to maintain source separation from my operationalization of logic diversity and thus alleviate concerns of common method variance. Since social media use is typically more tactical than strategic, it is more likely to be discussed in press releases than in annual reports, in which more strategic initiatives are discussed. In fact, Miranda et al. (2015) revealed that only 8% of firms' social media initiatives were discussed in annual reports, with 89% discussed in firms' press releases and the remainder discussed in proxy letters and other corporate statements such as sustainability reports. I focused on press releases because they are available across multiple years and are readily and widely available.

To identify news releases that contain narratives about social media, I employed previously-used search terms (Culnan et al. 2010; Miranda et al. 2015) to perform news release searches on LexisNexis. The search string from Miranda et al. (2015) is provided in Appendix F. In total, 621 social media-related press releases were collected. Narrative comprehensiveness was operationalized based on Pentland's (1999) five narrative characteristics present in each press release about social media. The five characteristics are time sequence, focal actor, voice, evaluative frame, and notable context. Each of the press releases received a score depending on the number of those characteristics the press release had. For example, when a

narrative contained all of the five characteristics (i.e., time sequence, focal actor, voice, evaluative frame, and notable context), the press release scored a 5.

Figure 3, along with Appendix G, shows examples of both less-comprehensive and comprehensive narratives. The first narrative is less-comprehensive because it contains little information regarding social media except who is telling the story, the company Ameren. This narrative received one on the narrative comprehensiveness scale. On the other hand, the second is more comprehensive. This narrative contains the focal actor as well as an evaluative frame (or moral values), which is "promoting social welfare is good". This narrative also contains a time sequence.

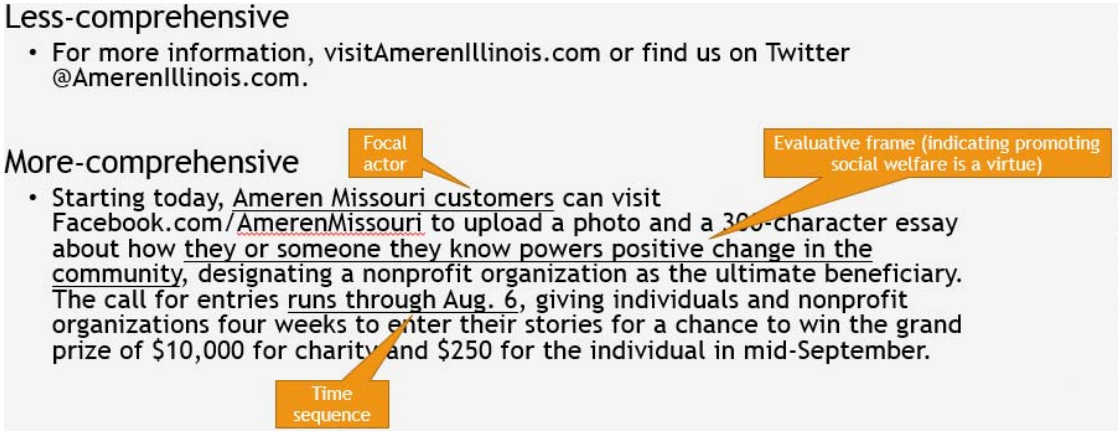

Figure 3 Examples of Comprehensiveness of Narratives

A researcher and I coded 50 random press releases initially. After we reconciled our differences and revised the coding scheme, I coded the rest of the press releases. Yearly scores for each company were calculated for the narrative comprehensiveness. Rather than simply averaging the comprehensive scores of all narratives for each year, I first averaged the scores monthly, summed those monthly

scores by year, and divided those scores by 12 (i.e., # of months a year) to produce yearly scores. The formula is specified as

$$\frac{\sum C_i}{12}$$, where

C is the monthly average, and *i* is the particular month.

This method accounts for the different distributions of the press releases across a year for different firms. For example, let us suppose that Firm A has a press release in January with a comprehensiveness score five. Firm B has 12 releases across the months of January through December, and each has a score five. The traditional yearly average calculation would produce a comprehensiveness score five for both Firm A and Firm B. However, it is highly likely that Firm B has a more comprehensive understanding of social media—than Firm A does—through producing 11 more comprehensive narratives. My yearly average calculation accounts for this and produces a 0.42 for Firm A (i.e., 5/12) and a five for Firm B (i.e., 5*12/12). By using this method, yearly narrative comprehensiveness scores created for each firm for the years 2009 through 2012.

4.2.2 Organizations' Social Media Use

Following Barnes et al. (2012), Culnan et al. (2010) and Miller and Tucker (2013), I assessed organizational use of social media by counting the number of firms' social media posts. Among many social media services (Appendix H), I focused on the three popular social media services: Facebook, Twitter, and blogs. These are the

major social media services that organizations use to communicate with their stakeholders (Barnes et al. 2012, Culnan et al. 2010; Jarvenpaa and Tuunainen 2013). Moreover, those services are most visited by external stakeholders (Nielsen 2012). As different social media services target different crowds (Chui et al. 2012; Nielsen 2012), those services are all needed to be taken into consideration.

I manually harvested Facebook posts and then used an Excel macro to organize the data. Mechanical Turk also was used to harvest Facebook posts. That is, I outsourced some portion of the Facebook post gathering. Facebook data were collected from the Highlight view. Since it is possible that Facebook displays different posts across regions and time, I tested whether the posts displayed are consistent across time and region. I first gathered Facebook posts. Then, we send them to a Mechanical Turk worker in India to check whether he would see the same posts. 96.5% of the posts were the same. Across the years of 2009 through 2012, 43 firms used Facebook at least for a year. More specifically, 8 firms used it for a year, 13 firms used it for two years, 7 firms for three years, and 15 firms for four years. I gathered a total of 8,602 Facebook posts published by those firms.

I collected tweets by accessing them through the Twitter API in R. Appendix I shows the R code used. Across the years of 2009 through 2012, 40 firms used Twitter at least for a year. More specifically, 8 firms used it for a year, 10 firms used it for two years, 0 firms used it for three years, and 22 firms used it for four years. A total of 38,006 tweets published by those firms were gathered.

Since blog posts were not as numerous as Facebook posts and tweets, I manually counted the number of blog posts. Across the years of 2009 through 2012, 6 firms used blogs at least for a year. More specifically, 2 firms used it for a year, 3 firms used it for two years, 1 firm used it for three years, and 0 firms used it for four years. I gathered a total of 1,868 blog posts published by these firms.

For each firm in the dataset, I created the social media intensity metric for each year. This metric was the sum of the number of social media posts by a firm for a year. More specifically, across the years of 2009 through 2012, 6 firms used social media for a year, 7 firms used social media for two years, 9 firms used social media for three years, and 28 firms used social media for four years. In total, 50 firms used social media at least for a year. Table 10 summarizes this social media dataset.

Table 10. Count of Firms that Used Social Media

	# of firms that used the following social media			**# of firms that used any of the 3 social media**
	Facebook	**Twitter**	**Blogs**	
During 1 year period	8	8	2	6
During 2 year period	13	10	3	7
During 3 year period	7	0	1	9
During 4 year period	15	22	0	28
Total	43	40	6	50

4.2.3 Organizations' Logic Diversity: Data Source, Coding Framework, and Text Mining Approach

The logic diversity metric was developed by coding the CEOs' letters to shareholders in firm annual reports (e.g., Eggers and Kaplan 2009). Looking into texts for organizational "logics" are appropriate because "through interpreting

organizational texts, themes can emerge that go beyond surface meanings" to reveal deep, perhaps unconscious, mental structure (Schneider and Dunbar 1992: 539). Moreover, CEO letters represent organizational logics as "[t]heir [CEO letters'] purpose is to review the performance and *actions of the firm* over the past year and to announce and explain *planned actions*" (Barr 1998: 648, emphasis added). Furthermore, "they [CEO letters] tell many stories that can be reordered to extract a set of recurring structures that reflect underlying *values*" (Fiol 1989: 279).

CEO letters were coded for each of Boltanski and Thévenot's (2006) logics of action, which are "roughly equivalent to institutional logics" (Thornton et al. 2012: 101). Drawing upon their respective backgrounds in economics and sociology, their field research, and readings of seminal texts, Boltanski and Thévenot identified six comprehensive high-level logics of action, or prototypical worlds, within which a specific logic dominated (DiMaggio 1997; Thornton et al. 2012). The six prototypical worlds—and the associated logics—are *industrial, market, domestic, inspiration, civic, and renown.*

The *industrial* world values "the efficiency of beings, their performance, their productivity, and their capacity to ensure normal operations and to respond usefully to needs" (Boltanski and Thévenot 2006: 204). The *market* world values "buyers and sellers" being "opportunistic in spotting and seizing the opportunities of the market, unhampered by any personal link", and actors are deemed to be "worthy when they are comprehensive" (Boltanski and Thévenot 1999: 372). The *domestic* world is concerned with personal relationships and values actors "through reference to generation, tradition, and hierarchy" (Boltanski and Thévenot 2006: 165). The world

of *inspiration* is inhabited by artists and other actors aspiring to be geniuses, and whose governing principle therefore is creativity. The *civic* world is inhabited by "citizens" who subjugate their "selfish lusts" and "direct themselves exclusively towards the common good" (Boltanski and Thévenot 1999: 371). The world of *renown* focuses on fame, visibility, or public esteem. Table 11 lists the six logics, their defining characteristics, and example codes. Figure 4 shows examples of codes in an actual CEO letter.

I used the coding scheme that Miranda et al. (2015) developed for identifying firms' use of these six logics of actions. The scheme is provided in Appendix J. To code the CEO letters based on the logics of action framework, I conducted text mining, particularly text classification, by using a Support Vector Machine (SVM) algorithm (e.g., Abbasi et al. 2010). SVM was chosen because it is especially excellent at binary classification and performs well in general (Abbasi et al. 2010; Chapelle et al. 2002 ;Wu et al. 2008). The thought-unit, or unit of analysis, was the sentence. The data for text mining consisted of 4,877 sentences from 62 firms in 2009, 5,019 from 59 firms in 2010, 4,642 from 56 firms in 2011, and 4,298 from 52 firms in 2012. During that time, some firms did not issue CEO letters to shareholders. Appendix K lists the sample firms and shows the years firm did not issue CEO letters to shareholders. Figure 5 summarizes the steps of my text classification method.

Figure 4. Sample CEO Letter with Coding Examples

Table 11 Logics and their Characteristics

Logics	Defining characteristics	Example codes
Market	making money	"Our strong financial performance was reflected in net income of $26.2 billion on sales and other operating revenues of $231 billion." "Over the last five years, we distributed $145 billion to our shareholders, and dividends per share have increased by 59 percent, including a 21-percent per share increase in the second quarter of 2012."
Industrial	efficiency, productivity	"Drilling activity steadily increased throughout the year, with the number of operated rigs in our Central Region increasing from seven to 25." "Today, we are producing from more than 150 net wells in the Marcellus on our 1.6 million net acres and estimate we could drill up to 20,000 additional net wells in the years ahead."
Inspiration	innovation, creativity	"An integral part of our success in breakthrough innovations is due to our ongoing investment in research and development." "Underpinning all of these opportunities are high-impact technologies that we have developed and continue to support at a robust level, investing nearly $5 billion in technology over the last five years."
Renown	fame, recognition	"In 2012, we ranked No.2 in earnings per barrel relative to our peer group." "Also in 2011, we were pleased to be included on Barron's list of the World's Most Respected Companies and Corporate Responsibility Magazine's 100 Best Corporate Citizens list."
Domestic	family, tradition	"We kicked off an employee wellness initiative that has already improved the lives of our employees and the communities in which we live and operate." "In 2010, we focused on new workplace safety programs, cut costs, and relentlessly looked for ways to be more efficient, more competitive and more profitable."
Civic	social welfare	"We apply the same type of commitment to our social performance, contributing to the creation of stronger communities wherever we operate." "We are proud supporters of the YMCA and its 157-year tradition of offering health and wellness and educational programs for young people and adults."

I first randomly selected 1550 sentences from the CEO letters from 2009 to 2012. Initially, another researcher and I coded 652 sentences. After I revised my coding scheme based on the reconciliation of our differences, I coded the rest on my own. Some sentences were assigned with more than one logics because there were words or word combinations that indicated multiple logics. To illustrate, here is a sentence from the training set: "In support of operational excellence, our dedicated workforce maintains a fundamental commitment to both physical and cyber safety—ensuring attention to safety in all aspects of our work and protecting our company against data threats." Here, discussing operational excellence indicates the industrial logic, and emphasizing workplace safety for employees indicates the domestic logic.

