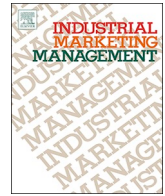




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Research paper

Co-creating social media agility to build strong customer-firm relationships

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ABSTRACT

Although promising links have been established between social information processing capability (internal capability), customer co-creation (external capability), and social media agility, empirical studies have not offered sufficiently convincing evidence on the benefits of using social media. This study adopted the dynamic capability view that assesses the development of internal capability by combining information acquisition, communication, and responsiveness and examines the effect of customer co-creation on operational agility through the use of social media. Data were gathered from 231 responses to a questionnaire in a business-to-business sales context. The key contribution of this study is its examination of how social media agility is influenced by both internal and external capabilities. The results reveal these two types of capabilities to have an interactive effect on social media agility that is positively correlated with the strength of customer-firm relationships.

1. Introduction

Businesses must strengthen customer responses and fulfill customer needs when faced with intense market competition. A company's failure to respond with increased efficiency and effectiveness compared with their competitors may result in significant deterioration in customer-firm relationships (Hardwick & Anderson, 2019; Koponen, Julkunen, & Asai, 2019; Murphy & Sashi, 2018). Scholars in the marketing management field have recognized the need to use customer-oriented technologies such as social media (Christodoulides, Michaelidou, & Siamagka, 2018; Nunan, Sibai, Schivinski, & Christodoulides, 2018; Ogilvie, Agnihotri, Rapp, & Trainor, 2018) to appear increasingly attractive to customers in their target markets. The use of social media can effectively connect a firm with its customers by enabling the exchange of information about its products and services. Many firms have invested in the development of effective social media to improve both interactions with customers and customer satisfaction (Agnihotri, Dingus, Hu, & Krush, 2016; Joo, Kim, & Yang, 2011). Practitioners and academics increasingly recognize that social media applications along with existing systems and processes foster stronger relationships with customers (Agnihotri et al., 2016; Juntunen, Ismagilova, & Oikarinen, 2019; Nunan et al., 2018). However, the influence of social media on the strength of customer-firm relationships depends substantially on responding to customers with agility. If businesses do not ensure that their use of social media is agile, they cannot identify changes in demands and market opportunities and respond efficiently and effectively by producing different combinations of products at volumes that match

customer needs.

The merger of existing operational agility with social media has given way to a new concept of agility that incorporates a more collaborative method to manage customer relationships, and it requires determining ways in which firms can achieve agility while using social media. Therefore, this study examined the effect of social media agility on the strength of customer-firm relationships and explored the antecedents of social media agility, beginning with social-information processing capability and customer co-creation.

Various aspects of agility have emerged in studies regarding management topics, such as supply chain management (Eckstein, Goellner, Blome, & Henke, 2015; Ngai, Chau, & Chan, 2011; Swafford, Ghosh, & Murthy, 2008), Internet of Things (Akhtar, Khan, Tarba, & Jayawickrama, 2018), and IT-enabled operational management (Tan, Tan, Wang, & Sedera, 2017). We employed the same logic in this study to examine agility as in studies about social media. Thus, we consider social media agility as a key business imperative. A firm's communication with customers using social media is crucial for creating and sharing social information associated with the capabilities of information processing; this provides firms with insights related to agility (Cai, Huang, Liu, & Wang, 2018; Pitafi, Liu, & Cai, 2018). Agility performance is improved when firms use social media to collaborate with their customers and develop new products or services. Previous research has yet to fully examine whether social media agility, in terms of social-information processing capability and customer cocreation agility, leads to better customer-firm relationships. We respond to this gap in the literature by developing a conceptual framework based on a

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literature review and empirical research in a business-to-business sales context.

Therefore, by focusing on how flexible firms can respond quickly to changes and redesign their offerings accordingly, this study examines the contribution of social media agility based on the complementarity between social-information processing capability and customer co-creation. Specifically, the antecedents and outcomes related to social media agility are examined; thus, our findings are relevant to the business-to-business domain. Social-information processing capability (an internal capability), particularly when coupled with customer co-creation (an external capability), is found to be related positively to social media agility, enhancing the strength of customer-firm relationships.

To achieve the abovementioned objectives, this study uses the dynamic capability approach, which posits that innovation performance depends substantially on internal and external capabilities (Zhang & Wu, 2017; Zouaghi, Sánchez, & Martínez, 2018) and the complementary relationship between these capabilities for e-service innovation (Chuang & Lin, 2015). According to this approach, internal social-information processing capabilities help firms quickly convert data and information into insights that can provide valuable resources for network partners (Zahra & George, 2002). Low social-information processing capability can inhibit a firm's internal organizational capability in adapting to rapidly changing external environments.

By contrast, external customer cocreation relates to involving customers in business processes to improve social media agility, such as firms using social media to directly communicate ideas about new products or services with their customers (Christodoulides et al., 2018; Khanagha, Volberda, & Oshri, 2017; Parveen, Jaafar, & Ainin, 2015), and developing external links and external collaborative relationships to boost innovation and overcome challenges. Lack of customer co-creation hinders the improvement and development of new products and services, which in turn limits social media agility; thus, a firm's ability to fulfill customer demands is reduced.

