How do social commerce-IT capabilities influence firm performance? Theory and empirical evidence

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Abstract

We theorized that the development of two contemporary social commerce-IT capabilities (social media and e-commerce) enables firms to engage online customers to improve their firm performance. We tested this theory by employing a secondary dataset on a sample of U.S. firms. The empirical analysis supported our theory in both examining the effects of social media and e-commerce as two individual capabilities and as two complementary capabilities. This study provides a unique organizational theory and empirical evidence on how social commerce-IT capabilities influence firm performance through the online engagement of customers.

Keywords: Social commerce-IT capabilities, online customer engagement, firm performance, business value of IT.

1. Introduction

Contemporary digital technologies such as social media and e-commerce have become critical for a firm's competitiveness and survival (Benitez et al., 2018a). Social media and e-commerce platforms can be used by customers to interact with firms and other customers for multiple purposes (e.g., searching product/service information, providing product/service reviews, encouraging other current/potential customers to engage with the firm). Contemporary firms simultaneously use social media and e-commerce platforms building the so-called social commerce initiatives. Social commerce provides new social information sharing, which has been considered as a fundamental role in firm-customer interactions. For example, Papa John's (a leading firm in the pizza industry) simultaneously leverages social media and its e-commerce platforms to improve digital customer experience (Benitez et al., 2018a). Social commerce is thus a new concept and phenomenon characterized by the interplay of social media and e-commerce platforms influencing customers' participation/engagement and decision-making behavior (e.g., decision to buy a product/service) (Zhang & Benyoucef, 2016).

The firm's usage of digital technologies (e.g., social media, e-commerce) can improve firm performance by increasing the opportunity to interact with customers (Froehle, 2006; Kiron, 2012a). Contemporary firms use digital technologies beyond commercial purposes (e.g., branding, sales), particularly to improve innovation (e.g., new product development), leadership (e.g., bolster recruitment and employee development), and operations (e.g., manufacturing, partner/supplier interaction) to create business value (Kane et al., 2014; Zhang & Benyoucef, 2016).

But simply investing in digital technologies does not guarantee the firm's success. Prior Information Systems (IS) literature has argued that the key in explaining information technology (IT)-based performance variation is how the firm leverages its IT resources (IT capabilities)

instead of how much it invests in IT resources (Benitez et al., 2018a; Benitez et al., 2018b). Social media and e-commerce platforms are two IT resources whose degree of investment and deployment may be heterogeneous among firms. This study considers social media capability and e-commerce capability as two IT capabilities that refer to the firm's ability in leveraging social media and e-commerce, respectively. Social media capability is the firm's ability in using and leveraging social media platforms to execute business activities (Benitez et al., 2018a). E-commerce capability refers to the firm's ability in using and leveraging web technology to promote and sell its products (Zhu & Kraemer, 2002; Devaraj et al., 2007; Li et al., 2010). On the basis of the social commerce literature, this research specifically considers social media capability and e-commerce capability as two social commerce-IT capabilities because social media and e-commerce (and the firm's capabilities associated with the leveraging of these IT resources) are the two pillars of the social commerce initiatives.

Past IS literature on social commerce lacks a clear understanding on the interaction of social media and e-commerce from a firm's perspective and capabilities' view. Prior social commerce literature has mainly focused on the individual's perspective by exploring customer behavior (Hildebrand et al., 2013; Rishika et al., 2013). However, little has been studied on social commerce from a firm's perspective and capabilities' view. This study tries to fulfill this gap by conceptualizing and examining the individual and complementary effects of social commerce-IT capabilities (social media capability and e-commerce capability) on firm performance through the mediator role of online customer engagement.

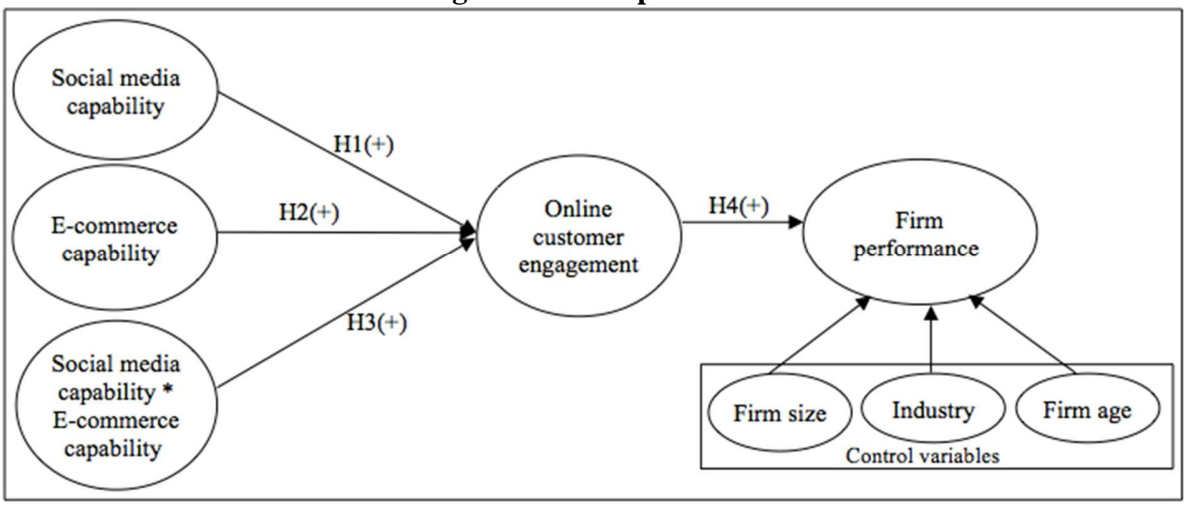
This study builds on the IT-enabled organizational capabilities perspective and considers customer engagement as the intermediate mechanism through which social commerce-IT capabilities improve firm performance. The ability to interact with customers is critical to succeed in the business world; furthermore, customer engagement may be considered a

mechanism to improve firm performance. Social media and e-commerce are digital technologies to connect and interact with customers. In this sense, the firm's ability in leveraging and inter-connecting digital technologies (i.e., social commerce-IT capabilities) may enable online customer engagement (degree of customers' involvement through online platforms) that is essential to improve performance. However, our understanding of this phenomenon is in its initial stages. The role of social commerce-IT capabilities in shaping online customer engagement and the effect of online customer engagement on firm performance are totally unclear (Xue et al., 2013; Ray et al., 2014). No prior IS literature has examined the customer participation mechanisms through which social media and e-commerce capabilities may lead to firm performance.

This study tries to answer the general research question on whether and how social commerce-IT capabilities influence firm performance, which leads to the following specific research questions: (1) Do social media and e-commerce capabilities affect firm performance individually? (2) Are social media and e-commerce complementary capabilities in affecting firm performance? (3) Does online customer engagement mediate this relationship? In answering these research questions, we examine the impact of social commerce-IT capabilities (social media capability and e-commerce capability) both individually and jointly on firm performance. Drawn on the IT-enabled organizational capabilities perspective, we use online customer engagement as a core intermediate mechanism to explain how firms convert investments in social media and e-commerce capabilities in positive return in innovation and customer service. Our central thesis is that social media and e-commerce capabilities can improve firm performance by online engaging customers. Social media capability and e-commerce capability can individually and jointly facilitate the social (customer involvement with the firm's social media platforms) and conventional online customer engagement (customer involvement with the firm's web

technology platform) to improve firm performance. Figure 1 presents the proposed conceptual model.

Figure 1: Conceptual model



There are two main gaps in the IS literature that we try to fulfill: (1) social commerce literature lacks an understanding on the interaction of social media and e-commerce from a firm's perspective and capabilities' view and (2) business value of IT literature vaguely studies social media and e-commerce capabilities as a way to improve firm performance through customer engagement. The proposed theory was tested on a sample of U.S. firms. The empirical analysis supported our theory in both examining the effects of social media and e-commerce as two individual capabilities and as two complementary capabilities.

This research makes several contributions to the field of IS: (1) we conceptualize social commerce-IT capabilities and study its effects on performance from a firm's perspective and capabilities' view; (2) we provide a unique organizational theory and empirical evidence on how social commerce-IT capabilities influence firm performance through the online engagement of customers; and (3) we provide a rich validated set of secondary measures to evaluate social commerce-IT capabilities, online customer engagement, and firm performance, which will be very useful for the further development of this research topic.

2. Theoretical background

2.1. Social commerce literature

Social commerce concept has received growing interest among IS scholars and practitioners (Zhang et al., 2014). Although there is no clear consensus and established definition of social commerce, there is a common understanding about its elements. Social commerce has been predominantly characterized by prior literature as an emerging phenomenon that consists of the interplay of two important elements: social media and e-commerce (Zhang & Benyoucef, 2016). This platform interaction enables customers to participate and interact, thus facilitating some decision-making behaviors, mainly related to commercial ends (e.g., decision to buy a product/service) (Liang et al., 2011). We draw from this prior literature to argue that social commerce involves the interaction of social media and e-commerce to influence different customers' behaviors such as customer engagement (e.g., social interaction and user-generated content).

Prior literature on social commerce has explored customers' behaviors and their effects on buying decisions (Chen & Shen, 2015; Zhang & Benyoucef, 2016). Social commerce platforms (i.e., social media and e-commerce platforms) are considered as potential factors of buying decisions in the sense that they facilitate customers' behavior such as information sharing, social interaction, and user-generated content (e.g., giving reviews or recommendations) (Zhang & Benyoucef, 2016). We explore customers' behavior in a different way, by examining how customer engagement in social media and e-commerce can help firms to improve their innovation and customer service performance.

User behavior theme has dominated social commerce research (Zhang et al., 2014). Prior literature has mainly focused on exploring the impact of user-generated content on user's satisfaction, trust, loyalty, or perceptions toward company reputation (Hildebrand et al., 2013; Li

et al., 2013) or on user's word of mouth, behavior toward shopping visits, and intention to purchase (Goh et al., 2013; Rishika et al., 2013). For example, Chen and Shen (2015) investigated the impact of relational factors (i.e., trust and commitment) on social commerce intentions (i.e., social shopping and social sharing) and the role of social support in relational factors. In summary, prior social commerce literature has focused on the individual's perspective by studying customer behavior.

