THE IMPACT OF SOCIAL MEDIA INITIATIVES ON OPERATIONAL AND FINANCIAL OUTCOMES: TWO EMPIRICAL STUDIES

LAM KIN SANG

Ph.D

The Hong Kong Polytechnic University

2015

The Hong Kong Polytechnic University

Department of Logistics and Maritime Studies

The Impact of Social Media Initiatives on Operational and Financial Outcomes: Two Empirical Studies

Lam Kin Sang

A thesis submitted in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

November 2014

CERTIFICATE OF ORIGINALITY

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it reproduces no material previously published or written, nor material that has been accepted for the award of any other degree or diploma, except where due acknowledgement has been made in the text.

_____ (Signed)

Lam Kin Sang (Name of student)

Abstract

With its growing popularity and influence, online social media, such as Facebook and Twitter, is transforming politics and social norms, and the way business is conducted. Although this emerging social media phenomenon has attracted much attention of practitioners and researchers, it is still not well understood whether and how firms can gain any operational and financial benefits from their social media initiatives. We conduct two empirical studies to address these questions.

Our first study focuses on firms' use of social media for sales and marketing, which is termed as social commerce. Considering the ability of social commerce to facilitate social and visible communication among firms and customers via social media, we draw upon uncertainty reduction theory from the communication literature to argue that social commerce benefits firms by reducing the uncertainty faced by customers. Following the uncertainty reduction logic, we further postulate that the effectiveness of social commerce in reducing uncertainty depends on the information warrant embedded in the communication as perceived by customers. An event study based on 275 social commerce initiatives announced between 2006 and 2011 supports our arguments. It shows that social commerce announcements increase the market value of firms, especially when firms' products bear high

uncertainty. Moreover, we find that both communicator-specific warrant, such as firm reputation, and channel-specific warrant, such as social media platform credibility, enhance the value creation of social commerce. Therefore, our first study offers an uncertainty reduction explanation on the business value of social commerce initiatives and provides empirical evidence in terms of increased market value.

Our second study concerns firms' overall social media efforts, without limiting to sales and marketing. Although social media has been widely viewed as a new commerce channel for the sale of products and services, its applications and implications beyond sales and marketing, especially in such areas as operations and innovation management, are emerging and worth further investigation. Therefore, our second study intents to understand whether and how firms' social media initiatives are able to improve their operational efficiency and innovativeness, two critical operational outcomes of firms. Viewing firms' social media initiatives from a social capital perspective, we argue that social media enables firms to facilitate faster information flows and better knowledge sharing across their internal and external social networks, resulting in operational efficiency and innovativeness improvement. However, the degree of the improvement might be contingent on the

richness, diversity, and quality of the information and knowledge being exchanged, which in turn depend on the structural and relational embeddedness of firms' ties with stakeholders in the social networks. Based on data collected from multiple sources, we construct a sample containing 1,096 firm-year observations and employ the system generalized method of moments (GMM) estimator for dynamic panel data (DPD) to test our arguments. The test results show that firms' social media initiatives improve their operational efficiency and innovativeness. Moreover, we further find that the improvement due to social media initiatives is more positive for firms with more geographically diversified stakeholders (structural embeddedness) and better stakeholder relationships (relational embeddedness). Therefore, our second study explains the ability of social media initiatives to unlock the potential of firms' embedded social capital and transform firms into ambidextrous organizations.

Taken together, our two studies highlight the critical role social media plays in improving firms' operational and financial outcomes, and also reveal the underlying factors that make the improvement vary across firms. The theoretical perspectives and the empirical evidence documented in our research provide important implications for future social media research and for firms to leverage the emerging social media technologies to gain competitive advantage.

Publications Arising from the Thesis

Lam, H. K. S., Yeung, A. C. L., Lo, C. K. Y., & Cheng, T. C. E. (2014). *Leveraging Social Media for Competitive Advantage: An Empirical Investigation on the Market Value of Social Commerce Initiatives*. Paper presented at the fifth POMS-HK International Conference, Hong Kong.

Lam, H. K. S., Yeung, A. C. L., Lo, C. K. Y., & Cheng, T. C. E. (2014). *Social Commerce Initiatives and Firm Value: The Roles of Implementing Strategies and Product Characteristics*. Paper presented at the POMS 2014 Annual Conference, Atlanta, Georgia, USA.

Lam, H. K. S., Yeung, A. C. L., Lo, C. K. Y., & Cheng, T. C. E. (2014). Social Commerce Initiatives and Market Value of Firms: A Contingency Perspective through Uncertainty Reduction. Paper under review at *MIS Quarterly*.

Acknowledgements

I would like to express my sincere gratitude to my three PhD supervisors, Prof. Andy Yeung, Prof. Edwin Cheng, and Dr. Chris Lo. It has been my honor to be their PhD student. I need to thank them for giving me the opportunity to pursue my PhD studies and guiding me throughout this research journey. This thesis would not have been possible without their invaluable advice, selfless sharing, and kindly encouragement. Their dedication and contribution to research and education have inspired and motivated me to be a good researcher and teacher in the future.

I also would like to thank Dr. Zhou Xu for being the chair, and Prof. Timon Du and Prof. Barbara Flynn for being the external members, of the board of my PhD examination. Their constructive and insightful comments have significantly improved the quality of this thesis. I also appreciate all the 12 student assistants for their help in collecting data for my PhD research. Their patience, efficiency, and professionalism in data collection have dramatically speeded up my research progress and enhanced my research quality.

Thanks should also go to my mother, Heung, and my girlfriend, Sze A, for their endless love, understanding, and support in my PhD journey. Although they could

not provide much technical support to my research, their personal and spiritual support was equally important to me, especially during the tough times in this PhD journey.

Table of Contents

List of Tables

List of Abbreviations

AAR	**Average Abnormal Return**
AR	**Abnormal Return**
CAAR	**Cumulative Average Abnormal Return**
CAR	**Cumulative Abnormal Return**
CRM	**Customer Relationship Management**
CRSP	**Center for Research in Security Prices**
DPD	**Dynamic Panel Data**
FASB	**Financial Accounting Standards Board**
FE	**Fixed Effects**
GMM	**Generalized Method of Moments**
IPO	**Initial Public Offering**
IV	**Instrumental Variables**
KLD	**Kinder, Lyndenberg, and Domini**
LSDV	**Least Squares Dummy Variables**
MAC	**Most Admired Companies**
OLS	**Ordinary Least Squares**
OM	**Operations Management**
R&D	**Research and Development**
ROA	**Return on Assets**
ROS	**Return on Sales**
SEC	**Securities and Exchange Commission**
SFE	**Stochastic Frontier Estimation**
SIC	**Standard Industrial Classification**
SMCR	**Source-Message-Channel-Receiver**
US	**United States**

Chapter 1 Introduction

1.1 Research Background

According to Kaplan and Haenlein (2010), social media can be defined as “a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0, and that allow the creation and exchange of User Generated Content” (p. 61). It includes social networking sites such as Facebook and Google+, as well as other Web 2.0 applications such as microblogs (e.g., Twitter), collaborative projects (e.g., Wikipedia), content communities (e.g., YouTube), virtual game worlds (e.g., World of Warcraft), and virtual social worlds (e.g., Second Life) (Kaplan and Haenlein, 2010). Social media is gaining popularity and influence among Internet users worldwide. For instance, in less than ten years, Facebook’s global active users have increased from 1 million in 2004 to 1.23 billion in 2013 (Kiss, 2014); A survey conducted by Experian, a global information services group, suggests that Internet users in the US spend about 27% of their online time on visiting social media sites (Gaudin, 2013). In view of this emerging trend, firms have begun to integrate social media technologies into their daily business operations. For instance, P&G has launched storefronts on Facebook, allowing Facebook users to buy P&G products directly without ever leaving the site (Gobry, 2011); Lockheed Martin has built its own internal social media platform called Unity,

enabling social interactions and project collaborations among its geographically dispersed employees (Murphy, 2010). A survey by *Harvard Business Review* also suggests that 79% of organizations have either adopted social media for organizational purposes (58%) or prepared to launch their social media initiatives (21%) (Harvard Business Review Analytic Services, 2010).

A natural question arising from this emerging trend in which firms adopt social media for organizational purposes is: Do firms really benefit from their social media efforts? Some anecdotal evidence suggests that they do (Guglielmo, 2009; Patel, 2010; Kiron et al., 2012; Business Wire, 2013). For instance, Dell has used Twitter feeds to sell PCs, accessories, and software to its followers, generating $6.5 million in revenue as of December 2009 (Guglielmo, 2009); Starbucks has relied on its social media platform named My Starbucks Idea to receive more than 150,000 ideas from customers, leading to 277 new innovations over a five-year period (Business Wire, 2013). A survey by McKinsey & Company also suggests that about 90% of firms that have adopted social media for organizational purposes reported some degrees of business benefits from the adoptions (Chui et al., 2012). However, some practitioners disagree (Gaudin, 2010; Lutz, 2012; Lee, 2013). For instance, Sucharita Mulpuru, an analyst at Forrester Research, has argued that the use of

social media for sales and marketing does not work because it is like “trying to sell stuff to people while they’re hanging out with their friends at the bar” (Lee, 2013, p. 94); Kathleen Culver, a transformation architect at Alcatel-Lucent, has warned the possibility of information overload and employee burnout after adopting enterprise social media in organizations (Gaudin, 2010). The recent terminations of social media initiatives by some well-known retailers including Gap Inc. and J.C. Penney further spark the controversy over the business value of firms’ social media efforts (Lutz, 2012). Therefore, the debate about the benefits of firms’ social media initiatives continues among practitioners and it is still not conclusive whether or not firms should adopt social media for organizational purposes.

1.2 Literature on Firms’ Social Media Initiatives

The emerging social media phenomenon has attracted much attention of researchers from different disciplines in recent years. Several special issues on social media have appeared in different Business journals such as *Information Systems Research* (Aral et al., 2013), *Marketing Science* (Fader and Winer, 2012), and the *International Journal of Electronic Commerce* (Liang and Turban, 2012). Although the academic community has been gaining more knowledge about the commercial activities on social media, it is still not clear whether and how firms’ social media

initiatives can improve their operational and financial performance. As pointed out by Aral et al. (2013), much of the extant literature has focused on the effects of individual social media users' actions, but not the outcomes of firms' strategic use of social media (i.e., firms' social media initiatives). For instance, Forman et al. (2008) investigate the impact of consumer-generated product reviews in an online community on the product sale of firms; Luo et al. (2013) study the ability of consumers' online ratings and blog posts to predict the equity value of firms. Even though some researchers have begun to deal with firms' social media initiatives directly (Liang and Turban, 2012; Goh et al., 2013; Rishika et al., 2013; Wu, 2013; Gu and Ye, 2014), they focus on the consequences of firms' social media initiatives at the individual user level, rather than the impact at the firm level. For instance, Wu (2013) concerns how the adoption of a social networking tool in an information technology firm affects the work performance and job security of individual employees; Rishika et al. (2013) examine the impact of individual customers' participations in a specialty firm's social media efforts on their frequencies of shopping visits. The lack of research investigating the impact of social media initiatives at the firm level may be due to the difficulty in collecting social media data across different firms. This is also reflected in the research context of prior studies on firms' social media initiatives that mainly rely on social media data from

a single firm only (e.g., Goh et al., 2013; Rishika et al., 2013; Wu, 2013). Therefore, there is still little empirical evidence about the consequences of firms' social media initiatives at the firm level.

On the other hand, as the adoption of social media in organizations is a relatively new phenomenon, it is still not well understood why firms are able to gain operational and financial benefits, if any, from their social media initiatives. Although a lot of effort has been put into developing new theories to explain the emerging social media phenomenon in recent years (Ollier-Malaterre et al., 2013; Kane et al., 2014a; Leonardi, in press), they mainly focus on explaining the actions of individual social media users, rather than firms' strategic use of social media. For instance, Ollier-Malaterre et al. (2013) build a framework to theorize about the motives and consequences of individual employees to adopt four archetypical sets of boundary management behaviors (i.e., open, audience, content, and hybrid) in public social networking sites with their professional contacts; Leonardi's (in press) communication visibility theory explains how visible communication occurring between others on social media improves the metaknowledge of a third party observer through two interrelated mechanisms: message transparency and network translucence. Such a focus on explaining individual behaviors on social media is

consistent with prior empirical studies that have concentrated on the consequences of individual social media users' actions (e.g., Forman et al., 2008; Luo et al., 2013) or the impact of firms' social media initiatives at the individual user level (e.g., Rishika et al., 2013; Wu, 2013). Therefore, little is known in the literature about the mechanisms underlying the impact of social media initiatives at the firm level.

1.3 Research Objectives

Our research aims to investigate whether, how, and why firms' social media initiatives affect their operational and financial performance. First, although the debate over the business value of firms' social media initiatives continues among practitioners, there is little empirical evidence documented in the academic literature. Our research intends to examine whether firms are able to reap benefits from their social media initiatives. Moreover, as the adoption of social media in organizations is still at its early stage, there are no best practices or commonly agreed adoption approaches among practitioners (Kiron et al., 2012). In other words, firms bearing different characteristics or implementing different strategies may benefit quite differently from their social media initiatives. Therefore, we are also interested in how the benefits arising from social media initiatives vary across firms. Finally, although documenting the impact of firms' social media initiatives is important,

understanding the mechanisms underlying the impact is even more critical, especially considering the lack of corresponding theoretical explanations in the literature (Ollier-Malaterre et al., 2013; Kane et al., 2014a; Leonardi, in press). Therefore, our research also would like to understand why firms are able to benefit from their social media initiatives, if any.

1.4 Research Approaches

We conduct two studies to accomplish our research objectives. Our first study focuses on firms' social media initiatives that assist firms in the sale of products and services, which is known as social commerce (Stephen and Toubia, 2010; Liang and Turban, 2012). Our focus on social commerce is consistent with the current trend in which social media is more commonly used by firms for sales and marketing instead of other organizational purposes such as employee recruitment and supplier integration (Kiron et al., 2012). Considering the ability of social commerce to facilitate social and visible communication among firms and customers via social media, we draw upon uncertainty reduction theory from the communication literature (Berger and Calabrese, 1975; Berger, 1986; Berger, 2006) to argue that social commerce benefits firms by reducing the uncertainty faced by customers. Following the uncertainty reduction logic, we further postulate that the effectiveness

of social commerce in reducing uncertainty depends on the information warrant embedded in the communication as perceived by customers. In other words, we postulate that social commerce initiatives that bear higher warranting value are more likely to reduce the uncertainty faced by customers and thus benefit firms more. To test our arguments, we collect 275 social commerce announcements of public firms in the US between 2006 and 2011. The publicly available announcements used in our study overcome the difficulty in collecting social media data across firms. We adopt the event study methodology from the finance literature (MacKinlay, 1997; McWilliams and Siegel, 1997) to quantify the financial benefits arising from firms' social commerce initiatives. The event study methodology, with its assumption of efficient markets (Fama, 1970), measures the changes in firms' market value upon the announcements of firms' social commerce initiatives, overcoming the difficulty in quantifying the business value of social commerce as encountered by practitioners (Kiron et al., 2012). On the other hand, we construct a cross-sectional regression model to analyze how the benefits of social commerce initiatives vary across firms with different information warrants such as firm reputation and social media platform credibility. We also perform additional tests and employ alternative specifications and measurements to ensure the robustness of our findings.

While our first study focuses on firms' use of social media for sales and marketing (i.e., social commerce), our second study concerns firms' overall social media efforts, without limiting to sales and marketing. Although social media has been widely viewed as a new commerce channel for the sale of products and services, its applications and implications beyond sales and marketing, especially in such areas as operations and innovation management, are emerging and worth further investigation. Considering the ability of firms' social media initiatives to facilitate faster information flows and better knowledge sharing across firms' internal and external social networks, we adopt the theoretical lens of social capital to argue that social media initiatives enable firms to unlock the potential of their embedded ties with stakeholders in the social networks, resulting in operational efficiency and innovativeness improvement. However, we also realize that the degree of the improvement might be contingent on the richness, diversity, and quality of the information and knowledge being exchanged, which in turn depend on the structural and relational embeddedness of firms' social capital in the social networks. In other words, we argue that the impact of social media initiatives on operational efficiency and innovativeness varies across firms with different structural and relational social capital embedded in their social networks. We rely on the geographic diversity of firms' stakeholders and firms' relationships with stakeholders, respectively, to

represent the structural and relational dimensions of firms' social capital. To test our arguments, we collect and combine data from multiple sources, resulting in an unbalanced sample with 1,096 firm-year observations across 271 firms over a six-year period (i.e., from 2006 to 2011). We construct two Dynamic Panel Data (DPD) models to specify the impact of social media initiatives on operational efficiency and innovativeness, respectively. We also include the moderating effects of stakeholder geographic diversity and stakeholder relationships in the two models. We employ the system generalized method of moments (GMM) estimator (Arellano and Bover, 1995; Blundell and Bond, 1998) to test our DPD models. The System GMM estimator enables us to address the "dynamic panel bias" (Nickell, 1981) and the possible endogeneity issues in the DPD models (Wintoki et al., 2012). As sensitivity checks, we also employ alternative measures of our variables and perform additional estimation of the DPD models.

1.5 Research Findings

In our first study, the event study results show that the announcements of social commerce initiatives are positively associated with the market value of firms. More specifically, the cumulative average abnormal return (CAAR) in a three-day event window around the social commerce announcement is 0.86% ($p < 0.001$),

representing an average increase of US$179.42 million in terms of market value. Consistent with our uncertainty reduction argument, the cross-sectional regression results further suggest that the associations between social commerce announcements and market value are more positive when firms' products bear high uncertainty. Moreover, we also find that both firm reputation and social media platform credibility enhance the value creation of social commerce initiatives, highlighting the important role of information warrant in uncertainty reduction. In particular, our additional analysis suggests that firms with high reputation, deploying more creditable social media platforms, and selling products with high uncertainty reap significantly more benefits (CAAR = 1.82%; $p < 0.001$) from their social commerce announcements. On the other hand, firms with low reputation, deploying less creditable social media platforms, and selling products with low uncertainty suffer significant losses (CAAR = -1.31%; $p < 0.05$) from their social commerce announcements. It suggests that the financial outcomes of a firm's social commerce announcement depend on the product type, reputation, and deployment strategy of the firm. Our findings remain robust with additional tests, different model specifications, and alternative measurements. Therefore, our first study provides empirical evidence about the financial benefits of social commerce initiatives, and also explains the circumstances in which such benefits are higher for firms.

In our second study, the System GMM estimation results show that social media initiatives improve the operational efficiency and innovativeness of firms. Moreover, we also find that the improvement due to social media initiatives is more positive for firms with more geographically diversified stakeholders and better stakeholder relationships. It highlights the important role of structural and relational embeddedness of social capital in moderating the impact of social media initiatives. However, our results also suggest that neither stakeholder geographic diversity nor stakeholder relationship *per se* is able to improve operational efficiency and innovativeness. It supports our argument that the improvement in operational efficiency and innovativeness should be viewed as a result of firms' social media initiatives that unlock the potential of firms' embedded social capital for value creation. Our findings remain consistent with alternative variable measurements and additional estimation approaches. Therefore, our second study has documented the impact of social media initiatives on operational efficiency and innovativeness, and revealed how the impact varies across firms with different stakeholder geographic diversity and stakeholder relationships.

1.6 Research Importance

Our research is important in several ways. First, while the debate over the business value of adopting social media in organizations continues among practitioners, there is little empirical evidence documented in the literature about the operational and financial outcomes of firms' social media initiatives. Our research represents one of the first attempts to investigate the impact of social media initiatives at the firm level. Our two studies, with one focusing on firms' use of social media for sales and marketing (i.e., social commerce) and another concerning firms' overall social media efforts, provide empirical evidence about the operational and financial benefits of social media initiatives in terms of increased market value and improved operational efficiency and innovativeness. The results documented in our research provide important empirical support for firms to adopt social media for business purposes.

Moreover, our research not only documents the impact of social media initiatives, but also reveals the underlying factors that make the impact vary across firms. For instance, our first study shows that the associations between social commerce announcements and market value vary depending on product uncertainty, firm reputation, and social media platform credibility, while our second study suggests that the improvement in operational efficiency and innovativeness due to social media initiatives is contingent on the geographic diversity of firms' stakeholders and

firms' relationships with their stakeholders. The results of these in-depth analyses provide important implications for firms to reap more benefits from their social media efforts.

In addition to the empirical evidence, our research provides theoretical explanations on the impact of social media initiatives as well as how the impact varies across firms. For instance, our first study provides an uncertainty reduction account for the associations between social commerce announcements and market value, and adopts the concept of information warrant to explain how such associations vary across firms with different information warrants. On the other hand, our second study views the impact of social media initiatives on operational efficiency and innovativeness from a social capital perspective, and also explains how the impact varies across firms with different structural and relational social capital. These theoretical explanations presented in our research advance our understanding of the mechanisms underlying the value creation of firms' social media initiatives and provide important theoretical implications for future social media research.

Chapter 2 Study One: Social Commerce Announcements and Market Value

2.1 Theoretical Background and Hypothesis Development

2.1.1 Social Commerce

Liang and Turban (2012) suggest that social commerce should contain two essential elements, namely, social media and commercial activities. Social media include popular social networking sites such as Facebook and Twitter, as well as other Web 2.0 sites like corporate online communities and company websites with social networking capabilities (Kaplan and Haenlein, 2010). An important attribute of such social media sites is their capacity to facilitate multi-way social and visible communication among different users of the sites (Gu and Ye, 2014). However, not all communication facilitated via social media are commercial, such as political campaigns and social movements. On the other hand, while firms' activities on social media can be regarded as commercial in general, we focus on those related to sales and marketing for several reasons. First, although the definition of social commerce varies across studies, it is commonly agreed that social commerce is for "the marketing and selling of products and services" (Stephen and Toubia, 2010, p. 215). Moreover, social media is more commonly used for sales and marketing rather than other organizational purposes such as employee recruitment and supplier

integration (Kiron et al., 2012). Finally, as social media may enable firms to achieve different organizational purposes through quite distinct mechanisms, focusing on the use of social media for sales and marketing allows us to develop a more consistent and not yet over-generalized theoretical perspective.

Despite the increased interest in the business value of social media, Aral et al. (2013) point out that prior research has mainly focused on the effects of social media users' actions, rather than the outcome of firms' strategic use of social media. For instance, Forman et al. (2008) focus on how consumer-generated product reviews in an online community are related to product sale; Luo et al. (2013) concern how firms' equity value can be predicted by consumers' online ratings and blog posts. Even though some researchers have begun to study social commerce directly (Liang and Turban, 2012), they concentrate on the drivers or consequences of social commerce adoption at the individual user level, rather than the impact at the firm level. For instance, Liang et al. (2012) investigate how social support and website quality affect users' intention to adopt social commerce; Gu and Ye (2014) examine the impact of management responses via social media on the satisfaction of individual customers. Our research represents one of the earliest studies investigating the impact of firms' social commerce initiatives in terms of market value. Moreover, in response to

Liang and Turban's (2012) call for new theories to better understand the emerging social commerce phenomenon, we ground our research on uncertainty reduction theory from the communication literature.