This study makes several crucial contributions to the literature. First, this study offers the novel insight that social media plays a vital role in enabling agility in the B2B domain. Our study demonstrates that social media agility focuses on quick responses, appropriate actions, and cost efficiency to build customer-firm relationships. Second, we argue that the relationship between internal and external driving forces is complementary; we posit that adopting a complementarity philosophy can elucidate how firms develop, integrate, and deploy their social-information processing capabilities and customer cocreation to generate social media agility. Finally, to achieve agility through the use of social media, firms should develop their social-information processing capabilities and enhance customer-firm cooperation. Social-information processing capability and social media agility are interconnected, and determining how they influence agility substantially contributes to closing the knowledge gap in B2B domains. Our study demonstrates how complementary information acquirement, communication, and responsiveness can be combined to enable social media agility, which has been shown to significantly influence customer-firm relationships. Moreover, a firm's collaboration with its customers can equip it with the information required to deliver products or services in a more timely manner and adapt to market changes.

The remainder of this study is structured as follows. In Section 2, we develop a research model and hypotheses. In Section 3, we describe the methodology used in this study. In Section 4, we assess the measurement model and test our hypotheses through a structural equation model. In Section 5, we discuss our empirical results. Finally, we propose the theoretical and managerial implications of this study.

2. Theoretical background and hypotheses

In this section, we review the literature related to the dynamic capability view and social media agility. Based on the literature review,

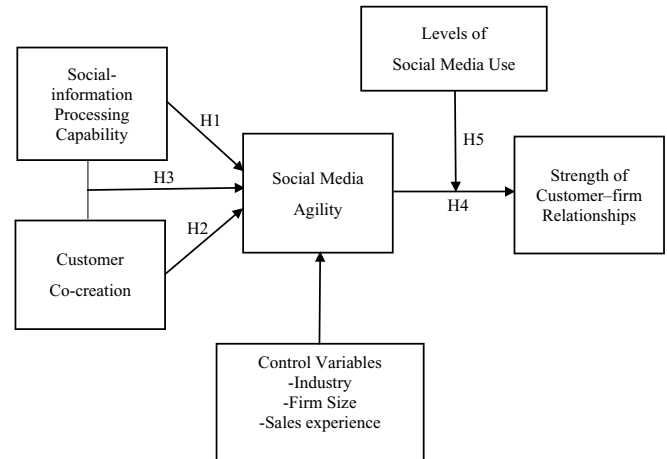


Fig. 1. Model and hypothesized relationships.

we develop the research model shown in Fig. 1 and propose the research hypotheses.

We describe a model wherein social-information processing capability is positively related to social media agility (H1); Customer co-creation is positively related to social media agility (H2); The complementarity between social-information processing capability and customer co-creation is positively related to social media agility (H3); Social media agility is positively related to the strength of customer-firm relationships (H4); and Levels of social media use have a positive moderating influence on the relationship between social media agility and the strength of customer-firm relationships (H5). In sum, this study explores the antecedents and consequences of social media agility, focusing on the critical constructs of social-information processing capability, customer co-creation, and the strength of customer-firm relationships. More specifically, the model includes two driving forces and one complementarity.

2.1. Dynamic capability view

From a resource-based view (RBV) (Barney, 1991; Gorovaia & Windsperger, 2018), a firm's distinctive resources and capabilities are fundamental sources of competitive advantage. Gorovaia and Windsperger (2018) proposed that the framework is inadequate for rapidly changing environments, whereas Yaprak, Yosun, and Cetindamar (2018) suggested that firm-specific resources and capabilities may create rigidity that prevents firms from adapting to a new competitive environment. The dynamic capability view is an extension of the RBV that overcomes these limitations by exploiting capabilities embedded in a firm's managerial and organizational processes in order to reconfigure resources and coordinate processes promptly and effectively to adapt to a competitive environment (Menguc & Barker, 2005; Zhang & Wu, 2017; Zouaghi et al., 2018). Research proposed that firms must nurture dynamic capabilities to renew, reconfigure, and adapt existing firm-specific resources accordingly (Chuang & Lin, 2015; Teece, Pisano, & Shuen, 1997).

Based on this assumption, Lokshin, Belderbos, and Carree (2008) and Teece et al. (1997) adopted the dynamic capability approach to emphasize that internal and external sourcing have a complementary effect on the improvement of innovation. Zhang and Wu (2017) proposed that the interplay between internal and external resources embedded in the network offers opportunities for the development of dynamic capabilities for new products. Manufacturers prefer to integrate internal and external resources in their transition to becoming solution-based businesses, according to Salonen and Jaakkola (2015). Chuang and Lin (2015) contended that the interaction between internal and external forces reflects the contribution of e-service innovation.

Firms should therefore align their internal sourcing with their external sourcing to reduce response times and increase cost efficiency. These studies have provided the foundation for our theory of social media agility, wherein a firm's internal resources interact with its external resources through the use of social media, thus reinforcing firms dynamic capabilities and enhancing its social media agility.