Little was studied on social commerce from a firm's perspective. Some studies have empirically examined the business value of social media and e-commerce capabilities individually and mainly focused on financial performance. For example, Zhu and Kraemer (2002) studied the effect of e-commerce capability and IT infrastructure on firm performance. Kumar et al. (2013) studied how to use social media to improve word of mouth, sales, and return on investment. Similarly, Lee et al. (2015) studied the effect of Facebook likes on sales performance, considering deal and product characteristics as moderator variables. In this sense, there is a lack of studies examining the impact of social commerce-IT capabilities (individually and as complementary capabilities) on firm performance. We draw on prior social commerce literature to theorize that the development of two social commerce-IT capabilities (social media and e-commerce) enables firms to engage online customers to improve their firm performance.

2.2. Conceptualization of social commerce-IT capabilities

This study is based on prior literature and focuses on two social commerce-IT capabilities: social media capability and e-commerce capability. First, we use the prior IS literature on IT capabilities to conceptualize social media and e-commerce as two IT capabilities. We consider social media capability and e-commerce capability as two IT capabilities that refer to the firm's ability in using and leveraging digital technologies. Social media capability is the firm's ability in purposely using and leveraging Facebook, Twitter, and corporate blog(s) to execute business

activities (Benitez et al., 2018a). E-commerce capability refers to the firm's ability in using and leveraging web technology to promote and sell its products (Zhu & Kraemer, 2002; Devaraj et al., 2007)[1]. Second, based on the social commerce literature, this research specifically considers social media capability and e-commerce capability as two social commerce-IT capabilities because social media and e-commerce are the two key pillars of the social commerce initiatives. Social commerce-IT capabilities refer to the firm's ability in *leveraging* and *inter-connecting* social media and e-commerce (capabilities). This study examines these capabilities individually and as a complement. This is the way we extend the concept of social commerce to a firm's perspective and capabilities' view – i.e., one of the potential contributions of this manuscript to the IS research.

2.3. IT-enabled organizational capabilities perspective

IS literature on business value of IT has mainly argued IT capabilities to indirectly affect firm performance. This body of IS literature has shaped the so-called IT-enabled organizational capabilities perspective, which has argued that organizational/process capabilities are key mechanisms by which IT helps firms to create business value (Benitez et al., 2018d). Some examples of these intermediate mechanisms are talent management, organizational learning, knowledge management, supply chain management, operational competence, and business flexibility (Ajamieh et al., 2016; Chen et al., 2017; Benitez et al., 2018a; Benitez et al., 2018c; Benitez et al., 2018d). This perspective has emerged as the dominant framework to solve theoretically and empirically the IT productivity paradox in the literature on business value of IT. The ability to interact with customers is critical to succeed in the business world, then customer

[1] From a broader level of definition and analysis, e-commerce/e-business technology capability can be defined as the firm's ability in using and leveraging web technology to exchange information within and outside the firm for buying and selling activities with suppliers and customers (Daniel & Grimshaw, 2002; Benitez et al., 2018c). Because our study was interested on the customer side of e-commerce and its effect on online customer engagement, we only focused on the web technology firm's usage to interact with customers (Xia & Zhang, 2010).

engagement may be considered a mechanism to improve firm performance. But companies need to have digital technology platform capabilities to engage customers. Social media and e-commerce are digital technologies to connect and interact with customers. In this sense, the firm's ability in leveraging digital technologies (i.e., social commerce-IT capabilities) may enable online customer engagement that may be essential to improve firm performance. This study builds on the literature of IT-enabled organizational capabilities to link indirectly theoretically social media and e-commerce capabilities (social commerce-IT capabilities) with firm performance through online customer engagement as a core intermediate mechanism.

2.4. The complementarity resource perspective

The complementarity resource perspective claims that complementarity among IT and business resources/capabilities can explain differences in other process capabilities and/or firm performance[2]. Resources and capabilities have been previously treated as complementary constituents (Ennen & Richter, 2010). Ennen and Richter's (2010) literature review categorizes different constituents of complementary relationships and found that the majority of studies base on the complementarity of knowledge resources/capabilities with other resources/capabilities (e.g., Ravichandran & Lertwongsatien, 2005; King et al., 2008). For example, Teece (1986), when talking about complementarity in innovation, argued that the commercialization of innovation requires additional complementary downstream capabilities (i.e., marketing know-how) to succeed in the market. Also, Zhu and Kraemer (2002) studied the complementarity between e-commerce capability and IT infrastructure to explain efficiency and lower costs. Resource/capability complementarities play a key role in understanding differences in process capabilities and/or firm performance, when the presence of a resource/capability can exert the

[2] The application of this perspective to the literature on business value of IT has been called also the moderation hypothesis of business value of IT/IT-enabled organizational capabilities perspective (for more details, please see Benitez & Walczuch, 2012).

value of other resource/capability (Ennen & Richter, 2010). Adopting several resources/capabilities at the same time (complementarity) can generate greater outputs to the sum of the individual effects of resources/capabilities considered in isolation (Adegbesan, 2009; Ennen & Richter, 2010).

Recent IS literature on business value of IT has also given importance to study complementarity between IT resources/capabilities. For example, Benitez et al. (2018a) argued the complementarity between IT infrastructure capability and social media capability to develop knowledge ambidexterity (i.e., an organizational capability). We argue the complementarity between social media capability and e-commerce capability. While social media can be easily accessible through the market, combining with e-commerce applications can help to build and maintain some advantages over competitors because of complementarities. We argue that the IT capabilities of social media and e-commerce, when working together, can improve firm performance through online customer engagement. In this sense, we consider social media and e-commerce as two complementary IT capabilities to increase firm performance. We use the complementarity resource perspective and the IT-enabled organizational capabilities perspective to explain theoretically the reinforcing effect of social media and e-commerce capabilities, and its influence on firm performance through online customer engagement.

2.5. The microfoundations approach

The microfoundations approach is a novel approach proposed in the Strategy field that decomposes the firm's frame into macro-level (firm-level) and micro-level (individual- or group-level) components (Teece, 2007; Barney & Felin, 2013). This approach can be considered as an extension/complement of the organizational capabilities-based theory that suggests that individual/group actions and interactions are the key source of firm heterogeneity in developing organizational capabilities and creating business value (Felin et al., 2012; Teece, 2012; Helfat &

Peteraf, 2015). In this sense, the individual actions can explain a significant portion of firm-level outcome variance (Bala, 2013). We use the microfoundations approach to conceptualize online customer engagement as an individual behavior of the customer and to link social and conventional online customer engagement with firm performance. This study uses the microfoundations approach to explain how customer engagement creates business value in the field of IS.

3. Hypotheses development

3.1. Social commerce-IT capabilities and online customer engagement

3.1.1. Social media capability and online customer engagement

Social media capability is the firm's ability in purposely use and leverage Facebook, Twitter, and corporate blogs to execute business activities (Benitez et al., 2018a). Social media is the first social commerce-IT capability examined in this study. Online customer engagement refers to the degree of customer's virtual emotional commitment, involvement, and motivation to participate and contribute to the firm's online business activities (Li et al., 2013; Ray et al., 2014). Prior IS research has classified IT-based media in social and conventional media (Luo et al., 2013; Yu et al., 2013). Drawn from this prior IS literature, we study two dimensions of online customer engagement: social online customer engagement and conventional online customer engagement. Social online customer engagement refers to the customer experience on interactions with the firm's social media platforms. Conventional online customer engagement refers to the customer experience on interactions with the firm's web technology platform.

Social media capability can enable the online engagement of customers. Online customer engagement requires firm's proficiency in social media. The customer's individual involvement in social media and the firm's website (i.e., a customer's individual action) requires a prior firm's involvement and proficiency in social media. A good example is Coca Cola's social media

capability. Coca Cola is positioned as one of the best companies in the world in managing social media. It can maintain a cohesive message on each of its different social media channels (e.g., Facebook, Twitter, Instagram, Tumblr), and its main purpose is to engage its audience, making people to be involved (e.g., @cocacola writes over 60 tweets that generate nearly 82000 engagements per month). One of its successful practices has been interacting directly with its audience (e.g., about 83% of @cocacola's tweets are direct and customized replies).

Social media are tools for mass collaboration between executives, employees, and customers (Kiron, 2012a), and the firm's ability in sharing, co-creating, discussing, and modifying user-generated content facilitates information sharing (Goh et al., 2013), interaction, and connection with customers (Aggarwal et al., 2012; Rishika et al., 2013), hence improving customer participation. For example, customers engage in the firm's social media platforms because they want to stay informed about the firm activities and about future launch of products, or because the collective intentions, social identity, and conception of group they perceive on the platform (Ore & Sieber, 2011). Moreover, providing a useful and enjoyable environment in social media influences customers to interact with others and return to the social media platform (Goel et al., 2013; Seol et al., 2016).

Finally, the development of a social media capability shows the firm's effort in cultivating trust with customers. Customers perceive the effort the firm makes in supporting the community; therefore, the risk to reveal personal information diminishes while the motivation to express reciprocity toward the trusted party may increase (Luo et al., 2010). Thus, the firm's effort to build a social media capability can increase the probability to online interact and engage with customers.

To sum up, the firm's ability in sharing, discussing, and generating useful and enjoyable content through social media can facilitate interaction with customers, who can feel more motivated to express their opinions and to reward the firm's effort in developing such content. We therefore hypothesize

Hypothesis 1 (H1): There is a positive relationship between social media capability and online customer engagement.

3.1.2. E-commerce capability and online customer engagement

E-commerce capability refers to the firm's ability in using and leveraging web technology to promote and sell its products (Zhu & Kraemer, 2002; Devaraj et al., 2007). E-commerce is the second social commerce-IT capability that is examined in this research. E-commerce can also enable the execution of individual actions such as social and conventional online customer engagement.

E-commerce platforms are specially characterized for giving information (Benitez et al., 2018c), which is one of the factors that motivate customer engagement. Giving personalized shopping and in-depth information on products strongly engages online shoppers and persuades them to revisit the firm's website for additional information (Eisingerich & Kretschmer, 2008). It can be critical to provide information on product features, product promotions/discounts, customer reviews, and information about contents related to the brand through the firm's website (Gu et al., 2012). Customers can be also motivated to use the firm's website to achieve enjoyable, pleasurable, and affective online experiences (Guo et al., 2011). For example, Porsche uses its website to offer adventure tours to online engage customers and reinforce its brand equity, which provides Porsche customers a pleasurable and affective web experience. Finally, firms can also leverage their web technology to improve the relationships with customers (e.g., innovate in

customer experience) to achieve a higher corporate reputation and a better market responsiveness (Li et al., 2013).