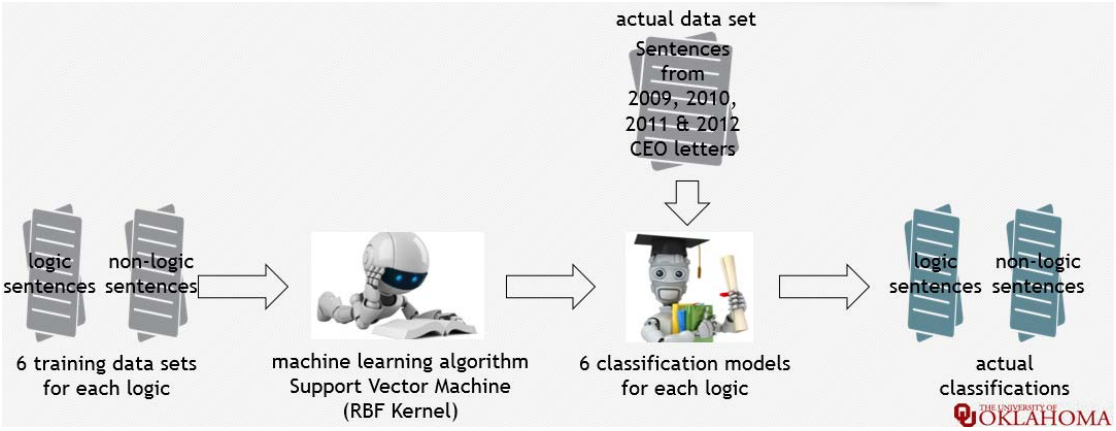

Figure 5. Text Mining (Text Classification) Procedure

Since multiple logics can appear in a sentence, I then created six binary training sets for each of the logics. So each of the sentences in a training set was classified as either logic or non-logic. For example, if a sentence contains an element of the market logic, it was treated as a logic sentence; if a sentence contains an

elements of any of the remaining logics, it was treated as a non-logic sentence. I opted not to apply resampling techniques (that is, I used the natural distribution of the occurrence of the two classes in the sample) because the predictive models should also learn about the distribution of the classes (Akbani et al. 2004). In addition, as noted later, the performance of my predictive models are high enough not to require any substantial resampling techniques.

I preprocessed the data. I conducted TF-IDF transformations, removed stop words (e.g., is and are), changed capital letters to lower cases, and stemmed the words by using the Lovins stemmer. I then selected only those attributes (i.e., words) that contribute to classification by using an information gain feature selection. Table 12 summarize the data preprocess.

Table 12. Data Preprocessing

	Market	**Industrial**	**Inspiration**	**Renown**	**Domestic**	**Civic**
Logic instances	854	495	165	311	281	256
Non-logic instances	696	1055	1385	1239	1269	1294
Selected attributes	225	218	327	139	179	169

Table 13 lists examples of attributes, or features, selected for each of the predictive models.

Table 13. Examples of Attributes

Logics	Attributes (Lovins Stemmed)
Market	marke growth, pric, return, econom, shareholder, dividen cost, capit, stateg, earn, revenu
Industrial	produc, oper, effici, dril, reli, process, capabil, facil, improv, updrad, refin, perform,
Inspiration	technolog, unconvent, innov, discover, transform, explor, reinv, research, adv, develop, lead, introduc
Renown	success, record, largest, lead, outstand, highlight, leader, award, leadership, achief, rank, honor
Domestic	employee, customer, saf, dedic, cultur, commun, talent, satisf, commitm, injur, peopl,
Civic	environm, commun, clean, emis, carbon, trust, footprint, protect, stewardship, clim, educ, green, sustain

After the data prepossessing was complete, the machine-learning SVM algorithm learned my coding patterns and created six classification models for each of the logics. I used the Radial Basis Function (RBF) kernel. Table 14 summarizes the six predictive models (one for each of the six logics). I also tested other text classification algorithms, such as Naïve Bayes, J48, and logistic regression, based on the No Free Lunch (NFL) theorem. This theorem states that no machine learning algorithm is absolutely and always better; it depends on where it is applied and how. I also tested other kernels of the SVM, such as the linear and the Polynomial kernels. Overall, the SVM predictive models performed the best, especially with the RBF kernel.

Table 14. Predictive Model Specifications and Evaluations

	Market	Industrial	Inspiration	Renown	Domestic	Civic
c	1	0.9	1	0.7	3.1	1.5
gamma	0.02	0.01	0.01	0.011	0.011	0.01
Accuracy*	91.42%	90.65%	96.96%	92.13%	94.45%	95.61%
AUC*	0.962	0.946	0.969	0.93	0.962	0.949

**10 fold cross-validation*

After the six predictive models (i.e., text classification models) were developed, I used them to classify the actual data set, in this case, sentences from 2009, 2010, 2011, and 2012 CEO letters, for the presence/absence of each of the six logics. Each of the six models thus classified each sentence in the data set as manifesting the focal logic or not manifesting that logic.

After the text classification was complete, I counted the number of logic sentences in each of the CEO letters—that is, for each of the companies for each year. I then calculated diversity scores by using Blau's index (Blau 1977). Blaus' index not only takes into account the number of logic categories in each CEO letter, but it also takes into account the proportion of each of the logics. It is most widely used diversity index for categorical variables (Harrison and Klein 2007), and logic diversity is a type of variety (Harrison and Klein 2007). Blau's (1977) index is represented as:

$1-\sum p_i^2$, where

P is the proportion of a logic category (e.g., market) represented in the CEO letter;

i is the number of logic categories—here, six.

The original index ranges from 0, indicating no diversity, to a theoretical maximum of 1. I multiplied these scores by 100 for interpretation ease. Appendix E shows example usage of diversity indices in prior studies.

4.2.4 Organizational Effectiveness: Legitimacy

For legitimacy, I used two variables. In line with Staw and Epstein (2000: 526), I view reputation as "a major vehicle for gaining organizational legitimacy", hence representative of legitimacy. Consequently, legitimacy was measured as firms' annual reputation scores available on the Fortune list (Staw and Epstein 2000; Wang 2010). Consistent with earlier work using this index, I transformed the raw scores to ordinal scores ranging from 0 to 4 (King 2008). The ordinal value 0 indicates the firm did not make the list for the particular year. The ordinal value 1 indicates the raw score is below 5.83 (1^{st} quartile), 2 indicates it is below 6.46 (2^{nd} quartile), 3 indicates it is below 7.05 (3^{rd} quartile), and 4 indicates 7.05 or higher.

The criteria used in the development of Fortune reputation scores include firm innovation, human resource management, use of corporate assets, social responsibility, quality of management, financial soundness, long-term investment, quality of products and services, and global competitiveness. As most of these criteria signal the financial side of legitimacy, I complemented Fortune reputation scores with the Kinder, Lydenberg, and Domini (KLD) social performance index (e.g., Sharfman 1996). KLD scores evaluate firms against their peers based on the following criteria: Environment, Community, Diversity, Employee Relations, Human Rights, Products, and Corporate Governance & Ethics. A firm has an overall strength score (i.e., positive points) and an overall concern score (i.e., negative points) on each of these criteria. For each firm, I subtracted the number of concerns from the number of strengths.

4.2.5 Organizational Effectiveness: Financial Performance

Following prior research on the business value of IT, organizational financial performance was measured as Return on Assets (ROA) and Return on Sales (ROS) (e.g., Dehning et al. 2007; Wang 2010). Both measures assess firms' operating performance, and as I noted earlier developing Hypothesis 5, organizations' logic diversity is likely to affect firms' operating activities through innovation and business practice changes. As ROA and ROS are widely used not only in the IS literature but also in the management literature (e.g., Robins and Wisersema 1995), using ROA and ROS also allows us to compare the impact of logic diversity with that of other variables on firm performance.

4.3 Control Variables

For each model in the upcoming regression analyses, I included a set of control variables. Table 15 summarizes these controls for each model. I now discuss my rationale for including these variables and explain the metrics associated with each control variable.

Table 15. Controls and Operationalizations

DVs	Controls	Operationalizations
Social media use (for H1)	Resource availability	Current ratios (Gaba and Meyer 2008)
	CEO attention to social media	# of social media terms mentioned in CEO's letters to shareholders
	Major events	# of firm names mentioned in major US news papers
	Industry	2-digit NASIC codes
	Firm innovativeness	# of patent applications
Logic diversity (for H2 and H3)	Operational scope	# of business areas mentioned in 10K forms
	International business scope	# of foreign countries the firm operates in
	Political orientation	Composition of congress members of states where the firms' headquarters are.
Legitimacy (for H4)	Firm size	# of employees
	Firm age	Current year – founding year
	Past performance	average ROA for the firm for the past 3 years
Financial performance (for H5)	Risk level	Sstandard deviation of the firm's ROA for the previous 5 years
	Industry profitability	Average annual GDP growth

4.3.1 Modeling Social Media Use

In modeling firms' social media use, I controlled for five factors—resource availability, firm innovativeness, CEO attention to social media, occurrence of major events, and firm industry.

Firms with available resources are more likely to pursue and experiment with new technologies (Levinthal and March, 1981), such as social media. For resource availability or slack, I used firms' current ratios (Gaba and Meyer 2008).

Likewise, innovative firms are more likely to experiment with new technologies. Firm innovativeness was measured as the number of patent applications

(Sorensen and Stuart 2000). I gathered patent data from the United States Patent and Trademark Office (USPTO) database.

Since CEO attention to IT influences and reflects firms' attitudes toward IT, following prior research in which CEO's attention to fiber-optics technology was assessed by counting the number of times CEOs mentioned the technology (Eggers and Kaplan 2009), I searched CEO letters to see how often social media related terms were mentioned. I counted the following terms related to social media, which were based on Miranda et al. (2015): social media, social network, social networking, facebook, twitter, linkedin, chatter, salesforce, tumblr, blog, wiki, wikipedia, vimeo, youtube, foursquare, friendfeed, google+, pinterest, orkut, instagram, flickr, ucc, yammer, web 2.0, social bookmark, virtual world, online community, online forum, and user created.

Major events tend to draw stakeholders' attention and thus are likely to be discussed on social media. Major events were assessed through the number of times the firm is mentioned in major US newspapers (Kim and Miranda 2013): The Wall Street Journal, The New York Times, The Washington Post, and USA Today. Such discussions among stakeholders then are likely to draw firms' attention, and this attention is further likely to lead to the firm's increased involvement in social media.

Finally, the energy sector represents disparate industries and firms in different industries have been found to manifest different proclivities toward social media (e.g., Culnan et al. 2010; Miranda et al. 2012). I therefore controlled for industry. Using the 2-digit NASIC codes yielded three dummies for four industries—21, 22, 32, and 48.

4.3.2 Modeling Logic Diversity

In modeling firms' logic diversity, I control for three factors—firms' operational scope, firms' international business scope, and firms' political environment.

Firms' operational scope, which can contribute to firms' exposure to diverse business areas—hence, diverse perspectives—was assessed as the number of firms' operations in different business areas (Tallman and Li 1996). I counted the number of operating areas listed under the Business section in 10-K forms. For example, Entergy states in its 10K for 2012: "Entergy operates primarily through two business segments: Utility and Entergy Wholesale Commodities." In this particular case, Entergy scored a two.

Similarly, firms' international business scope was measured as the number of foreign countries the firm operates in. I gained this information from the 10K forms as well as from LexisNexis® Corporate Affiliations™, which lists firms' subsidiaries and operating regions.

Firms' political environment may be reflected the political orientation of the state in which the firm's headquarters is. I used a continuous metric based on the composition of the U.S. Congress from the 107th all the way through 112th. I averaged the percentage of Republican Congresspersons in each Congress term.

4.3.3 Modeling Firm Legitimacy

In modeling firm legitimacy, I control for three factors—firm age, firm size, and past performance. Older firms enjoy legitimacy advantages (Suchman 1995).

Firm age was operationalized as the difference between the time t and the founding year (Belenzon and Berkovitz 2010).

Then, following earlier research on the organizational impacts of IT, I control also for firm size (Hitt et al. 1997; Zhu and Kraemer 2005). This was operationalized in terms of the number of employees that appeared in the 10K forms.

Finally, prior research has noted that "in many industries, legitimacy many simply be bestowed on the highest-performing firms" (Staw and Epstein 2000: 525). Past performance was measured as the average ROA for the firm for the past three years.

4.3.4 Modeling Firm Financial Performance

In modeling firm financial performance, I controlled for two factors—firm risk level and industry profitability.

Firm risk level was measured as the standard deviation of the firm's ROA for the previous five years (Tanriverdi 2005); "studying returns without controlling for risks is potentially an erroneous approach due to the tradeoffs between risks and returns" (Tanriverdi 2005: 321).

Industry profitability was assessed through the average annual GDP growth of each of the four industries; the Survey of Current Business contains the GDP information (Tallman and Li 1996).

Chapter 5: Data Analysis Approach and Preliminary Findings

5.1 Data Structure and Correlations

My data was structured as a panel data. It had 83 cross-sections (i.e., 83 firms) and four yearly data observations for each of those cross-sections. I therefore conducted panel regression analysis (e.g., Mithas et al. 2012). More specifically, I ran five sets of panel regression analyses to test each of the five hypotheses. Panel regression was selected over Structural Equation Modeling (e.g., PLS) because all the variables have one item (i.e., manifest variables). Moreover, SEMs do not effectively handle time-series data and correlated error terms.

Ideally, the total observations should have been 332 for each of the regression models. However, due to the time lags of independent and control variables together with missing data (hence, list-wise deletion), the observations used in data analysis varied.

Stata 12 was used; Appendix M provides the Stata code. All the independent and control variables—except time-invariant controls, such as industry—were lagged at least by a year for empirical and theoretical reasons. Empirically, the lagged independent variables reduce the reverse causality concerns (Butler and Wang 2012). Theoretical reasons relating to each dependent variable are provided below.

Regarding the relationship between narrative comprehensiveness and organizations' social media use (H1), it tends to take time that the social media uses and purposes newly discovered and recalled through creating comprehensive

narratives are actually implemented. Consequently, all the independent and control variables except the time unvarying ones were lagged by one year. Table 16 shows the bivariate correlations for H1.