2.1.2 Uncertainty Reduction Theory

Developed by Berger and his colleagues (Berger and Calabrese, 1975; Berger, 1986; Berger, 2006), uncertainty reduction theory seeks to explain how communication is used to reduce the uncertainty people face in interpersonal interactions. According to this theory, uncertainty is an unfavourable state and generates cognitive stress among people in interpersonal relationships. As a result, people often seek to reduce uncertainty, and communication is the primary vehicle for them to do so. People may engage in three different types of communication strategies to reduce uncertainty, namely, interactive, active, and passive communication. In interactive communication, information seekers engage in direct interaction with their targets to obtain uncertainty-reducing information through such methods as interrogation and self-disclosure. In active communication, there is no direct interaction between information seekers and their targets. Instead, information seekers acquire uncertainty-reducing information indirectly from third parties who are familiar with the targets. For instance, a customer may actively seek their friends' advice

regarding the quality of a certain service, rather than directly asking the firm to provide such information. Finally, in passive communication, information seekers neither interact directly with their targets nor communicate indirectly with third parties, but observe the communication between the targets and third parties passively to gather uncertainty-reducing information. For example, customers are engaged in the passive strategy as they read managers' responses to other customers' complaints in a social media website (Gu and Ye, 2014). Regardless of the specific communication strategies employed, reduction in uncertainty through communication should lead to trust and benefit the development of interpersonal relationships (Berger, 2006).

Since its conceptualization in the communication literature, uncertainty reduction theory has been adopted in different academic fields such as marketing and management (Morrison and Vancouver, 2000; Homburg et al., 2012; Walker et al., 2013). For instance, drawing upon uncertainty reduction theory, Walker et al. (2013) examine how communication throughout the recruitment process reduces the uncertainty faced by job seekers; Homburg et al. (2012) study how open communication about firm downsizing is related to customer uncertainty. Informed by studies employing uncertainty reduction theory and considering the ability of

social commerce to facilitate social and visible communication among different parties via social media (Liang and Turban, 2012), we see the merit of viewing the value creation of social commerce from the uncertainty reduction perspective.

2.1.3 An Uncertainty Reduction Perspective on Social Commerce

As traditional e-commerce mainly focuses on maximizing the efficiency of online transactions through sophisticated searches, one-click buying, and specification-driven virtual catalogues (Wang and Zhang, 2012; Huang and Benyoucef, 2013), it has long been criticized for its inability to reduce the uncertainty faced by customers. As a result, it is not surprising to find that traditional e-commerce channels are unsuitable for the sale of products with high uncertainty (Kiang et al., 2000; Overby and Jap, 2009). Social commerce, on the other hand, enables firms to facilitate all the three types of communication (i.e., interactive, active, and passive) via social media, reducing the uncertainty faced by customers, hence benefiting firms. For instance, instead of relying on the traditional one-way communication from firms to customers in e-commerce, social commerce enables firms to communicate interactively with customers via social media and address customers' queries about firms' products and services. Moreover, social communication occurs not only between firms and customers, but also among

customers, such that customers can communicate actively with one another to exchange information about firms' products and services. Finally, as the social communication among different parties is visible to other social media users, customers can observe the communication passively to gain knowledge about firms' products and services. Overall, all the three types of communication facilitated by social commerce, while not mutually exclusive, help reduce the product uncertainty perceived by customers, hence benefiting firms.

Although uncertainty reduction theory was originally developed for physical face-to-face communication, various empirical studies in the communication literature (e.g., Tidwell and Walther, 2002; Antheunis et al., 2012) have shown that individuals are quite capable of reducing uncertainty via computer-mediated communication (CMC) even in the absence of nonverbal cues (e.g., text-only CMC). Social information processing theory (Walther, 1992) also suggests that individuals are able to use CMC to develop relationships and express multi-dimensional relational messages through verbal or textual cues. Moreover, social commerce helps facilitate all the three types of communication simultaneously via social media, which is difficult to achieve in traditional CMC environments or physical communication channels. Therefore, there is no reason to believe that the

uncertainty reduction through the communication via social media will be in anyway weaker than face-to-face communication.

While the communication facilitated by social commerce is expected to reduce uncertainty and benefit firms, it is difficult for firms to quantify the business value arising from the communication (Kiron et al., 2012). In this research we overcome this difficulty by adopting the event study methodology from the finance literature (MacKinlay, 1997; McWilliams and Siegel, 1997) to measure the changes in firms' market value upon the announcements of social commerce initiatives. As the market is assumed to be efficient (Fama, 1970), the benefits arising from uncertainty reduction due to social commerce initiatives should be reflected in changes in firms' market value. Therefore, we propose that

H1. The announcement of a social commerce initiative is positively associated with the market value of the announcing firm.

If social commerce is able to reduce the uncertainty faced by customers as we have suggested, it is intuitive to expect that firms selling products with high uncertainty will benefit more from their social commerce initiatives. Uncertainty reduction

theory suggests that people are engaged in different types of communication strategies in order to reduce the uncertainty they face (Berger, 2006; Walker et al., 2013). In other words, people are less motivated to seek uncertainty-reducing information if they encounter low or no uncertainty. In the context of social commerce, if customers encounter high uncertainty about firms' products and services, it is more likely for them to be engaged in different types of communication via social media to obtain uncertainty-reducing information and social commerce plays a vital role in reducing their uncertainty. On the other hand, if customers are certain about firms' products and services, it is not necessary for them to seek uncertainty-reducing information via social media; hence social commerce may have little impact on their purchasing behavior. Although not explicitly adopting the theoretical lens of uncertainty reduction theory, prior social media studies have provided some empirical support for this argument (Huang et al., 2009; Bae and Lee, 2011). For instance, Huang et al. (2009) find that online product reviews have a greater influence on customers' purchase decisions for experience products (i.e., products with high quality uncertainty) than search products (i.e., products with low quality uncertainty). Therefore, we propose that

H2. The association between social commerce announcement and market value

is more positive for products with high uncertainty.

2.1.4 The Role of Information Warrant in Uncertainty Reduction

Although information seekers are engaged in communication in order to reduce uncertainty (Berger, 2006; Walker et al., 2013), not all information gathered from communication is perceived as trustworthy by information seekers. In other words, the effectiveness of communication in reducing uncertainty may depend on the extent to which information seekers trust the information obtained from communication. If information seekers trust the information obtained from communication, their uncertainty will be reduced accordingly; otherwise, communication may have little help in reducing their uncertainty. In the circumstance of uncertainty, information seekers may rely on other cues or warrants to gauge the legitimacy and validity of the information obtained from communication (Walther and Parks, 2002; Walther et al., 2009). Such information warrants could be specific to the communicators involved in the communication. For instance, while it is generally believed that online product reviews help reduce uncertainty and improve sale, recent studies (e.g., Forman et al., 2008; Hu et al., 2008; Luca, 2011; Baek et al., 2013) have shown that other reviewer-specific cues or warrants play important roles in moderating the impact of reviews.

Therefore, the ability of social commerce to reduce uncertainty and create value for firms may depend on the extent to which customers perceive the information obtained from social commerce as trustworthy. We consider firm reputation as an important firm-specific warrant that signals the trustworthiness of the information obtained from social commerce. This is because prior studies (e.g., Hansen et al., 2008; Wiles et al., 2010) have well documented the critical role firm reputation plays in commercial activities such as sales and marketing. Moreover, recent studies on social media (e.g., Hu et al., 2008; Luca, 2011; Baek et al., 2013) have suggested that reviewer reputation acts as an information warrant affecting the impact of product reviews. We thus expect a similar effect of firm reputation in social commerce. More specifically, we postulate that for firms with high reputation, firms' social commerce efforts are likely to be more effective. This is because customers will perceive that the information obtained from reputable firms through social commerce to be more trustworthy, further reducing the uncertainty they face about firms' products and services. However, for firms with low reputation, customers will be skeptical of the information obtained from such firms and their uncertainty may not be greatly reduced. Therefore, we propose that

H3. The association between social commerce announcement and market value is more positive for firms with high reputation.

While communicator-specific warrant such as firm reputation is expected to signal information trustworthiness and help reduce uncertainty, the roles of other non-communicator-specific warrants embedded in the communication process are also important. In particular, the well-established Source-Message-Channel-Receiver (SMCR) communication model (Berlo, 1960; Byron, 2008) regards communication channel as an essential element in the communication process, it is thus necessary to consider how channel-specific warrant may affect the information's trustworthiness as perceived by information seekers. The recent mass communication literature (e.g., Choi and Rifon, 2002; Bhatnagar et al., 2004; Judge et al., 2007) has also emphasized the role of channel-specific warrant such as medium credibility in altering receivers' perceptions of messages. For instance, Choi and Rifon (2002) show that Internet users view the message of an advertisement as more believable when the advertisement is placed on a more creditable website. Judge et al.'s (2007) research on academic publication suggests that readers rely on the ranking of a journal to judge the quality of a paper, even "controlling for the intrinsic quality of [the] paper as well as the prestige of its author(s)" (p. 494). Therefore, the extent to

which information seekers trust the information obtained from communication may not only depend on who the communicators are (communicator-specific warrant), but also which channels they use to communicate (channel-specific warrant).

The channel-specific warrant is particular important in the context of social commerce due to the special nature of social media. Social media is also called user-generated media (Shao, 2009), as their contents are mainly supplied by social media users rather than social media owners. However, due to ownership bias, the user-generated content hosted on different social media platforms may exhibit different levels of trustworthiness as perceived by information seekers (Helm, 2000; Park et al., 2009). For instance, Park et al. (2009) suggest that product reviews hosted on platforms owned by retailers directly, as compared with platforms owned by third parties, are perceived as less trustworthy and thus have a smaller influence on retail sale. This is because information seekers perceive that it is easier for retailers to filter or manipulate the content hosted on their own platforms rather than third parties' platforms. In other words, different social media platforms bear different levels of warranting value and such credibility is likely to affect the effectiveness of social commerce in reducing customers' uncertainty. Therefore, we propose that

H4. The association between social commerce announcement and market value is more positive for social media platforms with high credibility.

2.2 Methods

2.2.1 Data Collection

We collected social commerce announcements from Factiva, which contains news and information articles from top media outlets such as *The Wall Street Journal*, *The New York Times*, and hundreds of other sources (Gnyawali et al., 2010; Ba et al., 2013). Similar to prior event studies on e-commerce (e.g., Subramani and Walden, 2001; Dewan and Ren, 2007), we searched social commerce announcements with a combination of the following keywords: (announce or launch) and (NASDAQ or NYSE or AMEX) and (social commerce or social media or social network or social shopping or other relevant keywords such as Facebook and Twitter). A news article extracted from Fativa reporting the social commerce initiative of Delta Air Lines (NYSE: DAL) that enabled Facebook users to book flights with their friends directly on Facebook is shown in Appendix A as an example. As the term “social commerce” was first introduced by Yahoo! in November 2005 (Beach and Gupta, 2005), we searched social commerce announcements between 2006 and 2011. Our initial search yielded 5,256 news articles.

We read through the text of all the news articles collected and only retained those with explicit mention of the use of social media for sales and marketing. Since our target is publicly-listed firms in the US, we dropped social commerce announcements made by private or non-US firms, and deleted repeated announcements from different sources. After elimination, we obtained 348 social commerce initiatives announced by 241 firms. Some sample announcements are shown in Table 2.1. Table 2.2 presents the descriptive statistics of the sample.

To investigate the associations between social commerce announcements and the market value of firms, we obtained daily stock return data and Fama-French-Carhart's four-factor (Fama and French, 1993; Carhart, 1997) information from the Center for Research in Security Prices (CRSP) database and the Kenneth French Data Library, respectively. We read each social commerce announcement collected to identify the products offered and the social media platforms deployed by firms. If product information was not provided in the announcement, we searched for the related product information through firms' annual reports or Hoover's company profiles. We obtained the annual Most Admired Companies (MAC) lists from *Fortune* magazine to measure firm reputation

(Houston and Johnson, 2000; Wiles et al., 2010). Table 2.3 summarizes all the key variables and their sources used in this research.

Table 2.1 Sample Announcements of Social Commerce Initiatives

Aeropostale Launches Store for Facebook Fans Aeropostale, Inc. (NYSE: ARO), a mall-based specialty retailer of casual apparel for young women and men, has launched a fully integrated Facebook Store, powered by Usablenet's technology platform, that combines shopping and social media and extends full e-commerce functionality to the Aeropostale Facebook community. In addition to being able to purchase from Aeropostale's entire online inventory, the integrated Facebook e-commerce store allows users to easily 'Like' and share items and purchases with their Facebook network—leveraging the viral nature of Facebook's news feed. (PR Newswire, 2 August 2011)	**Qwest Launches "Talk to Qwest" on Twitter** The microblogging site Twitter is fast becoming a new way for companies to interact with customers, and Qwest (NYSE: Q) [a telecommunications service provider] today launched its own presence on Twitter, called “Talk to Qwest.” The Talk to Qwest team will monitor for customer service-related “tweets” and respond to and resolve customers’ problems in a whole new way. A team of Qwest representatives in Boise and Idaho Falls, Idaho, as well as Sioux Falls, S.D., are the “faces” of Talk to Qwest and proactively engage customers who may be having service problems and respond to customers who contact them.(Business Wire, 8 April 2009)	High Platform Credibility (Third Party Platform)
Wet Seal Announces Launch of New Online Fashion Community The Wet Seal, Inc. (Nasdaq:WTSLA), a leading specialty retailer to young women, today announced the launch of a new “fashion community” on the Company’s website, www.wetseal.com. The fashion community offers customers an enhanced shopping experience through a social networking platform using the latest Web 2.0 Technology. Customers can now not only shop, but can also create original Wet Seal styles by building outfits using the entire online assortment. Key features of the fashion community include the ability to build, tag, share and purchase outfits through a personalized boutique, build a fashion network by chatting with other stylists in the message center, and rate and purchase other stylists’ outfits in “The Runway.” (Business Wire, 28 April 2008)	**Rosetta Stone Launches Ratings & Reviews from Bazaarvoice** Bazaarvoice, the market and technology leader in hosted social commerce applications that drive sales, today announced that Rosetta Stone Inc. (NYSE:RST), a leading provider of technology-based language-learning solutions, has launched the Bazaarvoice social commerce platform with Ratings & Reviews™ at www.RosettaStone.com. Now existing customers can easily share their authentic opinions and experiences on a wide range of language-learning solutions covering more than 30 languages. New customers can easily browse customer-generated reviews at the category level (Learn Dutch) or product level (Dutch Level 1, 2, and 3 Set with Audio Companion™) and learn which solution is applicable to their interest and skill level. (Business Wire, 23 June 2009)	Low Platform Credibility (Own Platform)
Low Product Uncertainty (Search Product)	High Product Uncertainty (Experience Product)	

Table 2.2 Descriptive Statistics of Social Commerce Initiatives

Year	Number of Social Commerce Initiatives	Per cent
2006	13	3.7
2007	56	16.1
2008	36	10.3
2009	55	15.8
2010	95	27.3
2011	93	26.7
Total	348	100.0

Table 2.3 Key Variable Descriptions

Variable	Description	Measurement	Data Source	Reference
Product Uncertainty	Uncertainty of the products offered by a firm	High Product Uncertainty = Experience product, Low Product Uncertainty = Search product	Factiva, Hoover's company profiles, annual reports	Nelson (1970; 1974)
Firm Reputation	Reputation of a firm prior to the social commerce initiative	High Firm Reputation = Rank on or above the industry average, Low Firm Reputation = Rank below the industry average	*Fortune* magazine	Houston and Johnson (2000), Wiles et al. (2010)
Platform Credibility	Credibility of the social media platform deployed by a firm	High Platform Credibility = Third party platform, Low Platform Credibility = Own platform	Factiva	Park et al. (2009), Gu et al. (2012)
Firm Profitability	Profitability of a firm prior to the social commerce initiative	Return on Assets (ROA)	Compustat	Weill (1992), Morgan et al. (2009)
Firm Size	Size of a firm prior to the social commerce initiative	Ln(Total Assets)	Compustat	Im et al. (2001), Ba et al. (2013)
Firm Age	Age of a firm prior to the social commerce initiative	Ln(Announcement Year - Founding Year)	Hoover's company profiles	Oxelheim and Randøy (2003), Kalaignanam et al. (2007)

2.2.2 Event Study Methodology

To estimate the associations between social commerce announcements and market value (i.e., H1), we deploy the event study methodology to measure the abnormal return. Abnormal return is defined as the difference between the actual return with the occurrence of an event and the expected return had there been no event (MacKinlay, 1997; McWilliams and Siegel, 1997). We adopt Fama-French-Carhart's four-factor model (Fama and French, 1993; Carhart, 1997) to estimate firms' expected returns because it captures the risk-adjusted returns (Edmans, 2011) and has higher explanatory power for stock market movements (Swaminathan and Moorman, 2009). According to this model, the daily return of firm *i* at time *t*, R_{it}, is related to four different factors as follows:

$$R_{it} = \alpha_i + \beta_i RM_t + \gamma_i SMB_t + \delta_i HML_t + \sigma_i UMD_t + \varepsilon_{it}\,, \qquad (2.1)$$

where RM_t is the return of market portfolio, and SMB_t, HML_t, and UMD_t represent the differences in returns between small and big market capitalization stocks, between high and low book-to-market ratio stocks, and between high and low prior-return stocks, respectively. Following prior event studies (e.g., Im et al., 2001; Yang et al., 2012), we use the equally weighted index from CRSP for RM_t

due to its better ability to detect abnormal stock returns (Dann and Mikkelson, 1984).

We choose 120 trading days prior to a social commerce announcement as the estimation period and regress Equation (2.1) over this period to obtain the firm-specific parameters, namely, $\hat{\alpha}_i$, $\hat{\beta}_i$, $\hat{\gamma}_i$, $\hat{\delta}_i$, and $\hat{\sigma}_i$. We use these parameter estimates to construct the expected return, $E(R_{it})$, had there been no event:

$$E(R_{it}) = \hat{\alpha}_i + \hat{\beta}_i RM_t + \hat{\gamma}_i SMB_t + \hat{\delta}_i HML_t + \hat{\sigma}_i UMD_t \,. \quad (2.2)$$

We compute the abnormal return, AR_{it}, as the difference between the actual return, R_{it}, and the expected return, $E(R_{it})$, i.e.,

$$AR_{it} = R_{it} - E(R_{it}) = R_{it} - \left(\hat{\alpha}_i + \hat{\beta}_i RM_t + \hat{\gamma}_i SMB_t + \hat{\delta}_i HML_t + \hat{\sigma}_i UMD_t\right). \quad (2.3)$$

We choose three trading days around the event (i.e., day -1 to +1) as the event window (Chatterjee et al., 2001; Ba et al., 2013). We include the day before the event to account for possible information leakages before the announcement (McWilliams and Siegel, 1997) and the day after the event to capture the effect of

the announcement made after the closure of the stock market (MacKinlay, 1997). Therefore, we compute the cumulative abnormal return of firm i, CAR_i, as follows:

$$CAR_i = \sum_{t=-1}^{+1} AR_{it}. \quad (2.4)$$

Following McWilliams and Siegel (1997), we remove social commerce initiatives with confounding events, such as mergers and acquisitions, major contract awards, new product introduction, and key executive changes. We eliminated 47 social commerce initiatives with confounding events in the three-day event window in Factiva. We dropped 17 social commerce announcements because the corresponding firms' stock return data were unavailable in the 120-day estimation period or the three-day event window. We further discarded nine firms whose average daily stock prices were less than US$1 or whose trading volumes were less than 50,000 shares (Subramani and Walden, 2001; Dewan and Ren, 2007), leaving a final sample size of 275. We calculate the cumulative average abnormal return (CAAR) across these 275 samples as follows:

$$CAAR = \frac{1}{275}\sum_{i=1}^{275} CAR_i. \quad (2.5)$$

As the Shapiro-Wilk's normality test of CAR is significant ($p < 0.01$), we apply non-parametric tests, including the binomial sign test, Corrado rank test, and Wilcoxon signed rank test, to test the significance of CAAR (MacKinlay, 1997; McWilliams and Siegel, 1997). We also perform sensitivity tests with alternative estimation period, return model, and market portfolio to ensure the robustness of the results.

2.2.3 Cross-Sectional Regression Model

We construct a cross-sectional regression model to analyze the roles of product uncertainty (H2), firm reputation (H3), and platform credibility (H4) as follows:

$$CAR_i = \beta_0 + \beta_1 Product\ Uncertainty_i + \beta_2 Firm\ Reputation_i + \beta_3 Platform\ Credibility_i + \beta_4 Firm\ Size_i + \beta_5 Firm\ Profitability_i + \beta_6 Firm\ Age_i + Year\ Dummies + Industry\ Dummies + \varepsilon_i \,. \quad (2.6)$$

We follow prior studies (e.g., Chellappa and Shivendu, 2005; Dimoka et al., 2012) to use Nelson's (1970; 1974) classification of search and experience products as a measure of product uncertainty. More specifically, we regard search products as low

uncertainty (coded 0), and experience products as high uncertainty (coded 1). For firm reputation, we rely on the MAC lists published by *Fortune* magazine annually. Consistent with prior reputation studies (e.g., Houston and Johnson, 2000; Wiles et al., 2010), we treat firms with reputation ranks on or above the industry average as high reputation (coded 1), and others as low reputation (coded 0). As prior social media studies (e.g., Park et al., 2009; Gu et al., 2012) have suggested that platforms owned by third parties are perceived as more creditable than platforms owned by retailers directly, we view social media platforms such as Facebook and Twitter that are not owned by the announcing firms as high credibility (coded 1), and other platforms such as company websites and corporate customer forums that are owned by the announcing firms directly as low credibility (coded 0). Some coding examples of product uncertainty and platform credibility are shown in Table 2.1.

We control for other firm characteristics, including firm size, firm profitability, and firm age in the model. The detailed measures and corresponding data sources of these control variables are presented in Table 2.3. Moreover, we also include year (2006-2011) and industry (2-digit SIC code) dummies to account for unobserved time and industry effects.

We estimate Equation (2.6) using ordinary least squares (OLS). As robustness checks, we also derive heteroskedasticity-consistent estimation using the approach of White (1980) and employ alternative measures of the hypothesized and control variables.