In conclusion, firms that use web technology for giving critical information (e.g., product features, promotions, brand issues) create an image of transparency that motivates customers to participate and buy in the website (e.g., ordering products) or social media platform (e.g., providing reviews). Thus, we hypothesize that

Hypothesis 2 (H2): There is a positive relationship between e-commerce capability and online customer engagement.

3.1.3. The complementarity between social media capability and e-commerce capability and its effect on online customer engagement

Drawn on the complementarity resource perspective and the social commerce literature, social media and e-commerce can be two complementary capabilities that facilitate online customer engagement. Social media and e-commerce inter-connection and integration can affect customer's behavior in many ways, as they offer customers valuable and reliable information on products and services (Liang et al., 2011; Zhang et al., 2014). When working together, social media and e-commerce allow an open network structure, where relationship between firm and customers is more interactive because the firm can interact with customers more deeply and widely through social media.

According to the social commerce literature, jointly using social media and e-commerce platforms facilitates information sharing, supports social interaction, and enables user-generated content (e.g., giving valuable product information or product reviews) (Zhang & Benyoucef, 2016). Social media capability enables a better flow of information among customers. E-commerce capability is also a good source of information; however, e-commerce capability alone can be insufficient to engage customers to provide new knowledge (Benitez et al., 2018a). On the

other hand, social media capability will be insufficient per se to sell the company products. In this sense, social media and e-commerce are often the "two sides of the same coin," where one side facilitates the interaction and the other side facilities selling to customers. Social media and e-commerce complement each other. For example, SEUR (a leading express transport service in Spain) has used social media (i.e., Facebook and Twitter) to promote selling activities through its website, engage customers, and solve customer problems (Foncillas & Gonzalez, 2013).

To sum up, the inter-connection and integration of social media and e-commerce capabilities can improve the flow of information, the migration from one digital technology to another digital technology, and a better and deep connection with customers, who may be more motivated to participate in the online social and conventional platforms (i.e., social media and e-commerce).

Hypothesis 3 (H3): There is a positive relationship between the complementarity (positive interaction effect) between social media capability and e-commerce capability, and online customer engagement.

3.2. Online customer engagement and firm performance

We define firm performance as a multidimensional construct composed of two key ingredients (Mithas et al., 2011): innovation performance and customer service performance. Innovation performance refers to the outcomes obtained in the process of improving existing products/processes and/or developing new products/processes (Joshi et al., 2010; Benitez et al., 2018a). Customer service performance refers to the extent a firm fulfills customer needs and expectations obtaining better reliability and lower number of complaints (Ray et al., 2005; Mithas et al., 2011; Xue et al., 2013; Gunarathne et al., forthcoming). We conceptualize our firm performance construct according to that described by Mithas et al. (2011). They considered firm performance as a multidimensional construct composed of four elements: organizational effectiveness (e.g., level of innovation), customer-focused performance (e.g., customer

satisfaction or service performance), financial performance (e.g., revenue, profits, and earnings per share), and human resource performance (e.g., employees satisfaction). We focused on Mithas et al.'s (2011) elements that are theoretically supposed to be influenced directly by customer engagement: organizational effectiveness and customer-focused performance. Organizational effectiveness is similar to our innovation performance construct, and customer-focused performance is similar to our customer service performance. We focused on these two dimensions of performance as they are suggested to be directly influenced by customer engagement. Customers can provide the firm information about their desired and unfulfilled needs and ideas to improve innovation and customer service firm performance (Blazevic & Lievens, 2008). In addition, recent studies like Kane et al. (2014) showed that small firms (as the firms examined in this study) are increasingly using digital technologies with the main objective to improve their product innovation and customer service. In this sense, we are confident that the conceptualization and operationalization of our construct firm performance are consistent with prior top IS research. Definitions of the key constructs are summarized in Table 1.

Table 1: Definitions of key constructs

Construct	Definition	Informing source
Social media capability	Firm's ability in purposely using and leveraging Facebook, Twitter, and corporate blogs to execute business activities	Benitez et al. (2018a)
E-commerce capability	E-commerce capability refers to the firm's ability in using and leveraging web technology to promote and sell its products	Daniel and Grimshaw (2002), Devaraj et al. (2007), Li et al. (2010)
Online customer engagement	Online customer engagement refers to the degree of customer's virtual emotional commitment, involvement, and motivation to participate and contribute with the firm's online business activities	Li et al. (2013), Ray et al. (2014)
Firm performance	Performance of the firm composed of two elements: (1) innovation performance, which refers to the overall outcomes obtained in the process of improving existing products/processes and/or developing new products/processes and (2) customer service performance, which is the extent a firm fulfills customer needs and expectations obtaining better reliability and lower number of complaints	Ray et al. (2005), Joshi et al. (2010), Mithas at el. (2011), Xue et al. (2013), Benitez et al. (2018a)

Online customer engagement (i.e., social online customer engagement and conventional online customer engagement) can improve firm performance. Online customer engagement may improve innovation performance. First, opinions expressed by influential and experiential reviewers are the best sources to develop new products and serving customers. Online customer involvement and participation provide the firm with data and information about specific new product/process ideas, concepts, and prototypes, which enable the firm to develop new products (Fang et al., 2008; Abrahams et al., 2012). Customers' opinions help the firm to better understand what the customer wants the product to be (Yim et al., 2012). For example, in 2008, Starbucks opened MyStarbucksIdea, a social platform to collect ideas from customers. Customers could make suggestions about a wide range of categories (products, experience and service, social issues) and vote for others' posts. Starbucks selected ideas most welcomed by users and innovated. On the basis of ideas provided by MyStarbucksIdea, the company introduced hundreds of new products and activities (e.g., new flavors of the coffee, or the availability of Wi-Fi in Starbucks stores) (Dong & Wu, 2015).

Second, online customer participation may improve the effectiveness of the new product development process. On the one hand, constant information sharing and communication with customers can help the firm in learning how customer needs evolve during the new product development process (Fang et al., 2008). On the other hand, improving communication can help employees and customers to work more cooperatively (Pavlou & El Sawy, 2006), and firms can benefit from knowledge, skills, and resources of their customers during the innovation process (Mahr et al., 2014). Then, information sharing and critical information about the product idea achieved by the online customer engagement give the firm the opportunity to prevent costly mistakes of developing products that do not fit customer needs, optimizing the innovation process (Fang et al., 2008).

Online customer engagement may also improve customer service performance. Online customer involvement can provide data and information on customer needs, preferences, and market trends, which enable the firm to serve customers better (Ray et al., 2014; Benitez et al., 2018a). This information provided in social media and/or the website can help firms to agilely manage and solve complaints (Kiron, 2012b; Kiron et al., 2013), thus improving customer service performance. For example, Menbur (a leading retailer in Spain that sells shoes and bags) uses social media as a customer service channel. Menbur uses customer comments and posts to detect failures and improve customer satisfaction. Menbur's social media capability has converted this company in a successful case study awarded by Facebook[3].

To sum up, customers engaged in social media and web technologies provide the firm with data and information about new ideas for improving/developing products and improving customer service, which in turn improves innovation and customer service performance. Therefore, we hypothesize

Hypothesis 4 (H4): There is a positive relationship between online customer engagement and firm performance.

4. Research methodology

4.1. Sample

We tested the proposed model with the 100 small firms included in the 2013 Forbes America's Best Small Companies ranking (in short, the Forbes database), which includes the best 100 U.S. publicly small firms with sales under one billion dollars (Benitez et al., 2018a). We used as the sample all the firms (100) included in this database. The firms of the sample came from seven groups of industries: consulting (18 firms), IT (16), food manufacturing (seven), semiconductor

[3] This information was extracted from an interview that we gave to the Social Media Executive of Menbur conducted in July 2015.

manufacturing (six), healthcare (five), chemical (five), and other industries (43). On average, the firms of the sample had about 2335 employees and 488.120 million dollars of sales. Every firm in our sample had a website. 74%, 71%, and 35% of the firms included in the sample were active on Facebook, Twitter, and corporate blogs, respectively. Table 2 shows the descriptive analysis of the sample.

Prior IS research has contextualized several types of business value of IT studies on sample of firms included in well-known rankings (as the ranking used in this study) (e.g., Joshi et al., 2010; Benitez & Walczuch, 2012; Benitez et al., 2018a), which suggests that our decision in using the Forbes database was rational. We focused on this ranking for three reasons. First, because small firms have lower portfolio of financial resources to compete more effectively in the market, leveraging their investments in IT capabilities to online engage customers remains central, as compared with large firms (Benitez et al., 2018a). Second, the firms included in the Forbes database are leaders in sales and performance and are supposed to outperform in innovation and customer service. Third, the majority of prior IS research on social media and business activities has focused on large firms (Luo et al., 2013; Kane et al., 2014). In this sense, another distinctive feature of our study is its focus on small firms.

Table 2: Descriptive analysis

Industry	Firms by sector	Facebook		Twitter		Corporate blogs	
		Number	%	Number	%	Number	%
Consulting	18	16	88.889%	13	72.222%	5	27.778%
IT	16	16	100%	16	100%	14	87.500%
Food manufacturing	7	5	71.429%	5	71.429%	3	42.857%
Semiconductor manufacturing	6	4	66.667%	4	66.667%	0	0%
Healthcare	5	3	60%	4	80%	2	40%
Chemical	5	1	20%	1	20%	0	0%
Other industries	43	29	67.442%	28	65.116%	11	25.581%
Total	**100**	**74**	**74%**	**71**	**71%**	**35**	**35%**

4.2. Data and measures

We measured all our variables using a secondary dataset that comes from nine different sources/databases. We started collecting the information from the 2013 Forbes database and using the name of each firm, we gathered the information from other databases. The measurement structure is determined by the relationship between indicators and constructs (Henseler, 2017). There are two categories of constructs: reflective (common factor constructs) and formative. According to the most up-to-date methodological literature, there are two types of formative measurements: composite formative and causal formative[4]. In composite-formative measurements, (1) construct is built by indicators, (2) indicator correlations are common but not required, (3) there is no measurement error, and (4) dropping an indicator can alter the meaning of the construct. In causal-formative measurement, (1) indicators cause the construct, (2) correlations among indicators are not expected, (3) there is measurement error at construct level, and (4) dropping an indicator increases measurement error (Benitez et al., 2017; Henseler, 2017). All constructs of this research were modeled as composite formative[5] (in short, composite).