Table 16. Bivariate Correlations for H1

	Mean	s.d	1	2	3	4	5	6	7	8	9
1. SM USE	181.649	294.843	1.00								
2. NarraComp (t-1)	0.053	0.183	**0.16**	1.00							
3. ResAvailability (t-1)	1.273	0.572	**-0.18**	-0.01	1.00						
4. CEO attention SM (t-1)	0.037	0.277	0.04	**0.22**	0.03	1.00					
5. Major Event (t-1)	22.649	19.671	0.06	-0.07	0.05	0.07	1.00				
6. Firm Innovativeness (t-1)	0.012	0.042	0.02	0.07	**0.41**	-0.03	0.10	1.00			
7. Industry 1	0.457	0.499	**0.28**	0.11	**-0.24**	**0.15**	-0.04	**-0.25**	1.00		
8. Industry 2	0.159	0.367	-0.11	0.04	0.05	-0.06	-0.06	**0.14**	**-0.40**	1.00	
9. Industry 3	0.184	0.388	**-0.21**	-0.07	-0.11	-0.06	-0.12	**-0.13**	**-0.44**	**-0.21**	1.00

Notes:
n=245
Bold are correlations with p< .05
SM USE: social media use; NarraComp: narrative comprehensiveness score; ResAvailability: resource availability; CEO attention SM: CEOs' attention to social media

Regarding the relationship between organizations' social media use and logic diversity, the change in an organization' belief systems requires some time after a certain event (Labianca et al. 2000; Taylor and Crocker 1981). I therefore lagged all the independent and control variables except the time invariant variables by one year. Table 17 and Table 18 show the bivariate correlations for the variables involved in testing H2 and H3 respectively.

Table 17. Bivariate Correlations for H2

	Mean	**s.d**	**1**	**2**	**3**	**4**	**5**
1. Logic Diversity	71.802	5.605	1.00				
2. SM USE (t-1)	88.784	168.714	0.10	1.00			
3. Operational Scope (t-1)	8.778	3.370	-0.12	-0.01	1.00		
4. Int' Business Scope (t-1)	3.916	7.852	0.04	0.02	-0.07	1.00	
5. Political Orientation	55.431	16.438	**-0.17**	0.08	-0.01	0.08	1.00

Notes:
n=167
Bold are correlations with p< .05
SM USE: social media use

Table 18. Bivariate Correlations for H3

	Mean	s.d	1	2	3	4	5	6	7
1. Logic Diversity	71.802	5.605	1.00						
2. NarraComp (t-1)	0.053	0.175	0.14	1.00					
3. SM Use (t-1)	88.784	168.714	0.10	0.15	1.00				
4. NarraComp*SM Use (t-1)	5.379	25.783	-0.08	**0.21**	**-0.15**	1.00			
5. Operational Scope (t-1)	8.778	3.370	-0.12	0.00	-0.01	0.06	1.00		
6. Int' Business Scope (t-1)	3.916	7.852	0.04	0.04	0.02	-0.04	-0.07	1.00	
7. Political Orientation	55.431	16.438	-0.17	0.02	0.08	0.02	-0.01	0.08	1.00

Notes:
n=167
Bold are correlations with p< .05
NarraComp: narrative comprehensiveness score; SM Use: social media use
Mean-centered NarrativeComp and SM Use were used for the interaction term.

Regarding the relationship between organizations' logic diversity and legitimacy (H4), the reputation and KLD scores are calculated based on organizations' practices (e.g., innovation, social responsibility, and corporate governance) that require time to be implemented after logic change and eventually to produce outcomes. I thus lagged all the independent and control variables except the time invariant variables by two years. Table 19 and 20 shows the bivariate correlations among all variables involved in testing H4.

Table 19. Bivariate Correlations for H4 (KLD)

	Mean	s.d	1	2	3	4	5
1. KLD	2.92	3.56	1.00				
2. Logic Diversity (t-2)	72.16	5.07	**0.30**	1.00			
3. Firm Size (t-2)	15.86	19.32	**0.20**	0.08	1.00		
4. Firm Age (t-2)	67.70	47.89	-0.07	0.01	-0.02	1.00	
5. Past Performance (t-2)	4.70	4.50	-0.02	0.03	**0.56**	-0.02	1.00

Notes:
n=159
Bold are correlations with p< 0.05

Table 20. Bivariate Correlations for H4 (Reputation)

	Mean	s.d	1	2	3	4	5
1. Reputation	0.645	1.246	1.00				
2. Logic Diversity (t-2)	71.904	5.179	0.11	1.00			
3. Firm Size (t-2)	15.052	18.806	**0.47**	0.11	1.00		
4. Firm Age (t-2)	68.116	47.174	-0.13	0.04	-0.02	1.00	
5. Past Performance (t-2)	4.590	4.395	**0.31**	0.03	0.56	-0.02	1.00

Notes:
n=172
Bold are correlations with p< 0.05

Likewise, regarding the relationship between organizations' logic diversity and financial performance (H5), I lagged all the independent and control variables except the time invariant variables by two years. Cognition change such as logic change

requires organizational behavior change to produce outcomes, such as financial performance. For example, Eggers and Kaplan (2009) showed the one-year lagged impact of CEO and organizational cognition on strategic renewal: the launch of a new product line. Since the new line's impact on the organizations' financials appears in the next year's 10K form, there should be at least a two-year lag between cognition change (e.g., logic change) and organizations' financial performance. Table 21 and 22 show the bivariate correlations among all variables involved in H5.

Table 21. Bivariate Correlations for H5 (ROA)

	Mean	**s.d**	**1**	**2**	**3**	**4**
1. ROA	3.905	3.968	1.00			
2. Logic Diversity (t-2)	71.846	5.186	-0.05	1.00		
3. Risk Level (t-2)	2.694	3.159	**0.25**	-0.13	1.00	
4. Ind Profitability (t-2)	-1.875	21.065	0.06	-0.07	**0.18**	1.00

Notes:
n=170
Bold are correlations with p< .05
Ind Profitability: Industry Profitability

Table 22. Bivariate Correlations for H5 (ROS)

	Mean	**s.d**	**1**	**2**	**3**	**4**
1. ROS	7.287	6.881	1.00			
2. Logic Diversity (t-2)	71.846	5.186	0.12	1.00		
3. Risk Level (t-2)	2.694	3.159	-0.02	-0.13	1.00	
4. Ind Profitability (t-2)	-1.875	21.065	-0.03	-0.07	**0.18**	1.00

Notes:
n=170
Bold are correlations with p< .05
Ind Profitability: Industry Profitability

5.2 Tests of Assumptions

Prior to hypothesis testing, I checked whether the data were consistent with the assumptions of linear regression. I first tested for multicollinearity among independent and control variables. Table 23 list VIF and tolerance values, and Appendix L shows the full results of the tests.

Table 23. Multicollinearity Test

Model for	Variables	VIF	Tolerance
H1	NarraComp (t-1)	1.09	0.9181
	ResAvailability (t-1)	1.31	0.7648
	CEO attention SM (t-1)	1.08	0.9219
	Major Event (t-1)	1.07	0.9307
	Firm Innovativeness (t-1)	1.32	0.7584
	Industry 1	2.31	0.4323
	Industry 2	1.63	0.6133
	Industry 3	1.88	0.5329
H2	SM USE (t-1)	1.01	0.9936
	Operational Scope (t-1)	1.01	0.9945
	Int' Business Scope (t-1)	1.01	0.9878
	Political Orientation	1.01	0.9876
H3	NarraComp (t-1)	1.09	0.9201
	SM USE (t-1)	1.07	0.9358
	NarraComp*SM_Use (t-1)	1.09	0.915
	Operational Scope (t-1)	1.01	0.9909
	Int' Business Scope (t-1)	1.02	0.985
	Political Orientation	1.01	0.9862
H4	Logic Diversity (t-2)	1.01	0.9925
	Firm Size (t-2)	1.47	0.6802
	Firm Age (t-2)	1	0.9992
	Past Performance (t-2)	1.46	0.6846
H5	Logic Diversity (t-2)	1.02	0.9798
	Risk Level (t-2)	1.05	0.9521
	Ind Profitability (t-2)	1.04	0.9642

Notes:
Mean-centered NarrativeComp and SM Use were used for the interaction term.

The VIF values of the Model for H1 ranges from 1.07 to 2.31. The VIF values of the Model for H2 are all the same, 1.01. For H3, I centered the independent variables before creating the interactions terms to minimize multicollinearity between the main effect variables and interaction variable (Aiken and West 1991). The VIF values of the Model for H3 ranges from 1.01 to 1.09. The VIF values of the Model for H4 ranges from 1.01 to 1.47. Finally, the VIF values of the Model for H5 ranges from 1.02 to 1.05. In summary, all of these VIF values are considerably below 10, which indicates multicollinearity is not a problem.

Similarly, the tolerance scores of the Model for H1 range from 0.43 to 0.93, for H2 they range from 0.98 to 0.99, for H3 they range from 0.91 to 0.99, for H4 they range from 0.68 to 0.99, and for H5 they range from 0.95 to 0.97. No tolerance scores are less than 0.1, indicating that again multicollinearity is not a problem.

Next, I tested for heteroskedasticity. Heteroskedasticity is likely to be present in my data, as it was collected from four different industries and distribution of residual terms in the relationship between X and Y is likely to vary across industries. I conducted modified Wald tests for groupwise heteroskedasticity. Table 24 summarizes the test results. Overall, the tests strongly suggest need to correct for heteroskedasticity.

Table 24. Heteroskedasticity Test Results

Model for	Chi Squared	Probability>Chi Squared
H1 (1yr lagged IVs)	6,200,000	0.000
H2 (1yr lagged IVs)	700,000	0.000
H3 (1yr lagged IVs)	180,000	0.000
H4 with Reputation (2yr lagged IVs)	1.40E+10	0.000
H4 with KLD (2yr lagged IVs)	14837.79	0.000
H5 with ROA (2yr lagged IVs)	1.70E+08	0.000
H5 with ROS (2yr lagged IVs)	1.60E+13	0.000

Because my data contains cross-sectional time-series (i.e., panel), the residual terms are also highly likely to be correlated (i.e., auto-correlation or serial correlation is likely present). I tested for first-order (AR1) auto-correlation by using the auto-correlation test method developed by Wooldridge (2002). It should be noted that this method tests for auto-correlation on the entire panel data (i.e., overall correlation across panels). That is, this test shows whether there are AR1 autocorrelations in the panel data as a whole. Table 25 reports the test results. The Wooldridge test suggests that there are overall AR1 correlations for the models for H1 (F=50.760, p< 0.001), H4 of KLD (F= 8.215, p< 0.01), and H5 of ROS (F= 5.974, p< 0.0187).

Table 25 AR1 Auto-Correlation Test Results (overall)

Model for	F-Statistic	Probability>F-Statistic
H1 (1yr lagged IVs)	F(1, 80) = 50.760	0.000
H2 (1yr lagged IVs)	F(1, 37) = 0.924	0.3426
H3 (1yr lagged IVs)	F(1, 37) = 0.825	0.3696
H4 with Reputation (2yr lagged IVs)	F(1, 44) = 0.089	0.7667
H4 with KLD (2yr lagged IVs)	F(1, 40) = 8.215	0.0066
H5 with ROA (2yr lagged IVs)	F(1, 43) = 0.931	0.3400
H5 with ROS (2yr lagged IVs)	F(1, 43) = 5.974	0.0187

To correct for auto-correlations and heteroskedasticity, I thus conducted Prais–Winsten regression with heteroskedasticity-corrected standard errors (PCSEs) (Beck and Katz 1995). The Prais–Winsten method can address panel-specific A1 auto-correlations and heteroskedasticity (e.g., Fabrizio 2012; Jorgenson and Clark 2012; Mithas et al. 2013). I opted to correct for panel-specific A1 correlations for all the models because although some of the models did not reveal overall auto-correlations (i.e., models for H2, H3, H4 of Reputation, and H5 of ROA), it is highly likely that some individual panels still reveal auto-correlations. Thus, my hypothesis testing for those models are more conservative than not correcting for panel-specific auto-correlations.

Chapter 6: Results of Hypothesis Testing

In this section, I report the results of the five sets of Prais–Winsten regression analyses, each for the five hypotheses. Figure 6 summarizes the results of hypothesis testing. Results of each hypothesis test are then discussed.

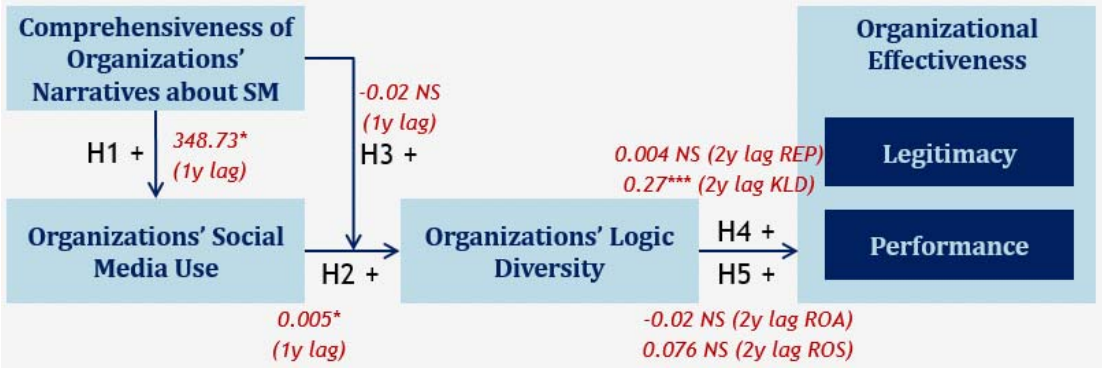

Figure 6. Summary of Results

6.1 H1: Effects of Narrative Comprehensiveness on Organizations' Social Media Use

H1 addresses how the comprehensiveness of organizations' narratives regarding social media impacts the organizations' social media use. The Prais–Winsten regression for H1 (Table 26) shows that as organizations' narratives regarding social media become more comprehensive, the organizations use more social media. (β=348.73, p<0.01). More specifically, an increase in the yearly narrative score by one leads to on average 349 more social media posts in the next year. These results lend support to H1.