2.3 Test Results

2.3.1 Event Study Results

The event study test results are presented in Table 2.4. As shown in Panel A, the average abnormal returns (AAR) on day -1, 0, and +1 are all positive and significant for the three non-parametric tests ($p < 0.05$). In Panel B of Table 2.4, the CAAR over the three-day event window (i.e., day -1 to +1) is positive and significant for the three non-parametric tests, providing strong support for H1 (CAAR = 0.86%, $p < 0.001$). We also estimate the CAARs over the two-day event windows (i.e., day -1 to 0, and day 0 to +1) as shown in Panel B of Table 2.4, but their values (0.53% and 0.68%) are less than that in the three-day event window (0.86%), showing that it is more appropriate to use a three-day event window in order to capture the full impact of social commerce announcements. Moreover, as shown in Panel B of Table 2.4, the CAARs over both the pre-event window and post-event window periods (i.e., day -30 to -2, and day +2 to +30) are not significant ($p > 0.05$) for all three

non-parametric tests, suggesting that a three-day event window is "long enough to capture the significant effect of the event" (McWilliams and Siegel, 1997, p. 636).

Table 2.4 Test Results of Abnormal Returns

Panel A: Average Abnormal Return (AAR)						
Day	*N*	*AAR*	Positive: Negative	Binomial Sign Test	Corrado Rank Test	Wilcoxon Signed Rank Test
-1	275	0.17%	150:125	2.174*	2.272*	2465.000*
0	275	0.36%	152:123	2.415**	2.236*	3192.000**
+1	275	0.32%	156:119	2.898**	2.966**	3352.000**
Panel B: Cumulative Average Abnormal Return (CAAR)						
Days	*N*	*CAAR*	Positive: Negative	Binomial Sign Test	Corrado Rank Test	Wilcoxon Signed Rank Test
-30, -2	275	0.43%	131:144	-0.120	-0.101	-97.000
-1, 0	275	0.53%	156:119	2.898**	3.188***	3686.000**
0, +1	275	0.68%	160:115	3.381***	3.678***	4570.000***
-1, +1	275	0.86%	175:100	5.191***	4.315***	5720.000***
+2, +30	268	-0.16%	128:140	-0.080	-0.451	-619.00

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (one-tailed tests).

2.3.2 Cross-Sectional Regression Results

The correlations among all the variables included in our regression analysis are presented in Table 2.5. It shows that the three hypothesized variables (i.e., product uncertainty, firm reputation, and platform credibility) highly correlate ($p < 0.05$)

with the dependent variable, CAR. The cross-sectional regression results are shown in Table 2.6. Model 1 is the basic model with all the control variables, year dummies, and industry dummies. Models 2 to 4 add the three hypothesized variables to Model 1, sequentially. The basic model is not significant ($F = 1.214$, $p > 0.05$), but Models 2 to 4 are significant ($F \geq 2.036$, $p < 0.001$) with adjusted R-squares ranging from 0.157 to 0.188. The number of observations N is reduced to 256 for all four models due to missing data for some control variables such as firm age.

Table 2.5 Correlation Matrix

Variable	1.	2.	3.	4.	5.	6.	7.
1. CAR (%)	1						
2. Product Uncertainty	0.280***	1					
3. Firm Reputation	0.150*	-0.020	1				
4. Platform Credibility	0.138*	0.089	0.194**	1			
5. Firm Size	0.072	0.048	0.587***	0.182**	1		
6. Firm Profitability	0.076	-0.058	0.089	-0.045	0.222***	1	
7. Firm Age	-0.017	0.027	0.296***	0.068	0.483***	0.214***	1
Mean	0.858	0.672	0.379	0.633	8.491	0.106	3.542
Standard Deviation	3.494	0.470	0.486	0.483	2.395	0.181	1.027

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed tests).

Table 2.6 Cross-Sectional Regression Results

Variable	Model 1	Model 2	Model 3	Model 4
Intercept	-0.682 (-0.715)	-1.823** (-1.991)	-1.069 (-1.113)	-1.395 (-1.444)
Firm Size	0.158 (1.348)	0.120 (1.092)	-0.041 (-0.320)	-0.060 (-0.475)
Firm Profitability	-0.022 (-0.017)	-0.081 (-0.069)	0.255 (0.218)	0.446 (0.383)
Firm Age	-0.262 (-1.066)	-0.239 (-1.041)	-0.227 (-0.995)	-0.199 (-0.878)
Product Uncertainty		2.614*** (5.582)	2.629*** (5.675)	2.492*** (5.361)
Firm Reputation			1.086** (2.366)	1.025* (2.246)
Platform Credibility				0.811* (2.038)
Year Dummies	Included	Included	Included	Included
Industry Dummies	Included	Included	Included	Included
Number of Observations (*N*)	256	256	256	256
R-square	0.206	0.309	0.328	0.341
Adjusted *R*-square	0.036	0.157	0.176	0.188
F-value	1.214	2.036***	2.155***	2.229***

Notes:

1. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed tests for control variables and one-tailed tests for hypothesized variables).
2. *t*-statistics are in parentheses.

Product uncertainty remains positive and significant ($p < 0.001$) across Models 2 to 4, suggesting that the associations between social commerce announcements and market value are more positive when firms' products bear high uncertainty. Therefore, H2 is supported. Moreover, firm reputation is also positive and significant ($p < 0.05$) in Models 3 and 4, indicating that firms with high reputation

benefit more from social commerce announcements. Therefore, H3 is also supported. Finally, platform credibility is positively significant ($p < 0.05$) in Model 4. It shows that firms deploying social media platforms with high credibility reap more benefits, and H4 is supported as well.

Table 2.7 Sensitivity Test Results (Cumulative Average Abnormal Return)

Model	*N*	*CAAR*	Positive: Negative	Binomial Sign Test	Corrado Rank Test	Wilcoxon Signed Rank Test
1. 240-day estimation period	269	0.78%	161:108	3.900***	4.283***	4748.500***
2. Fama-French's three-factor model	275	0.77%	173:102	4.970***	4.267***	5428.000***
3. Value-weighted index	275	0.82%	160:115	3.365***	4.255***	4791.000***
				Binomial Sign Test		Wilcoxon Signed Rank Test
4. Abnormal profitability change	166	0.79%	94:72	1.630^		1134.500*

^ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (one-tailed tests).

2.4 Sensitivity Tests

We perform various sensitivity tests to analyze the robustness of our findings. First, we re-examine CAAR by revising the estimation period from 120 days to 240 days, changing the estimation model from Fama-French-Carhart's four-factor model to Fama-French's three-factor model, and modifying the market portfolio from the equally weighted index to the value-weighted index, resulting in Models 1 to 3, respectively. As shown in Table 2.7, the CAARs remain positive and significant for

all the non-parametric tests across the three models ($p < 0.01$). Moreover, although the event study methodology has been widely adopted across different disciplines (MacKinlay, 1997; McWilliams and Siegel, 1997), there is still some concern about the possible stock market over-reactions to corporate events, especially involving technological innovations like social commerce initiatives. To address this concern, we follow Barber and Lyon (1996) to compute the abnormal profitability change due to social commerce initiatives. More specifically, we calculate the abnormal profitability change as the difference in ROA change between a sample firm and its control firms from year *t-1* to *t*, where *t* is the year of social commerce initiative. Control firms are defined as non-social commerce adaptors with similar ROA, size, and industry as the sample firm one year before social commerce adoption (i.e., year *t-1*) (see Barber and Lyon (1996) for the detailed procedures). We find that the average abnormal profitability change is positive and significant ($p < 0.10$), as shown in Model 4 of Table 2.7. This suggests that social commerce initiatives improve the profitability of adopting firms, ruling out the explanation of stock market over-reactions. Overall, these sensitivity tests provide further support for our findings regarding the positive associations between social commerce announcements and market value.

Table 2.8 Sensitivity Test Results (Cross-Sectional Regression)

Model	Product Uncertainty	Firm Reputation	Platform Credibility	*N*	Adjusted R-square	*F*-value
1. 240-day estimation period	2.084*** (4.429)	0.741^ (1.616)	0.635^ (1.579)	250	0.158	1.976**
2. Fama-French's three-factor model	2.330*** (5.112)	0.862* (1.927)	0.571^ (1.463)	256	0.167	2.062***
3. Value-weighted index	2.336*** (5.105)	1.020* (2.270)	0.581^ (1.484)	256	0.178	2.151***
4. Abnormal profitability change	1.500^ (1.420)	1.536^ (1.533)	1.425* (1.699)	163	0.171	1.780**
5. Measure Product Uncertainty based on technology intensity	1.844*** (3.221)	0.906* (1.905)	1.279*** (3.096)	256	0.119	1.719**
6. Measure Firm Reputation based on Fortune's top 100 most admired companies	2.510*** (5.358)	0.778^ (1.548)	0.853* (2.133)	256	0.178	2.147***
7. Measure Platform Credibility based on Alexa's top 1,000 sites in the US	2.513*** (5.422)	0.966* (2.104)	0.837* (2.024)	256	0.188	2.227***
8. Measure Firm Size as Ln(Employees)	2.508*** (5.332)	0.871* (1.930)	0.823* (2.025)	253	0.181	2.160***
9. Measure Firm Profitability as ROS	2.382*** (5.151)	1.071** (2.383)	0.926** (2.335)	256	0.206	2.378***
10. Measure Firm Age as Ln(announcing year - IPO year)	2.477*** (5.231)	1.083* (2.297)	0.889* (2.201)	252	0.187	2.199***
11. Heteroskedasticity-consistent estimation	2.492*** (5.527)	1.025* (2.214)	0.811* (2.120)	256	0.188	2.229***
12. Control for firms with more than one announcement	2.509*** (5.356)	1.025* (2.242)	0.826* (2.059)	256	0.184	2.177***

^ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (one-tailed tests).

To check the sensitivity of the cross-sectional regression results, we re-run Equation (2.6) with the new CARs obtained from Models 1 to 3 of Table 2.7. The corresponding regression results are presented as Models 1 to 3 in Table 2.8. All the three hypothesized variables in our cross-sectional regression analysis remain

positive and significant across all the three models ($p < 0.10$). We also re-run Equation (2.6) with the abnormal profitability change as the dependent variable and obtain consistent results as shown in Model 4 in Table 2.8.

As our measures of the hypothesized and control variables could not be perfect, we adopt alternative measures of these variables to ensure the robustness of our results. First, the product uncertainty based on Nelson's (1970; 1974) classification focuses on the quality uncertainty encountered by customers *before* purchase, without taking account of the uncertainty in its use *after* purchase. Following Chen and Xie (2008), we consider technology-intensive products as products with higher uncertainty in their usage (see, e.g., John et al., 1999). Following Deason and Ferrantino (2009), we regard products that are included in the Advanced Technology Products (ATP) list released by the US Census Bureau as technology-intensive products (i.e., high-uncertainty products; coded 1), and others as low uncertainty (coded 0).

Second, while the industry-adjusted reputation rank has been widely accepted as a measure of firm reputation in prior reputation studies (e.g., Houston and Johnson, 2000; Wiles et al., 2010), customers might be more aware of firms' overall, rather than within-industry, reputation ranks. Therefore, we follow Swaminathan and

Moorman (2009) to regard firms that are included in the top 100 MAC list each year as high reputation (coded 1) and others as low reputation (coded 0).

Third, although prior social media studies (e.g., Park et al., 2009; Gu et al., 2012) have suggested that third party-owned platforms are perceived as more creditable than retailer-owned platforms, some retailer-owned platforms such as the websites of Dell Computer and Bank of America have very high daily visit volumes (http://www.alexa.com/topsites/countries/US) and established their credibility among Internet users. Consistent with prior studies (e.g., Kim et al., 2010; Singh et al., 2011) that use Alexa's rankings to measure website popularity and credibility, we regard social media platforms that are included in Alexa's top 1,000 sites in the US as high credibility (coded 1) and others as low credibility (coded 0).

For the three control variables, we compute firm size as the natural logarithm of number of employees (Ranganathan and Brown, 2006), firm profitability as return on sales (Bharadwaj, 2000), and firm age as the natural logarithm of number of years between firms' social commerce announcement and IPO listing (Li et al., 2010).

The corresponding results with those alternative measures are presented in Models 5 to 10 of Table 2.8, respectively. All the coefficients are positive and significant ($p < 0.10$) across all the six models. Moreover, performing heteroskedasticity-consistent estimation of Equation (2.6), we obtain qualitatively similar results as shown in Model 11 of Table 2.8. Finally, to control for firms with more than one social commerce announcement from 2006 to 2011, we create a dummy variable to indicate whether a firm has more than one announcement (coded 1) or not (coded 0). After including this dummy variable in our regression model, the results remain consistent as shown in Model 12 of Table 2.8. The results of these sensitivity tests confirm the robustness of our cross-sectional regression models.

2.5 Discussions and Conclusion

We advance the understanding of social commerce and explain its value creation to business through the theoretical lens of uncertainty reduction theory. We argue that social commerce enables firms to facilitate social and visible communication among different parties via social media, reducing the uncertainty faced by customers, hence benefiting firms. We quantify the financial value of social commerce through the event study methodology. Specifically, we find that the average abnormal stock return in a three-day event window around the social commerce announcement is

0.86%, representing an average increase of US$179.42 million in terms of market value. Consistent with our uncertainty reduction argument, we show that the abnormal stock returns are more positive when firms' products bear high uncertainty. Finally, we highlight the importance of information warrant in social commerce. We show that both communicator-specific warrant, such as firm reputation, and channel-specific warrant, like social media platform credibility, enhance the value creation of social commerce initiatives.

Although the popularity and influence of social media have attracted much attention of researchers in recent years, the extant literature has been dominated by research on its effects on individual social media users (Aral et al., 2013), rather than how and why firms' strategic social media initiatives would have an impact on their organizational outcomes. Our research represents one of the earliest studies investigating the impact of firms' strategic use of social media for sales and marketing purposes. We quantify the impact of social commerce in terms of abnormal stock returns, showing that social commerce is able to increase shareholders' value. Our further analysis indicates that social commerce also has a positive impact on profitability in terms of abnormal ROA, suggesting that the associations between social commerce announcements and market value are more

than impression management or investors' over-reaction, and firms can get real payoff from their social commerce initiatives. The empirical evidence documented in our research may encourage researchers to shift their focus from individual social media users' behaviours to performance outcomes of firms' strategic use of social media.

2.5.1 Theoretical Implications

Our research is grounded in the uncertainty reduction perspective from the communication literature. Although uncertainty reduction theory has been widely applied in different academic fields such as marketing and management (Morrison and Vancouver, 2000; Homburg et al., 2012; Walker et al., 2013), it has rarely been adopted in prior research on e-commerce. This may be due to the fact that e-commerce focuses on maximizing transaction efficiency (Wang and Zhang, 2012; Huang and Benyoucef, 2013), rather than reducing customer uncertainty. Prior e-commerce studies (e.g., Kiang et al., 2000; Overby and Jap, 2009) have also suggested that e-commerce is not suitable for the sale of products with high uncertainty. However, social commerce represents a paradigm shift to emphasize communication rather than transaction (Stephen and Toubia, 2010; Liang and Turban, 2012). Such a fundamental change allows us to understand the business

value of social commerce through the uncertainty reduction perspective. It also implies that the findings of prior e-commerce studies may no longer hold in the context of social commerce. For instance, while prior e-commerce studies (e.g., Kiang et al., 2000; Overby and Jap, 2009) show that e-commerce is more suitable for the sale of products with low uncertainty, our research indicates that social commerce benefits firms selling products with high uncertainty. Such a contradiction between e-commerce and social commerce suggests that it may be oversimplified or misleading to regard social commerce just as part of e-commerce. In other words, researchers should view social commerce as a completely new phenomenon, rather than an extension of e-commerce. Considering the communication role of social commerce, the uncertainty reduction perspective adopted in our research provides an important theoretical basis for future social commerce studies.

However, researchers should realize that communication is a complex and dynamic process. While communication is the primary vehicle used by information seekers to reduce uncertainty, the extent to which communication reduces uncertainty is contingent on the perceived trustworthiness of the information. We adopt the concept of information warrant from the communication literature (Walther and

Parks, 2002; Walther et al., 2009) to explain how other cues or warrants such as firm reputation and social media platform credibility may affect the benefits of social commerce. Information warrant is particularly important for customers in the context of social commerce. This is because, compared with physical channels, customers in social commerce are unable to experience the physical environment. Communication thus is the major vehicle for them to gather uncertainty-reducing information. Information warrant signals whether customers can trust the information obtained from communication. The inclusion of both communicator- and channel-specific warrants in our research provides a more comprehensive view on how different information warrants help reduce uncertainty. This is also consistent with the well-established SMCR communication model (Berlo, 1960; Byron, 2008) and contemporary mass communication literature (e.g., Choi and Rifon, 2002; Bhatnagar et al., 2004; Judge et al., 2007) that emphasize the important roles of both communicators and communication channels in the communication process, in addition to the richness of information *per se*. We thus urge researchers to take a contingency perspective on the value creation of social commerce, considering not only whether social commerce benefits firms, but also how and why such benefits vary.

Our research shows that although social commerce initiatives benefit firms in general as indicated by the significant positive CAAR (0.86%; $p < 0.001$), the actual benefits vary according to a number of moderating factors. To better demonstrate the practical impact of the moderating factors, we compare two distinguished groups. We contrast a group of firms ($N = 48$) having high reputation, deploying a third-party owned social commerce platform, and selling experience products (i.e., high-warrant firms selling high-uncertainty products) with a group of firms ($N = 31$) having low reputation, deploying a self-owned platform, and selling search products (i.e., low-warrant firms selling low-uncertainty products). The results are shown in Table 2.9. We find that while the high-warrant firms selling high-uncertainty products gain significantly higher abnormal returns (CAAR = 1.82% [cf. CAAR = 0.86% in general]; $p < 0.001$), the low-warrant firms selling low-uncertainty products suffer losses from their social commerce initiatives (CAAR = -1.31%; $p < 0.05$). Such a sharp difference suggests that, although social commerce benefits firms in general, some firms indeed do not get payoffs from their social commerce efforts under certain conditions. In other words, depending on the suitability of product type and the creditability of the communication means, firms may or may not benefit from their social commerce initiatives.

Table 2.9 Intergroup Comparison Results

Groups	*N*	CAAR	Positive: Negative	Wilcoxon Signed Rank Test	Mann-Whitney *U* Test
High product uncertainty, high firm reputation, and high platform credibility	48	1.82%	37:11	1014.000***	1163.000***
Low product uncertainty, low firm reputation, and low platform credibility	31	-1.31%	10:21	-140.000*	

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed tests).

2.5.2 Practical Implications

Since the commercialization of the Internet in 1990s, e-commerce sales channels have been widely adopted by firms in the US. According to the data released by the US Census Bureau (http://www.census.gov/retail/#ecommerce), the US e-commerce sales have increased about five-fold over the last decade, from $44 billion in 2002 to $224 billion in 2012. Many firms believe that, with the experience gained from e-commerce, they are able to duplicate the success in the age of Web 2.0. However, social commerce is not as simple as we assume. Even some well-known e-commerce retailers such as Gap Inc. and J.C. Penney have failed to reap the expected benefits from social commerce (Lutz, 2012), sparking the controversy over the business value of social commerce. Our research suggests that managers, especially those with the experience of adopting e-commerce, should change their

mindsets by viewing social commerce as a communication-oriented business model, rather than a transaction-oriented business process. This is because the business value of social commerce emerges from its capacity to facilitate social and visible communication, rather than its ability to maximize transaction efficiency. When the communication facilitated by social commerce reduces customers' uncertainty about firms' products and services, transactions via either electronic or physical channels are more likely to take place. If managers realize the role of social commerce in reducing uncertainty, they would not be surprised to see that social commerce has a more positive impact on products with high uncertainty. Although managers have long been informed that e-commerce is unsuitable for the sale of products with high uncertainty (Kiang et al., 2000; Overby and Jap, 2009), our research suggests that social commerce, with its capacity to facilitate social and visible communication, benefits firms selling products with high uncertainty. Such a contradicting finding between e-commerce and social commerce suggests that the experience gained by practitioners from e-commerce may have little relevance to their initiatives to adopt social commerce.

2.5.3 Limitations and Future Research

Our research, like any other studies using archival data, cannot be perfect in its

measurements. In particular, we rely on the classification of search and experience products to determine product uncertainty, focusing on the dimension of quality uncertainty only. Similarly, we determine a social media platform's credibility based on its ownership, while the creditability of a social media platform can also be affected by many other factors. Admitting these limitations, we have employed alternative proxies in our analyses. As mentioned above, we consider uncertainty in product usage as an alternative measurement for product uncertainty (Chen and Xie, 2008), and also use Alexa's rankings to determine a platform's credibility (Kim et al., 2010; Singh et al., 2011). Our results are robust with other proxies, providing confidence in the reliability of our findings. Nevertheless, we still encourage researchers to further improve the variable measurements and verify the conclusion made in this study.

In terms of the scope, our research focuses only on firms' applications of social media for sales and marketing, while the impact of social media in business is far beyond sales and marketing. Social media can be adopted for a wide range of other organizational purposes such as internal coordination, operations, and innovation management (Kiron et al., 2012). We acknowledge that the mechanism by which social media creates value could be different under such circumstances. For instance,

firms may adopt social media to improve operations and foster innovativeness by facilitating information flow and knowledge sharing (Barry et al., 2011; Kiron et al., 2012), leading to a knowledge-based perspective on the value creation of social media. In other words, a completely different perspective can be adopted to understand the value creation process of social media depending on the purpose of its use. Therefore, it would be interesting for future research to investigate the use of social media for other organizational purposes and reveal the underlying mechanisms of the value creation processes.

2.5.4 Conclusion

In conclusion, we contribute to the understanding of the business value of firms' social commerce initiatives and ascertain the circumstances in which social commerce initiatives create a higher value for firms. This is particularly the case when firms' products bear high uncertainty and when they possess communicator-specific warrant, such as firm reputation, and channel-specific warrant, such as social media platform credibility. On the other hand, we caution that social commerce may not be suitable for all types of firms. Specifically, firms with low-warranting value selling low-uncertainty products may not find their social commerce useful. In fact, our analysis shows that the social commerce initiatives of

such firms could result in financial losses in some circumstances. Our research lays a theoretical foundation for research on social commerce through the perspective of uncertainty reduction and offers practical insights for managers to profitably deploy their social commerce efforts.

Chapter 3 Study Two: The Impact of Social Media Initiatives on Operational Efficiency and Innovativeness

3.1 Theoretical Background and Hypothesis Development

3.1.1 Social Media Initiatives

Although social media has been widely viewed as a new commerce channel for the sale of products and services (i.e., social commerce), its applications beyond sales and marketing, especially in such areas as operations and innovation management, have emerged in recent years (Kiron et al., 2012). For instance, Starbucks has launched a social media platform called My Starbucks Idea to enable customers to participate in developing new drinks and flavours (Gallaugher and Ransbotham, 2010); Caterpillar has adopted Spredfast's social media platform to facilitate coordination and collaboration across its internal departments and the extended dealer network (PR Newswire, 2012). A recent report released by *MIT Sloan Management Review* also suggests that maturing companies are moving the use of social media beyond sales and marketing; with 87% use it to spur innovation while 60% integrate social media into operations (Kane et al., 2014b). Therefore, the consequences and implications of adopting social media in operations and innovation management should not be overlooked.