Drawn on the Culnan et al.'s (2010) and Benitez et al.'s (2018a) works, we measured social media capability as a multidimensional construct determined by Facebook capability, Twitter capability, and blog(s) capability with information collected from Facebook, Twitter, Twopcharts

[4] Despite some statistical software packages seem to give the possibility to directly estimate casual-formative models, these models cannot be estimated directly, but they should be estimated by using a multiple-indicator-multiple causes model (Benitez et al., 2017; Henseler, 2017).

[5] A clear distinction can be done between behavioral constructs and design constructs (or artifacts) (Benitez et al., 2017; Henseler, 2017). While behavioral constructs are usually modeled as common factor (reflective) models, composite formative should be the preferred choice for artifacts. These artifacts can be understood as theoretically justified constructions that consist of more elementary components (Benitez et al., 2018a). They are human-made objects that are typically created by managers, staff, or the firm itself and should be modeled as composite. The composite artifact serves as proxy for the concept under investigation and can be understood as a bunch of components (indicators) that compose the concept (composite artifact) (Henseler, 2017). Component selection represents how the author team understands the concept under investigation (Rueda et al., 2017).

database (http://www.twopcharts.com), and firm's blog site in June 2014[6]. Social media capability was specified as composite at first- and second-order levels. We evaluated Facebook capability using the number of events, experience, and updated content by the firm with data collected from the Facebook site of the firm. Twitter capability was measured in terms of firm's spent time writing tweets, experience, and updated content by the firm with data collected from the Twitter site and Twopcharts database. Finally, we measured blog capability in a similar vein as per Facebook/Twitter firm's experience and updates.

We conducted a structured content analysis in June 2014 of the firm's website to measure e-commerce capability as a composite first-order construct through the accumulated total number of firm's web functionalities to interact with customers (Zhu & Kraemer, 2002). Drawn from Zhu and Kraemer, we focused on 13 e-commerce functionalities related to customers: four functionalities related to product information (e.g., if the website offered product availability information), five functionalities related to actions that facilitate transactions online (e.g., if it was possible to buy and view the order process cycle online), and four functionalities related to interaction and customization (e.g., if it was possible to log or configure product features online). Specifically, we codified whether the firm's website had the 13 particular e-commerce functionalities. We measured each functionality using a binary variable, representing whether the firm's website had the functionality, where zero was "no" and one was "yes." The final e-commerce capability index was created by transforming the binary variables of individual functionalities into a single measure and adding the accumulated total number of firm's web functionalities. This measuring scheme was adapted from Zhu and Kraemer (2002). Table 3

[6] We think that our social media capability construct is a good representation of how firms use external social media platforms to execute business activities. Facebook, Twitter, and corporate blog(s) are the most used external social media by firms around the world (Culnan et al., 2010). Moreover, our conceptualization and operationalization come from the conceptualization and operationalization of Benitez et al. (2018a), which is strongly supported by their empirical examination.

presents the list of 13 e-commerce functionalities used to assess e-commerce capability (Zhu & Kraemer, 2002).

We measured online customer engagement as a composite third-order level construct determined by social online customer engagement (a second-order construct) and conventional online customer engagement (a first-order construct). Social online customer engagement was specified as a composite at first- and second-order level determined by Facebook customer engagement, Twitter customer engagement, and blog customer engagement, with information on the degree of customer activity, interaction, and contribution to Facebook, Twitter, and blog of the firm, collected from the firm's Facebook, Twitter, and blog sites from June to August 2014 (He et al., 2013; Kiron et al., 2013). Facebook customer engagement was measured through fan evolution, number of user comments, likes, and shares per firm's post with data from the firm's Facebook site. We assessed Twitter customer engagement in terms of firm's number of following, the evolution of followers, number of customer comments, favorites, and retweets per firm's tweet with data collected from the firm's Twitter site. Finally, blog customer engagement was measured as the number of customer comments and shares per firm's post.

Table 3: List of e-commerce functionalities (Zhu & Kraemer, 2002)

Category	Functionality	Description
Information	Product information online	Product catalogue or other product availability information
	Search capability	If the website offers search engine to refine by needs
	Product review	Third party reviews or customer ratings
	Product update	If the website presents frequently asked questions and offers maintenance, support email, or other pre-and post-sales support
Transaction	Buy capability	If it is possible to buy online
	Online order tracking	If it is possible to view the order processing cycle
	Account management	If the customer can log and make easier the order or can benefit from personalized account or reward programs
	Return	Information, procedure, and mechanism to facilitate returns
	Security	Indications about the security of transactions, payment, and verification systems

Interaction and customization	Customization	Functionality to configure product features via website
	Customer registration	If you can log or subscribe to electronic bulletin system
	Online recommendation	If there exist dynamic real-time online product recommendations or other tools to provide recommendations to customers
	Real-time support (chat)	Instant messaging communication and open discussion forum

Conventional online customer engagement is a composite first-order construct measured as the degree of customer's contribution to the firm's website. We evaluated the relative traffic rank position of the firm's website with data collected from Alexa database (http://www.alexa.com/) from June to August 2014 (Heath et al., 2013). Alexa database provides a website ranking based on a combination of reach (the number of visitors in a given day) and page views (the total number of visits). The website with the highest combination of both measures is ranked #1. We evaluated the Alexa ranking per industry and performed the relative traffic rank position by calculating the rate of sectoral excellence (RSE) in web customer engagement for June, July, and August 2014 as follows: 1 - (Rank position of the firm's website / Number of firms in the industry) (Benitez & Walczuch, 2012; Benitez et al., 2018a; Benitez et al., 2018b; Benitez et al., 2018d). Conventional online customer engagement was measured as the average RSE in web customer engagement from June to August 2014.

Firm performance is a composite second-order construct composed of two traditional dimensions of firm performance: innovation performance and customer service performance (Mithas et al., 2011). Innovation performance is a single construct that was measured as the firm's patent quality with data collected from the U.S. Patent and Trademark Office database in the period 2011-2014 (Benitez et al., 2018a). This three-year period smooths out the bias derived from a good or bad year (Tanriverdi, 2005). To evaluate patent quality, we first estimated a patent quality weighting ratio (PQWR), and then, we calculate the RSE in innovation (Benitez & Walczuch, 2012; Benitez et al., 2018a). PQWR was measured weighting the number of patents in

2011 by the citations that these patents have obtained within a three-year window (Kleis et al., 2012). We calculated PQWR for 2011-2014 as follows: $PQWR_{2011\text{-}2014}$ = Number of citations received by the firm's patents of 2011 in subsequent patents within 2012-2014/Number of published patents by the firm in 2011. RSE in innovation was calculated as follows: 1 - (Firm's position in its industry in our PQWR ranking / Total number of firms in each industry in our PQWR ranking). The final measure of innovation performance was the RSE in innovation for 2011-2014.

Customer service performance is a composite first-order construct measured with information on the firm's reliability and honesty in serving customers collected from the Better Business Bureau (BBB) database (https://www.bbb.org/) in October 2014 (Ma et al., 2012). BBB is a non-profit organization that focuses on providing free business reviews based on firms' trust and honesty. BBB serves as intermediary between U.S. firms and nearly 1 million disputes from customers each year. Specifically, we used the number of solved complaints in the last three years (from October 2011 to October 2014) and the presence or absence of accreditation for implementing the BBB Code of Business Practices (based on the firm's trust and honesty) in October 2014 as two indicator proxies to measure customer service performance. Managing complaints to solve customers' problems is part of customer service performance (Gunarathne et al., forthcoming). The better the firm's ability to solve complaints, the better is the customer service performance. Then, it is rational to expect that firms that effectively solve complaints and are guided by a code of practices for honesty are more reliable and outperformers for customers in terms of customer service. These two indicators are thus objective and credible to measuring customer service performance effectively[7]. We used the natural logarithm of the number of

[7] Traditionally, customer service has been related to the number of complaints (e.g., Ray et al., 2005; Ma et al., 2012). For example, Ray et al. (2005) operationalized customer service performance as the quality of the process of serving

complaints that were solved by the firm during October 2011 - October 2014. The presence or absence of accreditation was measured as a dummy giving the value 1 if the firm possesses the BBB accreditation and 0 in other cases.

Finally, we controlled for firm size, industry, and firm age on firm performance (Mithas et al., 2011). We controlled for firm size on firm performance because firms with more organizational resources are more likely to invest in innovation and customer service practices (Benitez & Walczuch, 2012). We measured firm size as the natural logarithm of the number of employees in 2014 with information collected from COMPUSTAT database (Benitez et al., 2018a). Innovation and customer service performance can also depend on the industry in which the firm operates. We controlled for industry on firm performance by measuring industry as a dummy variable (0: Manufacturing, 1: Service firm) with information collected from Forbes database (Benitez & Ray, 2012). As firm age can explain differences in organizational attitude toward innovation and performance, we also controlled for firm age on firm performance. Firm age was calculated as the natural logarithm of the number of years in 2014 that the firm has been operating on its key industry with information collected from Forbes database (Chen et al., 2015). Our constructs were specified as composite at first-, second-, and third-order level (Henseler et al., 2016). Table A1 in the appendix shows a summary of the measure definition and data sources for all the constructs employed in this study.

customers by using a complaint ratio. Recently, some IS literature gives much importance to analyze complaints on social media to provide customer service (e.g., Gunarathne et al., forthcoming). Being realistic, every firm receives complaints; then, effectiveness in managing them is essential. We go beyond the number of complaints and measure the firm's ability in solving complaints. We are not interested in measuring customer satisfaction but how effective is the company in handling complaints. In this sense, we consider and assume that solving complaints is an objective proxy to effectively measure customer service performance.