Table 26. Prais–Winsten Regression Results for H1

DV: Organizations' Social Media Use		
	Controls	**H1**
NarraComp *(t-1)*		348.73** (127.46)
ResAvailability *(t-1)*	-114.24** (36.37)	-115.18** (36.2)
CEO attention SM *(t-1)*	8.08 (47.66)	-26.25 (58.41)
Major Event *(t-1)*	0.51 (0.69)	0.56 (0.66)
Firm Innovativeness *(t-1)*	859.28* (95.32)	730.74* (355.54)
Industry 1	105.03 (72.7)	91.73 (71.46)
Industry 2	-75.27 (71.63)	-90.7 (69.04)
Industry 3	-131.79* (62.63)	-142.01* (64.49)
Constant	316.87** (95.32)	310.54* (94.64)
R^2	0.17	0.22
Observations	245	245

Notes:
<0.05, **<0.01, *<0.001*
Heteroskedasticity-corrected standard errors are in parentheses.
NarraComp: narrative comprehensiveness score; ResAvailability: resource availability; CEO attention SM: CEOs' attention to social media

6.2 H2: Effects of Organizations' Social Media Use on Organizations' Logic Diversity

H2 addresses how organizations' social media use diversifies the organizations' logic. The Prais–Winsten regression for H2 (3rd column of Table 27) shows that as organizations' use of social media increases, their logic becomes more diverse (β=0.005, p <0.05). These results support H2.

Table 27. Prais–Winsten Regression Results for H2 and H3

DV: Organizations' Logic Diversity				
	Controls	**H2**	**Na&SM**	**H3**
NarraComp*SM_Use (t-1)				-0.02 (0.01)
NarraComp (t-1)			3.81 (2.18)	4.33 (2.42)
SM Use (t-1)		0.005* (0.002)	0.004* (0.002)	0.004 (0.002)
Operational Scope (t-1)	-0.23 (0.12)	-0.24* (0.12)	-0.22 (0.11)	-0.21 (0.12)
Int' Business Scope (t-1)	0.05 (0.04)	0.05 (0.04)	0.04 (0.03)	0.04 (0.04)
Political Orientation	-0.08* (0.04)	-0.08* (0.03)	-0.08* (0.03)	-0.08* (0.03)
Constant	78.15*** (1.99)	77.9*** (1.94)	77.57*** (1.91)	77.48* (1.91)
R2	0.938	0.944	0.943	0.944
Observations	167	167	167	167

Notes:
<0.05, **<0.01, *<0.001*
Heteroskedasticity-corrected standard errors are in parentheses.
NarraComp: narrative comprehensiveness score; SM Use: social media use
Mean-centered NarrativeComp and SM Use were used for the interaction term.

6.3 H3: Effects of Narrative Comprehensiveness on the Relationship between Organizations' Social Media Use and Logic Diversity

H3 is concerned with how narrative comprehensiveness impacts the relationship between organizations' social media use and logic diversity. The Prais–Winsten regression for H3 (last column of Table 27) shows that this moderating impact is not statistically significant. Consequently, H3 is not supported.

6.4 H4: Effects of Organizations Logic Diversity on Legitimacy

H4 addressed how organizations' logic diversity impacts their legitimacy, measured as reputations scores and KLD scores. The Prais–Winsten regression for H4 (Table 28) shows mixed results. While increase in logic diversity does not necessary lead to a higher reputation score in two years, it does increase KLD scores (β=0.27, p<0.001). These results partially support H4. Logic diversity does not seem to increase the financial side of organizational legitimacy; but it indeed increases the social side of legitimacy.

Table 28. Prais–Winsten Regression Results for H4

	DV: Reputation			**DV: KLD**	
	Controls	**H4**		**Controls**	**H4**
Logic Diversity *(t-2)*		0.004 (0.014)			0.27*** (0.05)
Firm Size *(t-2)*	0.017* (0.007)	0.017* (0.00)		0.06*** (.013)	0.05*** 0.02)
Firm Age *(t-2)*	-0.0008 (0.0016)	-0.00005 (0.002)		-0.0002 (.005)	-0.004 (0.005)
Past Performance *(t-2)*	0.03 (0.02)	0.031 (0.023)		-0.23** (.08)	-0.164 (0.088)
Constant	0.44* (0.17)	-0.013 (1.004)		2.89*** (.46)	-12.6*** (3.41)
R^2	0.34	0.27		0.13	0.21
Observations	172	172		159	159

Notes:
<0.05, **<0.01, *<0.001*
Heteroskedasticity-corrected standard errors are in parentheses.

I also conducted a regression analysis for H4 with social media as a control variable, allowing for the direct effect of social media on legitimacy. As Table 29 shows, logic diversity does not affect either reputation or KLD scores even after social media use is controlled for.

Table 29 Prais–Winsten Regression Results for H4 with SMUSE Control

	DV: Reputation			DV: KLD		
	Controls	**SMUSE**	**H4**	**Controls**	**SMUSE**	**H4**
Logic Diversity (t-2)			.003 (.02)			.19*** (.04)
SM USE (t-3)		-.00008 (.0009)	-.00009 (.0009)		.003 (.002)	.003 (.002)
Firm Size (t-2)	.011 (.008)	.01 (.008)	.0108 (.008)	.03* (.01)	.03* (.01)	.02 (.01)
Firm Age (t-2)	-.002 (.002)	-.002 (.002)	-.001 (.002)	-.005 (.004)	-.005 (.005)	-.006 (.004)
Past Performance (t-2)	.09* (.03)	.09* (.04)	.09** (.03)	.102 (.09)	.103 (.09)	.13 (.09)
Constant	.27 (.2)	.28 (.20)	.04 (1.27)	3.21 (.52)	3.06*** (.537)	-11.3** (3.48)
R2	0.26	0.26	0.26	0.27	0.28	0.39
Observations	112	112	112	102	102	102

Notes:
<0.05, **<0.01, *<0.001*
Heteroskedasticity-corrected standard errors are in parentheses.
The n became smaller because for the full model (last column of the table), I removed all the observations from the rows if observations in either social media use or logic diversity are missing.

6.5 H5: Effects of Organizations Logic Diversity on Financial Performance

Finally, H5 is concerned with how organizations' logic diversity impacts their financial performance, measured as Return on Assets (ROA) and Return on Sales (ROS). The Prais–Winsten regression for H5 (Table 30) shows that increase in logic diversity does not necessary lead to higher ROA or ROS in two years, thus disconfirming H5.

I also conducted a regression analysis for H5 with social media as a control variable, allowing for the direct effect of social media on performance. As Table 31 shows, logic diversity does not affect either ROA (β= -0.025, *n.s.*) or ROS (β= 0.16, *n.s.*) even after social media use is controlled for.

Table 30. Prais–Winsten Regression Results for H5

	DV: ROA			DV: ROS	
	Controls	**H5**		**Controls**	**H5**
Logic Diversity *(t-2)*		-0.02 (0.06)			0.076 (0.09)
Risk Level *(t-2)*	0.37*** (0.08)	0.33** (0.106)		-0.18 (0.12)	0.026 (0.18)
Ind Profitability *(t-2)*	-0.014 (0.01)	-0.01 (0.014)		-0.03 (0.02)	-0.014 (0.02)
Constant	2.43*** (0.3)	4.33 (4.52)		6.87*** (0.58)	1.76 (7.10)
R^2	0.24	0.19		0.13	0.15
Observations	170	170		170	170

Notes:
<0.05, **<0.01, *<0.001*
Heteroskedasticity-corrected standard errors are in parentheses.
Ind Profitability: industry profitability

Table 31 Prais–Winsten Regression Results for H5 with SMUSE Control

	DV: ROA			DV: ROS		
	Controls	**SM USE**	**H5**	**Controls**	**SM USE**	**H5**
Logic Diversity (t-2)			-.025 (.047)			.16 (.08)
SM USE (t-3)		.003 (.003)	.003 (.003)		.006 (.006)	.006 (.007)
Risk Level (t-2)	-.04 (.08)	-.04 (.07)	-.052 (.07)	-.27* (.13)	-.28* (.13)	-.25 (.13)
Ind Profitability (t-2)	.17*** (.02)	.18*** (.02)	.17*** (.02)	.101* (.04)	.107* (.04)	.11* (.046)
Constant	1.9*** (.26)	1.6*** (.30)	3.56 (3.47)	6.61*** (.72)	6.31*** (.66)	-5.45 (6.07)
R2	0.44	0.46	0.46	0.15	0.17	0.19
Observations	109	109	109	109	109	109

Notes:
<0.05, **<0.01, *<0.001*
Heteroskedasticity-corrected standard errors are in parentheses.
The n became smaller because for the full model (last column of the table), I removed all the observations from the rows if observations in either social media use or logic diversity are missing.

Table 32 summaries all of the hypothesis testing results.

Table 32. Summary of Hypothesis Testing

Relationships	Supported
(H1) Narrative Comprehensiveness → Social Media Use	Supported
(H2) Social Media Use → Logic Diversity	Supported
(H3) Narrative Comprehensiveness → Impact of Social Media Use on Logic Diversity	Not Supported
(H4) Logic Diversity → Legitimacy	Partially Supported
(H5) Logic Diversity → Financial Performance	Not Supported

6.6 Robustness Checks & Post-hoc Analysis

6.6.1 Negative Binomial Regression for H1

The social media use variable demonstrates a high frequency of zero counts. That is, there are a number of years in which the firms did not post any social media posts. As social media use is an overdispersed count variable (i.e., the distribution mean is greater than the standard deviation), I conducted negative binomial regression to check the robustness of the findings from the Prais–Winsten regression. Table 33 provides the results of the negative binomial regression. By and large, the results are consistent with those of the Prais–Winsten regression in Table 26. As organizations' narratives regarding social media become more comprehensive, the organizations use social media more. (β=1.66, p<0.001).

Table 33. Negative Binomial Regression Results for H1

DV: Organizations' Social Media Use		
	Controls	**H1**
NarraComp *(t-1)*		1.66*** (0.39)
ResAvailability *(t-1)*	-0.63* (0.26)	-0.63* (0.26)
CEO attention SM *(t-1)*	-0.37 (0.48)	-0.45 (0.41)
Major Event *(t-1)*	-0.005 (0.004)	-0.004 (0.004)
Firm Innovativeness *(t-1)*	7.53*** (2.14)	7.22** (2.16)
Industry 1	-0.56 (0.41)	-0.51 (0.403)
Industry 2	-0.18 (0.53)	-0.26 (0.52)
Industry 3	0.88 (0.57)	1.01 (0.59)
Constant	0.67 (0.57)	0.56 (0.57)
Log likelihood	-1199.167	-1192.598
Observations	245	245

Notes:
<0.05, **<0.01, *<0.001*
Heteroskedasticity-corrected standard errors are in parentheses.
The coefficients are logged values in negative binomial regression.
NarraComp: narrative comprehensiveness score; ResAvailability: resource availability; CEO attention SM: CEOs' attention to social media

6.6.2 Mediation Test for the Relationships including Social Media Use, Logic Diversity, and Legitimacy (KLD)

To determine whether logic diversity is a mediator between organizations' social media use and legitimacy, I conducted additional regression analyses. I followed the mediation testing steps (i.e., hierarchical regression) specified by Barron and Kenny (1986), used in a myriad of studies (e.g., Harrison et al. 2002; Jehn et al.

1999). When there are three variables, an independent variable (IV), a mediating variable (MV), and a dependent variable (DV), the steps include

(1) checking whether the IV is correlated with the DV

(2) checking whether the IV is correlated with the MV,

(3) checking whether the MV is correlated with the DV in the presence of the IV (i.e., controlling for IV), and

(4) checking whether and how the IV is correlated with the DV in the presence of the MV.

The third and fourth steps are done in the same regression model. If all the conditions are met up to Step 3, the mediation effect is established. Step 4 tests whether it is a partial or a full mediation. That is, if the direct effects of IV disappears in the presence of MV, the MV is established as a full mediator.

Step 1: I tested whether social media use is directly related with KLD with a three-year lag; there should be at least a year lag between the social media use and logic diversity, and there is a two-year lag between logic diversity and legitimacy (i.e., H4). The Prais-Winsten regression results (Table 34) show that organizations' social media use does not impact KLD scores with a three-year lag.

Table 34. Direct Effects of Social Media Use on Legitimacy (KLD Scores)

	DV: KLD
SM Use *(t-3)*	0.005 (0.003)

Notes:
Included controls are Firm Size, Firm Age, and Past Performance (ROA)
Heteroskedasticity-corrected standard errors are in parentheses.
N= 129 for the first model
<0.05, **<0.01, *<0.001*

From the supported H2, the relationship between social media use (IV) and logic diversity (MV) has been established with a one-year lag. Organizations' social media use (here, the IV) is positively related with logic diversity with a one-year lag—here, the MV (β= 0.005, p <0.05; Table 27). Since it may be possible that the dynamics of relationships between social media use, logic diversity, and KLD in the presence of both the IV and MV are different, I ran a regression with both the IV and MV in it (Step 3).