On the other hand, although some social media initiatives are not especially designed for operations and innovation management, they may still affect the operational efficiency and innovativeness of firms. For instance, while the primary objective of social commerce initiatives is to assist in the sale of products and services (Stephen and Toubia, 2010; Liang and Turban, 2012), the communication facilitated by social commerce may also enable firms to learn more about customer demands and preferences, resulting in lower operating costs and more innovative products and services (Cecere, 2010; Anderson et al., 2011). Prior studies on technology adoption have also suggested that the benefits arising from the adoption of a specific technology can be far beyond its originally designed purposes. For instance, while the implementation of Customer Relationship Management (CRM) technologies is to improve customer satisfaction, customer retention, and customer share development as intended (Verhoef, 2003; Mithas et al., 2005), recent studies have found that CRM can also has an impact on other dimensions of organizational outcomes such as cost efficiency, new product development, and innovativeness (Krasnikov et al., 2009; Battor and Battor, 2010; Ernst et al., 2011). Therefore, in this study we are interested in firms' overall social media efforts rather than those especially aiming for operations and innovation management. We investigate

whether and how firms' social media initiatives, in general, can have an impact on operational efficiency and innovativeness, two critical operational outcomes of firms.

3.1.2 Operational Efficiency and Innovativeness

Operational efficiency and innovativeness are two different dimensions of operational outcomes. While operational efficiency refers to a firm's efficiency in converting its operational resources such as materials, labour, and capital into operational output (Li et al., 2010), innovativeness represents a firm's competence in exploring and generating new ideas and knowledge (Cho and Pucik, 2005; Das and Joshi, 2007). Both operational efficiency and innovativeness are critical for the survival and sustainable competitive advantage of firms (Cho and Pucik, 2005; Tan et al., 2007; Li et al., 2010; Wu et al., 2010; Dotzel et al., 2013; Zhang et al., 2014). For instance, Li et al. (2010) find that software firms with higher operational efficiency have a greater likelihood of survival in the long run; Zhang et al. (2014) show that firms wining innovation awards increase profits, revenues, and market values more than firms without innovation awards. Therefore, it is important for firms to achieve both simultaneously in today's competitive environment.

However, as operational efficiency emphasizes efficiency whereas innovativeness relies on flexibility, traditional operations management (OM) techniques may fail to help firms achieve both simultaneously, resulting in "productivity dilemma" as suggested in the literature (Tilcsik, 2008; Adler et al., 2009; Garud et al., 2011). For instance, a case study on 3M Corporation suggests that Six Sigma initiative improved 3M's operational efficiency, but "had an adverse impact on 3M's culture of innovation" (Garud et al., 2011, p. 746). At the individual level, Tilcsik (2008) finds that engineers receiving ISO 9000 trainings increase efficiency at the expense of creativity. Although prior studies on organizational ambidexterity have revealed various antecedents of organizational ambidexterity (Gibson and Birkinshaw, 2004; Raisch and Birkinshaw, 2008), these studies are different from our study that focuses on operational efficiency and innovativeness. In particular, while prior studies have commonly viewed organizational ambidexterity as the pursuit of different dimensions of *organizational activities* such as exploration and exploitation activities simultaneously (He and Wong, 2004; Raisch et al., 2009), the operational efficiency and innovativeness in this study represent different dimensions of *organizational outcomes*. Such a difference is also reflected in the antecedents of organizational ambidexterity as documented in the literature that emphasizes on "organizational structures, behavioral contexts, and leadership processes" (Raisch

and Birkinshaw, 2008, p. 380), rather than organizational strategies or initiatives that are the concern of our study. Therefore, we still know very little from the literature about whether there are any organizational strategies or initiatives that enable firms to improve operational efficiency and innovativeness simultaneously.

On the other hand, while anecdotal evidence has suggested that firms' social media efforts enable them to gain operational efficiency and innovativeness improvement (Cecere, 2010; Kane et al., 2014b), we are not aware of any empirical studies documenting the impact of social media initiatives on operational efficiency and innovativeness at the firm level. More importantly, it is still not well understood why firms are able to gain operational efficiency and innovativeness improvement, if any, from their social media initiatives. Our study attempts to explain the mechanism underlying the impact of social media initiatives on operational efficiency and innovativeness through the theoretical lens of social capital.

3.1.3 Social Capital

Capital is the stock of resources under the control of an individual or collective (Esser, 2008). Social capital, as a special form of capital, can be generally defined as "the sum of the actual and potential resources embedded within, available through,

and derived from the network of relationships possessed by an individual or social unit" (Nahapiet and Ghoshal, 1998, p. 243). For an organization, the network of relationships can be among individual members such as employees within the organization, which is referred to as internal social capital, as well as those between the organization and external stakeholders such as customers, which is referred to as external social capital (Leana and Pil, 2006; Payne et al., 2011). Prior social capital studies have suggested that an organization is able to derive value from its internal as well as external social capital (Fischer and Pollock, 2004; Leana and Pil, 2006; Stam and Elfring, 2008; Payne et al., 2011). For instance, Leana and Pil's (2006) research on urban public schools shows that both internal social capital (relations among teachers) and external social capital (relations between the principal and external stakeholders) contribute to the performance of the schools. Considering the importance of both internal and external social capital to an organization, in this research we view a firm's social capital as the resources embedded in its internal as well as external social networks.

Although conventional social capital studies have commonly assumed the ability of those embedded social resources *per se* to create value, recent research has begun to distinguish "having social capital" from "using social capital" (Kwon and Adler,

2014, p. 414). In other words, an actor having a nexus of ties embedded in its social networks does not necessarily imply that all those embedded ties will be used by the actor for value creation. For instance, Obukhova and Lan (2013) suggest that the social capital that a job seeker has does not predict whether or not this job seeker will use his or her social capital to search for a job. Therefore, the extent to which social capital creates value may depend on not only whether an actor has social capital, but also how this actor uses its social capital. Consistent with this perspective, instead of assuming that firms' social capital *per se* will lead to operational efficiency and innovativeness improvement, we view the improvement in operational efficiency and innovativeness as a result of firms' social media initiatives that unlock the potential of firms' embedded social capital for value creation.

3.1.4 A Social Capital Perspective on Social Media Initiatives

A firm, like any other forms of organization, is expected to have a nexus of ties embedded in its internal and external social networks. Although social capital researchers share the idea that "social networks have value" (Putnam, 2000, p. 19), the value creation capacity of those embedded ties may not be fully utilized due to the difficulty in facilitating information flows and knowledge sharing across firms'

social networks. For instance, employees from different departments and geographically separated offices may encounter difficulty in sharing information and knowledge with one another (Leonardi, in press). It is also challenging for firms to gather information and knowledge from external customers who are often physically dispersed. Although contemporary communication technologies such as email and instant messaging are able to overcome the geographical constraint, they usually enable information and knowledge exchanges between a dyad or among a few group members, rather than across firms' entire social networks (Leonardi, in press). Nevertheless, the emerging social media technologies represent a paradigm shift that enables firms to facilitate faster information flows and better knowledge sharing across their internal and external social networks (Qualman, 2010; Treem and Leonardi, 2012). While social capital researchers have suggested that the "social ties of one kind often can be used for different purposes" (Adler and Kwon, 2002, p. 17), we argue that the information flows and knowledge sharing facilitated by firms' social media initiatives are especially beneficial to the improvement of operational efficiency and innovativeness.

Social media initiatives might lead to higher operational efficiency in several ways. First, within firms' internal social networks, social media initiatives enable faster

information flows and better knowledge sharing among employees, accelerating the diffusion of new knowledge or best practices across different departments and geographically separated offices (Szulanski, 1996). Moreover, the information and knowledge being shared via social media is visible to different parties, reducing information asymmetry, avoiding knowledge duplication, and enabling management to make more informed decisions in a timely manner (Sanders, 2007; Leonardi, in press). Finally, social media also enables employees in different workplaces to work and collaborate virtually, overcoming geographic boundaries, reducing costs and improving efficiency.

On the other hand, social media initiatives also help firms to unlock the social resources embedded in their external social networks for operational efficiency improvement. For instance, customer reviews and comments collected from social media provide useful information for firms to improve their products or services (Barlow, 1996). Through social media, company information (e.g., new product information) can be shared among customers, reducing communication costs (Eng and Quaia, 2009). Positive experience shared by customers on social media can increase firms' reputation, decreasing sales and general administration costs (Chevalier and Mayzlin, 2006). In short, social media initiatives enable faster

information flows and better knowledge sharing across firms' internal and external social networks, resulting in operational efficiency improvement.

H1. Social media initiatives improve the operational efficiency of firms.

In addition to improving operational efficiency, the social interactions facilitated by firms' social media initiatives are likely to stimulate new ideas and enhance organizations' intellectual capacity. For instance, the interactions facilitated by social media among employees from different geographic areas with different cultures may help generate creative ideas. Gassmann (2001) suggests that a project team with high cultural diversity "can lead to totally unexpected impulses of creativity and innovation" (p. 94). Employees from different departments such as R&D, manufacturing, and marketing may view the same problems from different perspectives, and their interactions via social media may help generate innovative solutions (Kahn, 2001; Olson et al., 2001).

Social media facilitates external information flows, allowing firms to renew their knowledge base and explore new opportunities. Cassiman and Veugelers (2006) maintain that the knowledge acquired from external environments can complement

internal R&D activities for innovation purposes. Through social media, firms might proactively include customers in new product development (NPD). For instance, Starbucks' My Starbucks Idea and Dell's IdeaStorm social media platforms enable customers to participate in developing new products and submit innovative ideas to the firms directly (Gallaugher and Ransbotham, 2010; Anderson et al., 2011; Bayus, 2013). Past studies have shown that customer involvement in NPD improves product quality and innovativeness (Koufteros et al., 2005). We thus develop the second hypothesis as follows:

H2. Social media initiatives improve the innovativeness of firms.

3.1.5 The Role of Stakeholder Geographic Diversity and Stakeholder Relationships

Although we have argued that social media initiatives enable firms to facilitate faster information flows and better knowledge sharing across firms' social networks, resulting in operational efficiency and innovativeness improvement, it should be realized that the degree of the improvement may also depend on the richness, diversity, and quality of the information and knowledge being exchanged. From the social capital perspective, while social media initiatives enable firms to unlock their

embedded social capital for value creation, the extent to which the value can be created may be contingent on the nature of the social capital being unlocked. This is because although all firms are expected to have a nexus of ties embedded in their internal and external social networks, the structures of and the relations among those embedded ties should vary across firms, resulting in different opportunities for value creation. Prior social capital studies (e.g., Granovetter, 1992; Moran, 2005) have also regarded the structural and relational embeddedness of one's ties in its social networks as two important dimensions of social capital. We thus expect that the geographic diversity of firms' stakeholders (the structural dimension) and firms' relationships with stakeholders (the relational dimension) may affect the impact of social media initiatives on operational efficiency and innovativeness.

The structural embeddedness of social capital concerns the "configuration of one's network" (Moran, 2005, p. 1131), including the geographic distribution of an actor's social ties with different stakeholders. Stakeholders' geographic diversity may affect the value of the information and knowledge shared by them. For instance, Cummings (2004) finds that the knowledge shared by employees who are dispersed across geographic locations is more valuable as "they have access to a greater variety of task-related information, which can open up new opportunities for

knowledge sharing" (p. 353). Social capital studies also suggest that actors maintaining "larger, more diverse or non-redundant networks of contacts" (Moran, 2005, p. 1146) are more likely to extract value from their social capital. Therefore, firms may benefit more from stakeholders who are more geographically diversified.

Nevertheless, geographic distance in general increases the difficulty of information and knowledge sharing among stakeholders (Cummings, 2004). It also makes it more difficult for firms to gather and coordinate information and knowledge (Espinosa et al., 2007). Previous research on social capital has acknowledged the costs of maintaining diverse social ties (Nahapiet and Ghoshal, 1998; Adler and Kwon, 2002). Social media could potentially overcome these issues by facilitating sharing among geographically distributed stakeholders, enabling firms to maintain social connectivity and manage diverse knowledge. Accordingly, we postulate that the impact of social media initiatives will be more positive for firms with more geographically diversified stakeholders.

H3a. The impact of social media initiatives on operational efficiency is more positive for firms with more geographically diversified stakeholders.

H3b. The impact of social media initiatives on innovativeness is more positive for firms with more geographically diversified stakeholders.

While structural embeddedness concerns the configuration of one's networks, relational embeddedness refers to the "quality of those relationships" (Moran, 2005, p. 1131) embedded in the networks. Although academics have paid relatively less attention to relational embeddedness as compared with structural embeddedness (Moran, 2005; Laursen et al., 2012), Moran (2005) argues that "the configuration of that network is not all that matters; the quality of one's relationships matters too" (p. 1130). In other words, "what you know" (the information and knowledge) depends on not only "whom you know" (the structural embeddedness), but also "how well you know them" (the relational embeddedness). Therefore, in addition to the stakeholder geographic diversity, we are also interested in how firms' relationships with stakeholders might affect the impact of social media initiatives.

Stakeholders' willingness to participate in firms' social media initiatives might depend on their relationships with firms. Previous research has showed that good stakeholder relationships motivate stakeholders to share information and knowledge (Walter, 2003; Liao et al., 2004; Bock et al., 2005). For instance, Liao et al. (2004)

find that employees having good relationships with firms are more likely to share their job experience voluntarily. The social capital literature also suggests that organizational actors significantly benefit from their relational embeddedness in carrying out both execution-oriented and innovation-oriented tasks (Moran, 2005). Therefore, we expect that firms' social media initiatives are more likely to mobilize their embedded social ties for value creation when firms have good relationships with stakeholders.

H4a. The impact of social media initiatives on operational efficiency is more positive for firms with better stakeholder relationships.

H4b. The impact of social media initiatives on innovativeness is more positive for firms with better stakeholder relationships.

3.2 Methods

3.2.1 Data Collection

We collected and combined longitudinal data from multiple sources in order to test our hypotheses. More specifically, we searched Factiva to obtain news

announcements about firms' social media initiatives in each year[1]. Consistent with our first study, we limited our search to a six-year period from 2006 to 2011. As we were interested in firms' overall social media efforts, without limiting to sales and marketing, our search in Factiva contained the name of the firm under study and some general social media terms such as social media, social network, social software, and Web 2.0. However, as the number of firms covered by different data sources used in our study varied from one to another, we limited our search to 271 firms that were covered by all these data sources, including Compustat Fundamentals, *Fortune* magazine, Compustat Segments, and Kinder, Lyndenberg, and Domini (KLD). In particular, we obtained the annual accounting data from Compustat Fundamentals and the innovation ratings published by *Fortune* magazine yearly to measure the two dependent variables, namely, operational efficiency and innovativeness, respectively. On the other hand, we relied on the geographic

[1] Another approach to quantify firms' social media efforts in each year is to collect data about firms' annual budgets or spending on social media initiatives. However, we have tried various ways, including consulting directly with International Data Corporation, a US market research firm specializing in information technology and consumer technology, but still failed to obtain the social media spending data at the firm level. Such a difficulty in data collection may also explain why there is a lack of social media studies at the firm level. Nevertheless, collecting social media initiatives based on news announcements enables us to analyze the details of the specific social media initiatives announced, and thus assess the "actual implementation" (Staw and Epstein, 2000, p. 531) of, not only the "spending on", social media by the corresponding firms.

segment data from Compustat Segments and the social ratings provided by KLD to determine the two moderating variables, namely, stakeholder geographic diversity and stakeholder relationships, respectively. The detailed measurement procedures are discussed below.

3.2.2 Measurements

Social Media Initiatives. For each sample firm, we have read through the text of its news articles collected from Factiva and only retained those with explicit mention about the use of social media by the specific sample firm for organizational purposes. A news article extracted from Fativa reporting the adoption of social media by Honeywell, a *Fortune* 100 company, to enable employees to locate, manage, and share information and knowledge is shown in Appendix B as an example. To avoid the problem of double counting, we have deleted repeated reports of the same social media initiative from different publication sources. In each year, we use the number of social media initiatives of a sample firm to quantify its social media efforts. However, as the number of social media initiatives is highly skewed across firms (skewness statistic = 14.269), we apply a natural logarithmic transformation to control for the skewness. Therefore, the social media initiatives of firm *i* in year *t* is measured as

$$Social\ Media\ Initiatives_{it}$$

$$= ln(Number\ of\ social\ media\ initiatives_{it} + 1). \quad (3.1)$$

Operational Efficiency. Following prior studies on firm capabilities (e.g., Dutta et al., 2005; Li et al., 2010), we measure the operational efficiency of firms based on the Stochastic Frontier Estimation (SFE) methodology. The use of SFE is consistent with our definition of operational efficiency that represents a firm's efficiency in converting its operational resources into operational output (Li et al., 2010). To implement SFE, we first construct a stochastic production function to model the relationship between a firm's operational resources (i.e., number of employees, cost of goods sold, and capital expenditure) and its operational output (i.e., operating income) as follows:

$$ln(Operating\ Income)_{ijt} = \beta_0 + \beta_1 ln(Number\ of\ Employees)_{ijt} + \beta_2 ln(Cost\ of\ Goods\ Sold)_{ijt} + \beta_3\ ln(Capital\ Expenditure)_{ijt} + \varepsilon_{ijt} - \eta_{ijt}\ , \quad (3.2)$$

where ε_{ijt} is the stochastic random error term and η_{ijt} represents the technical

inefficiency of firm *i* in industry *j* (2-digit SIC code) in year *t*. η_{ijt} ranges from 0 to 1, with 0 as no technical *inefficiency* (i.e., the frontier who is technically efficient). Therefore, η_{ijt} is a relative measure to represent how *inefficient* a firm is when compared to the corresponding frontier in the same industry within the same year. Therefore, the operational efficiency of firm *i* in industry *j* in year *t* can be calculated as

$$Operational\ Efficiency_{ijt} = 1 - \widehat{\eta_{ijt}}. \quad (3.3)$$

Innovativeness. We rely on the innovation ratings published by *Fortune* magazine annually to measure the innovativeness of firms. The innovation rating is one of nine criteria used by *Fortune* magazine to pick the Most Admired Companies (MAC) from its *Fortune* 1,000 companies annually. This rating has been widely used in prior studies (e.g., Cho and Pucik, 2005; Luo and Bhattacharya, 2006) as a measure of innovativeness at the firm level. Its reliability and validity have also been verified by Cho and Pucik (2004). Consistent with our measurement of operational efficiency, we are interested in the relative innovativeness of a firm compared with its industry peers in order to account for any inter-industry differences. Therefore, we standardize the innovation rating of a firm within its industry as defined by *Fortune*

magazine. Moreover, due to a one-year lag between the survey and publication of the innovation ratings, we compute the innovativeness of firm *i* in industry *j* in year *t* as follows:

$$Innovativeness_{ijt} = \frac{Innovation\ rating_{ij(t+1)} - Mean\ of\ innovation\ rating_{j(t+1)}}{Standard\ deviation\ of\ innovation\ rating_{j(t+1)}}. \quad (3.4)$$

Stakeholder Geographic Diversity. We measure stakeholder geographic diversity based on the geographic segment data obtained from Compustat Segments, which have been frequently used in prior studies to measure the geographic diversification of firms (Hendricks et al., 2009). Consistent with our discussion in hypothesis development, we focus on the geographic diversity of two important stakeholder groups, namely, employees and customers. However, as the data concerning number of customers in each geographic segment is not available in Compustat Segments, we follow prior studies (e.g., Bowman and Narayandas, 2004; Ryals, 2005) to use sales as a proxy for customer size. Our measurement is based on the Herfindahl index (Herfindahl, 1950; Hendricks et al., 2009) as follows:

$$Stakeholder\ Geographic\ Diversity_{it}$$

$$= 1 - \frac{1}{2}\sum_{k=1}^{N}[(\frac{Number\ of\ Employees_{ikt}}{Number\ of\ Employees_{it}})^2 + (\frac{Sales_{ikt}}{Sales_{it}})^2] \ , \quad (3.5)$$

where *k* represents the *k*th of *N* geographic segments reported by firm *i* in year *t*.

Stakeholder Relationship. We measure stakeholder relationship based on the social ratings provided by KLD. Each year, KLD evaluates the social performance of more than 650 publicly-traded firms in terms of their relations with different stakeholders such as employees and customers, based on data collected from multiple sources (see e.g., Luo et al., 2014). Consistent with our measure of stakeholder geographic diversity, we focus on firms' relationships with the employee and customer stakeholder groups. The social ratings provided by KLD are regarded as "the best data available for a comprehensive measure of corporate social relationships and stakeholder management" (Wang et al., 2009, p. 1272). As KLD tabulates each dimension of stakeholder relations in terms of several "strengths" and "concerns", we follow prior studies (e.g., Wang et al., 2009; Luo et al., 2014) by subtracting the number of concerns from the number of strengths in each dimension and obtaining the average stakeholder relationship of firm *i* in year *t* as

$$Stakeholder\ Relationship_{it}$$

$$= \frac{1}{2}\sum_{n=1}^{2}(\ Relation\ Strengths_{int} - Relation\ Concerns_{int})\ , \quad (3.6)$$

where n = 1 and 2 represent the employee and customer dimensions, respectively.

Control Variables. We include four control variables, namely, firm size, firm profitability, firm age, and firm R&D intensity, in our study as they might affect the operational efficiency and innovativeness of firms (Cohen and Levinthal, 1990; Subramanian and Nilakanta, 1996; Jansen et al., 2006; Peng et al., 2008; Wu et al., 2010). The detailed measurements of the four control variables are shown in Table 3.1.