5. Empirical analysis and results

5.1. Motivation of the method of estimation

We tested the proposed model by using the structural equation modeling (SEM) technique. Specifically, we performed a partial least squares (PLS) path modeling[8]. It is appropriate to use PLS in this study as the method of estimation for the following reasons. First, PLS is a full-fledged SEM method of estimation that can conduct exact test of model fit, and it is suitable for empirical research development (Henseler et al., 2016). Second, PLS is an optimal method of estimation for composite models, as the proposed conceptual model (Henseler et al., 2014; Benitez et al., 2017). Third, PLS is the dominant and most used method of estimation in IS empirical research published in the leading IS journals (Polites et al., 2012; Benitez et al., 2018b; Benitez et al., 2018d). We used the statistical software package Advanced Analysis for Composites (ADANCO) 2.0.1 Professional (http://www.composite-modeling.com/) (Henseler & Dijkstra, 2015). ADANCO is a variance-based SEM software that models causal and predictive models by estimating composites, common factors, and single indicators.

Prior to performing the empirical analysis, we completed a statistical power analysis to determine the minimum sample size required to estimate the proposed model. Assuming an anticipated effect size of 0.200, a desired statistical power level of 0.800, five predictors (i.e., the

[8] SEM is a statistical technique used to model complex relationships between latent variables/constructs (unobserved variables) by configuring associations between indicators (observed variables) and constructs. PLS is a SEM method of estimation that creates proxies for latent variables as weighted sums of indicators. In a two-step approach, PLS first creates proxies for the latent constructs and then estimates path coefficients. The first step consists of an iterative PLS algorithm to estimate weights, reliabilities, and composite correlations (inner and outer weight estimations), thus obtaining the measurement model (relationship between latent variables and their indicators). The second step consists of using the previous weight scheme (relationship between latent variables and their indicators) to estimate path coefficients and loadings (Benitez et al., 2017). Both SEM and PLS are employed correctly in the context of this research because the proposed conceptual model of this study includes very complex measurement and structural relationships. However, on the basis of the suggestions of one of the reviewers of the panel, we re-estimated the proposed interaction model by using the latent variable scores and employing ordinary least squares as the method of estimation. This OLS estimation yielded similar results to those obtained for the interaction model (Table 5), which suggests that the method of estimation selection did not affect the results, and consequently, it is not an issue in this research.

number of links received by the construct Twitter engagement), and a confidence level of 0.95, the minimum required sample size to estimate the model is 91 (Cohen, 1988; Nitzl et al., 2016). Thus, our sample (100) had a good size to test the proposed theory.

5.2. Confirmatory composite analysis

Before testing the structural model, we checked for the external validity of our composite constructs by performing a confirmatory composite analysis (Henseler et al., 2014; Benitez et al., 2017). This analysis is useful to detect wrong assignment of indicators to constructs or wrong number of constructs (model misspecification). We evaluated the goodness of model fit for the saturate model (i.e., a model where there is free correlation among measurements) by examining the standardized root mean squared residual (SRMR), unweighted least squares (ULS) discrepancy (d_{ULS}), and geodesic discrepancy (d_G) (Henseler et al., 2016; Benitez et al., 2017). These measures of goodness of fit evaluate the discrepancy between the empirical correlation matrix and the model-implied correlation matrix. The lower they are, the better is the model fit (Henseler et al., 2014). Table 4 shows results of the saturate model fit evaluation for the first-, second-, and third-order constructs. All discrepancy values are lower than the 95%-quantile of the bootstrap discrepancies (HI_{95} values), which shows that with a 5% level of probability, the measurement structure of our composite constructs is correct. There is an empirical support for the structure of our composite constructs at first-, second-, and third-order levels. Then, we can proceed with the measurement model evaluation[9] and the structural model evaluation.

Table 4: Results of the confirmatory composite analysis

Discrepancy	First-order constructs			Second-order constructs			Third-order constructs		
	Value	**HI_{95}**	**Conclusion**	**Value**	**HI_{95}**	**Conclusion**	**Value**	**HI_{95}**	**Conclusion**
SRMR	0.077	0.091	Supported	0.046	0.073	Supported	0.040	0.052	Supported
d_{ULS}	1.655	2.287	Supported	0.095	0.240	Supported	0.016	0.027	Supported
d_G	0.779	2.701	Supported	0.048	0.103	Supported	0.006	0.011	Supported

[9] This confirmatory composite analysis can be also considered as part of the measurement model evaluation (Benitez et al., 2017).

5.3. Measurement model evaluation

We assessed the multicollinearity, weights, and its level of significance, loadings, and its level of significance of the indicators and dimensions of our composite first-, second, and third-order constructs[10] (Cenfetelli & Bassellier, 2009; Benitez et al., 2017). There is no multicollinearity problem if variance inflation factors (VIFs) of the indicators and dimensions are lower than 10 (Tanriverdi & Uysal, 2015; Benitez et al., 2018b). Except for one item pertaining to the Facebook engagement dimension, VIF values are well below 10. We dropped this item; therefore, multicollinearity is not a problem in our empirical analysis. A composite item/dimension should be retained if its weight and/or loading are significant (Cenfetelli & Bassellier, 2009; Benitez et al., 2018b). We performed a bootstrap analysis with 5000 subsamples to obtain the significance level of indicator and dimension weights and loadings, and beta coefficients. All the indicator and dimension loadings and weights are significant at 0.05 level. Overall, this analysis shows good measurement properties for the proposed model. Table A2 in the appendix presents the details of the measurement model evaluation at first-, second-, and third-order levels.

5.4. Structural model evaluation

To test the hypotheses of the proposed model, we considered two models: (1) a baseline model, where we evaluate H1, H2, and H4 and (2) an interaction model, where we included the interaction term of social media capability and e-commerce capability to evaluate H3. To test the interaction model, we followed a two-stage approach to form the interaction term (social media capability * e-commerce capability) (Fassott et al., 2016). In the first stage, we ran the baseline model to obtain construct the scores of independent (i.e., e-commerce capability or social media

[10] Traditional evaluation of reliability and validity for reflective do not work well for composite models (Peng & Lai, 2012). All the constructs in our proposed model were specified as composite. Factor and composite models are evaluated differently (Benitez et al., 2017). First, content validity should be ensured by creating measures based on prior literature, interviews with executives, and/or the opinion of the author team. Then, a confirmatory composite analysis is performed to support the composite structure. Finally, multicollinearity problems and significance of weights and loadings should be evaluated (Cenfetelli & Bassellier, 2009; Benitez & Ray, 2012).

capability)[11] and moderator variables (i.e., e-commerce capability or social media capability). In the second stage, we built the interaction term as the product of the independent and moderator (i.e., e-commerce capability and social media capability) construct scores. The interaction term was then added to the interaction model in the second stage.

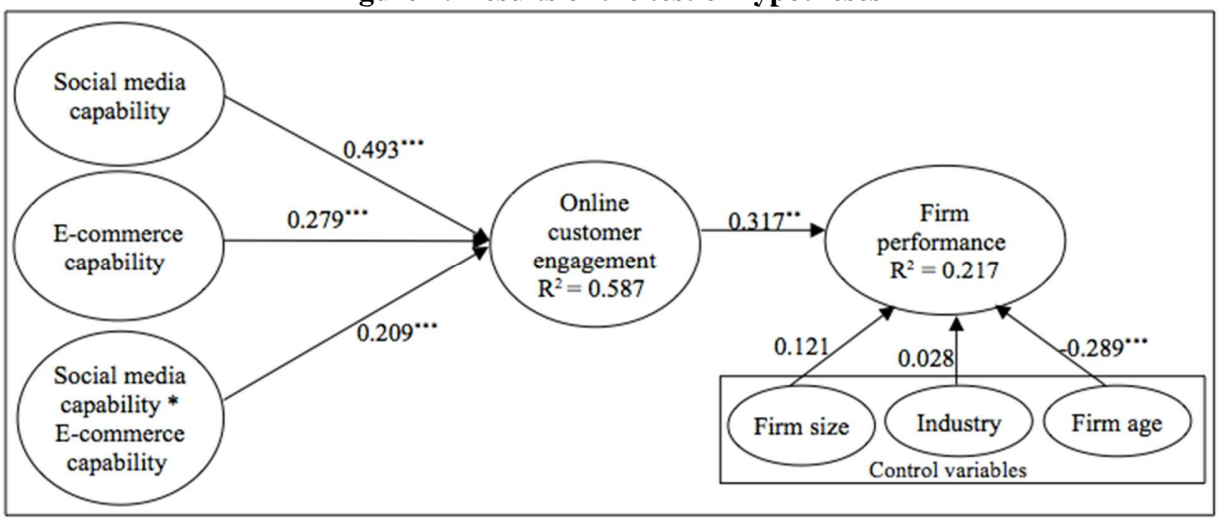
All the hypotheses were supported by the empirical analysis. Social media and e-commerce capabilities individually contribute to the development of online customer engagement (0.001 level). In addition, online customer engagement improves firm performance (0.01 level). The interaction term of social media capability and e-commerce capability on online customer engagement was also supported (0.001 level), which means that social media and e-commerce capabilities jointly contribute to the development of online customer engagement. The effect of e-commerce capability (or social media capability) becomes larger when social media capability (or e-commerce capability) increases (Fassott et al., 2016).

The values of the beta coefficients, their level of significance, the effect size (f^2) values, and the R^2 values are individual measures of the explanatory power of the model. Beta coefficients around 0.200 are considered economically significant, and R^2 values higher than 0.200 indicate good explanatory power of the endogenous variables of the model (Benitez et al., 2018b). The beta coefficients of the hypothesized relationships range from 0.209^{***} to 0.493^{***}. H1, H2, and H3 were supported by the data with 0.001 level of significance, while H4 was significant at 0.01 level. The f^2 specifies the relative size of each incremental relationship included in the proposed model. The f^2 values of the key relationships of the model ranged from 0.100 to 0.399.

[11] Considering social media capability or e-commerce capability as the independent or the moderator variable does not matter. Both interpretations are valid (Spiller et al., 2013; Fassott et al., 2016).

The R^2 value of the variable online customer engagement was 0.587, while that of firm performance was 0.217. Overall, this analysis shows a good explanatory power for the proposed model. Figure 2 shows the result of the interaction model.

Figure 2: Results of the test of hypotheses



Note: $^{\dagger}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$, one-tailed test.

We also evaluated the goodness of model fit for the structural model by examining the SRMR, d_{ULS}, and d_G (Henseler et al., 2016; Benitez et al., 2017). SRMR values for the two models were well below the threshold of 0.080 (Henseler et al., 2014; Benitez et al., 2017). All discrepancy values for the two models were below the 99%-quantile of the bootstrap discrepancies, which means that, with a probability of 1%, we can claim that the proposed theory of social commerce-IT capabilities and firm performance is correct and capable to explain how the IT and corporate worlds function (Henseler & Dijkstra, 2015; Benitez et al., 2017) and how companies can create business value from their social commerce-IT capabilities investments. Table 5 provides detailed information of the structural model evaluation.