Table 35 shows the results of the Prais-Winsten regression. It should be noted that the sample is smaller because for the full model (last column of the table), I removed all the observations from the rows if observations in either social media use or logic diversity were missing.

Table 35 Direct Effects of Social Media Use on Legitimacy (KLD Scores)—Full Model

	DV: KLD		
	Controls	**SMUSE**	**H4**
Logic Diversity (t-2)			.19*** (.04)
SM USE (t-3)		.003 (.002)	.003 (.002)
Firm Size (t-2)	.03* (.01)	.03* (.01)	.02 (.01)
Firm Age (t-2)	-.005 (.004)	-.005 (.005)	-.006 (.004)
Past Performance (t-2)	.102 (.09)	.103 (.09)	.13 (.09)
Constant	3.21 (.52)	3.06*** (.537)	-11.3** (3.48)
R2	0.27	0.28	0.39
Observations	102	102	102

Notes:
SM Use: social media use
<0.05, **<0.01, *<0.001*
Heteroskedasticity-corrected standard errors are in parentheses.

The full model confirms that social media does not directly affect legitimacy represented as KLD scores.

6.6.3 Further Examination of Hypothesis 5

Regarding the unsupported relationship between logic diversity and financial performance, I conducted further analysis. The Prais–Winsten regression in Table 36 shows that initially, logic diversity has a negative impact on firm financials (ROA: β= -0.01, p<0.05), be it statistically significant or not. However, over time the signs of coefficients become positive, be it statistically significant or not, and logic diversity starts to return positive firm financials three years later (ROS: β=0.2, p<0.05).

Table 36. Impact of Logic Diversity on Financials over Time

	DV: ROA	DV: ROS	n
Logic Diversity ***(t-1)***	-0.01* (0.05)	-0.03 (0.11)	222
Logic Diversity ***(t-2)***	-0.02 (0.06)	0.08 (0.09)	170
Logic Diversity ***(t-3)***	0.02 (0.06)	0.2* (0.09)	114

Notes:
<0.05, **<0.01, *<0.001*
Heteroskedasticity-corrected standard errors are in parentheses.
Included controls are Risk Level and Industry Profitability.

6.6.4 Mediation Test for the Relationships including Social Media Use, Logic Diversity, and Financial Performance

As organizations' social media use impacts logic diversity (i.e., H1 confirmed) and logic diversity impacts organizations' financial performance, I conducted further analyses to test mediation of logic diversity. I tested for direct effects of social media use on financial performance by using the three lag structures—a one-year, two-year, and three-year lag—because in the previous section, I examined the effect of logic diversity on financial performance with all the thee lag structures. To conserve degrees of freedom and minimize multi-collinearity, the three lagged variables were run in three separate models. Table 37 shows the results of a Prais-Winsten regression. The table shows that social media use directly affects ROA with a year lag (β= -0.001, p <0.01). Therefore, social media use has direct effects on ROA with a one-year lag. One noticeable finding, however, is that again the signs of coefficients become positive, be it statistically significant or not.

Table 37. Direct Effects of Social Media Use on Firm Performance

	DV: ROA	DV: ROS	n
SM Use *(t-1)*	-0.001** (0.0005)	-0.001 (0.001)	303
SM Use *(t-2)*	-0.001 (0.001)	0.00008 (0.002)	225
SM Use *(t-3)*	0.002 (0.003)	0.01 (0.007)	147

Notes:
SM Use: social media use
Included controls are Risk Level and Industry Profitability.
Heteroskedasticity-corrected standard errors are in parentheses.
<0.05, **<0.01, *<0.001*

Social media use affects logic diversity with a one-year lag (β= 0.005, p <0.05; Table 27). With that in mind, social media use at *t-2* does not affect ROA (β= -0.001, *n.s.*; Table 37) while logic diversity at *t-1* does affect ROA (β= 0.01, p <0.05) (Table 36). Since it may be possible that the dynamics of relationships between social media use (IV), logic diversity (MV), and ROA (DV) in the presence of both the IV and MV in the model are different, I ran a regression with both the IV and MV in it. Table 38 shows the results of the Prais-Winsten regression. It confirms that social media use does not indeed impact ROA with a two-year lag (β= 0.00002, *n.s.*) in the presence with logic diversity.

Table 38. Direct Effects of Social Media Use and Logic Diversity on ROA

	DV: ROA	n
SM Use *(t-2)*	0.00002 (0.001)	163
Logic Diversity *(t-1)*	-0.13* (0.06)	

Notes:
SM Use: social media use
Included controls are Risk Level and Industry Profitability.
Heteroskedasticity-corrected standard errors are in parentheses.
<0.05, **<0.01, *<0.001*

Regarding ROS, Table 36 shows that logic diversity positively affects ROS with a three-year lag (β= 0.2, p <0.05). Unfortunately, I was not able to test the mediation of logic diversity between social media use and ROS because the data did not allow to have a four-year lag impact of social media use on ROS. Since social media use affects logic diversity with a one-year lag, future research with longer time lags could determine whether logic diversity is a mediator or not.

Chapter 7: Discussion

The goal of this dissertation was to examine two related research questions. First, *what happens to organizational effectiveness—especially to legitimacy and financial performance—when organizations use social media?* Second, *what influences organizations' social media use?* In this chapter, I discuss what I have found regarding these two research questions and consider my findings in the light of extant research on social media and organizational impacts of IT.

7.1 Research Question 1. What happens especially to legitimacy and financial performance when organizations use social media?

Overall, my findings suggest that firms can expect beneficial impacts when they use social media. Through a total of five years of data for 83 firms in the energy sector, I have found that when organizations leverage social media, their logics become more diverse and, as a result, organizations become more effective.

First, consistent with H2, when organizations use social media, my findings show that the organizations' cognition is affected. More specifically, the organization's logic becomes more diverse through being exposed to stakeholders' diverse demands and expectations. This finding is consistent with institutional theory, which suggests regulatory, professional, and peer influences affect organizations (DiMaggio and Powell 1983; Rowan 1982). My findings also suggest a need for us to have a better understanding of the impact of competing logics on organizational effectiveness. There is a rich stream of literature in management and sociology that

focuses on whether and how competing logics co-exist (e.g., Quinn and Rohrbaugh 1983; Lounsbury 2007; Marquis and Lounsbury 2007; Murry 2010). My findings contribute to this research stream, specifically by noting the role played by information technology in facilitating the co-existence of diverse logics.

Second, consistent with H4, positive effects of social media use were observed with regard to increased social approval (i.e., legitimacy) enjoyed by organizations. Whereas these effects were insignificant with regard to the Fortune reputation scores, they were significant with regard to the KLD metric, use of which is increasingly advocated by social responsibility scholars as it is believed to assess firms' legitimacy on a range of factors beyond their financial performance (Chiu and Sharfman 2011; McWilliams and Siegel 2001). Specifically, I found logic diversity to increase the legitimacy enjoyed by energy sector firms, though with a two-year lag. Past research has demonstrated that firms use social media to enact and showcase corporate social responsibility initiatives (Miranda et al. 2015) and that social responsibility initiatives are pursued largely to increase firms' legitimacy with the public (e.g., Wood 1991). This study augments these findings by showing that the logic diversity, which increases with firms' social media use, heightens public perceptions of firm legitimacy.

My findings also augment extant understanding of the organizational impacts of information technology. An extensive set of studies speaks to the financial and operational efficiencies stemming from firms' IT initiatives (e.g., Dehning et al. 2007; Melville et al. 2004; Santhanam and Hartono 2003; Bharadwaj 2000). Despite extensive management research attesting to the importance of legitimacy to firms

(e.g., Meyer and Rowan 1977; Suchman 1995; Pfeffer and Salancik 2003; Sharfman and Fernando 2008), there is a dearth of studies examining the legitimacy consequences of firms' IT initiatives. My study findings suggest the need for future researchers of organizational impacts of IT to consider the effects of the technologies they study on the legitimacy the organizations deploying those technologies enjoy.

Third, although logic diversity did not affect firm financials significantly with a two-year lag (H5), logic diversity did influence firms' financial performance significantly with a *three*-year lag. Interestingly, diversified logics are found to have a negative – though insignificant – impact on firm performance in the short-run, i.e., with a one-year lag, but a positive impact firm financials after a longer time lag, i.e., three years. The longer lag between increases in organizations' logic diversity and improvements in their performance may be a function of two factors. First, due to inertia pressures, it takes a while for changes in cognition to translate into the changes in the organizations' material and human resources (Sewell 2005) needed to affect firm performance. Second, also due to inertia, the changes in business practice and resource distribution triggered by logic diversity initially may lead to negative financial performance, as those changes tend to disrupt the existing order initially and then settle in (Sambamurthy and Zmud 2012; Scott and Davis 2007), producing positive outcomes.

Of course, it also is possible that organizations simply employ new logics ceremonially in their talk, without any corresponding changes to business practices. Such decoupling (Meyer and Rowan 1977) or the gap between informational engagement and material engagement (Wang 2010) has been observed in diverse

business areas (e.g., Westphal and Zajac 2001). Moreover, there may be organizational constraints that restrict the organization's enactments of diversified logics—e.g., resistance from internal and external stakeholders (Lapointe and Rivard 2005; Thornton et al. 2012). Only organizations that follow through with their displayed logics are then likely to produce positive outcomes. This raises an empirical question worthy of future research.

Finally, the findings that social media eventually affects firm financials positively further enrich our understanding of IT business value (Melville et al. 2004). In the 1990s, the effort to understanding the IT productivity paradox concluded with the findings that IT indeed has a positive impact on organizations (Brynjolfsson and Hitt 1996; Brynjolfsson et al. 2002) and on society (Hitt and Brynjolfsson 1996). My findings augment findings from these studies, highlighting IT impacts not only on organizational performance, but also on the legitimacy those organizations enjoy.

7.2 Research Questions 2. What influences organizations' social media use?

Overall, my findings suggest that organizations' narratives about social media are a good indicator of organizations' near-future social media use. Specifically, my findings suggest that by creating and publishing comprehensive narratives about social media, organizations tend to memorialize extant uses and purposes of the focal technology and to discover new uses and purposes for it, as reflected in the increased usage of social media—or material engagement with the technology—reflected in the findings regarding H1. These findings augment extant knowledge about post-adoptive use of IT (e.g., Jasperson et al. 2005; Zhu and Kraemer 2005; Zhu et al. 2006) by

introducing organizations' public IT narratives as a factor that influences organizations' IT use.

The hypothesized moderating effect of narrative comprehensiveness on the relationship between organizations' social media use and their logic diversity (H2) was found to be insignificant. This insignificance may be a function of two factors, as described below.

First, the narrative comprehensiveness metric simply counted the different elements of an archetypal narrative present in the organizations' discourse about social media. It is possible that some elements of a narrative invite greater stakeholder input into organizations logics than do others. For example, focal actor may be more critical to inviting stakeholder input than time sequence. Further, the manner in which focal actors are articulated may also invite or suppress stakeholder input into organizational logics. If, for instance, the articulation of focal actor in the narrative corresponds to an identity claim, i.e., describes "who" does something and tends to increase the participation of the particular "who" (Tilly 2006; Kim and Miranda 2011), that includes a broad demographic, it then may invite input from such a broad demographic. In contrast, an articulation of voice that references only a narrow demographic may be received as less inclusive, thereby precluding input from a wide range of stakeholders. Future research could explore this possibility by examining the moderating relationship between each element of the narrative rather than applying a summative metric.

Second, it is possible that through monitoring and stakeholders' regular posts on organizations' social media, the organizations are already sufficiently exposed to stakeholders' diverse demands and expectations, and as a result, more input encouraged by comprehensive narratives may not necessarily further increase logic diversity. In other words, the change in logic diversity concomitant with social media use itself over-rides the ability of other variables to contribute to logic diversity. Further, due to their limited cognition capability (Simon 1991), organizations may not effectively process more input spurred by comprehensive narratives.

The argument could be made that there may be a direct positive relationship between narrative comprehensiveness and financial performance because organizations producing comprehensive narratives about social media are likely to use social media mindfully. That is, such organizations adopt and use technologies after they carefully consider and evaluate the fit between their business goals/strategies and the functionality of the technologies (Swanson and Ramiller 2004; Weick and Roberts 1993). Such fit tend to generate beneficial outcomes for the organization (Sabherwal and Chan 2001). I therefore tested this direct relationship. Table 39 shows the results of a regression analysis between narrative comprehensiveness and firm performance.

Table 39 Direct Effects of Narrative Comprehensiveness on Performance

	DV: ROA	DV: ROS	n
NarraComp *(t-1)*	-0.28 (0.61)	0.57 (1.19)	303
NarraComp *(t-2)*	0.46 (0.94)	0.03 (1.61)	225
NarraComp *(t-3)*	0.25 (1.46)	-0.79 (2.64)	147

Notes:
NarraComp: narrative comprehensiveness
Included controls are Risk Level and Industry Profitability.
Heteroskedasticity-corrected standard errors are in parentheses.
<0.05, **<0.01, *<0.001*

The regression results show that comprehensive narratives do not directly affect firms' financial performance with a one year, a two year, or a three year lag. A key reason would be that the impact of narrative comprehensiveness may require a longer time lag as organizations need time to implement and use a technology after they have developed a rich understanding of the technology. This possibly longer time lag is in fact suggested in my research model. Between narrative comprehensiveness and financial performance, there is a four year time lag. Future research could explore the impact of this longer time lag. Another reason would be that an organization might be mindful when understanding a technology but mindless when adopting, implementing, and assimilating the technology. Organizations understand, adopt, implement, and assimilate a technology (Swanson and Ramiller 2004), and if an organization do not follow through with their initial mindfulness shown at the comprehension stage, their mindful understanding of the technology is not likely to lead to beneficial impacts on firm financial performance.