Table 3.1 Key Variable Descriptions

Variable Name	Description	Measurement	Data Source	Reference
Social Media Initiatives	Number of social media initiatives of a firm in each year	ln (Number of social media initiatives per year + 1)	Factiva	Staw and Epstein (2000), Wang (2010)
Operational Efficiency	Efficiency of a firm (relative to its industry peers) in converting its operational resources into operational output	$ln(Operating\ Income)_{ijt} = \beta_0 + \beta_1 ln(Number\ of\ Employees)_{ijt} + \beta_2 ln(Cost\ of\ Goods\ Sold)_{ijt} + \beta_3\ ln(Capital\ Expenditure)_{ijt} + \varepsilon_{ijt} - \eta_{ijt}$, $Operational\ Efficiency_{ijt} = 1 - \widehat{\eta_{ijt}}$, where *i*, *j*, and *t* are firm, industry, and year indices, respectively.	Compustat Fundamentals	Dutta et al. (2005), Li et al. (2010)
Innovativeness	Innovativeness of a firm relative to its industry peers	Standard score (z-score) of a firm's innovation rating in its industry	*Fortune* Magazine	Cho and Pucik (2005), Luo and Bhattacharya (2006)
Stakeholder Geographic Diversity	Geographic diversity of a firm's stakeholders including employees and customers	$1 - \frac{1}{2}\sum_{k=1}^{N}\left[\left(\frac{Number\ of\ Employees_{ikt}}{Number\ of\ Employees_{it}}\right)^2 + \left(\frac{Sales_{ikt}}{Sales_{it}}\right)^2\right]$, where *k* represents the *k*th of *N* geographic segments reported by firm *i* in year *t*.	Compustat Segments	Herfindahl (1950), Hendricks et al. (2009)
Stakeholder Relationship	Relationship of a firm with its stakeholders including employees and customers	$\frac{1}{2}\sum_{n=1}^{2}(Relation\ Strengths_{int} - Relation\ Concerns_{int})$, where *n* = 1 and 2 represent employee and customer dimensions, respectively.	KLD	Wang et al. (2009), Luo et al. (2014)
Firm Size	Size of a firm in the year of social media initiatives	ln (Sales)	Compustat Fundamentals	Ranganathan and Brown (2006), Bardhan et al. (2013)
Firm Profitability	Profitability of a firm in the year of social media initiatives	Return on Assets (ROA)	Compustat Fundamentals	Weill (1992), Morgan et al. (2009)
Firm Age	Age of a firm in the year of social media initiatives	ln (Year of social media initiatives - Founding year)	Hoover's	Oxelheim and Randøy (2003), Kalaignanam et al. (2007)
Firm R&D Intensity	R&D intensity of a firm in the year of social media initiatives	R&D Expenses / Sales	Compustat Fundamentals	Ba et al. (2013), Bardhan et al. (2013)

3.2.3 Dynamic Panel Data (DPD) Models

We have constructed two Dynamic Panel Data (DPD) models to test our hypotheses as follows:

$$
\begin{aligned}
&Operational\ Efficiency_{it} \\
&= \alpha_0 + \alpha_1 Operational\ Efficiency_{i(t-1)} + \alpha_2 Social\ Media\ Initiatives_{i(t-1)} \\
&+ \alpha_3 Social\ Media\ Initiatives_{i(t-1)} \times Stakeholder\ Geographic\ Diversity_{i(t-1)} \\
&+ \alpha_4 Social\ Media\ Initiatives_{i(t-1)} \times Stakeholder\ Relationship_{i(t-1)} \\
&+ \alpha_5 Stakeholder\ Geographic\ Diversity_{i(t-1)} \\
&+ \alpha_6 Stakeholder\ Relationship_{i(t-1)} + \alpha_7 Firm\ Size_{it} + \alpha_8 Firm\ Profitability_{it} \\
&+ \alpha_9 Firm\ Age_{it} + \alpha_{10}\ Firm\ R\&D\ Intensity_{it} + \varepsilon_{it}\ . \qquad (3.7)
\end{aligned}
$$

$$
\begin{aligned}
&Innovativeness_{it} \\
&= \beta_0 + \beta_1 Innovativeness_{i(t-1)} + \beta_2 Social\ Media\ Initiatives_{i(t-1)} \\
&+ \beta_3 Social\ Media\ Initiatives_{i(t-1)} \times Stakeholder\ Geographic\ Diversity_{i(t-1)} \\
&+ \beta_4 Social\ Media\ Initiatives_{i(t-1)} \times Stakeholder\ Relationship_{i(t-1)} \\
&+ \beta_5 Stakeholder\ Geographic\ Diversity_{i(t-1)} \\
&+ \beta_6 Stakeholder\ Relationship_{i(t-1)} + \beta_7 Firm\ Size_{it} + \beta_8 Firm\ Profitability_{it} \\
&+ \beta_9 Firm\ Age_{it} + \beta_{10}\ Firm\ R\&D\ Intensity_{it} + \varepsilon_{it}\ . \qquad (3.8)
\end{aligned}
$$

We rely on α_2 and β_2 to determine the impact of social media initiatives on operational efficiency (H1) and innovativeness (H2), respectively. The moderating effects of stakeholder geographic diversity are indicated by α_3 (H3a) and β_3 (H3b), while α_4 (H4a) and β_4 (H4b) show how stakeholder relationship moderates the impact of social media initiatives. We include lagged dependent variables as regressors in the two models because firm performance such as operational efficiency and innovativeness could be path dependent and persistent over time (Mukherji et al., 2011; Vandaie and Zaheer, in press). The inclusion of lagged dependent variables makes our models "dynamic" in nature, as contrasted to traditional "static" panel data models without considering the persistent influence of past performance. Consistent with prior DPD studies (e.g., Mukherji et al., 2011; Vandaie and Zaheer, in press), we use one-year lags of the dependent variables as regressors in the two models. We also maintain one-year lags between the dependent and hypothesized variables to ensure the direction of causality under tested. Finally, we include all the four control variables, namely, firm size, firm profitability, firm age, and firm R&D intensity, in the two DPD models.

3.2.4 System Generalized Method of Moments (GMM) Estimation

Our research context induces several challenges in testing our proposed hypotheses. First, although we include the lagged dependent variables in the models to account for the persistent influence of past performance, these lagged dependent variables are correlated with the fixed effects in the error term (i.e., ε_{it}) by construction, leading to the "dynamic panel bias" and making the conventional ordinary least squares (OLS) estimation inconsistent (Nickell, 1981). While Kiviet (1995) suggests that the least squares dummy variables (LSDV) estimator is able to handle the dynamic panel bias, it works only for balanced panels (Roodman, 2009) and thus is unsuitable for our unbalanced sample with some firms having more observations than others[2]. In addition, as the adoption of social media in organizations is a new phenomenon, the number of time periods in our data is relatively small, with a maximum of six years between 2006 and 2011, making the fixed effects (FE) approaches biased as demonstrated by Flannery and Hankins (2013). Moreover, although we have maintained one-year lags between the dependent and hypothesized variables to ensure the direction of causality being tested, we have not completely ruled out the possibility of endogeneity. In particular, it is possible that firms' strategies and performance codetermine each other (Wintoki et al., 2012; Bardhan et

[2] Moreover, our independent variables such as social media initiatives could be endogenous as discussed below, violating LSDV's assumption that the regressors are strictly exogenous (Flannery and Hankins, 2013) and making this methodology inappropriate in our research context.

al., 2013). On one hand, firms' strategies such as social media initiatives may have an impact on firm performance in terms of operational efficiency and innovativeness as we have suggested. On the other hand, the operational efficiency and innovativeness of firms may also affect firms' decisions to adopt social media, leading to the possibility of two-way causality. Therefore, without taking this possible reverse causation into account, the impact of social media initiatives on operational efficiency and innovativeness could be overstated. Another potential source of endogeneity is the unobservable firm-specific heterogeneity (Wintoki et al., 2012). In other words, there may be some unobservable factors such as managerial ability and corporate culture that affect firms' use of social media and operational outcomes such as efficiency and innovativeness simultaneously, making the relationships between social media initiatives and these operational outcomes biased. Although conventional instrumental variables (IV) techniques that use external variables that are outside the immediate dataset as instruments can address the endogeneity concern, it is difficult to obtain such strictly exogenous instruments externally as pointed out by prior studies (see e.g., Wintoki et al., 2012; Bardhan et al., 2013).

Considering the challenges as discussed above, we follow recent DPD studies (e.g.,

Wintoki et al., 2012; Bardhan et al., 2013; Chizema et al., in press) to employ the generalized method of moments (GMM) estimator to test our hypotheses. More specifically, we adopt the System GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998) in this research. The System GMM estimator offers several important advantages over other approaches mentioned above and suits our research context better. First, the System GMM estimator addresses the dynamic panel bias directly by instrumenting the lagged dependent variables with variables uncorrelated with the fixed effects in the error term (Roodman, 2009). Second, the System GMM estimator is suitable for our data with unbalanced panels. An intensive comparison on different DPD techniques conducted by Flannery and Hankins (2013) suggests that the System GMM estimator appears to be one of "the most robust methodologies for unbalanced panels with endogenous variables" (p. 13). Third, the System GMM estimator is appropriate for our data with relatively small number of time periods. Roodman (2009) also emphasizes that the System GMM estimator should be applied to research with "small T, large N" panels. This is because the number of instruments used in System GMM tends to explode with the number of time periods, T, causing several problems in estimation (see Roodman, 2009 for the detailed discussion). Finally, although the System GMM estimator also employs the IV techniques to deal with the endogeneity issue, it does not rely on

external variables that are outside the immediate dataset to construct instruments. Instead, the System GMM estimator constructs instruments internally with the transformation of existing variables, overcoming the difficulty in obtaining exogenous instruments externally (Roodman, 2009; Wintoki et al., 2012).

To implement the System GMM estimator, we first transform the DPD models as shown in Equations (3.7) and (3.8) into their first difference forms as follows:

$$\Delta\, Operational\ Efficiency_{it}$$

$$= \alpha_1 \Delta\, Operational\ Efficiency_{i(t-1)} + \alpha_2 \Delta\, Social\ Media\ Initiatives_{i(t-1)}$$

$$+ \alpha_3 \Delta\, Social\ Media\ Initiatives_{i(t-1)} \times \Delta\, Stakeholder\ Geographic\ Diversity_{i(t-1)}$$

$$+ \alpha_4 \Delta\, Social\ Media\ Initiatives_{i(t-1)} \times \Delta\, Stakeholder\ Relationship_{i(t-1)}$$

$$+ \alpha_5 \Delta\, Stakeholder\ Geographic\ Diversity_{i(t-1)}$$

$$+ \alpha_6 \Delta\, Stakeholder\ Relationship_{i(t-1)} + \alpha_7 \Delta\, Firm\ Size_{it}$$

$$+ \alpha_8 \Delta\, Firm\ Profitability_{it} + \alpha_9 \Delta\, Firm\ Age_{it} + \alpha_{10} \Delta\, Firm\ R\&D\ Intensity_{it}$$

$$+ \Delta\, \varepsilon_{it}\ . \qquad (3.9)$$

$$\Delta\, Innovativeness_{it}$$

$$= \beta_1 \Delta\, Innovativeness_{i(t-1)} + \beta_2 \Delta\, Social\ Media\ Initiatives_{i(t-1)}$$

$$+ \beta_3 \Delta\, Social\ Media\ Initiatives_{i(t-1)} \times \Delta\, Stakeholder\ Geographic\ Diversity_{i(t-1)}$$

$$+ \beta_4 \Delta\, Social\ Media\ Initiatives_{i(t-1)} \times \Delta\, Stakeholder\ Relationship_{i(t-1)}$$

$$+ \beta_5 \Delta\, Stakeholder\ Geographic\ Diversity_{i(t-1)}$$

$$+ \beta_6 \Delta\, Stakeholder\ Relationship_{i(t-1)} + \beta_7 \Delta\, Firm\ Size_{it}$$

$$+ \beta_8 \Delta\, Firm\ Profitability_{it} + \beta_9 \Delta\, Firm\ Age_{it} + \beta_{10} \Delta\, Firm\ R\&D\ Intensity_{it}$$

$$+ \Delta\, \varepsilon_{it}\ . \qquad (3.10)$$

For each variable X in Equations (3.9) and (3.10), ΔX_{it} represents $X_{it} - X_{i(t-1)}$, and $\Delta X_{i(t-1)}$ represents $X_{i(t-1)} - X_{i(t-2)}$.

The transformation processes remove the time-invariant fixed effects in the error term (i.e., the unobservable firm-specific heterogeneity) in the original Equations (3.7) and (3.8). Moreover, instead of using exogenous instruments outside the immediate dataset, Arellano and Bond (1991) propose a GMM estimator that uses the lagged values of the endogenous regressors as instruments for the variables in the difference equations (i.e., Equations (3.9) and (3.10)), which is commonly known as Difference GMM estimator (Bapna et al., 2013; Burtch et al., 2013). Valid instruments, by definition, should be highly correlated with the variables to be instrumented but orthogonal to the error term (Chizema et al., in press). These

requirements result in a set of “moment conditions” that enables the Difference GMM estimator to select the suitable lagged values as valid instruments for the difference equations (i.e., Equations (3.9) and (3.10)). Although the Difference GMM estimator has been widely adopted in prior DPD studies (e.g., Dezsö et al., 2012; Sodero et al., 2013), Blundell and Bond (1998) show that the instruments used in the Difference GMM estimator could be weak if the autoregressive process becomes too persistent over time, as is possible in our study involving firm performance. In order to address this weak instruments concern, Arellano and Bover (1995) and Blundell and Bond (1998) develop a new GMM estimator with additional moment conditions in which the lagged differences of the endogenous regressors are used as instruments for the original level equations (i.e., Equations (3.7) and (3.8)). This new GMM estimator is usually referred to as System GMM estimator (Bapna et al., 2013; Bardhan et al., 2013) as it estimates a system of two equations simultaneously—the original level equation and the transformed difference equation. However, as the fixed effects are still presented in the error term of the original level equations (i.e., Equations (3.7) and (3.8)), an additional assumption is required in order to implement the System GMM estimator: Although the endogenous variables are correlated with the fixed effects in the error term by construction, it is assumed that the correlation is constant over time (i.e.

time-invariant) (Arellano and Bover, 1995; Blundell and Bond, 1998). This is a reasonable assumption for data over a relatively short time period such as ours with a maximum of six years (Wintoki et al., 2012). This assumption allows the System GMM estimator to difference the instruments to make them exogenous to the fixed effects in the error term and address the endogeneity concern (Roodman, 2009). Therefore, the System GMM estimator uses lagged differences as instruments for the original level equations, in addition to the use of lagged levels as instruments for the transformed difference equations. The introduction of more instruments enables the System GMM estimator to address the concern of weak instruments in the Difference GMM estimator and improve the estimation efficiency dramatically (Roodman, 2009).

In this study, we implement the two-step System GMM estimator as it is efficient and robust to any pattern of heteroskedasticity (Roodman, 2009). Since the robust estimates of the coefficients' standard errors assume no correlation across firms in the idiosyncratic disturbances (those apart from the fixed effects), we follow Roodman's (2009) suggestion by including the year dummies in our DPD models to make this assumption more likely to hold.

3.3 Results

The correlations among all variables included in this study are presented in Table 3.2. It shows that the two dependent variables are highly correlated with their lagged values (b = 0.787 for operational efficiency and b = 0.760 for innovativeness), providing support for the inclusion of the lagged dependent variables in the regression models and the adoption of the System GMM estimator for data analysis.

The test results regarding the impact of social media initiatives on operational efficiency and innovativeness are shown in Tables 3.3 and 3.4, respectively. There are four models in each table. Model 1 is the basic model including all four control variables, lagged dependent variable, two moderating variables, and year dummies. Model 2 further adds the main effect of social media initiatives to Model 1. The moderating effects of stakeholder geographic diversity and stakeholder relationship are introduced in Models 3 and 4, sequentially. The number of firm-year observations is 1,096 in Table 3.3, but reduced to 1,062 in Table 3.4 due to the missing innovativeness data in some firm-year observations. All models in the two tables are significant ($p < 0.001$) based on the Wald Chi-square statistic.

Table 3.2 Correlation Matrix

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Operational Efficiency	1										
2. Lagged Operational Efficiency	0.787***	1									
3. Innovativeness	0.181***	0.181***	1								
4. Lagged Innovativeness	0.181***	0.191***	0.760***	1							
5. Social Media Initiatives	0.178***	0.169***	0.094**	0.057	1						
6. Stakeholder Geographic Diversity	0.178***	0.186***	0.049	0.053	0.080**	1					
7. Stakeholder Relationship	0.164***	0.175***	0.078*	0.097**	0.104***	0.242***	1				
8. Firm Size	0.099**	0.088**	0.254***	0.243***	0.277***	0.092**	-0.209***	1			
9. Firm Profitability	0.499***	0.398***	0.115***	0.122***	0.099**	0.044	0.103***	0.026	1		
10. Firm Age	0.034	0.056	0.048	0.041	-0.027	0.237***	0.026	0.155***	-0.011	1	
11. Firm R&D Intensity	0.296***	0.279***	0.054	0.060	0.111***	0.400***	0.298***	-0.090**	0.057	-0.046	1
Mean	0.693	0.696	0.218	0.213	0.264	0.203	-0.296	9.549	0.148	3.939	0.042
Standard Deviation	0.102	0.104	0.882	0.873	0.492	0.164	0.926	1.156	0.066	0.815	0.066

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed tests).

Table 3.3 The Impact of Social Media Initiatives on Operational Efficiency

Variables	Model 1	Model 2	Model 3	Model 4
Intercept	0.123 (1.101)	0.129 (0.854)	0.126 (0.841)	0.120 (0.800)
Firm Size	0.017 (1.665)	0.018 (1.417)	0.017 (1.375)	0.018 (1.408)
Firm Profitability	0.847*** (9.301)	0.820*** (8.060)	0.818*** (8.013)	0.811*** (7.924)
Firm Age	0.019 (0.910)	0.016 (0.666)	0.018 (0.755)	0.018 (0.787)
Firm R&D Intensity	-0.099 (-1.551)	-0.218 (-1.559)	-0.224 (-1.623)	-0.210 (-1.489)
Lagged Operational Efficiency	0.316*** (8.374)	0.321*** (8.190)	0.330*** (8.305)	0.330*** (8.324)
Stakeholder Geographic Diversity	0.016 (0.977)	0.010 (0.428)	0.006 (0.270)	0.008 (0.333)
Stakeholder Relationship	0.002 (0.680)	0.005* (2.139)	0.005* (2.162)	0.004 (1.779)
Social Media Initiatives		0.011*** (3.168)	0.007* (2.065)	0.007* (2.073)
Social Media Initiatives × Stakeholder Geographic Diversity			0.045** (2.488)	0.039* (2.196)
Social Media Initiatives × Stakeholder Relationship				0.005* (2.013)
Year Dummies	Included	Included	Included	Included
Number of observations (*N*)	1096	1096	1096	1096
Wald Chi-square	338.24***	400.34***	408.82***	409.94***
Sargan statistic	$p = 0.32$	$p = 0.30$	$p = 0.36$	$p = 0.35$
AR(1)	$p = 0.01$	$p = 0.03$	$p = 0.02$	$p = 0.02$
AR(2)	$p = 0.63$	$p = 0.93$	$p = 0.90$	$p = 0.88$

Notes:

1. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed tests for control variables and one-tailed tests for hypothesized variables).
2. *t*-statistics are in parentheses.

Table 3.4 The Impact of Social Media Initiatives on Innovativeness

Variables	Model 1	Model 2	Model 3	Model 4
Intercept	-2.873* (-2.358)	-3.538 (-1.752)	-3.946 (-1.915)	-4.032 (-1.945)
Firm Size	0.316*** (3.642)	0.387*** (3.501)	0.402*** (3.557)	0.405*** (3.575)
Firm Profitability	0.429 (0.588)	0.357 (0.534)	0.322 (0.484)	0.410 (0.610)
Firm Age	-0.017 (-0.062)	-0.010 (-0.025)	0.059 (0.148)	0.068 (0.168)
Firm R&D Intensity	1.583* (2.527)	1.400 (1.320)	1.431 (1.375)	1.466 (1.416)
Lagged Innovativeness	0.276*** (5.320)	0.224*** (3.975)	0.224*** (3.918)	0.223*** (3.918)
Stakeholder Geographic Diversity	-0.057 (-0.271)	-0.010 (-0.035)	0.006 (0.020)	0.048 (0.158)
Stakeholder Relationship	-0.014 (-0.454)	-0.005 (-0.196)	-0.011 (-0.401)	-0.023 (-0.851)
Social Media Initiatives		0.158*** (4.512)	0.098** (2.538)	0.097** (2.464)
Social Media Initiatives × Stakeholder Geographic Diversity			0.786*** (3.360)	0.601** (2.401)
Social Media Initiatives × Stakeholder Relationship				0.069* (2.246)
Year Dummies	Included	Included	Included	Included
Number of observations (*N*)	1062	1062	1062	1062
Wald Chi-square	70.87***	72.22***	81.74***	92.25***
Sargan statistic	$p = 0.29$	$p = 0.44$	$p = 0.57$	$p = 0.56$
AR(1)	$p = 0.00$	$p = 0.00$	$p = 0.00$	$p = 0.00$
AR(2)	$p = 0.19$	$p = 0.31$	$p = 0.36$	$p = 0.35$

Notes:

1. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-tailed tests for control variables and one-tailed tests for hypothesized variables).
2. *t*-statistics are in parentheses.

Before discussing the detailed results based on the System GMM estimation, we conduct two tests to verify the suitability of applying the System GMM estimator in our research context. The first one is Sargan test, which is used to check the orthogonality of the instrumental variables to the error term (Chizema et al., in press). The Sargan statistic is not significant ($p > 0.05$)[3] across all the models as shown in Tables 3.3 and 3.4, failing to reject the null hypothesis that the specific instrumental variables are uncorrelated with the error term. Therefore, the instruments used in this study can be viewed as exogenous and appropriate. The second test is to check the autocorrelation in the idiosyncratic disturbances (those apart from the fixed effects). As this test is applied to the residuals in differences, the first-order autocorrelation (AR1) should be significant by construction[4]. The results shown in Tables 3.3 and 3.4 also suggest that all the first-order autocorrelations (AR1) are statistically significant ($p < 0.05$). Therefore, we need to rely on the second-order autocorrelation in differences (AR2) to determine the first-order autocorrelation in levels (Roodman, 2009). The statistically insignificant AR2 ($p >$

[3] A more conservative threshold of *p*-value suggested by Roodman (2009) is 0.25 and he also warns that this *p*-value should not be too close to 1. The *p*-values of our Sargan statistic across all models in Tables 3.3 and 3.4 are higher than 0.25 and lower than 0.6, satisfying Roodman's (2009) conservative requirements.

[4] Let v_{it} be idiosyncratic disturbance term. Δv_{it} (i.e., $v_{it} - v_{i(t-1)}$) should be correlated with $\Delta v_{i(t-1)}$ (i.e., $v_{i(t-1)} - v_{i(t-2)}$) via the shared $v_{i(t-1)}$ term.

0.05) across all the models in Tables 3.3 and 3.4 suggests that we fail to reject the null hypothesis that there is no serial correlation in the idiosyncratic disturbances. As a result, there is no evidence that our models are misspecified.

For all models shown in Tables 3.3 and 3.4, the lagged dependent variables are positive and significant ($p < 0.001$), providing strong support for the persistent influence of past performance in terms of operational efficiency and innovativeness. Two control variables, namely, firm profitability and firm size, are positively significant ($p < 0.001$) in all models of Tables 3.3 and 3.4, respectively. It suggests that while more profitable firms seem to have higher operational efficiency, larger firms appear to be more innovative. Although firm R&D intensity is positively significant ($p < 0.05$) in Model 1 of Table 3.4, it becomes insignificant ($p > 0.05$) after including the hypothesized variables in Models 2 to 4. On the other hand, stakeholder relationship is positive and significant ($p < 0.05$) in Models 2 and 3 of Table 3.3, but becomes insignificant ($p > 0.05$) in the full model (i.e., Model 4).