5.5. Test of time selection bias

We checked for potential time selection bias in the measures of social media capability, e-commerce capability, online customer engagement, and innovation performance in two ways (a double test). First, we checked for potential time selection bias by collecting data on social commerce-IT capabilities and online customer engagement in November and December 2017 and estimating several robustness models. The development of social media and e-commerce capabilities and their influence on online customer engagement can require time; therefore, there can be a time effect bias in our study associated with the date in which data were collected. Then, we collected data in November 2017 for social commerce capabilities (i.e., social media and e-commerce capabilities) and in December 2017 for online customer engagement, leaving one-month time lapse. We measured social media capability by Facebook capability, Twitter capability, and blog capability with information collected from Facebook, Twitter, Twopcharts database, and firm's blog site in November 2017. E-commerce capability was measured as the accumulated total number of firm's web functionalities in November 2017. Online customer engagement is a composite third-order level construct determined by social online customer engagement and conventional online customer engagement. Social online customer engagement was determined by Facebook customer engagement, Twitter customer engagement, and blog customer engagement, with information collected from the firm's Facebook, Twitter, and blog site from November to December 2017. Conventional online customer engagement was evaluated by the relative traffic rank position in Alexa database for November and December 2017. We estimated three robustness models for this first test of time selection bias: (1) social commerce-IT capabilities measured in June 2014 and November 2017: we correlated social media/e-commerce capability measured in June 2014 and social media/e-commerce capability measured in November 2017. Results suggest a high correlation between measures. The beta

coefficient between social media capability measured in June 2014 and November 2017 was 0.886^{***}. The beta coefficient between e-commerce capability measured in June 2014 and November 2017 was 0.812^{***}. These results give additional credibility to our social media and e-commerce capabilities measures. (2) Online customer engagement measured in June-August 2014 and November-December 2017: we correlated online customer engagement measured in the period from June to August 2014 and online customer engagement measured in the period from November to December 2017. Results show that the beta coefficient between the measures was 0.852^{***}, which gives additional credibility to our online customer engagement measure. (3) Social commerce-IT capabilities and online customer engagement in November-December 2017: we estimated a model in which social commerce-IT capabilities in November 2017 influences online customer engagement in November-December 2017. This alternative model provides results similar to those of the proposed model (Table 5), as social media capability is positively associated with online customer engagement ($\beta = 0.564^{***}$), and e-commerce capability is positively associated with online customer engagement ($\beta = 0.259^{***}$).

Second, we also checked for potential time selection bias in the operationalization of innovation performance (one of the dimensions of firm performance), by estimating two additional alternative models. In the first alternative model, we measured innovation performance as a single construct determined by the number of patents published in 2014 with information collected from U.S. Patent and Trademark Office database (Kleis et al., 2012). In the second alternative model, we measured innovation performance as a single construct determined by the RSE in innovation for 2014-2017 in a similar vein as we did for RSE in innovation for 2011-2014. First, we estimated a PQWR, and then, we built a ranking by industry, where the better the position of a firm, the greater is the PQWR, to subsequently calculate the RSE in innovation. PQWR was measured by weighting the number of patents in 2014 by the citations that these

patents have obtained within a three-year window (2015-2017) (Kleis et al., 2012). Results in both cases are similar to those of the proposed interaction model, which gives robustness and additional credibility to our innovation performance measure. Table A3 in the appendix shows the results of the test of time selection bias (robustness) for innovation performance. Overall, the results of this double test of time selection bias indicate that time selection bias is not a problem in our empirical analysis.

5.6. Test of endogeneity

Endogeneity may be caused between two variables by the omission of variables in a proposed model and by the existence of bidirectional relationships (Benitez et al., 2018d). Because it is debatable whether greater online customer engagement has a positive association with social media capability and e-commerce capability as well as online customer engagement may be affected by other variables (e.g., customer experience), we performed a test of endogeneity on the relationships between social media capability and online customer engagement and between e-commerce capability and online customer engagement. By using the firm's IT infrastructure capability as an instrumental variable of social media capability and e-commerce capability, the Hausman tests revealed that the relationships between e-commerce capability and online customer engagement ($\chi^2 = 1.0389$, d.f. = 1, $p = 0.308$) and between social media capability and online customer engagement appear unaffected by endogeneity ($\chi^2 = 3.0586$, d.f. = 1, $p = 0.080$). This analysis indicates that omitted variables and reverse causality are not a problem in the relationships between social media and e-commerce capabilities and online customer engagement in the context of this research (Benitez et al., 2018d).

5.7. Mediation analysis

We performed a post hoc mediation analysis by adding the direct effect of the social commerce-IT capabilities interaction term on firm performance. We performed a bootstrap analysis of 5000 subsamples to test the significance of the indirect effect (Zhao et al., 2010; Nitzl et al., 2016). We evaluated whether the indirect effect was significant to determine the type of mediation. In our analysis, the direct effect was not significant, while the indirect effect was significant at 0.05 level ($\beta = 0.055^{*}$), showing an indirect-only mediation (Zhao et al., 2010; Nitzl et al., 2016) (Table 6). The total effect was also significant at 0.05 level ($\beta = 0.182^{*}$). These results reinforce those obtained in the test of hypotheses and suggest that social media and e-commerce capabilities interaction positively affects firm performance through online customer engagement (Zhao et al., 2010; Benitez et al., 2017).

Table 6: Indirect effect analysis

Relationship	Direct effect	Indirect effect	Total effect
Social media capability * E-commerce capability → Firm performance	0.127 (1.199) [-0.083, 0.323]	0.055* (1.755) [0.001, 0.123]	0.182* (1.731) [-0.034, 0.378]

5.8. Test of robustness

Contemporary PLS path modeling requires a robustness test on the proposed model against alternative theoretical and empirical explanations (Benitez et al., 2016; Benitez et al., 2018b). In this sense, we checked for the robustness of the proposed theory in two ways. In the first alternative model, we considered social media capability and e-commerce capability as two dimensions of a same concept/construct, named social commerce competence (a third-order construct composed of social media capability and e-commerce capability). Results of this alternative model indicate that social commerce competence is positively related to online customer engagement ($\beta = 0.731^{***}$). This indicates that the operationalization of the phenomenon social commerce-IT capabilities does not affect the results of the study. In the

second alternative model, we considered the dimensions of firm performance separately, keeping every other relationship the same. This means that the key endogenous variables of this model were innovation performance and customer service performance. Results obtained in the second alternative model yield similar results to those obtained in the proposed model (Figure 2). This indicates that the operationalization of the construct firm performance does not affect the results of the study. As the proposed theory does not have a significantly worse estimated model fit, it is our best theoretical understanding of the research problem, and it is a more parsimonious theory, the proposed theory is preferred to the alternative models included in this test of robustness (Henseler et al., 2016; Benitez et al., 2017). Table 5 shows the details of this test of robustness.

Table 5: Results of the PLS estimation and results of the test of robustness

Beta coefficient	**Baseline model**	**Interaction model**	**Mediation**	**Alternative model 1**	**Alternative model 2**
Social media capability → Online customer engagement (H1)	0.530*** (7.557) [0.392, 0.666]	0.493*** (6.409) [0.337, 0.638]	0.493*** (6.410) [0.337, 0.638]		0.529*** (7.505) [0.390, 0.665]
E-commerce capability → Online customer engagement (H2)	0.297*** (3.472) [0.118, 0.456]	0.279*** (3.133) [0.105, 0.451]	0.279*** (3.132) [0.105, 0.451]		0.298*** (3.466) [0.118, 0.456]
Social media capability * E-commerce capability → Online customer engagement (H3)		0.209*** (3.107) [0.066, 0.330]	0.210*** (3.118) [0.067, 0.331]		
Online customer engagement → Firm performance (H4)	0.325** (2.877) [0.081, 0.520]	0.317** (2.780) [0.074, 0.515]	0.263** (2.257) [0.019, 0.472]	0.327** (2.899) [0.082, 0.520]	
Social media capability * E-commerce capability → Firm performance			0.127 (1.199) [-0.083, 0.323]		
Social commerce competence → Online customer engagement				0.731*** (15.797) [0.638, 0.819]	
Online customer engagement → Innovation performance					0.275** (2.770) [0.076, 0.464]
Online customer engagement → Customer service performance					0.221* (1.932) [-0.009, 0.440]
Control variables					
Firm size → Firm performance	0.121 (1.164) [-0.100, 0.307]	0.121 (1.166) [-0.101, 0.308]	0.118 (1.151) [-0.101, 0.302]	0.121 (1.164) [-0.099, 0.307]	
Industry → Firm performance	0.027 (0.221) [-0.186, 0.284]	0.028 (0.233) [-0.186, 0.286]	0.075 (0.638) [-0.144, 0.315]	0.026 (0.218) [-0.187, 0.283]	
Firm age → Firm performance	-0.289*** (3.816) [-0.431, -0.139]	-0.289*** (3.804) [-0.431, -0.139]	-0.273*** (3.514) [-0.421, -0.118]	-0.289*** (3.822) [-0.431, 0.139]	
Firm size → Innovation performance					0.066 (0.761) [-0.111, 0.229]