7.3 Theoretical Contributions

This dissertation makes three key theoretical contributions. First, I identify and empirically test a fundamental mechanism, organizational logic diversity, though which organizational social media improves crucial organizational effectiveness, i.e., financial performance and legitimacy. Despite extensive organizational use of social media (Chui et al. 2012) and some initial empirical evidence (Luo et al. 2013), we still have little systematic understanding of social media impacts on organizations' financial performance or legitimacy. This issue is reflected in the lament by Treem and Leonardi (2012: 145) that "many studies of social media use provide insights about a specific tool, in a particular organizational context, but they do not develop theory about the consequences of organizations' social media use." I highlight logic diversity as a mechanism through which organizational social media use influences organizational effectiveness. By addressing *why/how* organizational effectiveness occurs through social media, I ultimately contribute to the developing theorization of social media impacts (Treem and Leonardi 2012; Uquhart and Vaast 2012) and to the IT post-adoption literature in general (Zhu and Kraemer 2005; Jasperson et al. 2005).

Second, I explain how narratives influence organizational social media use and its further impact. Narratives are a form of sensemaking and sensegiving and thus often facilitate innovation adoption and use (Maitlis and Lawrence 2007; Sonenshien 2010; Swanson and Ramiller 1997). Surprisingly, despite this apparent theoretical and practical importance for IS innovation, IS scholars have paid little attention to the role of this symbolic activity. By particularly focusing on organizational narratives, I thus

contribute to the under-developed knowledge of the narrative role in technology use and impact. This is also an important contribution to the social media literature, where our insufficient understanding exists of the antecedents of organizational social media use. Furthermore, I also contribute by introducing the concept of comprehensiveness in the narrative literature, going beyond the conventional focus on the contents of narratives (Barry and Crant 2000). "[N]arrative materials can be analyzed along myriad dimensions, such as contents; structure; style of speech affective characteristics; motives, attitudes, and beliefs of the narrator or her or his cognitive level" (Lieblich et al. 1998: 9).

Finally, I demonstrate an important role of technology in fostering logic diffusion and diversity. Despite considerable attention to logic evolution, competition, and co-existence inside and outside organizations (see Thornton (2012) for review), the role of IT in this change has been largely ignored. Understanding such role is important as logic diversity may result in positive organizational outcomes.

7.4 Practical Contributions

This dissertation makes three main practical contributions as well. First, I demonstrate the benefits of tapping into social media big data. Some firms—in particular, many energy firms—are cautiously disposed toward using social media (Culnan et al. 2010; Miranda et al. 2015). As a result, they may miss out on benefits that social media may offer, e.g., improved financial performance and a better corporate image. In fact, the Energy Department is an active user of social media (Edward 2013), and some consultancies (Accenture 2012) have been promoting social

media to energy companies. The findings of this study can further encourage energy firms to tap into the benefits of social media and social media big data.

Second, I show that comprehensive narratives are possibly a way to increase organization-wide social media use. This understanding will help those managers who wish to boost their seemingly beneficial social media use.

Finally, my dissertation will help organizations understand the advantages of organizational logic diversity. After all, diversity is believed to foster flexibility, adaptability, and innovation (Harrison and Klein 2007).

Chapter 8: Study Limitations and Future Research Directions

As with all research studies, this dissertation is not without limitations. The finding of this dissertation should be interpreted and applied with these limitations in mind. These limitations provide stepping stones for future research, however.

8.1 Conceptual Limitations and Future Directions

This dissertation provides opportunities for conceptual improvement that could be taken in the areas of IT impacts and the antecedents of IT use.

First, I have examined only one aspect of narratives—comprehensiveness. However, other aspects of narratives such as thickness (Shenhav 2005,) intensity, and frequency might also serve a good indicator of organizations' future social media use. Future research could explore this possibility. Similarly, future research could also examine how the impact of "internal" narratives about social media and the "external" narratives (e.g., press releases) differs

Second, it is possible that certain characteristics of narratives are more effective in affecting organizations' social media use than are others. Future research could examine whether and how weighting should be considered. Similarly, it is possible that certain configurations of the characteristics are more effective. Such configuration approach (Fiss 2011) is also worth future endeavor.

Third, social media yields big data from Facebooks posts and tweets, and researchers have been striving to understand its impact on organizations (Davenport et

al. 2012; LaVelle et al. 2011). My findings regarding H2 could suggest that when organizations tap into social media, which often contains stakeholders' diverse demands and expectations, organizations' logic tends to become more diversified, thereby increasing legitimacy and performance. This might be a stepping stone to enriching our understanding of how social media big data impacts organizations.

8.2 Methodological Limitations and Future Directions

The Findings of this dissertation could be informed by different operationalizations of the constructs and by the findings in other research settings.

First, I assumed that the more social media posts an organization publishes (i.e., more organizational social media use), the more replies or responses the organization receives from their stakeholders. I tested this assumption in an exploratory manner by using post counts and reply counts from Facebook. I randomly selected 15 firms from the sample and counted the Facebook posts published by the organizations and the replies to those posts. There is a reasonably high correlation between the number of Facebook posts published by organizations and the number of replies the organizations received (r=0.514, n=15, $p < 0.05$).

Second, although social media has a wide interaction capability and thus tends to contain diverse views, demands, and expectations from the stakeholders, it is possible that replies come from only certain groups of stakeholders. Future research could more closely measure how much an organization is exposed to diverse views and demands and examine how this kind of exposure impacts the organization's logic diversity.

Third, I assumed that when organizations post social media messages, they also read what is posted on their social media page as well as monitor other social media services where messages about the organizations are posted. It is unlikely that organizations simply post messages on social media and ignore what is said about them (e.g., Kane et al. 2014). In fact, the Appendix O shows OG&E's reply to their customers' social media message, which indicates that organizations do read what is posted on their social media page. Moreover, albeit not in my sample, Best Buy closely monitors their Twitter page, reflected in the following their CEO's statement (emphasis mine): "In fact, we're even using social media to help provide those [technical] solutions. On Twitter we have a feed called Twelpforce. Customers can post about their tech problems, and Best Buy associates—or other Twitter users—can post solutions. *By monitoring the feed*, we're able to learn a lot about what our customers are doing and to help them with problems in real time" (Dunn 2010: 48).

Fourth, future research could count the occurrences of the five narrative elements in a narrative, rather than simply count the existence of the elements. It is quite possible that Firm A that describes 10 evaluative frames regarding social media in a narrative holds a more comprehensive understanding of social media than does Firm B that mentions only one evaluative frame in a narrative. In this case, Firm A may display higher social media use. Besides, the narrative comprehensiveness score could be calculated by using the Blau's Index, which would attest to the firms' tendency to address each narrative element with equal emphasis. That is, Firm A with a social media narrative that has five occurrences in each of the narrative elements may have a more comprehensive understanding of social media than Firm B with a

narrative that has five occurrences in only one narrative element category but only one occurrence in the remaining four narrative elements.

Fifth, in this study, I have focused only on the energy sector. Still, the findings of the study are highly likely to generalize to other areas (e.g., healthcare, high-tech industry, and retail industry). For instance, diversified logics in the retail industry is also likely to lead to higher legitimacy and financial performance. Nevertheless, future research conducted in other multiple sectors and industries could further demonstrate the generalizability of the findings of this dissertation.

Sixth, future research could examine the impact of other social media services. Other than major and general social media services—such as Facebook—that are used across countries and generations, niche social media services (e.g., reddit, LinkedIn, and Instagram (see Appendix H for more)) might have different effects on organizations' logic diversity. Since how much a social media service exposes an organization to diverse views is likely to affect the organization's logic diversity, social media that attracts only a certain type of users will not help diversify organizations' logics.

Finally, although my data contains 83 companies and spans across five years, fairly small samples were used for data analysis due to the lagged impacts. Future research could further strengthen my findings by using a longer time periods or by using monthly or quarterly data. It is certainly possible to use monthly or even daily data for the relationship between narrative comprehensiveness and social media use.

Press releases are published on a daily basis, and social media posts are published in every second.

Chapter 9: Conclusion

In this dissertation, I have addressed two research questions regarding how social media impacts organizations effectiveness and how narratives impact organizations' social media use. To do so, I have drawn on the narrative and the institutional logics literatures to demonstrate that organizational narratives about social media play a crucial role in organizations' social media use and, in effect, in the diversity of logics that the organizations hold. Logic diversity, in turn, is found to enhance firms' legitimacy and financial performance. My conceptualization and findings from my empirical work contribute novel insights to two domains of MIS research. First, my research contributes to extant knowledge on how organizational use of information technologies comes about—specifically to the literature on post-adoptive use—by highlighting the salience of organizations' public narratives about information technology. Second, my research contributes to extant knowledge on the organizational impacts of IT in two ways—by highlighting organizations' logic diversity as a mechanism through which modern information technologies may influence organizational effectiveness and by highlighting legitimacy as an important aspect of organizational effectiveness.

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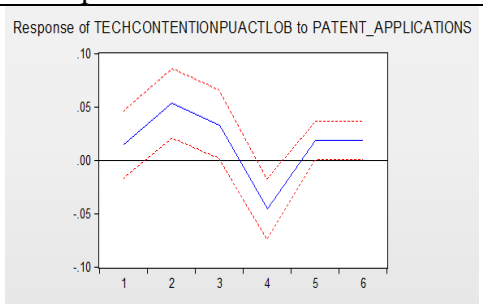
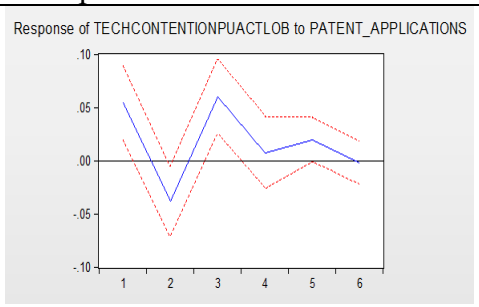
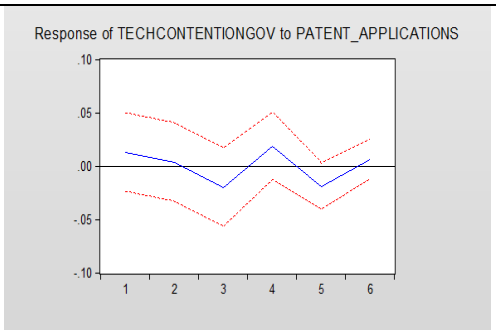
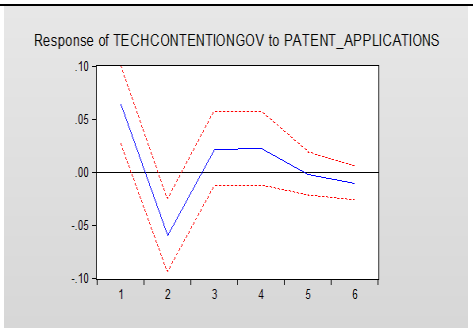
Appendix A. Summary of Key Findings of 2nd Year Paper

Hypothesis 1a: Entrainment of contention to innovation will be ***quicker*** *during the social media era than it will during the pre-social media era.*

Hypothesis 1b: Entrainment of contention to innovation will ***last longer*** *during the social media era than it will during the pre-social media era.*

The immediate contentious response by both activists and government to patent applications (charts in the right hand side of Table 40) shows that contention is more quickly entrained to innovation during the social media era. That is, when companies innovate with technology, there is likely to be initial negative reactions from key stakeholders. This confirms Hypothesis 1A. Although the contentious response is slower during the pre-SM era, activists indeed respond in the second quarter, displaying a brief entrainment (top chart in the left hand side of Table 40). By comparison, although activists' initial reaction during the SM era drops in the second quarter, it picks up in the third quarter (top chart in the right hand side). That is, this shows evidence that entrainment of contention to innovation lasts longer during the social media era, lending a support to Hypothesis 1b.