Social media initiatives remain positive and significant ($p < 0.05$) across Models 2 to 4 in both Tables 3.3 and 3.4, suggesting that social media initiatives improve the operational efficiency and innovativeness of firms. Therefore, both H1 and H2 are

supported. Moreover, the interaction between social media initiatives and stakeholder geographic diversity is also positive and significant ($p < 0.05$) in Models 3 and 4 of the two tables. It shows that the impact of social media initiatives on operational efficiency and innovativeness is more positive for firms with more geographically diversified stakeholders, supporting H3a and H3b, respectively. Finally, Model 4 of Tables 3.3 and 3.4 show significantly positive interaction between social media initiatives and stakeholder relationship ($p < 0.05$), indicating that firms with better stakeholder relationships gain more operational efficiency and innovativeness improvement from their social media initiatives. Therefore, both H4a and H4b are supported.

3.4 Sensitivity Tests

We conduct several sensitivity tests to ensure the robustness of our findings. A major concern regarding research using archival data such as ours is the measurement. We realize that our measurement of the variables used in this study is not perfect, and thus employ alternative measures to check the sensitivity of our results. More specifically, we measure the dependent, hypothesized, and control variables in Equations (3.7) and (3.8) with alternative proxies as discussed below.

Operational Efficiency. Although conventional Cobb-Douglas production functions like the one shown in Equation (3.2) have been widely adopted in prior studies (e.g., Dutta et al., 2005; Narasimhan et al., 2006) to measure firm capabilities such as R&D and marketing capabilities, Li et al. (2010) show that translog production functions that take the nonlinearity and interactions into account are better models to describe the output and input relationships. Therefore, we construct a translog production function to model the relationship between operating output and inputs as shown below.

$$
\begin{aligned}
&ln(Operating\ Income)_{ijt} \\
&= \beta_0 + \beta_1 ln(Number\ of\ Employees)_{ijt} + \beta_2 ln(Cost\ of\ Goods\ Sold)_{ijt} \\
&+ \beta_3\, ln(Capital\ Expenditure)_{ijt} + \beta_4 ln^2(Number\ of\ Employees)_{ijt} \\
&+ \beta_5 ln^2(Cost\ of\ Goods\ Sold)_{ijt} + \beta_6\, ln^2(Capital\ Expenditure)_{ijt} \\
&+ \beta_7 ln(Number\ of\ Employees)_{ijt} \times ln(Cost\ of\ Goods\ Sold)_{ijt} \\
&+ \beta_8 ln(Cost\ of\ Goods\ Sold)_{ijt} \times ln(Capital\ Expenditure)_{ijt} \\
&+ \beta_9 ln(Number\ of\ Employees)_{ijt} \times ln(Capital\ Expenditure)_{ijt} \\
&+ \varepsilon_{ijt} - \eta_{ijt}\,. \qquad (3.11)
\end{aligned}
$$

The operational efficiency of a firm is calculated based on Equation (3.3) with the

new $\widehat{\eta_{ijt}}$ obtained from Equation (3.11).

Innovativeness. We have measured innovativeness based on the standard score as shown in Equation (3.4) with the assumption of normal distribution. However, the number of firms in some industries is relatively small, which may violate the assumption of normal distribution. Therefore, instead of calculating the standard score, we apply a natural logarithmic transformation to control for the possible skewness and obtain the alternative innovativeness measure as shown below.

$$Innovativeness_{ijt} = ln(Innovation\ rating_{ij(t+1)})\,. \qquad (3.12)$$

Social Media Initiatives. A survey conducted by the *MIT Sloan Management Review* suggests that firms' social media efforts vary quite significantly across industries (Kiron et al., 2012), indicating the need to control for industry-specific effects. Therefore, we normalize a firm's social media initiatives within its industry (2-digit SIC code), and obtain the alternative measure as shown below.

$$Social\ Media\ Initiatives_{ijt} = \frac{Social\ media\ initiatives_{ijt} - Mean\ of\ social\ media\ initiatives_{jt}}{Standard\ deviation\ of\ social\ media\ initiatives_{jt}}\,, \qquad (3.13)$$

where *j* represents the industry index.

Stakeholder Geographic Diversity. As neither the Financial Accounting Standards Board (FASB) nor the Securities and Exchange Commission (SEC) requires firms to report their geographic segments in a standard format (Denis et al., 2002; Hendricks et al., 2009), the number of geographic segments reported by firms in Compustat Segments could vary significantly from one to another. In order to avoid this inconsistency, we follow Denis et al. (2002) by grouping a firm's geographic segments outside the US as a single non-domestic segment and compute the stakeholder geographic diversity as shown below.

$$Stakeholder\ Geographic\ Diversity_{it} = \frac{1}{2}\left(\frac{Number\ of\ employees\ outside\ the\ US_{it}}{Number\ of\ employees_{it}} + \frac{Sales\ outside\ the\ US_{it}}{Sales_{it}}\right). \quad (3.14)$$

Stakeholder Relationship. The total number of "strengths" and "concerns" in each dimension of the stakeholder relations could vary slightly across years as KLD is improving its research methodology continually. For instance, KLD introduced the health and safety strength to the dimension of employee relation in 2003, but

excluded the workforce reduction concern from the same dimension in 2010. In order to make the results comparable across years, in each year, we normalize a firm's strengths (concerns) in each dimension by the total number of strengths (concerns) in that dimension as defined by KLD (Servaes and Tamayo, 2013) and obtain the stakeholder relationship as shown below.

$$Stakeholder\ Relationship_{it} = \frac{1}{2}\sum_{n=1}^{2}\left(\frac{Relation\ Strengths_{int}}{Total\ Relation\ Strengths_{nt}} - \frac{Relation\ Concerns_{int}}{Total\ Relation\ Concerns_{nt}}\right). \quad (3.15)$$

Control Variables. For the alternative measures of the four control variables, we measure firm size as the natural logarithm of number of employees (Ranganathan and Brown, 2006), firm profitability as return on sales (Bharadwaj, 2000), firm age as the natural logarithm of number of years between firms' social media initiatives and IPO listing (Li et al., 2010), and firm R&D intensity as a firm's R&D expenses scaled by number of employees (Bardhan et al., 2013).

The regression results based on these alternative measures are shown in Models 1 to 8 in Tables 3.5 and 3.6, respectively. All the eight models in the two tables are significant ($p < 0.001$) based on the Wald Chi-square statistic. Both Sargan statistic

and AR(2) are not significant ($p > 0.05$), while AR(1) is significant ($p < 0.05$), across Models 1 to 8 in Tables 3.5 and 3.6, indicating the validity of the instruments used and the lack of autocorrelations in errors. More importantly, the main effects of social media initiatives as well as the moderating effects of stakeholder geographic diversity and stakeholder relationship remain positive and significant ($p < 0.10$) across Models 1 to 8 in Tables 3.5 and 3.6, showing the robustness of our findings with alternative measures. Moreover, we also further include two-year lagged dependent variables as regressors in our DPD models and obtain qualitatively similar results as shown in Model 9 of Tables 3.5 and 3.6.

Finally, we conduct an additional test to verify our measure of social media initiatives. More specifically, we obtain the total impressions served across social media of 30 firms from January to August 2012 as measured by comScore. This measure is regarded as “the best proxy for overall economic activity” (Edwards, 2012) of a firm on social media. We adopt our methodology to measure the social media initiatives of these 30 firms in the same period (i.e., January to August 2012) and compare our measure with comScore’s measure. The significant correlation between the two measures ($b = 0.45$, $p < 0.05$) provides further support to our measurement methodology.

Table 3.5 Sensitivity Test Results

(The Impact of Social Media Initiatives on Operational Efficiency)

Model	Social Media Initiatives	Social Media Initiatives × Stakeholder Geographic Diversity	Social Media Initiatives × Stakeholder Relationship	*N*	Wald Chi-square	Sargan statistic	AR(1)	AR(2)
1. Measure Operational Efficiency based on translog production function	0.012** (2.986)			1096	493.04***	*p* = 0.13	*p* = 0.01	*p* = 0.86
	0.008* (2.031)	0.039* (1.794)	0.006* (1.794)	1096	501.19***	*p* = 0.16	*p* = 0.01	*p* = 0.91
2. Measure Social Media Initiatives based on z-score	0.003** (2.739)			1086	396.06***	*p* = 0.22	*p* = 0.03	*p* = 0.96
	0.002** (2.354)	0.011* (1.846)	0.002* (2.206)	1086	405.73***	*p* = 0.27	*p* = 0.03	*p* = 0.94
3. Measure Stakeholder Geographic Diversity based on non-domestic share	0.011*** (3.190)			1096	399.96***	*p* = 0.29	*p* = 0.03	*p* = 0.93
	0.008** (2.483)	0.045* (2.235)	0.005* (1.940)	1096	412.35***	*p* = 0.34	*p* = 0.02	*p* = 0.87
4. Measure Stakeholder Relationship based on normalization	0.010*** (3.154)			1096	399.28***	*p* = 0.31	*p* = 0.03	*p* = 0.92
	0.007* (2.112)	0.040* (2.286)	0.024* (1.904)	1096	407.29***	*p* = 0.37	*p* = 0.02	*p* = 0.88
5. Measure Firm Size as Ln(Employees)	0.009** (2.843)			1096	397.52***	*p* = *0.44*	*p* = *0.03*	*p* = *0.90*
	0.006* (1.878)	0.035* (1.994)	0.004* (1.727)	1096	406.68***	*p* = *0.47*	*p* = *0.02*	*p* = *0.86*
6. Measure Firm Profitability as ROS	0.008** (2.557)			1096	507.20***	*p* = *0.23*	*p* = *0.02*	*p* = *0.69*
	0.005* (1.723)	0.024^ (1.376)	0.006** (2.365)	1096	524.51***	*p* = *0.25*	*p* = *0.02*	*p* = *0.64*
7. Measure Firm Age as Ln(Year of social media initiatives - IPO year)	0.008** (2.525)			1096	391.77***	*p* = *0.27*	*p* = *0.02*	*p* = *0.93*
	0.005^ (1.526)	0.035* (2.072)	0.005* (2.018)	1096	399.77***	*p* = *0.28*	*p* = *0.02*	*p* = *0.89*
8. Measure Firm R&D Intensity as R&D Expenses / Employees	0.010* (2.958)			1096	409.18***	*p* = *0.33*	*p* = *0.03*	*p* = *0.92*
	0.006* (1.962)	0.036* (2.057)	0.005* (1.822)	1096	416.99***	*p* = *0.37*	*p* = *0.02*	*p* = *0.87*
9. Include two-year lagged dependent variable	0.010** (3.002)			1008	455.37***	*p* = *0.16*	*p* = *0.02*	*p* = *0.50*
	0.007* (2.077)	0.030^ (1.639)	0.004^ (1.626)	1008	453.67***	*p* = *0.18*	*p* = *0.02*	*p* = *0.47*

^ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (one-tailed tests).

Table 3.6 Sensitivity Test Results

(The Impact of Social Media Initiatives on Innovativeness)

Model	Social Media Initiatives	Social Media Initiatives × Stakeholder Geographic Diversity	Social Media Initiatives × Stakeholder Relationship	*N*	Wald Chi-square	Sargan statistic	AR(1)	AR(2)
1. Measure Innovativeness based on natural logarithmic transformation	0.123*** (3.974)			1062	115.85***	*p* = 0.81	*p* = 0.00	*p* = 0.17
	0.080* (2.281)	0.359* (1.702)	0.066** (2.543)	1062	134.87***	*p* = 0.86	*p* = 0.00	*p* = 0.17
2. Measure Social Media Initiatives based on z-score	0.033** (2.664)			1051	60.74***	*p* = 0.47	*p* = 0.00	*p* = 0.25
	0.020^ (1.465)	0.247** (2.749)	0.023^ (1.532)	1051	69.00***	*p* = 0.61	*p* = 0.00	*p* = 0.33
3. Measure Stakeholder Geographic Diversity based on non-domestic share	0.159*** (4.530)			1062	73.25***	*p* = 0.44	*p* = 0.00	*p* = 0.31
	0.124*** (3.492)	0.431^ (1.639)	0.075** (2.360)	1062	88.75***	*p* = 0.54	*p* = 0.00	*p* = 0.34
4. Measure Stakeholder Relationship based on normalization	0.159*** (4.541)			1062	72.21***	*p* = 0.43	*p* = 0.00	*p* = 0.31
	0.096** (2.444)	0.616** (2.615)	0.383** (2.386)	1062	91.00***	*p* = 0.55	*p* = 0.00	*p* = 0.34
5. Measure Firm Size as Ln(Employees)	0.172*** (4.862)			1060	55.47***	*p* = 0.34	*p* = 0.00	*p* = 0.26
	0.104** (2.646)	0.642** (2.514)	0.083** (2.611)	1060	79.63***	*p* = 0.38	*p* = 0.00	*p* = 0.29
6. Measure Firm Profitability as ROS	0.155*** (4.331)			1062	72.93***	*p* = 0.51	*p* = 0.00	*p* = 0.31
	0.092* (2.303)	0.605** (2.438)	0.066* (2.168)	1062	91.53***	*p* = 0.63	*p* = 0.00	*p* = 0.35
7. Measure Firm Age as Ln(Year of social media initiatives - IPO year)	0.142*** (4.097)			1062	57.60***	*p* = 0.51	*p* = 0.00	*p* = 0.26
	0.086* (2.222)	0.560* (2.241)	0.069* (2.278)	1062	75.68***	*p* = 0.54	*p* = 0.00	*p* = 0.29
8. Measure Firm R&D Intensity as R&D Expenses / Employees	0.158*** (4.531)			1060	64.87***	*p* = 0.42	*p* = 0.00	*p* = 0.30
	0.095** (2.439)	0.606** (2.423)	0.070* (2.323)	1060	87.85***	*p* = 0.53	*p* = 0.00	*p* = 0.34
9. Include two-year lagged dependent variable	0.164*** (4.497)			969	79.57***	*p* = 0.24	*p* = 0.00	*p* = 0.46
	0.101** (2.384)	0.637** (2.338)	0.067* (1.983)	969	92.47***	*p* = 0.35	*p* = 0.00	*p* = 0.49

^ $p < 0.10$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (one-tailed tests).

3.5 Discussions and Conclusion

Through the theoretical lens of social capital, our study has argued that social media initiatives enable firms to unlock the potential of their embedded ties with stakeholders across internal and external social networks, leading to operational efficiency and innovativeness improvement. Consistent with our argument, the regression results based on the System GMM estimation shows that social media initiatives improve the operational efficiency and innovativeness of firms. Moreover, we further find that the improvement due to social media initiatives is more positive for firms with more geographically diversified stakeholders and better stakeholder relationships, highlighting the important role the structural and relational dimensions of social capital play in affecting the value creation of social media initiatives. Our findings remain robust with alternative measurement and analysis approaches.

Besides the main impact of social media initiatives and the moderating effects of stakeholder geographic diversity and stakeholder relationship, the regression results also suggest that both operational efficiency and innovativeness are quite persistent over time, providing support to the inclusion of the lagged dependent variables in our regression models. Although the concern regarding the persistence of firm performance has been raised for a few decades (Bain, 1956; Suarez et al., 2013), it is

still not a common practice among researchers to include the lagged performance variables in their regression models. This may be due to the fact that including lagged dependent variables as regressors will lead to the “dynamic panel bias” and make some conventional estimation techniques such as OLS inconsistent (Nickell, 1981). Nevertheless, recent development in DPD estimation techniques such as the System GMM estimator (Arellano and Bover, 1995; Blundell and Bond, 1998) enables researchers to better address the dynamic panel bias as well as the possible endogeneity issues. Therefore, it is important for researchers to take the persistence of firm performance into account in their research and employ some advanced estimation techniques to obtain unbiased results.

3.5.1 Theoretical Implications

We have adopted the theoretical lens of social capital in this study. However, different from prior social capital studies that have suggested that having social capital *per se* enables an actor to gain competitive advantage (Moran, 2005; Leana and Pil, 2006), we argue that competitive advantage should be viewed as a result of the actor’s efforts to unlock the potential of their embedded social capital for value creation. In other words, our study makes a distinction between “having social capital” and “using social capital” (Kwon and Adler, 2014, p. 414). The findings

regarding the direct effects of the structural and relational dimensions of social capital provide support to our argument. More specifically, as shown in Model 4 (i.e., the full model) of Tables 3.3 and 3.4, stakeholder geographic diversity (the structural dimension) and stakeholder relationship (the relational dimension) have no direct impact ($p > 0.05$) on the operational efficiency and innovativeness of firms. Therefore, we reject the assumption that having social capital *per se* results in competitive advantage.

However, the lack of direct impact of having social capital does not necessarily lead to the underestimation of the importance of having social capital in value creation. Our study suggests that although neither stakeholder geographic diversity nor stakeholder relationship has a direct impact on operational efficiency and innovativeness, they both positively moderate the impact of social media initiatives on operational efficiency and innovativeness. This is consistent with our argument that while social media initiatives leverage firms' embedded social capital to create value, the extent to which the value can be created is still contingent on the stock of social capital the firms have. While recent social capital studies have begun to distinguish "having social capital" from "using social capital" (Obukhova and Lan, 2013; Kwon and Adler, 2014), they pay little attention to the possible interactions

between “having social capital” and “using social capital” in creating value. Our study, on the other hand, makes it clear that the extent to which an actor can benefit from the use of social capital is contingent on the stock of social capital it has. Therefore, on one hand, we reject the simple assumption that having social capital *per se* leads to higher value, but argue that it is firms’ strategies (e.g., social media initiatives) that mobilize their embedded social capital for value creation. On the other hand, we also realize the important role firms’ embedded social capital plays, especially in affecting the effectiveness of firms’ strategies in creating value. Therefore, future research should pay more attention to the dynamic relationships between firms’ strategies and social capital in creating value, rather than overemphasizing the role of either strategies or social capital in the value creation process.

Moreover, our research shows the need to take account of both the structural and relational dimensions of social capital. Although prior social capital studies have commonly conceptualized social capital in terms of its structural dimension only (Moran, 2005; Laursen et al., 2012), Moran (2005) has argued that “the configuration of that network is not all that matters; the quality of one’s relationships matters too” (p. 1130). In addition to the direct effects as documented in Moran’s

(2005) research, our study further reveals the moderating role that the structural and relational dimensions of social capital play in value creation. Therefore, future research should not treat social capital as a unidimensional construct, but need to take its structural as well as relational dimensions into account.

Our study also contributes to the literature on organizational ambidexterity. Prior studies on organizational ambidexterity have concerned firms' efforts in pursuit of different organizational activities such as exploration and exploitation simultaneously. While such mixed strategies are expected to help firms become more efficient and innovative simultaneously, recent studies have showed that they may instead make firms get "stuck in the middle" (Raisch and Birkinshaw, 2008, p. 398) due to the difficulty in balancing exploration and exploitation activities simultaneously. For instance, Ebben and Johnson (2005) show that firms pursuing efficiency and flexibility strategies simultaneously underperform as compared to firms pursuing either efficiency or flexibility strategies only. On the other hand, our research suggests that, instead of relying on mixed strategies, firms can in fact implement some single strategies such as social media initiatives to improve operational efficiency and innovativeness, transforming themselves into ambidextrous organizations. It indicates that while mixed strategies do not always

guarantee the transformation of firms into ambidextrous organizations, some single strategies such as social media initiatives can do a better job without making firms get “stuck in the middle” (Raisch and Birkinshaw, 2008, p. 398). Therefore, future research on organizational ambidexterity should not simply assume the capability of mixed strategies, but ignore the roles of some single strategies, in transforming firms into ambidextrous organizations.

3.5.2 Practical Implications

Firms have well recognized the importance of being both efficient and innovative in order to survive in today’s competitive environment. However, various OM practices, such as ISO 9000 and Six Sigma, are shown to improve productivity at the expense of creativity (Tilcsik, 2008; Garud et al., 2011), resulting in the productivity dilemma as suggested in the literature (Adler et al., 2009). On the other hand, firms engaging in exploration and exploitation activities simultaneously have the risk of being “stuck in the middle” (Raisch and Birkinshaw, 2008, p. 398), and fail to become ambidextrous organizations. Nevertheless, the advances in technologies such as social media provide a unique opportunity for firms to achieve these critical organizational objectives. As social media is expected to transform the way information and knowledge exchange across firms’ social networks upon adoption,

some firms may worry about the possible resultant drawbacks (Gaudin, 2010; Molok et al., 2010; Leonardi et al., 2013). For instance, too much social interaction on social media may disrupt work and distract employees from work-related communication, resulting in lower productivity (Leonardi et al., 2013); outflows of firms' information and knowledge to external social networks via social media may lead to the leakage of confidential information or trade secrets, hurting firms' intellectual property and innovation (Molok et al., 2010). While these concerns about the dark sides of social media usage should not be overlooked, our research suggests that the benefits arising from social media adoption in organizations may outweigh its possible drawbacks. In particular, our research shows that social media initiatives enable firms to improve operational efficiency and innovativeness, overcoming the productivity dilemma as encountered in other OM initiatives (Tilcsik, 2008; Garud et al., 2011). Moreover, instead of encouraging firms to engage in multiple activities such as exploration and exploitation simultaneously, our research suggests that firms can in fact rely on social media as a strategic move to transform themselves into ambidextrous organizations.

Although the information and knowledge exchanged on social media are expected to improve operational efficiency and innovativeness, firms should realize that the

degree of the improvement may also depend on the diversity of the information and knowledge being exchanged as well as the willingness of firms' stakeholders to share their information and knowledge. This is because similar information or duplicate knowledge being exchanged on social media may have a little help in improving firms' operational efficiency and innovativeness. Firms also gain little from their social media initiatives if their stakeholders such as employees and customers are not willing to participate in information and knowledge sharing on social media. Our research suggests that firms with more geographically diversified stakeholders and better stakeholder relationships benefit more from their social media initiatives. This is because stakeholders who are dispersed across geographic locations bear more diverse information and non-redundant knowledge (Cummings, 2004), while stakeholders having better relationships with firms are more likely to contribute their information and knowledge (Liao et al., 2004). Therefore, firms need to assess the geographic diversity of and the relationships with their stakeholders in order to extract more value from their social media initiatives.

3.5.3 Limitations and Future Research

Our current study suffers from several limitations which in turn create new opportunities for future research. First, like any other studies relying on archival data,

our study cannot be perfect in its measurements. Although we have employed alternative measures to ensure the robustness of our findings, our measurements could be further improved. In particular, we focus on two stakeholder groups, namely, employees and customers, when measuring stakeholder geographic diversity and stakeholder relationship. The focus on employees and customers only is due to the data availability of the databases used, but is still consistent with the fact that firms' social media initiatives mainly target at employees and customers instead of other stakeholder groups (Kiron et al., 2012). Nevertheless, we believe it could be interesting for future research to take the role of other stakeholder groups such as suppliers into account and adopt alternative research approaches such as surveys or case studies to overcome the data limitation of our study.