Firm size → Customer service performance									0.106 (1.016) [-0.114, 0.293]	
Industry → Innovation performance									-0.101 (0.942) [-0.297, 0.119]	
Industry → Customer service performance									0.104 (0.983) [-0.099, 0.314]	
Firm age → Innovation performance									-0.145† (1.602) [-0.320, 0.037]	
Firm age → Customer service performance									-0.263*** (3.448) [-0.405, -0.104]	
	R^2	**Adjusted R^2**	**R^2**	**Adjusted R^2**	**R^2**	**Adjusted R^2**	**R^2**	**Adjusted R^2**	**R^2**	**Adjusted R^2**
Online customer engagement	0.542	0.533	0.587	0.574	0.587	0.574	0.535	0.530	0.541	0.532
Firm performance	0.222	0.189	0.217	0.184	0.229	0.188	0.223	0.191		
Innovation performance									0.107	0.069
Customer service performance									0.163	0.127
SRMR value	0.055		0.059		0.060		0.066		0.048	
SRMR HI_{99}	0.070		0.069		0.065		0.073		0.072	
d_{ULS} value	0.203		0.194		0.196		0.195		0.182	
d_{ULS} HI_{99}	0.324		0.261		0.234		0.239		0.409	
d_G value	0.080		0.090		0.084		0.079		0.079	
d_G HI_{99}	0.137		0.092		0.088		0.089		0.178	
Effect size (f^2)										
Social media capability → Online customer engagement (H1)	0.430		0.399		0.399				0.428	
E-commerce capability → Online customer engagement (H2)	0.135		0.132		0.132				0.135	
Social media capability * E-commerce capability → Online customer engagement (H3)			0.100		0.100					
Online customer engagement → Firm performance (H4)	0.131		0.124		0.073		0.133			
Social media capability * E-commerce capability → Firm performance					0.016					
Social commerce competence → Online customer engagement							1.150			
Online customer engagement → Innovation performance									0.082	
Online customer engagement → Customer service									0.056	

performance					

6. Discussion and conclusions

This research examines the impact of two contemporary social commerce-IT capabilities (social media capability and e-commerce capability) on firm performance on a sample of U.S. firms. We theorized that the development of these social commerce-IT capabilities enables firms to engage online customers to improve their firm performance. The empirical analysis supports our theory. Specifically, the empirical analysis suggests that the social commerce-IT capabilities of social media and e-commerce positively individually influence firm performance through online customer engagement. The empirical analysis also supports our theory in examining the effects of social media and e-commerce as two complementary capabilities. The interplay of social media and e-commerce capabilities (i.e., social commerce) improves the flow of information and develop a better and deep connection with customers, who may be more motivated to participate in the digital platforms (social media and e-commerce).

Firms that better leverage its social media and e-commerce achieve fine-grained customer knowledge by engaging customers virtually in social media and the firm's website. For example, Finnair (a Finland's national airline) ran some social media platforms (Facebook, Twitter, corporate blogs, YouTube, Pinterest) looking for innovative ideas from customers. After properly developing the community (e.g., offering support, reacting to comments, giving information), Finnair obtained hundreds of ideas from community members. Some of the most voted ideas to implement were giving passengers a service of swapping books and offering vegetarian meals onboard (Jarvenpaa & Tuunainen, 2013). This example illustrated how a company with proficiency in social media can engage customers to acquire knowledge to innovate in product and service.

Overall, firm's social media and e-commerce capabilities individually and jointly motivate customers to participate, give opinions, interchange ideas, and create a sense of brand identification, commitment, and loyalty (Chen & Shen, 2015). This deep connection and interaction with/among customers are beneficial for firms.

This study has two main limitations. First, the findings of this study can be generalized only to the best small U.S. firms (included in the Forbes database). Future research should examine whether the results obtained in this study are kept in the context of other countries (e.g., European Union, Asia, LATAM) and/or other type of firms (e.g., micro-firms, other small firms, large firms). Furthermore, future research should compare whether small firms benefit more or less than large firms from social commerce. Second, the constructs social media capability and social online customer engagement were conceptualized and measured by covering Facebook, Twitter, ad corporate blog(s), which is consistent with prior IS research (Culnan et al., 2010; Benitez et al., 2018a). However, the focus only on these three external social media may constitute a limitation. Drawn on our study, we encourage IS scholars to develop the concepts of social media capability and social online customer engagement by extending our conceptualization and measures to other external social media (e.g., WeChat, LinkedIn, Instagram, or YouTube) and to enterprise social media (e.g., Microsoft Yammer). This line of research appears to be a very promising avenue for future fine-grained IS research. Finally, because our study was interested on the customer side of e-commerce and its effect on online customer engagement, we only focused on the web technology firm's usage to interact with customers. Future IS research should examine the supplier side of e-commerce and its effect on online customer engagement.

This research has several contributions to the field of IS. First, this study conceptualizes social commerce-IT capabilities and analyzes their effects on performance from a firm's perspective and a capabilities' view. According to the social commerce literature, this research specifically

considers social media capability and e-commerce capability as two social commerce-IT capabilities because social media and e-commerce are the two pillars of the social commerce initiatives. Social commerce-IT capabilities refer to the firm's ability in *leveraging* and *inter-connecting* social media and e-commerce (capabilities). These capabilities were examined individually and as two complementary capabilities, which was supported by the empirical analysis.

We study social commerce-IT capabilities' effects on performance from a firm's perspective. Majority of articles on social commerce explore customers' behavior from an individual's perspective. Literature on social commerce from the firm's perspective is in its infancy and primarily focuses on how to use social commerce to improve financial performance. In addition to helping customers in making purchase decisions, social commerce can help firms to improve their internal innovation and customer service processes. Recent literature has emphasized the role of online communities, for example, in open innovation success (Mount & Garcia, 2014) and in helping firms to understand how to better serve customers (Kane et al., 2014). This research contributes to the social commerce literature by studying social commerce from a firm's perspective and capabilities' view, specifically analyzing how firms take benefit of their social commerce-IT capabilities to improve innovation and customer service performance.

Second, we provide a unique organizational theory and empirical evidence on how social commerce-IT capabilities influence firm performance through the online engagement of customers. We find that firms that invest and develop social commerce-IT capabilities achieve tangible and intangible business benefits such as greater innovation and customer service performance. Few studies have conceptually and empirically examined the business value of social commerce-IT capabilities, that is, the impact of social commerce-IT capabilities on firm performance through customer participation. This study provides a unique organizational theory

and empirical evidence on how social commerce-IT capabilities influence firm performance through the online engagement of customers.

Third, the microfoundations approach suggests that individual/group member actions are the key source of firm heterogeneity in executing/developing organizational routines/capabilities and creating business value (Felin et al., 2012). For example, this approach argues that job processes and employee's characteristics are critical to explain the overcoming of diverse organizational capabilities (Hodgkinson & Healey, 2011; Teece, 2012). We use the microfoundations approach to conceptualize online customer engagement as an individual behavior of the customer and to explain how IT creates business value by considering online customer engagement as an individual behavior facilitated by social commerce-IT capabilities. This seems to be a promising venue for future research in the field of IS.

Finally, this research has also a methodological contribution. We provide a rich validated set of secondary measures to evaluate social commerce-IT capabilities, online customer engagement, innovation performance, and customer service performance that comes from nine high-quality databases from the industry (e.g., firm's annual reports, Facebook, Twopcharts). Future IS research can use these measures to explore these and/or other related research questions.

Firms invest millions of dollars in IT but not all these investments generate the expected results (Benitez & Walczuch, 2012). This research provides useful lessons for IT managers. First, this study shows that the development of social media and e-commerce, i.e., two social commerce-IT capabilities, can improve firm performance through customer participation. Companies can take advantage of users' reviews to know what they are expecting in terms of new product development and new ways of serving and supporting customer service. Social and conventional online customer involvement and participation provide the firm critical information on customer needs and ideas for new product development and customer service support. For

example, SAP exploits social media (i.e., Facebook, Twitter, YouTube, and LinkedIn) to directly communicate with customers, getting feedback from them, and hence providing information about new products and acting as a customer service function (Kiron, 2012c).

Second, this study explains how to engage customers to participate and give information online. On the one side, IT managers can learn that managing social commerce-IT capabilities (social media and e-commerce) can enable a better online customer engagement. On the other side, senior executives can see the strategic need of exploiting relationship among complementary resources if they suffer resource constraints. This study highlights the importance of developing jointly social media and e-commerce capabilities to improve performance.

Overall, we provide IT managers a simple, eloquent, and new explanation on how social commerce-IT capabilities affect firm performance. Social media and e-commerce capabilities create innovation and customer value by serving as the foundation to facilitate social and conventional online engagement. Thus, investments in social media and e-commerce create business value for companies. Social commerce-enabled customer engagement provides rich customer knowledge to innovate in product development and customer experience. Social commerce-IT capabilities matter.

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8. Appendix

Table A1: Construct name, measure definition, and data sources

Construct name	Measure description	Source
Social media capability	Facebook capability, Twitter capability, and blog capability	Second-order construct
Facebook capability: Facebook activity of the firm in terms of:	Number of events, experience, and updated content in June 2014	Facebook site of the firm
Number of events	Number of events published on Facebook (from 0 to 168)	Facebook site of the firm
Experience	Number of months operating in Facebook (from 0 to 77.996)	Facebook site of the firm
Updates	For each firm, we scored from 1 to 5 when the firm had made a comment on Facebook more than one month ago (1), in the last month (2), two weeks ago (3), in the last week (4), in the last two days (5)	Facebook site of the firm
Twitter capability: Twitter activity of the firm in terms of:	Spent time writing tweets, experience, and updated content in June 2014	Twitter site of the firm and Twopcharts
Spent time	Number of hours spent in writing tweets (from 0 to 219)	Twopcharts
Experience	Number of months operating in Twitter (from 0 to 75.565)	Twopcharts
Updates	For each firm, we scored from 1 to 5 when the firm had made a comment on Twitter more than one month ago (1), in the last month (2), two weeks ago (3), in the last week (4), in the last two days (5)	Twitter site of the firm
Blog capability: Blog activity of the firm in terms of:	Experience and updated content in June 2014	Blog site of the firm
Experience	Number of months operating in the blog (from 0 to 163.909)	Blog site of the firm
Updates	For each firm, we scored from 1 to 5 when the firm had made a comment on the corporate blog more than one month ago (1), in the last month (2), two weeks ago (3), in the last week (4), in the last two days (5)	Blog site of the firm
E-commerce capability	Accumulated total number of 13 firm's web functionalities to interact with customers in June 2014. This measure ranges from 0 to 13	Structured content analysis of the firm's website
Online customer engagement	Social online customer engagement and conventional online customer engagement	Third-order construct
Social online customer engagement	Facebook engagement, Twitter engagement, and blog engagement	Second-order construct
Facebook engagement: Facebook customer engagement in terms of:	Fan evolution, number of user comments per firm's post, likes per firm's post and shares per firm's post from June to August 2014	Facebook site of the firm
Fan evolution	(Number of fans in $September_{2014}$ - Number of fans in $June_{2014}$) / Number of fans in $June_{2014}$ (from 0 to 1.294)	Facebook site of the firm
Number of comments per post	Users' comments from $June_{2014}$ to $August_{2014}$ / Firm's comments from $June_{2014}$ to $August_{2014}$ (from 0 to 223.790)	Facebook site of the firm
Number of likes per post	Number of likes from $June_{2014}$ to $August_{2014}$ / Firm's comments from $June_{2014}$ to $August_{2014}$ (from 0 to 4600.894)	Facebook site of the firm
Number of shares per post	Number of shares from $June_{2014}$ to $August_{2014}$ / Firm's comments from $June_{2014}$ to $August_{2014}$ (from 0 to 735.213)	Facebook site of the firm
Twitter engagement: Twitter customer engagement in terms of:	Number of following, the evolution of followers, number of customer comments per firm's tweet, favorites per firm's tweet and retweets per firm's tweet from June to August 2014	Twitter site of the firm