Table 40. Entrainment of Contention to Innovation during Pre-Social Media Era vs. during Social Media Era

(Pre-Social Media Era) Response of Activist Contention	(Social Media Era) Response of Activist Contention
	
(Pre-Social Media Era) Response of Government Agency Contention	**(Social Media Era) Response of Government Agency Contention**
	

**H1 (One Vector Autoregression Model for Each Era)*

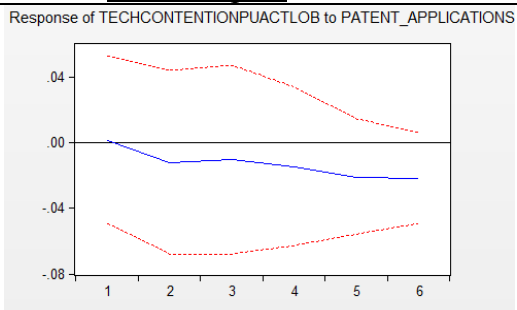
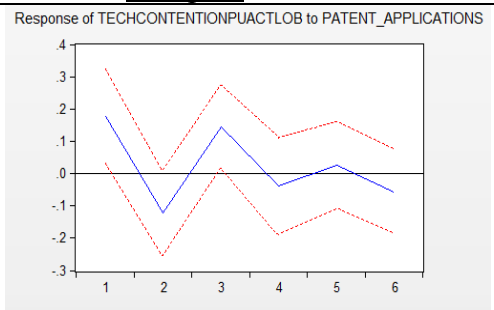
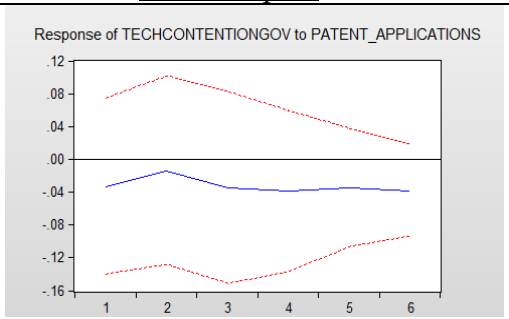
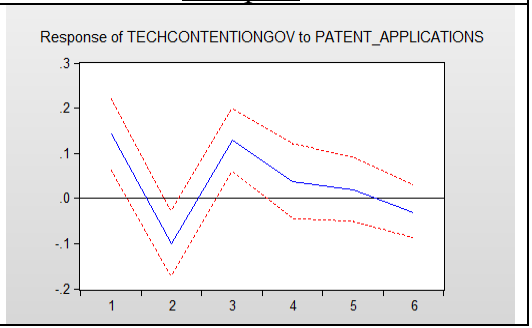
Hypothesis 2a: During the social media era, contention will ***be more quickly*** *entrained to* ***complex*** *innovations than it will to simple innovations.*

Hypothesis 2b: During the social media era, contention will be entrained ***longer*** *to* ***complex*** *innovations than it will to simple innovations.*

Consistent with Hypothesis 2A, during the social media era, contention occurs more quickly to complex innovations than it does to less complex innovations (charts in the right hand side of Table 41). In fact, contention does not seem to respond to

less complex innovations (charts in the left hand side of Table 41). This also lends support to Hypothesis 2b. Overall, these results support our argument that complex innovations create more attention due to the combination of uncertain nature of the innovation and the unfavorable images of the energy sector.

Table 41. Entrainment of Contention to Complex Innovation during the Social Media Era

(Social Media Era) Response of Activist Contention to Less-complex Innovations	(Social Media Era) Response of Activist Contention to Complex Innovations
	
(Social Media Era) Response of Government Agency Conte ntion to Less-complex Innovations	(Social Media Era) Response of Government Agency Cont ention to Complex Innovations
	

**One Vector Autoregression Model or Each Complexity Type*

Appendix B. Summary of Social Media Studies

Studies	Type	Research Questions	Independent Variables	Dependent Variables
Aoun and Vatanasakdakul (2012)	Interpretative case study on 1 firm	How social media is used in organizations?	Championing, recognition, ownership	Social media use
Koch et al. (2012)	Interpretative case study on 1 firm	How does internal social networking sites impact employee emotions and organizations?	Use of internal social networking sites	Higher employee morale, better engagement, lower turnover rates
Gray et al. (2011)	Survey of 850 people	How is being connected to other people through social book mark related to the person' innovativeness?	Use of social bookmaking services	Personal innovativeness
Rishika et al. (2013)	Post-positivistic case study on 1 firm	How does users' participation in social media impact their visit frequencies and profitability?	Participation of social media (e.g., becoming a fan of a Facebook page)	Customers' social media visit frequency and profitability
Goh et al. (2013)	Post-positivistic case study on 1 firm	What is the impact of user- and market-generated content?	Characteristics of user-generated content and marketer-generated content	Customer spending

Choi et al. (2011)	Experiment with 44 groups	What are the effects of Twitter on group effectiveness compared to traditional computer-mediated technology settings?	Use of Twitter-enabled mobile communication device	Group effectiveness
Majchrzak et al. (2013)	Survey of 168 people	What are the impacts of shaping behaviors on knowledge reuse?	Wiki contributors' knowledge resources	Perceived reused of knowledge
Luo et al. (2013)	Post-positivistic case study on 9 firm	How do product reviews by consumers on social media affect firm equity value?	Product reviews by consumers	Equity value (stock abnormal return)
Aggarwal et al. (2012)	Post-positivistic study with diverse archival data	What is the impact of employees' negative blog posts?	Negative blog posts	Readership of employees' blogs
Miller and Tucker (2013)	Post-positivistic study with diverse archival data	What is the impact of organizations' active management of social media page?	Management of social media page (i.e., Facebook)	Facebook posting counts and nature

Appendix C. Practical Guidelines for Social Media

Studies	Organizations Goals	Practical Guidelines
Di Gangi et al. (2010)	How to build and manage user innovation communities	• Create user toolkit • Strategic positioning of personnel • Engage lead users • Promote self-governance • Respond quickly, ask questions • If you let them vote, make it count • Present progress clearly
Jarvenppa and Tuunainen (2013)	How to use social media for open co-creation	• Stay Focused on Long-Term Goals During Shorter-Term Initiatives • Experiment with Multiple SMTs • Build Community and Relational Identification with the SMT Followers • Use Both Institutionalized and Individualized Socialization Tactics • Reinforce and Leverage External Co-Creation Initiatives with Internal Changes
Kane et al. (2009)	How to manage online communities	• Develop formal social media policies • Monitor external and internal online communities • Engage online communities • Act as first responders
Kaplan (2012)	How to take advantage of social media on smart phones	• Individualize activities to take account of user preferences and interests • Integrate activities into users' life to avoid being a nuisance • Involve users through engaging conversations • Initiate creation of user-generate contents
Kaplan and Haenlein (2010)	How to use social media in general	• Choose carefully • Pick the application, or make your own • Ensure activity alignment • Media plan integration • Access for all • Be active • Be interesting • Be humble • Be unprofessional • Be honest

Kietzmann et al. (2011)	How to manage social media activities	• Recognize and understanding social media environ met by using the "honeycomb" framework • Develop social media strategies and plans that align with firms' business strategies • Be a curator of social media content and interactions • Keep track of what is being talked about on social media
Leidner et al. (2010)	How to use internal social media to assimilate new hires	• Allow New Hires to Self-manage their Assimilation into the Organization • Legitimize Use of Enterprise 2.0 Systems During the Workday • Seek Senior Sponsors for Work-related Events • Blur the Social/Work Boundaries to Maximize the Potential Benefits from Social Networking

Appendix D. List of Firms in Original Sample

AES Corporation
Allegheny Energy
Alpha Natural Resources
Ameren
American Electric Power
Anadarko Petroleum
Apache
Aquila
Atmos Energy
Baker Hughes
BJ Services
British Petroleum
Burlington Resources
Calpine
Cameron International
CenterPoint Energy
Chesapeake Energy
Chevron
Cinergy
CMS Energy
ConocoPhillips
Consol Energy
Consolidated Edison
Constellation Energy
Crosstex Energy
CVR Energy
Devon Energy
Dominion Resources
DTE Energy
Duke Energy
Dynegy
Edison International
El Paso
Enbridge Energy Partners
Energy East
Energy Future Holdings
Energy Transfer Equity
Energy Transfer Partners
Entergy
Enterprise GP Holdings
Enterprise Products Partners
EOG Resources
Exelon
Exxon Mobil
FirstEnergy
FMC Technologies
Global Partners
Halliburton
Hess
HollyFrontier
Integrys Energy Group
Kerr-McGee
KeySpan
Kinder Morgan
Marathon Oil
Marathon Petroleum
MDU Resources Group
Mirant
MRC Global
Murphy Oil
National Oilwell Varco
NextEra Energy
NiSource
Northeast Utilities
NRG Energy
NuStar Energy
Occidental Petroleum
OGE Energy
Oneok
Peabody Energy
Pepco Holdings
PG&E Corporation
Plains All American Pipeline
PPL
Premcor
Progress Energy
Public Service Enterprise Group
Reliant Energy
Royal Dutch Shell
Scana
Schlumberger
Sempra Energy
Sierra Pacific Resources
Smith International
Southern
Spectra Energy
Sunoco
Targa Resources
TEPPCO Partners
Tesoro
TransMontaigne
UGI
Unocal
Valero Energy
Western Refining
Williams
Wisconsin Energy
Xcel Energy
XTO Energy

Appendix E. Firms Removed from Original Sample

Firm	Reason
Allegheny Energy	In 2010, it was merged with First Energy.
Aquila	In 2010, it become a wholly owned subsidiary of Great Plains Energy.
BJ Services	In 2010, it was acquired by Baker Hughes
British Petroleum	It was removed to prevent possible noise in the data due to the BP oil spill in 2010.
Burlington Resources	In 2005, it was sold to ConocoPhilips.
Cinergy	In 2006, it was acquired by Duke Energy.
Energy East	In 2007, it was acquired by Iberdrola SA (Spanish firm).
Enterprise GP Holdings	In 2010, it was acquired by Enterprise Products.
Kerr-McGee	In 2006, it was acquired by Anadarko Petroleum.
KeySpan	In 2006, it was acquired by National Grid plc (UK firm).
Mirant	In 2010, it was merged with Reliant Energy.
Premcor	In 2005, it was acquired by Valero.
Smith International	In 2010, it became a wholly owned subsidiary of Schlumberger.
TEPPCO Partners	In 2009, it was acquired by Enterprise Product Partners.
TransMontaigne	In 2006, it became a wholly owned subsidiary of Morgan Stanley,
Unocal	In 2005, it was merged with Chevron.

Appendix F. LexisNexis Search Strings for News Releases Including Narratives about Social Media

(facebook and not (www! pre/5 facebook) or (http:// pre/5 facebook) or ("Join us on" pre/5 facebook) or ("Updates on" pre/5 facebook)) or (twitter and not (www! pre/5 twitter) or (http:// pre/5 twitter) or ("Follow us on" pre/5 twitter) or ("Updates on" pre/5 twitter)) or ("social media" or "social networking" or "LinkedIn" or "Chatter" or "Salesforce" or "Tumblr" or "blog" or "wiki" or "web 2.0" or "youtube" or "mashup" or "rss" or "forums" or "online community" or "user-created content" or "virtual social world" or "instagram" or "virtual world" or "social bookmark" or "Flickr")

Appendix G. Example of Narratives about Social Media

Delo® Grease ESI named to Equipment Today Contractors' Top 50 New Products of 2012;
Grease Delivers Optimum Equipment Protection and ROI with Service Intervals of 30,000 Miles and Beyond

LENGTH: 839 words

DATELINE: SAN RAMON, Calif.

Chevron Products Company, a **Chevron** U.S.A. Inc. division, maker of the Delo® brand of technologically advanced engine oils, lubricants and coolants, announced today its Delo® Grease ESI was selected by Equipment Today, as one of the "game-changing new construction products of 2012". The product was chosen by the nationally recognized equipment magazine, serving commercial construction contractors, as an award winner for the 2012 Contractors' Top 50 New Products. The award is given based on inquiries, page views and online voting by readers of Equipment Today, which reaches 77,000 construction equipment owners and end users. Additional information on award recipients can be found in the September issue of Equipment Today and in a special online section of ForConstructionPros.com……

Delo Grease ESI is available across North American. Please contact Chevron or your local lubricant marketer for more information on availability and package styles.

Follow the Delo Brand

The Delo brand can be followed on various **social media** channels, including **Facebook** , **YouTube** , **Twitter** and **Flickr** .