Moreover, our study focuses on the impact of social media initiatives on operational efficiency and innovativeness only, although social media initiatives may affect other organizational outcomes as well. For instance, a recent survey conducted by *MIT Sloan Management Review* suggests that about 83% of maturing companies use social media to improve leadership performance and talent management (Kane et al., 2014b). Social capital researchers have also argued that the "social ties of one kind often can be used for different purposes" (Adler and Kwon, 2002, p. 17). Therefore,

future research can broaden our understanding of the impact of social media initiatives by taking other organizational outcomes into account. On the other hand, while our study has documented the benefits arising from social media initiatives in terms of improved operational efficiency and innovativeness, we should not ignore the possible drawbacks due to the adoption of social media in organizations. For instance, some practitioners have warned the possible information overload and employee burnout after the intensive use of social media in organizations (Gaudin, 2010). Therefore, it is important for future research to further reveal the possible dark sides of social media initiatives, together providing a more comprehensive view about the consequences of social media adoption in organizations.

Finally, the implementation of the System GMM estimator also relies on some assumptions. In particular, although the System GMM estimator allows the endogenous variables to be correlated with the fixed effects in the error term, it assumes that the correlation is time-invariant (Arellano and Bover, 1995; Blundell and Bond, 1998). We acknowledge that we are unable to verify this assumption, but past studies (e.g., Wintoki et al., 2012) have suggested that this assumption is reasonable for data over a relatively short time period such as ours with a maximum of six years.

3.5.4 Conclusion

To conclude, our second study has documented the positive impact of social media initiatives on operational efficiency and innovativeness, two critical operational outcomes of firms. We also show that firms with more geographically diversified stakeholders and better stakeholder relationships gain more operational efficiency and innovativeness improvement from their social media initiatives. While our research reveals the ability of social media initiatives to unlock the potential of firms' embedded social capital for value creation, we also realize the important role the structural and relational embeddedness of social capital plays in affecting the effectiveness of social media initiatives in creating value. Therefore, our study highlights the dynamic relationships between social media initiatives and social capital in transforming firms into ambidextrous organizations, and provides important implications for both researchers and practitioners.

Chapter 4 Conclusion

With its growing popularity and influence, online social media, such as Facebook and Twitter, is transforming politics and social norms, and the way business is conducted (Qualman, 2010; Kiron et al., 2012). Although firms are adopting the emerging social media technologies for various organizational purposes, it is still not well understood whether and how firms can gain any operational and financial benefits from their social media initiatives. Our two studies have provided empirical evidence about the impact of social media initiatives at the firm level and also explained the mechanisms underlying the value creation of firms' social media efforts.

Our two studies suggest that the adoption of social media in organizations in general, and for the sale of products and services (i.e., social commerce) in particular, can have a positive impact on operational and financial outcomes in terms of increased market value and improved operational efficiency and innovativeness. More specifically, we find that social commerce announcements increase the market value of firms, while firms' overall social media efforts improve their operational efficiency and innovativeness. However, our two studies also suggest that the adoption of social media in organizations is not a "one size fits all" strategy such

that different firms benefit quite differently from their social media initiatives. In particular, we find that the associations between social commerce announcements and market value are more positive for firms with high reputation, selling products with high uncertainty, and deploying social media platforms with high credibility. On the other hand, firms with more geographically diversified stakeholders and better stakeholder relationships benefit more from their social media initiatives. Our additional analysis further suggests that, under certain circumstances, firms indeed suffer significant losses from their social commerce investments. Therefore, our two studies suggest that while the adoption of social media, on average, enables firms to improve their operational and financial outcomes, the degree of the improvement varies quite significantly across firms. The empirical evidence documented in the two studies provides important support to the adoption of social media for organizational purposes, and also reveals the circumstances in which firms can reap more benefits from their social media efforts.

In addition to the empirical evidence documented, our two studies also provide theoretical explanations about why firms are able to gain operational and financial benefits from their social media efforts. More specifically, our first study draws upon uncertainty reduction theory from the communication literature to argue that

social commerce enables firms to facilitate social and visible communication among different parties via social media, reducing the uncertainty faced by customers, hence benefiting firms. We also adopt the concept of information warrant to explain how communicator-specific warrant, such as firm reputation, and channel-specific warrant, such as social media platform credibility, can enhance the effectiveness of social commerce in reducing customer uncertainty and creating value for firms. On the other hand, our second study adopts the theoretical lens of social capital to argue that social media initiatives enable firms to unlock the potential of their social capital embedded in the social networks, leading to operational efficiency and innovativeness improvement. We further explain how the structural and relational embeddedness of firms' social capital, in terms of stakeholder geographic diversity and stakeholder relationships, can affect the effectiveness of social media initiatives in improving operational efficiency and innovativeness. Our theoretical perspectives are consistent with the empirical evidence documented in the two studies, and advance our understanding of the mechanisms underlying the value creation of firms' social media efforts.

The theoretical perspectives adopted in our two studies also offer important implications for future research. In particular, our uncertainty reduction perspective

on the business value of social commerce challenges the conventional view that social commerce is an extension of e-commerce. While e-commerce focuses on maximizing transaction efficiency and is unsuitable for the sale of products with high uncertainty (Kiang et al., 2000; Overby and Jap, 2009), our study shows that social commerce, with its ability to reduce customer uncertainty, benefits firms in selling products with high uncertainty. Such a contradiction between e-commerce and social commerce suggests that researchers should take an uncertainty reduction perspective to view social commerce as a completely new phenomenon, rather than an extension of e-commerce. On the other hand, our social capital perspective on firms' overall social media efforts rejects the simple assumption that having social capital alone is sufficient to create value. We view the value creation as a result of firms' social media efforts that unlock the potential of firms' embedded social capital, but also realize that the extent to which the value can be created is contingent on the social capital the firms have. Therefore, we urge future research to pay more attention to the dynamic interactions between firms' strategies (e.g., social media initiatives) and social capital in value creation, without overemphasizing the role of either firms' strategies or social capital only. Moreover, we also believe that it would be interesting for future research to consider other operational and financial benefits beyond those documented in our research, as well as the possible drawbacks, of

adopting social media in organizations.

Overall, our research highlights the critical role social media plays in improving firms' operational and financial outcomes, and also reveals the underlying factors that make the improvement vary across firms. The theoretical perspectives and the empirical evidence documented in our research provide important implications for future research and for firms to leverage the emerging social media technologies to gain competitive advantage.

Appendix A A Social Commerce Initiative Announcement Extracted from Factiva

Delta Air Lines Opens First Social Commerce Channel on Facebook with Alvenda ; Booking Travel is Made Easier for Customers and Their Facebook Friends

721 words
12 August 2010
14:00 GMT
Business Wire
BWR
English

MINNEAPOLIS - (BUSINESS WIRE) - Delta Air Lines (**NYSE**:DAL) and Alvenda Inc., the only integrated **social commerce** channel, officially launched the travel industry's first ecommerce capability on Facebook today. Facebook users will now be able to book flights with their friends directly on Facebook.

Delta's Ticket Window will also be attached to Delta's online banner ads allowing customers to book travel with their Facebook friends on thousands of other Alvenda-certified publisher websites and on Delta's partner websites including the New York Yankees.

Delta's social commerce channel now allows any of the site's 500+ million users to complete a full travel booking on facebook.com/delta and also on the Facebook home page of thousands of fans via Alvenda's unique In-Stream Shopping™ features.

"Our customers are spending more time online and are looking for new ways to connect with us. We're now bringing Delta to our customers rather than the other way around – on our own website, on Facebook, on travel websites, on Internet news sites, and beyond," said Bob Kupbens, Delta's Vice President – eCommerce.

"We're looking forward to empowering Delta's 160 million annual customers to shop on their own terms and give them an easy way to book travel with their friends," said Wade Gerten, Founder and CEO of Alvenda. "Delta is the first travel company to open millions of new selling opportunities via a social commerce channel."

Delta leveraged the latest release of Alvenda's StoreCast™ platform which enables the convergence of social networking, ecommerce, and advertising. The Alvenda StoreCast™ platform, proven with many of the world's largest merchants, is now more robust than ever. Major enhancements were made by Alvenda to support Delta's needs in the complex integration of flight bookings and the industry's regulatory requirements.

Alvenda opens in-stream shopping experiences that include a quick checkout feature inside Facebook's news feed, fan pages, and inside banner ads on publisher websites. Merchants that partner with Alvenda typically see 10 to 20 times the engagement rates achieved with traditional direct marketing and social media programs. People interact and transact far more often when not required to leave their preferred online experience.

About Alvenda

Alvenda creates social commerce channels for some of the largest merchants in the world by integrating social networking, advertising, and ecommerce. Alvenda was the first company to bring ecommerce to Facebook in July 2009 with 1-800-Flowers.com. Since then, Alvenda has been rapidly launching top merchants such as Avon's Mark division, Best Buy, Brooks Brothers, Delta, and Hallmark to create social selling opportunities. Alvenda was founded in 2008 and is led by executives with domain expertise in ecommerce software, direct marketing, online publishing, and social media. Alvenda has been featured in Advertising Age, Financial Times, Wall Street Journal, Business Week, New York Times, WWD, Bloomberg TV, and Techcrunch. Alvenda was also named the grand prize winner of the 2009 Minnesota Cup. Alvenda is funded by Split Rock Partners and is based in Minneapolis, MN. For more information on Alvenda, visit alvenda.com.

About Delta Air Lines

Delta Air Lines serves more than 160 million customers each year. With its unsurpassed global network, Delta and the Delta Connection carriers offer service to 367 destinations in 65 countries on six continents. Headquartered in Atlanta, Delta employs more than 70,000 employees worldwide and operates a mainline fleet of more than 700 aircraft. A founding member of the SkyTeam global alliance, Delta participates in the industry's leading trans-Atlantic joint venture with Air France-KLM and Alitalia. Including its worldwide alliance partners, Delta offers customers more than 13,000 daily flights, with hubs in Amsterdam, Atlanta, Cincinnati, Detroit, Memphis, Minneapolis-St. Paul, New York-JFK, Paris-Charles de Gaulle, Salt Lake City and Tokyo-Narita. The airline's service includes the SkyMiles frequent flier program, the world's largest airline loyalty program; the award-winning BusinessElite service; and more than 45 Delta Sky Clubs in airports worldwide. Customers can check in for flights, print boarding passes, check bags and review flight status at delta.com.

Document BWR0000020100812e68c004ha

Appendix B A Social Media Initiative Announcement Extracted from Factiva

DOW JONES

Honeywell Chooses Connectbeam for Social Bookmarking and Social Networking; New social software allows enterprise users to connect and collaborate on demand

420 words
18 April 2007
12:00 GMT
PR Newswire (U.S.)
PRN
English

REDWOOD CITY, Calif., April 18 /PRNewswire/ -- Connectbeam, Inc., a leading provider of enterprise **social software**, announced today that it has been chosen by global technology company **Honeywell** (NYSE: HON) to provide social bookmarking and tagging, expertise location, and enterprise **social networking** capabilities to **Honeywell** employees. Using Connectbeam software, **Honeywell** knowledge workers will be able to locate and manage information together while easily networking with each other's knowledge, interests and skills in a secure, behind the firewall implementation.

Honeywell's implementation is based on Connectbeam's Social Bookmarking & Networking Appliance, a pre-configured appliance server deployed behind the enterprise firewall, and Connectbeam's Application Connector for Google Enterprise Search.

Honeywell's Rich Hoeg has posted about the Connectbeam implementation at http://econtent.typepad.com/econtent/2007/03/tagging_inside_.html .

Puneet Gupta, Connectbeam's CEO, commented, "Connectbeam solves two key problems facing every enterprise worker: how to find information that they can be certain is current, accurate and significant, and how to locate and connect with knowledgeable colleagues."

"Connectbeam's integration with Google Enterprise Search was important to **Honeywell**," added Connectbeam Vice President of Sales, Charles Pendell. "By making Google search results more useful, Connectbeam helps **Honeywell** employees do better, more efficient work, while improving the company's ROI on its Google search investment."

Integration with enterprise search, from Google and a number of other vendors, allows Connectbeam to provide social search. Search results now highlight information from your colleagues' searches, especially the information that they have found most useful. Connectbeam also points the user to related searches that can extend knowledge. Most important, Connectbeam social search instantly and effortlessly identifies and connects enterprise workers with colleagues whose interests and knowledge enhances theirs. Connectbeam integration means that every enterprise search increases collective intelligence and makes it easily available to enterprise workers.

About Connectbeam: Connectbeam is a leading provider of Enterprise 2.0 **social software**, bringing **Web 2.0** information-sharing and ease of use to the enterprise, so that organizations and their employees can connect and collaborate on demand. Privately held, Connectbeam is located in California's Silicon Valley. More information about Connectbeam and its offerings can be found at http://www.connectbeam.com .

SOURCE Connectbeam, Inc.

200704180800PR_NEWS_USPR_____SFW006.xml

Document PRN0000020070418e34i003ms

References

Adler, P. S., & Kwon, S. W. (2002). Social capital: Prospects for a new concept. *Academy of Management Review*, 27(1), 17-40.

Adler, P. S., Benner, M., Brunner, D. J., MacDuffie, J. P., Osono, E., Staats, B. R., ... & Winter, S. G. (2009). Perspectives on the productivity dilemma. *Journal of Operations Management*, 27(2), 99-113.

Anderson, M., Sims, J., Price, J., & Brusa, J. (2011). *Turning "Like" to "Buy": Social Media Emerges as a Commerce Channel*. New York City, NY: Booz & Company.

Antheunis, M. L., Schouten, A. P., Valkenburg, P. M., & Peter, J. (2012). Interactive uncertainty reduction strategies and verbal affection in computer-mediated communication. *Communication Research*, 39(6), 757-780.

Aral, S., Dellarocas, C., & Godes, D. (2013). Introduction to the special issue—Social media and business transformation: A framework for research. *Information Systems Research*, 24(1), 3-13.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, 58(2), 277-297.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable

estimation of error-components models. *Journal of Econometrics,* 68(1), 29-51.

Ba, S., Lisic, L. L., Liu, Q., & Stallaert, J. (2013). Stock market reaction to green vehicle innovation. *Production and Operations Management*, 22(4), 976-990.

Bae, S., & Lee, T. (2011). Product type and consumers' perception of online consumer reviews. *Electronic Markets*, 21(4), 255-266.

Baek, H., Ahn, J., & Choi, Y. (2013). Helpfulness of online consumer reviews: Readers' objectives and review cues. *International Journal of Electronic Commerce*, 17(2), 99-126.

Bain, J. S. (1956). *Barriers to New Competition*. Cambridge, MA: Harvard University Press.

Bapna, R., Langer, N., Mehra, A., Gopal, R., & Gupta, A. (2013). Human capital investments and employee performance: An analysis of IT services industry. *Management Science,* 59(3), 641-658.

Barber, B. M., & Lyon, J. D. (1996). Detecting abnormal operating performance: The empirical power and specification of test statistics. *Journal of Financial Economics*, 41(3), 359-399.

Bardhan, I., Krishnan, V., & Lin, S. (2013). Business value of information technology: Testing the interaction effect of IT and R&D on Tobin's Q.

Information Systems Research, 24(4), 1147-1161.

Barlow, J. (1996). *A Complaint is a Gift: Using Customer Feedback as a Strategic Tool*. Berrett-Koehler Store.

Barry, C., Markey, R., Almquist, E., & Brahm, C. (2011). *Putting Social Media to Work*. Boston, Massachusetts: Bain & Company.

Battor, M., & Battor, M. (2010). The impact of customer relationship management capability on innovation and performance advantages: testing a mediated model. *Journal of Marketing Management*, 26(9-10), 842-857.

Bayus, B. L. (2013). Crowdsourcing new product ideas over time: An analysis of the Dell IdeaStorm community. *Management Science*, 59(1), 226-244.

Beach, D., & Gupta, V. (2005). *Social Commerce via the Shoposphere & Pick Lists*. Retrieved October 25, 2014, from http://www.ysearchblog.com/2005/11/14/social-commerce-via-the-shoposphere-pick-lists/.

Berger, C. R. (1986). Uncertain outcome values in predicted relationships uncertainty reduction theory then and now. *Human Communication Research*, 13(1), 34-38.

Berger, C. R. (2006). Uncertainty reduction theory. In E. Griffin (Ed.), *A First Look at Communication Theory* (pp. 130-141). New York, NY: McGraw-Hill.

Berger, C. R., & Calabrese, R. J. (1975). Some explorations in initial interaction and beyond: Toward a developmental theory of interpersonal communication. *Human Communication Research*, 1(2), 99-112.

Berlo, D. K. (1960). *The Process of Communication*. New York: Holt, Rinehart & Winston.

Bharadwaj, A. (2000). A resource-based perspective on IT capability and firm performance: An empirical investigation. *MIS Quarterly*, 24(1), 169-196.

Bhatnagar, N., Aksoy, L., & Malkoc, S. A. (2004). Embedding brands within media content: The impact of message, media, and consumer characteristics on placement efficacy. In L. J. Shrum (Ed.), *The Psychology of Entertainment Media: Blurring the Lines between Entertainment and Persuasion* (pp. 99-116). Mahwah, NJ: Erlbaum.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115-143.

Bock, G. W., Zmud, R. W., Kim, Y. G., & Lee, J. N. (2005). Behavioral intention formation in knowledge sharing: Examining the roles of extrinsic motivators, social-psychological factors, and organizational climate. *MIS Quarterly*, 29(1), 87-111.

Bowman, D., & Narayandas, D. (2004). Linking customer management effort to

customer profitability in business markets. *Journal of Marketing Research*, 41(4), 433-447.

Burtch, G., Ghose, A., & Wattal, S. (2013). An empirical examination of the antecedents and consequences of contribution patterns in crowd-funded markets. *Information Systems Research*, 24(3), 499-519.

Business Wire. (2013). *Starbucks Celebrates Five-Year Anniversary of My Starbucks Idea*. Retrieved October 25, 2014, from http://www.businesswire.com/news/home/20130328006372/en/Starbucks-Celebrates-Five-Year-Anniversary-Starbucks-Idea#.VE-yxvncnBg.

Byron, K. (2008). Carrying too heavy a load? The communication and miscommunication of emotion by email. *Academy of Management Review*, 33(2), 309-327.

Carhart, M. M. (1997). On persistence in mutual fund performance. *Journal of Finance*, 52(1), 57-82.

Cassiman, B., & Veugelers, R. (2006). In search of complementarily in innovation strategy: Internal R&D and external knowledge acquisition. *Management Science*, 52(1), 68-82.

Cecere, L. (2010). *Rise of Social Commerce: A Trail Guide for the Social Commerce Pioneer*. San Mateo, CA: Altimeter Group.

Chatterjee, D., Richardson, V. J., & Zmud, R. W. (2001). Examining the shareholder wealth effects of new CIO position announcements. *MIS Quarterly*, 25(1), 43-70.

Chellappa, R. K., & Shivendu, S. (2005). Managing piracy: Pricing and sampling strategies for digital experience goods in vertically segmented markets. *Information Systems Research*, 16(4), 400-417.

Chen, Y., & Xie, J. (2008). Online consumer review: Word-of-mouth as a new element of marketing communication mix. *Management Science*, 54(3), 477-491.

Chevalier, J. A., & Mayzlin, D. (2006). The effect of word of mouth on sales: Online book reviews. *Journal of Marketing Research*, 43(3), 345-354.

Chizema, A., Liu, X., Lu, J., & Gao, L. (in press). Politically connected boards and top executive pay in Chinese listed firms. *Strategic Management Journal*.

Cho, H. J., & Pucik, V. (2004). Reliability and validity of the Fortune Reputation Survey: Measuring innovativeness and quality. *Working paper 2004-6*, IMD.

Cho, H. J., & Pucik, V. (2005). Relationship between innovativeness, quality, growth, profitability, and market value. *Strategic Management Journal*, 26(6), 555-575.

Choi, S. M., & Rifon, N. J. (2002). Antecedents and consequences of web

advertising credibility: A study of consumer response to banner ads. *Journal of Interactive Advertising*, 3(1), 12-24.

Chui, M., Manyika, J., Bughin, J., Dobbs, R., Roxburgh, C., Sarrazin, H., Sands, G., & Westergren, M. (2012). *The Social Economy: Unlocking Value and Productivity through Social Technologies*. McKinsey & Company.

Cohen, W., & Levinthal, D. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35(1), 128-152.

Cummings, J. N. (2004). Work groups, structural diversity, and knowledge sharing in a global organization. *Management Science*, 50(3), 352-364.

Dann, L. Y., & Mikkelson, W. H. (1984). Convertible debt issuance, capital structure change and financing-related information: Some new evidence. *Journal of Financial Economics*, 13(2), 157-186.

Das, S. R., & Joshi, M. P. (2007). Process innovativeness in technology services organizations: Roles of differentiation strategy, operational autonomy and risk-taking propensity. *Journal of Operations Management*, 25(3), 643-660.

Deason, L., & Ferrantino, M. J. (2009). Determinants of diffusion and downstreaming of technology intensive products in international trade. *Working Paper No. 2009-10-B*, U.S. International Trade Commission.

Denis, D. J., Denis, D. K., & Yost, K. (2002). Global diversification, industrial

diversification, and firm value. *The Journal of Finance*, 57(5), 1951-1979.

Dewan, S., & Ren, F. (2007). Risk and return of information technology initiatives: Evidence from electronic commerce announcements. *Information Systems Research*, 18(4), 370-394.

Dezsö, C. L., & Ross, D. G. (2012). Does female representation in top management improve firm performance? A panel data investigation. *Strategic Management Journal*, 33(9), 1072-1089.

Dimoka, A., Hong, Y., & Pavlou, P. A. (2012). On product uncertainty in online markets: Theory and evidence. *MIS Quarterly*, 36(2), 395-426.

Dotzel, T., Shankar, V., & Berry, L. L. (2013). Service innovativeness and firm value. *Journal of Marketing Research*, 50(2), 259-276.

Dutta, S., Narasimhan, O. M., & Rajiv, S. (2005). Conceptualizing and measuring capabilities: Methodology and empirical application. *Strategic Management Journal*, 26(3), 277-285.

Ebben, J. J., & Johnson, A. C. (2005). Efficiency, flexibility, or both? Evidence linking strategy to performance in small firms. *Strategic Management Journal*, 26(13), 1249-1259.

Edmans, A. (2011). Does the stock market fully value intangibles? Employee satisfaction and equity prices. *Journal of Financial Economics*, 101(3),

621-640.

Edwards, J. (2012). *Meet the 30 Biggest Social Media Advertisers Of 2012*. Retrieved April 26, 2015, from http://www.businessinsider.com/the-30-biggest-social-media-advertisers-of-2012-2012-9.

Eng, T. Y., & Quaia, G. (2009). Strategies for improving new product adoption in uncertain environments: A selective review of the literature. *Industrial Marketing Management*, 38(3), 275-282.

Ernst, H., Hoyer, W. D., Krafft, M., & Krieger, K. (2011). Customer relationship management and company performance: The mediating role of new product performance. *Journal of the Academy of Marketing Science*, 39(2), 290-306.