Number of following	Number of following in $August_{2014}$ (from 0 to 24472)	Twitter site of the firm
Follower evolution	(Number of followers in $September_{2014}$ - Number of followers in $June_{2014}$)/Number of followers in $June_{2014}$ (from -0.045 to 0.864)	Twitter site of the firm
Number of customer tweets per firm tweet	Users' tweets from $June_{2014}$ to $August_{2014}$ / Firm's tweets from $June_{2014}$ to $August_{2014}$ (from 0 to 1.655)	Twitter site of the firm
Number of favorites per tweet	Number of favorites from $June_{2014}$ to $August_{2014}$ / Firm's comments from $June_{2014}$ to $August_{2014}$ (from 0 to 20.943)	Twitter site of the firm
Number of retweets per tweet	Number of retweets from $June_{2014}$ to $August_{2014}$ / Firm's comments from $June_{2014}$ to $August_{2014}$ (from 0 to 7.593)	Twitter site of the firm
Blog engagement: Blog customer engagement in terms of:	Number of customer comments per firm's post and shares per firm's post from June to August 2014	Blog site of the firm
Number of comments per post	Customer comments from $June_{2014}$ to $August_{2014}$ / Firm's comments from $June_{2014}$ to $August_{2014}$ (from 0 to 7.800)	Blog site of the firm
Number of shares per post	Shares in Facebook, Twitter, LinkedIn, Google + from $June_{2014}$ to $August_{2014}$ / Firm's comments from $June_{2014}$ to $August_{2014}$ (from 0 to 335.351)	Blog site of the firm
Conventional online customer engagement	RSE in web customer engagement = 1 - (Rank position of the firm's website / Total number of firms in the industry). The final score of the RSE was calculated as the mean average for the months of June, July, and August 2014 (from 0 to 1)	Alexa
Firm performance	Innovation performance and customer service performance	Second-order construct
Innovation performance	$RSE_{2011\text{-}2014}$ in innovation = 1 - (Firm's position in its industry in our PQWR ranking / Total number of firms in each industry in our PQWR ranking)	U.S. Patent and Trademark Office
Customer service performance	Number of solved complaints in the last three years and a dummy variable (0 = Absence, 1 = Presence of BBB accreditation) in October 2014	BBB
Number of solved complaints	Natural logarithm of the number of solved complaints from October 2011 to October 2014	BBB
Awarded firm	Absence (0) or possession (1) of accreditation based on the BBB Code of Business Practices in 2014	BBB
Firm size	Natural logarithm of the number of employees in 2014	COMPUSTAT
Industry	Dummy variable (0: Manufacturing, 1: Service firm)	Forbes
Firm age	Natural logarithm of the number of years in the industry in 2014	Forbes

Table A2: Measurement model evaluation at first-, second, and third-order level

	Mean	S.D.	VIF	Weight	Loading
Social media capability (composite second-order construct)					
Facebook capability: Facebook activity of the firm in terms of (composite first-order construct)			2.334	0.356^{***}	0.871^{***}
Number of events	5.510	18.549	1.111	0.252^{***}	0.532^{***}
Experience	33.773	25.582	2.260	0.476^{***}	0.908^{***}
Updates	2.740	2.223	2.219	0.480^{***}	0.902^{***}
Twitter capability: Twitter activity of the firm in terms of (composite first-order construct)			2.644	0.433^{***}	0.917^{***}
Spent time	17.280	32.149	1.306	0.383^{***}	0.745^{***}
Experience	35.752	27.651	2.114	0.434^{***}	0.870^{***}
Updates	2.750	2.285	2.254	0.384^{***}	0.878^{***}

Blog capability: Blog activity of the firm in terms of (composite first-order construct)			1.596	0.356***	0.809***
Experience	17.266	31.681	1.913	0.545***	0.920***
Updates	1.255	1.949	1.913	0.543***	0.919***
E-commerce capability (composite single indicator)	6.110	2.685		1.000***	1.000***
Online customer engagement (composite third-order construct)					
Social online customer engagement (composite second-order construct)			1.307	0.415**	0.769***
Facebook engagement: Facebook engagement of the customer in terms of (composite first-order construct)			1.045	0.481***	0.623***
Fan evolution	0.113	0.210	1.001	0.490***	0.489***
Number of comments per post	5.933	25.296	1.513	0.490***	0.781***
Number of likes per post	100.923	485.299	1.513	0.490***	0.769***
Number of shares per post	12.008	75.025	Dropped	Dropped	Dropped
Twitter engagement: Twitter engagement of the customer in terms of (composite first-order construct)			1.059	0.596***	0.751***
Number of following	1065.960	2902.486	1.477	0.361***	0.742***
Follower evolution	0.091	0.147	1.510	0.153*	0.601***
Number of customer tweets per firm tweet	0.129	0.277	1.250	0.234***	0.367**
Number of favorites per tweet	0.826	2.630	6.057	0.254***	0.850***
Number of retweets per tweet	0.652	1.229	7.668	0.363***	0.932***
Blog engagement: Blog engagement of the customer in terms of (composite first-order construct)			1.016	0.459***	0.553***
Number of comments per post	0.171	0.954	1.008	0.694***	0.751***
Number of shares per post	8.796	40.508	1.008	0.662***	0.723***
Conventional online customer engagement (composite single indicator)	0.474	0.286	1.307	0.731***	0.932***
Firm performance (composite second-order construct)					
Innovation performance (composite single indicator)	0.167	0.309	1.006	0.760***	0.807***
Customer service performance (composite first-order construct)	1.554	1.880	1.006	0.592**	0.653***
Number of solved complaints	0.854	0.281	1.508	0.624***	0.861***
Awarded firm	0.165	0.373	1.508	0.499***	0.914***

Table A3: Test of time selection bias (robustness) for innovation performance

Beta coefficient	Interaction model		First alternative model		Second alternative model	
Social media capability → Online customer engagement (H1)	0.493***		0.494***		0.493***	
E-commerce capability → Online customer engagement (H2)	0.279***		0.276***		0.279***	
Social media capability * E-commerce capability → Online customer engagement (H3)	0.209***		0.211***		0.209***	
Online customer engagement → Firm performance (H4)	0.317**		0.237*		0.264**	
Control variables						
Firm size → Firm performance (control variable)	0.121		0.136		0.115	
Industry → Firm performance (control variable)	0.028		0.045		-0.023	
Firm age → Firm performance (control variable)	-0.289***		-0.301***		-0.341***	
R^2	**R^2**	**Adjusted R^2**	**R^2**	**Adjusted R^2**	**R^2**	**Adjusted R^2**
Online customer engagement	0.587	0.574	0.588	0.575	0.587	0.574
Firm performance	0.217	0.184	0.179	0.144	0.205	0.171
SRMR value	0.059		0.055		0.061	
SRMR HI_{99}	0.069		0.063		0.069	
d_{ULS} value	0.194		0.164		0.204	
d_{ULS} HI_{99}	0.261		0.220		0.258	
d_G value	0.090		0.081		0.096	
d_G HI_{99}	0.092		0.085		0.090	

Note: In the first alternative model, innovation performance is measured as the number of patents published in 2014. In the second alternative model, innovation performance is measured as RSE in innovation for 2014-2017.

Table A4: Correlation matrix

	1	1.1	1.2	1.3	2	3	3.1	3.1.1	3.1.2	3.1.3	3.2	4	4.1	4.2	5	6	7
1. Social media capability	1																
1.1. Facebook capability	0.871***	1															
1.2. Twitter capability	0.918***	0.750***	1														
1.3. Blog capability	0.808***	0.525***	0.600**	1													
2. E-commerce capability	0.548***	0.476***	0.578***	0.354***	1												
3. Online customer engagement	0.693***	0.552***	0.678***	0.561***	0.588***	1											
3.1. Social online customer engagement	0.650***	0.538***	0.613***	0.532***	0.518***	0.868***	1										
3.1.1. Facebook engagement	0.371***	0.327***	0.318***	0.323***	0.316***	0.524***	0.623***	1									
3.1.2. Twitter engagement	0.504***	0.449***	0.522***	0.326***	0.395***	0.654***	0.751***	0.206*	1								
3.1.3. Blog engagement	0.373***	0.247**	0.326***	0.398***	0.287**	0.493***	0.553***	0.042	0.123	1							
3.2. Conventional online customer engagement	0.543***	0.410***	0.554***	0.432***	0.494***	0.855***	0.484***	0.274**	0.368***	0.292**	1						
4. Firm performance	0.355***	0.278**	0.362***	0.274**	0.329***	0.376***	0.252**	0.218*	0.129†	0.153†	0.398**	1					
4.1. Innovation performance	0.325***	0.277**	0.265**	0.310***	0.288**	0.290**	0.140†	0.218*	0.060	-0.001	0.365***	0.612***	1				
4.2. Customer service performance	0.222*	0.159†	0.273**	0.131†	0.215*	0.273**	0.221*	0.124	0.122	0.194*	0.250**	0.837***	0.080	1			
5. Firm size	0.053	0.061	0.069	0.004	-0.053	0.005	-0.008	-0.169*	0.084	0.051	0.018	0.050	-0.002	0.065	1		
6. Industry	0.260**	0.242**	0.201*	0.240**	-0.032	0.077	0.087	-0.127	0.164†	0.110	0.044	0.132*	-0.038	0.193*	0.292**	1	
7. Firm age	-0.232**	-0.206*	-0.182*	-0.220*	-0.021	-0.166*	-0.192*	-0.066	-0.226*	-0.057	-0.092	-0.313***	-0.157†	-0.287**	0.278**	-0.156†	1