Appendix H. Social Media Services

Source: Brian Solis & JESS3 (https://conversationprism.com/)

Appendix I. R Code for Gathering Tweets

```
require(twitteR)

#-----------set up Twitter authentication ------------------------

download.file(url="http://curl.haxx.se/ca/cacert.pem", destfile="cacert.pem")

reqURL <-  "https://api.twitter.com/oauth/request_token"
accessURL <- "https://api.twitter.com/oauth/access_token"
authURL <- "https://api.twitter.com/oauth/authorize"
consumerKey <- "k2joAJcuH91jo6RBaJ9jpHa3T"
consumerSecret                                                              <-
"7Rr8wAZXXy79bkbhm2E9Dvtu8s3CRhdRGMqNhLyOluxHUW5ies"
twitCred <- OAuthFactory$new(consumerKey=consumerKey,
                        consumerSecret=consumerSecret,
                        requestURL=reqURL,
                        accessURL=accessURL,
                        authURL=authURL)
twitCred$handshake(cainfo="cacert.pem")
#save for later use for Windows
save(twitCred, file="twitter authentication.Rdata")
load("twitter authentication.Rdata")
registerTwitterOAuth(twitCred)

#-----------Get data for Baker and Hughes-------------------------

BHInc.list <- userTimeline('BHInc', n=3000, includeRts=TRUE, cainfo="cacert.pem")
BHInc.df = twListToDF (BHInc.list)
write.csv (BHInc.df, file='C:/Users/Inchan/Desktop/BHInc.csv', row.names=F)
```

Appendix J. Coding Scheme for Boltanski and Thevenot Prototypical Logics

Logic	**Definitions**	**Representative Keywords**	**Prototypical Actors**
Inspiration	Related to creating creative tangible and/or intangible materials (e.g., ideas)	Inexpressible, ethereal, bizarre, unusual, marvelous, unspeakable, disturbing, exciting, spontaneous, emotional, love, passion, create, escape from habit, risk, uniqueness, **discover*, *innovate*, *innovative** (cannot just be self-promotion, has to reference **something new**)	Artists, visionaries, genius
Domestic	Related to patrimonials (i.e., patriarchy and) matriarchy (e.g., sponsorship, encouragement etc.)	Benevolent, trustworthy, honest, faithful, habits, etiquette, gift (if **both parties receive** something of **value** and what is **exchanged** is **stipulated**, then **not a gift**), duty, responsibility, **loved ones**, **empower**, **help**, title, **lead** (in a **leadership** sense, **not** in a **prominence** sense), generations, tradition, hierarchy, well brought up, wise, rank, authority, subordination	Parents, king, ancestors, leader, boss
Renown	Related to gaining public fame, recognition, esteem etc.	Public opinion, fame, reputed, recognized, visible, to have success, to distinguish oneself, attention getting, recognition, **leading** (in a **prominence** sense, **not** in a **leadership** sense), **winner** (relative to **accolades or prominence**, **not tangible resources**, e.g., won a bid)	Stars/fans, opinion leader, spokesperson
Civic	Related to fixing social problems	Preeminence of collectives, rule governed, official, dignity, civil rights, renunciation of the particular (good of the many over good of the few), solidarity, **legalize**, **codify**, **mobilize**, **membership**, **collective*	Public collectives, parties, representatives, federation, chapter, office, committee, secretary

		*action**, **educate** (refers to educating the **public**, **not corporate training**), **community**	
Market	Related to gaining monetary benefit	Competition, rivalry, competitors, winner (relative to **tangible resources**, e.g., won a bid, **not accolades or prominence**), of value, desire, selfishness, opportunism, detachment, possessions, buy, get, sell, business, market, pay, compete, deal, prize, money, value, payback, benefit	Businessmen, salesmen, clients, buyers, contractors
Industrial	Related to improving efficiency	Efficiency, performance, future, functional, reliable operational, breakdown, tools (e.g., voting tools), criteria, definitions, methods, plan, goal, cause, factor, average, probability, progress, control, standardize, optimize, solve, organize, analyze	Professionals, experts, specialists

**Developed based on Boltanski and Thevenot's conceptualization.*

Appendix K. CEO Letters to Shareholders by Firm by Year

Company	2009	2010	2011	2012
AES Corporation	O	O	O	O
Alpha Natural Resources	X	X	X	O
Ameren	O	O	O	O
American Electric Power	X	X	X	X
Anadarko Petroleum	O	X	O	O
Apache	O	O	O	O
Atmos Energy	O	O	O	O
Baker Hughes	O	O	O	O
Calpine	O	O	O	O
Cameron International	O	O	O	O
CenterPoint Energy	O	O	X	O
Chesapeake Energy	O	X	O	O
Chevron	O	O	O	X
CMS Energy	O	O	O	O
Conoco Phillips	O	O	O	O
Consol Energy	X	X	X	X
Consolidated Edison	O	O	O	O
Constellation Energy	X	X	X	X
Crosstex Energy	O	O	O	X
CVR Energy	O	O	X	O
Devon Energy	O	O	O	O
Dominion Resources	O	O	O	X
DTE Energy	X	X	X	X
Duke Energy	O	O	O	O
Dynegy	O	X	X	X
Edison International	O	O	O	O
El Paso Corporation	O	O	O	O
Enbridge Energy Partners	O	O	X	O
Energy Future Holdings	X	X	X	X
Energy Transfer Equity	X	X	X	X
Energy Transfer Partners	X	X	X	X
Entergy	O	O	O	O
Enterprise Products Partners	X	X	X	X
EOG Resources	O	O	O	O
Exelon	O	O	O	O
Exxon Mobil	O	O	O	O

FirstEnergy	O	O	O	O
FMC Technologies	O	X	O	O
Global Partners	O	O	O	X
Halliburton	O	X	O	O
Hess	O	O	O	O
HollyFrontier	O	O	O	X
Integrys Energy Group	O	O	O	O
Kinder Morgan	O	O	O	O
Marathon Oil	O	O	O	O
Marathon Petroleum	X	X	O	O
MDU Resources Group	O	O	O	O
MRC Global	X	X	O	X
Murphy Oil	O	O	O	O
National Oilwell Varco	O	O	O	X
NextEra Energy	O	O	O	O
NiSource	O	O	O	O
Northeast Utilities	O	O	X	X
NRG Energy	O	O	X	X
NuStar Energy	X	X	X	X
Occidental Petroleum	X	X	O	O
OGE Energy	O	O	O	X
OneOK	O	O	O	O
Peabody Energy	O	O	O	O
Pepco Holdings	O	O	O	X
PG&E Corporation	O	O	X	X
Plains All American Pipeline	X	O	O	X
PPL	O	O	O	O
Progress Energy	O	O	X	X
Public Service Enterprise Group	O	O	X	O
Reliant Energy	X	X	X	X
Scana	O	O	O	O
Schlumberger Technology Corporation	X	O	O	O
Sempra Energy	O	O	O	O
Shell Oil Company	O	O	O	O
Sierra Pacific Resources	O	O	X	O
Southern Company	X	X	X	X
Spectra Energy	O	O	O	O
Sunoco	O	O	O	X
Targa Resources	X	X	X	X
Tesoro	X	X	X	X

UGI	O	O	O	O
Valero Energy	O	O	X	O
Western Refining	X	X	O	X
Williams	O	O	O	O
Wisconsin Energy	O	O	O	O
Xcel Energy	O	O	X	O
XTO Energy	X	X	X	X
Total	**62**	**59**	**56**	**52**

Notes:
O: CEO letter to shareholders exist for the year.
X: CEO letter to shareholders does not exist for the year.

Appendix L. Example Usage of Diversity Indices

Sample Studies	Diversity Variable	Diversity Measure
Petkova et al. (2013)	Sensegiving diversity	Blau's Index
Menz and Scheef (2013)	Product diversification	Entropy (Jacquemin-Berry Index)
Menz and Scheef (2013)	TMT role interdependence	Blau's Index
Nielsen and Nielsen (2013)	TMT nationality diversity	Blau's Index
Lu and Beamish (2004)	Product diversification	Blau's Index (Herfindahl)*
Carpenter (2002)	TMT functional diversity TMT education diversity	Blau's Index
Geringer et al. (2000)	Product diversification	Blau's Index (Herfindahl)
Hitt et al. (1997)	International diversification Product diversification	Entropy (Jacquemin-Berry Index)
Hambrick et al. (1996)	TMT functional diversity TMT education diversity	Blau's Index (Herfindahl)
Tallmand and Li (1996)	Product diversification	Blau's Index (Herfindahl)

**The Herfindahl index is essentially the same as the Blau's index (Bunderson and Sutcliffe 2002).*

Appendix M. Stata Code

Descriptive Statistics (for H1)	tabstat SMSUM1 NarrativeOzero0 Res_Availability CEOAttention_SM MMM Patents_App IND1 IND2 IND3 , case stat(n, me, sd) col (stat) long
Correlations	corr SMSUM1 NarrativeOzero0 Res_Availability CEOAttention_SM MMM Patents_App IND1 IND2 IND3 pwcorr SMSUM1 NarrativeOzero0 Res_Availability CEOAttention_SM MMM Patents_App IND1 IND2 IND3, o case star(.05)
Multicollinearity (for H1)	collin NarrativeOzero0 MMM CEOAttention_SM Res_Availability IND1 IND2 IND3 if !missing(SMSUM1), corr
Heteroskedasticity (for H1)	xtgls SMSUM1 NarrativeOzero0 MMM CEOAttention_SM Res_Availability IND1 IND2 IND3 Patents_App, p(h) xttest3
A1 auto-correlation on pulled data (i.e., non panel-specific)	xtserial SMSUM1 NarrativeOzero0 MMM CEOAttention_SM Res_Availability IND1 IND2 IND3 Patents_App
H1	xtpcse SMSUM1 NarrativeOzero0 MMM CEOAttention_SM Res_Availability IND1 IND2 IND3 Patents_App, hetonly c(p) rho(tsc)
H1 (binomial)	xtnbreg SMSUM1 NarrativeOzero0 MMM CEOAttention_SM Res_Availability IND1 IND2 IND3 Patents_App
H2	xtpcse Blau1 SMSUM Oper Num_ForeignCountry P_Orientation , hetonly c(p) rho(tsc)
H3	xtpcse Blau1 NarrativeOzero0 SMSUM SMSUMxNarO Oper Num_ForeignCountry P_Orientation, hetonly c(p) rho(tsc)
H4 (KLD)	xtpcse KLD2 Blau EmpNum FirmAge PastROA3yAVG, hetonly c(p) rho(tsc)
H4 (Reputation)	xtpcse Rep2 Blau EmpNum FirmAge PastROA3yAVG, hetonly c(p) rho(tsc)
H5 (ROA)	xtpcse ROA2 Blau RiskLevel Ind_Profitability, hetonly c(p) rho(tsc)
H5 (ROS)	xtpcse ROS2 Blau RiskLevel Ind_Profitability, hetonly c(p) rho(tsc)
Mediation (SMUSE→Logic Diversity-→KLD)	xtpcse KLD3 Blau1 SMSUM EmpNum FirmAge PastROA3yAVG, hetonly c(p) rho(tsc)
Mediation (SMUSE→Logic Diversity-→ROA)	xtpcse ROA2 Blau1 SMSUM RiskLevel Ind_Profitability, hetonly c(p) rho(tsc)

Appendix L. Multicollinearity Diagnostic Test Full Results

Model for	**Variables**	**VIF**	**SQRT VIF**	**Tolerance**	**R-Squared**
H1	NarraComp (t-1)	1.09	1.04	0.9181	0.0819
	ResAvailability (t-1)	1.31	1.14	0.7648	0.2352
	CEO attention SM (t-1)	1.08	1.04	0.9219	0.0781
	Major Event (t-1)	1.07	1.04	0.9307	0.0693
	Firm Innovativeness (t-1)	1.32	1.15	0.7584	0.2416
	Industry 1	2.31	1.52	0.4323	0.5677
	Industry 2	1.63	1.28	0.6133	0.3867
	Industry 3	1.88	1.37	0.5329	0.4671
H2	SM USE (t-1)	1.01	1	0.9936	0.0064
	Operational Scope (t-1)	1.01	1	0.9945	0.0055
	Int' Business Scope (t-1)	1.01	1.01	0.9878	0.0122
	Political Orientation	1.01	1.01	0.9876	0.0124
H3	NarraComp (t-1)	1.09	1.04	0.9201	0.0799
	SM USE (t-1)	1.07	1.03	0.9358	0.0642
	NarraComp*SM_Use (t-1)	1.09	1.05	0.915	0.085
	Operational Scope (t-1)	1.01	1	0.9909	0.0091
	Int' Business Scope (t-1)	1.02	1.01	0.985	0.015
	Political Orientation	1.01	1.01	0.9862	0.0138
H4	Logic Diversity (t-2)	1.01	1	0.9925	0.0075
	Firm Size (t-2)	1.47	1.21	0.6802	0.3198
	Firm Age (t-2)	1	1	0.9992	0.0008
	Past Performance (t-2)	1.46	1.21	0.6846	0.3154
H5	Logic Diversity (t-2)	1.02	1.01	0.9798	0.0202
	Risk Level (t-2)	1.05	1.02	0.9521	0.0479
	Ind Profitability (t-2)	1.04	1.02	0.9642	0.0358

Appendix O. OG&E's Response to Messages Posted on Social Media

OG&E
October 27, 2014 · Edited ·

Pumpkin submissions for our Orange Power contest have ended, but the voting continues. Vote for your favorite Pumpkin and help a fan win 2 tickets and a VIP pass to OSU vs. Texas. Voting ends Oct. 29.

Vote here: http://a.pgtb.me/73S9Gn

Orange Power Contest

A.PGTB.ME

Like · Comment · Share · 311 21 2

311 people like this.

2 shares

Albert Barbara Semrad Seems this contest is only for pokes fans, what about us OU fans?????
October 28, 2014 at 6:55pm · Like

Albert Barbara Semrad Does this mean OU fans don't have to pay our bills?
October 28, 2014 at 6:57pm · Like

Chris Charlton Albert, OU fans already don't pay their bills then again they don't have electricity. lol
October 28, 2014 at 10:09pm · Like · 2

Chris Charlton When are you going to contact an announce the winners?
October 30, 2014 at 12:59pm · Like

Chris Charlton Royce, A lot of likes but not really that many entries. I mean they like the concept of winning tickets but don't want to hassle with a pumpkin, I guess?
October 30, 2014 at 3:21pm · Like

OG&E Chris Charlton we're tallying the unique likes and will contact the winners directly to let them know the details of claiming their prize.
October 30, 2014 at 3:23pm · Like · 2

Appendix P. Data Analysis including BP Data

Here, I report the results of data analyses that include BP.

	IVs \ DVs	SMUSE	Logic Diversity		REP	KLD	ROA	ROS
H1	**NarraComp *(t-1)***	333.63** (128.53)						
H2	**SM Use *(t-1)***		.004* (.002)					
H3	**NarraComp* SM_Use *(t-1)***			-.018 (.01)				
H4	**Logic Diversity *(t-2)***				.005 (.013)	.21*** (.04)		
H5							-.02 (.06)	.07 (.09)

<0.05, **<0.01, *<0.001*

Heteroskedasticity-corrected standard errors are in parentheses