Espinosa, J. A., Slaughter, S. A., Kraut, R. E., & Herbsleb, J. D. (2007). Team knowledge and coordination in geographically distributed software development. *Journal of Management Information Systems*, 24(1), 135-169.

Esser, H. (2008). The two meanings of social capital. In D. Castiglione, J. van Deth & G. Wolleb (Eds.), *The Handbook of Social Capital* (pp. 22-49). Oxford: Oxford University Press.

Fader, P. S., & Winer, R. S. (2012). Introduction to the special issue on the emergence and impact of user-generated content. *Marketing Science*, 31(3),

369-371.

Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *Journal of Finance*, 25, 383-417.

Fama, E. F., & French, K. R. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 33(1), 3-56.

Fischer, H. M., & Pollock, T. G. (2004). Effects of social capital and power on surviving transformational change: The case of initial public offerings. *Academy of Management Journal*, 47(4), 463-481.

Flannery, M. J., & Hankins, K. W. (2013). Estimating dynamic panel models in corporate finance. *Journal of Corporate Finance*, 19, 1-19.

Forman, C., Ghose, A., & Wiesenfeld, B. (2008). Examining the relationship between reviews and sales: The role of reviewer identity disclosure in electronic markets. *Information Systems Research*, 19(3), 291-313.

Gallaugher, J., & Ransbotham, S. (2010). Social media and customer dialog management at Starbucks. *MIS Quarterly Executive*, 9(4), 197-212.

Garud, R., Gehman, J., & Kumaraswamy, A. (2011). Complexity arrangements for sustained innovation: Lessons from 3M Corporation. *Organization Studies*, 32(6), 737-767.

Gassmann, O. (2001). Multicultural teams: Increasing creativity and innovation by

diversity. *Creativity and Innovation Management*, 10(2), 88-95.

Gaudin, S. (2010). *Experts Warn of the Dark Side of Enterprise 2.0*. Retrieved October 25, 2014, from http://www.computerworld.com/article/2519038/social-business/experts-warn-of-the-dark-side-of-enterprise-2-0.html.

Gaudin, S. (2013). *Americans Spend 16 Minutes of Every Hour Online on Social Nets*. Retrieved October 25, 2014, from http://www.computerworld.com/article/2496852/internet/americans-spend-16-minutes-of-every-hour-online-on-social-nets.html.

Gibson, C. B., & Birkinshaw, J. (2004). The antecedents, consequences, and mediating role of organizational ambidexterity. *Academy of management Journal*, 47(2), 209-226.

Gnyawali, D. R., Fan, W., & Penner, J. (2010). Competitive actions and dynamics in the digital age: An empirical investigation of social networking firms. *Information Systems Research*, 21(3), 594-613.

Gobry, P. (2011). *P&G Opens Facebook Stores, Paving the Way for Facebook's Next Billion Dollar Business.* Retrieved October 25, 2014, from http://www.businessinsider.com/procter-gamble-facebook-stores-2011-6.

Goh, K. Y., Heng, C. S., & Lin, Z. (2013). Social media brand community and

consumer behavior: Quantifying the relative impact of user- and marketer-generated content. *Information Systems Research*, 24(1), 88-107.

Granovetter, M. S. (1992). Problems of explanation in economic sociology. In N. Nohria & R. Eccles (Eds.), *Networks and Organizations: Structure, Form and Action* (pp. 25-56). Boston: Harvard Business School Press.

Gu, B., & Ye, Q. (2014). First step in social media: Measuring the influence of online management responses on customer satisfaction. *Production and Operations Management*, 23(4), 570-582.

Gu, B., Park, J., & Konana, P. (2012). The impact of external word-of-mouth sources on retailer sales of high-involvement products. *Information Systems Research*, 23(1), 182-196.

Guglielmo, C. (2009). *Dell Rings up $6.5 Million in Sales Using Twitter*. Retrieved October 25, 2014, from http://www.bloomberg.com/apps/news?pid=newsarchive&sid=akXzD_6YNHCk.

Hansen, H., Samuelsen, B. M., & Silseth, P. R. (2008). Customer perceived value in BtB service relationships: Investigating the importance of corporate reputation. *Industrial Marketing Management*, 37(2), 206-217.

Harvard Business Review Analytic Services. (2010). *The New Conversation: Taking*

Social Media from Talk to Action. Boston, MA: Harvard Business Review.

He, Z. L., & Wong, P. K. (2004). Exploration vs. exploitation: An empirical test of the ambidexterity hypothesis. *Organization science*, 15(4), 481-494.

Helm, S. (2000). Viral marketing—Establishing customer relationships by 'word-of-mouse'. *Electronic Markets*, 10(3), 158-161.

Hendricks, K. B., Singhal, V. R., & Zhang, R. (2009). The effect of operational slack, diversification, and vertical relatedness on the stock market reaction to supply chain disruptions. *Journal of Operations Management*, 27(3), 233-246.

Herfindahl, O. C. (1950). Concentration in the Steel Industry. *Doctoral Dissertation*, Columbia University.

Homburg, C., Klarmann, M., & Staritz, S. (2012). Customer uncertainty following downsizing: The effects of extent of downsizing and open communication. *Journal of Marketing*, 76(3), 112-130.

Houston, M. B., & Johnson, S. A. (2000). Buyer-supplier contracts versus joint ventures: Determinants and consequences of transaction structure. *Journal of Marketing Research*, 37(1), 1-15.

Hu, N., Liu, L., & Zhang, J. J. (2008). Do online reviews affect product sales? The role of reviewer characteristics and temporal effects. *Information Technology and Management*, 9(3), 201-214.

Huang, P., Lurie, N. H., & Mitra, S. (2009). Searching for experience on the web: An empirical examination of consumer behavior for search and experience goods. *Journal of Marketing*, 73(2), 55-69.

Huang, Z., & Benyoucef, M. (2013). From e-commerce to social commerce: A close look at design features. *Electronic Commerce Research and Applications*, 12(4), 246-259.

Im, K. S., Dow, K. E., & Grover, V. (2001). A reexamination of IT investment and market value of the firm: An event study methodology. *Information Systems Research*, 12(1), 103-117.

Jansen, J. J., Van Den Bosch, F. A., & Volberda, H. W. (2006). Exploratory innovation, exploitative innovation, and performance: Effects of organizational antecedents and environmental moderators. *Management Science*, 52(11), 1661-1674.

John, G., Weiss, A. M., & Dutta, S. (1999). Marketing in technology-intensive markets: Toward a conceptual framework. *Journal of Marketing*, 63 (October Special Issue), 78-92.

Judge, T. A., Cable, D. M., Colbert, A. E., & Rynes, S. L. (2007). What causes a management article to be cited: Article, author, or journal?. *Academy of Management Journal*, 50(3), 491-506.

Kahn, K. B. (2001). Market orientation, interdepartmental integration, and product development performance. *Journal of Product Innovation Management*, 18(5), 314-323.

Kalaignanam, K., Shankar, V., & Varadarajan, R. (2007). Asymmetric new product development alliances: Win-win or win-lose partnerships?. *Management Science*, 53(3), 357-374.

Kane, G. C., Alavi, M., Labianca, G., & Borgatti, S. P. (2014a). What's different about social media networks? A framework and research agenda. *MIS Quarterly*, 38(1), 275-304.

Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D., & Buckley, N. (2014b). *Moving Beyond Marketing: Generating Social Business Value across the Enterprise*. North Hollywood, CA: MIT Sloan Management Review.

Kaplan, A. M., & Haenlein, M. (2010). Users of the world, unite! The challenges and opportunities of Social Media. *Business Horizons*, 53(1), 59-68.

Kiang, M. Y., Raghu, T. S., & Shang, K. H. M. (2000). Marketing on the Internet: Who can benefit from an online marketing approach?. *Decision Support Systems*, 27(4), 383-393.

Kim, W., Jeong, O. R., & Lee, S. W. (2010). On social web sites. *Information Systems*, 35(2), 215-236.

Kiron, D., Palmer, D., Phillips, A. N., & Kruschwitz, N. (2012). *Social Business: What Are Companies Really Doing?*. North Hollywood, CA: MIT Sloan Management Review.

Kiss, J. (2014). *Facebook's 10th Birthday: From College Dorm to 1.23 Billion Users*. Retrieved October 25, 2014, from http://www.theguardian.com/technology/2014/feb/04/facebook-10-years-mark-zuckerberg.

Kiviet, J. F. (1995). On bias, inconsistency, and efficiency of various estimators in dynamic panel data models. *Journal of Econometrics*, 68(1), 53-78.

Koufteros, X., Vonderembse, M., & Jayaram, J. (2005). Internal and external integration for product development: The contingency effects of uncertainty, equivocality, and platform strategy. *Decision Sciences*, 36(1), 97-133.

Krasnikov, A., Jayachandran, S., & Kumar, V. (2009). The impact of customer relationship management implementation on cost and profit efficiencies: Evidence from the US commercial banking industry. *Journal of Marketing*, 73(6), 61-76.

Kwon, S. W., & Adler, P. S. (2014). Social capital: Maturation of a field of research. *Academy of Management Review*, 39(4), 412-422.

Laursen, K., Masciarelli, F., & Prencipe, A. (2012). Regions matter: How localized

social capital affects innovation and external knowledge acquisition. *Organization Science*, 23(1), 177-193.

Leana, C. R., & Pil, F. K. (2006). Social capital and organizational performance: Evidence from urban public schools. *Organization Science*, 17(3), 353-366.

Lee, N. (2013). *Facebook Nation: Total Information Awareness*. New York: Springer.

Leonardi, P. M. (in press). Social media at work: Toward a theory of communication visibility. *Information Systems Research*.

Leonardi, P. M., Huysman, M., & Steinfield, C. (2013). Enterprise social media: Definition, history, and prospects for the study of social technologies in organizations. *Journal of Computer-Mediated Communication*, 19(1), 1-19.

Li, S., Shang, J., & Slaughter, S. A. (2010). Why do software firms fail? Capabilities, competitive actions, and firm survival in the software industry from 1995 to 2007. *Information Systems Research*, 21(3), 631-654.

Liang, T. P., & Turban, E. (2012). Introduction to the special issue: Social commerce: A research framework for social commerce. *International Journal of Electronic Commerce*, 16(2), 5-13.

Liang, T. P., Ho, Y. T., Li, Y. W., & Turban, E. (2012). What drives social commerce: The role of social support and relationship quality. *International Journal of*

Electronic Commerce, 16(2), 69-90.

Liao, S. H., Chang, J. C., Cheng, S. C., & Kuo, C. M. (2004). Employee relationship and knowledge sharing: A case study of a Taiwanese finance and securities firm. *Knowledge Management Research and Practice*, 2(1), 24-34.

Luca, M. (2011). Reviews, reputation, and revenue: The case of Yelp.com. *Working Paper 12-016*, Harvard Business School.

Luo, X., & Bhattacharya, C. B. (2006). Corporate social responsibility, customer satisfaction, and market value. *Journal of Marketing*, 70(4), 1-18.

Luo, X., Kanuri, V. K., & Andrews, M. (2014). How does CEO tenure matter? The mediating role of firm-employee and firm-customer relationships. *Strategic Management Journal*, 35(4), 492-511.

Luo, X., Zhang, J., & Duan, W. (2013). Social media and firm equity value. *Information Systems Research*, 24(1), 146-163.

Lutz, A. (2012). *Facebook Is Not Driving E-commerce as much as Some Retailers Hoped*. Retrieved October 25, 2014, from http://www.washingtonpost.com/business/facebook-is-not-driving-e-commerce-as-much-as-some-retailers-hoped/2011/04/07/gIQADPYgJR_print.html.

MacKinlay, C. A. (1997). Event studies in economics and finance. *Journal of Economic Literature*, 35(1), 13-39.

McWilliams, A., & Siegel, D. (1997). Event studies in management research: Theoretical and empirical issues. *Academy of Management Journal*, 40(3), 626-657.

Mithas, S., Krishnan, M. S., & Fornell, C. (2005). Why do customer relationship management applications affect customer satisfaction?. *Journal of Marketing*, 69(4), 201-209.

Molok, N. N. A., Chang, S., & Ahmad, A. (2010). *Information Leakage through Online Social Networking: Opening the Doorway for Advanced Persistence Threats*. Paper presented at the 8th Australian Information Security Management Conference, Perth, Australia.

Moran, P. (2005). Structural vs. relational embeddedness: Social capital and managerial performance. *Strategic Management Journal*, 26(12), 1129-1151.

Morgan, N. A., Vorhies, D. W., & Mason, C. H. (2009). Market orientation, marketing capabilities, and firm performance. *Strategic Management Journal*, 30(8), 909-920.

Morrison, E. W., & Vancouver, J. B. (2000). Within-person analysis of information seeking: The effects of perceived costs and benefits. *Journal of Management*, 26(1), 119-137.

Mukherji, P., Sorescu, A., Prabhu, J. C., & Chandy, R. K. (2011). Behemoths at the

gate: How incumbents take on acquisitive entrants (and why some do better than others). *Journal of Marketing*, 75(5), 53-70.

Murphy, G. D. (2010). *Using Web 2.0 Tools to Facilitate Knowledge Transfer in Complex Organisational Environments: A Primer*. Paper presented at the ICOMS Asset Management Conference 2010, University of Adelaide, South Australia.

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, 23(2), 242-266.

Narasimhan, O., Rajiv, S., & Dutta, S. (2006). Absorptive capacity in high-technology markets: The competitive advantage of the haves. *Marketing Science*, 25(5), 510-524.

Nelson, P. (1970). Information and consumer behavior. *Journal of Political Economy*, 78(2), 311-329.

Nelson, P. (1974). Advertising as information. *Journal of Political Economy,* 83(3), 729-754.

Nickell, S. J. (1981). Biases in dynamic models with fixed effects. *Econometrica*, 49, 1417-1426.

Obukhova, E., & Lan, G. (2013). Do job seekers benefit from contacts? A direct test with contemporaneous searches. *Management Science*, 59(10), 2204-2216.

Ollier-Malaterre, A., Rothbard, N. P., & Berg, J. (2013). When worlds collide in cyberspace: How boundary work in online social networks impacts professional relationships. *Academy of Management Review*, 38(4), 645-669.

Olson, E. M., Walker, O. C., Ruekerf, R. W., & Bonnerd, J. M. (2001). Patterns of cooperation during new product development among marketing, operations and R&D: Implications for project performance. *Journal of Product Innovation Management*, 18(4), 258-271.

Overby, E., & Jap, S. (2009). Electronic and physical market channels: A multiyear investigation in a market for products of uncertain quality. *Management Science*, 55(6), 940-957.

Oxelheim, L., & Randøy, T. (2003). The impact of foreign board membership on firm value. *Journal of Banking & Finance*, 27(12), 2369-2392.

Park, J., Gu, B., & Konana, P. (2009). *Impact of Multiple Word-of-Mouth Sources on Retail Sales*. Paper presented at the 30th International Conference on Information Systems, Phoenix.

Patel, K. (2010). *Will E-commerce Help Facebook's Ad Sales?*. Retrieved October 25, 2014, from http://adage.com/article/digital/e-commerce-facebook-s-ad-sales/142322/.

Payne, G. T., Moore, C. B., Griffis, S. E., & Autry, C. W. (2011). Multilevel

challenges and opportunities in social capital research. *Journal of Management*, 37(2), 491-520.

Peng, D. X., Schroeder, R. G., & Shah, R. (2008). Linking routines to operations capabilities: A new perspective. *Journal of Operations Management*, 26(6), 730-748.

PR Newswire. (2012). *Spredfast to Provide Caterpillar with Social Engagement across the Enterprise*. Retrieved October 25, 2014, from http://www.prnewswire.com/news-releases/spredfast-to-provide-caterpillar-with-social-engagement-across-the-enterprise-183906251.html.

Putnam, R. (2000). *Bowling Alone. The Collapse and Revival of American Community*. New York: Simon & Schuster.

Qualman, E. (2010). *Socialnomics: How Social Media Transforms the Way We Live and Do Business*. New York: Wiley.

Raisch, S., & Birkinshaw, J. (2008). Organizational ambidexterity: Antecedents, outcomes, and moderators. *Journal of Management*, 34(3), 375-409.

Raisch, S., Birkinshaw, J., Probst, G., & Tushman, M. L. (2009). Organizational ambidexterity: Balancing exploitation and exploration for sustained performance. *Organization Science*, 20(4), 685-695.

Ranganathan, C., & Brown, C. V. (2006). ERP investments and the market value of

firms: Toward an understanding of influential ERP project variables. *Information Systems Research*, 17(2), 145-161.

Rishika, R., Kumar, A., Janakiraman, R., & Bezawada, R. (2013). The effect of customers' social media participation on customer visit frequency and profitability: An empirical investigation. *Information systems research*, 24(1), 108-127.

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *Stata Journal*, 9(1), 86-136.

Ryals, L. (2005). Making customer relationship management work: The measurement and profitable management of customer relationships. *Journal of Marketing*, 69(4), 252-261.

Sanders, N. R. (2007). An empirical study of the impact of e-business technologies on organizational collaboration and performance. *Journal of Operations Management*, 25(6), 1332-1347.

Servaes, H., & Tamayo, A. (2013). The impact of corporate social responsibility on firm value: The role of customer awareness. *Management Science*, 59(5), 1045-1061.

Shao, G. (2009). Understanding the appeal of user-generated media: A uses and gratification perspective. *Internet Research*, 19(1), 7-25.

Singh, R. I., Sumeeth, M., & Miller, J. (2011). A user-centric evaluation of the readability of privacy policies in popular web sites. *Information Systems Frontiers*, 13(4), 501-514.

Sodero, A. C., Rabinovich, E., & Sinha, R. K. (2013). Drivers and outcomes of open-standard interorganizational information systems assimilation in high-technology supply chains. *Journal of Operations Management*, 31(6), 330-344.

Stam, W., & Elfring, T. (2008). Entrepreneurial orientation and new venture performance: The moderating role of intra- and extraindustry social capital. *Academy of Management Journal*, 51(1), 97-111.

Staw, B. M., & Epstein, L. D. (2000). What bandwagons bring: Effects of popular management techniques on corporate performance, reputation, and CEO pay. *Administrative Science Quarterly*, 45(3), 523-556.

Stephen, A. T., & Toubia, O. (2010). Deriving value from social commerce networks. *Journal of Marketing Research*, 47(2), 215-228.

Suarez, F. F., Cusumano, M. A., & Kahl, S. J. (2013). Services and the business models of product firms: An empirical analysis of the software industry. *Management Science*, 59(2), 420-435.

Subramani, M., & Walden, E. (2001). The impact of e-commerce announcements on

the market value of firms. *Information Systems Research*, 12(2), 135-154.

Subramanian, A., & Nilakanta, S. (1996). Organizational innovativeness: Exploring the relationship between organizational determinants of innovation, types of innovations, and measures of organizational performance. *Omega*, 24(6), 631-647.

Swaminathan, V., & Moorman, C. (2009). Marketing alliances, firm networks, and firm value creation. *Journal of Marketing*, 73(5), 52-69.

Szulanski, G. (1996). Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal*, 17(S2), 27-43.

Tan, K. C., Kannan, V. R., & Narasimhan, R. (2007). The impact of operations capability on firm performance. *International Journal of Production Research*, 45(21), 5135-5156.

Tidwell, L. C., & Walther, J. B. (2002). Computer-mediated communication effects on disclosure, impressions, and interpersonal evaluations: Getting to know one another a bit at a time. *Human Communication Research*, 28(3), 317-348.

Tilcsik, A. (2008). *The Devil in the Details: Unintended Micro-level Consequences of Process Management*. Harvard Business School.

Treem, J. W., & Leonardi, P. M. (2012). Social media use in organizations: Exploring the affordances of visibility, editability, persistence, and association.

Communication Yearbook, 36, 143-189.

Vandaie, R., & Zaheer, A. (in press). Alliance partners and firm capability: Evidence from the motion picture industry. *Organization Science*.

Verhoef, P. C. (2003). Understanding the effect of customer relationship management efforts on customer retention and customer share development. *Journal of Marketing*, 67(4), 30-45.

Walker, H. J., Bauer, T., Cole, M., Bernerth, J., Feild, H., & Short, J. (2013). Is this how I will be treated? Reducing uncertainty through recruitment interactions. *Academy of Management Journal*, 56(5), 1325-1347.

Walter, A. (2003). Relationship-specific factors influencing supplier involvement in customer new product development. *Journal of Business Research*, 56(9), 721-733.

Walther, J. B. (1992). Interpersonal effects in computer-mediated interaction: A relational perspective. *Communication Research*, 19(1), 52-90.

Walther, J. B., & Parks, M. R. (2002). Cues filtered out, cues filtered in: Computer-mediated communication and relationships. In M. L. Knapp & J. A. Daly (Eds.), *Handbook of Interpersonal Communication* (pp. 529-563). Thousand Oaks, CA: Sage.

Walther, J. B., Van Der Heide, B., Hamel, L. M., & Shulman, H. C. (2009).

Self-generated versus other-generated statements and impressions in computer-mediated communication: A test of warranting theory using Facebook. *Communication Research,* 36(2), 229-253.

Wang, C., & Zhang, P. (2012). The evolution of social commerce: The people, management, technology, and information dimensions. *Communications of the Association for Information Systems,* 31(5), 1-23.

Wang, H. C., He, J., & Mahoney, J. T. (2009). Firm-specific knowledge resources and competitive advantage: The roles of economic-and relationship-based employee governance mechanisms. *Strategic Management Journal*, 30(12), 1265-1285.

Wang, P. (2010). Chasing the hottest IT: Effects of information technology fashion on organizations. *MIS Quarterly*, 34(1), 63-85.

Weill, P. (1992). The relationship between investment in information technology and firm performance: A study of the valve manufacturing sector. *Information Systems Research,* 3(4), 307-333.

White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica*, 48(4), 817-838.

Wiles, M. A., Jain, S. P., Mishra, S., & Lindsey, C. (2010). Stock market response to regulatory reports of deceptive advertising: The moderating effect of omission

bias and firm reputation. *Marketing Science*, 29(5), 828-845.

Wintoki, M. B., Linck, J. S., & Netter, J. M. (2012). Endogeneity and the dynamics of internal corporate governance. *Journal of Financial Economics*, 105(3), 581-606.

Wu, L. (2013). Social network effects on productivity and job security: Evidence from the adoption of a social networking tool. *Information Systems Research*, 24(1), 30-51.

Wu, S. J., Melnyk, S. A., & Flynn, B. B. (2010). Operational capabilities: The secret ingredient. *Decision Sciences*, 41(4), 721-754.

Yang, S. B., Lim, J. H., Oh, W., Animesh, A., & Pinsonneault, A. (2012). Using real options to investigate the market value of virtual world businesses. *Information Systems Research*, 23(3), 1011-1029.

Zhang, G. P., Yu, J., & Xia, Y. (2014). The payback of effective innovation programs: Empirical evidence from firms that have won innovation awards. *Production and Operations Management*, 23(8), 1401-1420.