Guided by the dynamic capability, this study examines how to deploy social-information processing capability and customer co-creation through the reconfiguration of existing resources to increase social media agility. Social-information processing capability is derived from internal driving forces that are typically under a firm's control (Leskovar-Spacapan & Bastic, 2007), such as management and organizational capability (Zhang & Wu, 2017; Zouaghi et al., 2018). Customer co-creation from external driving forces, such as the interactions and collaborations between a firm and its customers (Franklin & Marshall, 2018; Heirati & Siahtiri, 2017; Marcos-Cuevas, Nätti, Palo, & Baumann, 2016), are predominantly beyond the firm's control (Leskovar-Spacapan & Bastic, 2007). Building on the literature, this study presents empirical evidence for the complementary effects of social-information processing capability and customer co-creation on social media agility using a dynamic capability approach. A firm's social-information processing capability and ability to collaborate with customers not only reduce response times but also improve interactions to enhance social media agility and strengthen its relationship with customers.

2.2. Social media agility

The term “agility” refers to the ability of a firm to rapidly sense and adapt dynamically to changes such as through information processing or analytics (Akhtar et al., 2018). Studies have proposed that supply chain agility creates value by increasing the IT competence of service providers to improve interactions with customers and enhance inter-organizational collaboration (Eckstein et al., 2015; Ngai et al., 2011; Swafford et al., 2008). Ngai et al. (2011) suggested that supply chain agility “is the capability of an organization to respond to market changes visible to customers using a set of supply chain competencies that enable such capability” (p. 233). Akhtar et al. (2018) defined operational agility as the ability of organizations to cope with demands and changes with a combination of speed, accuracy, cost efficiency, and flexibility.

However, our model posits that social media agility can also generate a competitive advantage in a B2B sales domain. Social media agility is a relatively new concept that entails quick responses, appropriate content, and cost efficiency and is defined as the use of social media applications to enhance flexibility in day-to-day operations (Ancillai, Terho, Cardinali, & Pascucci, 2019; Cai et al., 2018; Chirumalla, Oghazi, & Parida, 2018). Social media agility also implies that firms must conduct active research to understand the current and potential needs of customers by using social media (Pitafi et al., 2018). Firms with plans to have greater agility to respond to change cooperate and communicate with customers in order to simultaneously fulfill customer needs and adapt to market changes (Zhou, Mavondo, & Saunders, 2018). Based on above literatures on operational and supply chain agility, we conceptualized social media agility as a multi-dimensional construct composed of two critical constructs: internal and external social media agility rooted in the micro and macro environment, defined as the ability of firms using social media to cope with demands and changes.

2.3. Impact of social-information processing on social media agility

Firms are increasingly using social media platforms such as Facebook, LinkedIn, and Twitter to connect with customers, employees, and competitors (Christodoulides et al., 2018; Nunan et al., 2018). This change in corporate communications is challenging firms to improve their flexibility of day-to-day operations by bolstering their information

processing capabilities (Andzulis, Panagopoulos, & Rapp, 2012). Zhang, Ji, Wang, and Chen (2017) suggested that social information “is generated from human communication or interaction” (p. 282), it is challenging researchers and practitioners to reconsider the concept of processing capability. Relational information processing (Jayachandran, Sharma, Kaufman, & Raman, 2005) emphasizes the importance of customer-centric information processes and capabilities. The view posits that the necessary conditions for a firm's ability to focus on customer interactions and the development of information processes are likely to influence the success of customer-centric management systems.

Thus, the concept of social information processing is giving way to an extended information-processing perspective that recognizes new capabilities of processing social information from social media. Similarly, social-information processing capability refers to a firm's competency in acquiring, communicating, and responding to information obtained from interactions that are facilitated by social media.

A firm can improve its operational agility using its dynamic data and information processing capabilities (Akhtar et al., 2018). Agnihotri et al. (2016) suggested using information technology as a resource to support the design and modification of new information processes, such as using social media to consult with customers, deliver product and service offerings efficiently, and seize market opportunities effectively. Firms with considerable IT-enabled operational agility often require information systems to sense and respond to environmental changes effectively (Swafford et al., 2008; Tan et al., 2017). The marketing management literature suggests that social media and the Internet can help firms collect and communicate the required information to respond to market changes (Agnihotri et al., 2016; Kao & Wu, 2016), enabling them to holistically understand the needs and preferences of their customers and thus identify and seize business opportunities quickly, accurately, and responsiveness (Sambamurthy, Bharadwaj, & Grover, 2003; Zhang, 2011).

Other scholars have found that the use of the Internet of things can enhance a firm's dynamic data and information processing capabilities (Gubbi, Buyya, Marusic, & Palaniswami, 2013; Uden & He, 2017). Possessing information processing capabilities can enable the collection of valuable information and data that can provide marketing insights to improve operational agility (Akhtar et al., 2018). Tan et al. (2017) suggest that many firms have invested in large integrated information systems, such as interorganizational systems (IOS), to improve their supply chain operations inter alia. Our study examined the use of emergent social media in enabling firms to respond with agility and rapid speed to market changes. Social-information processing capability emphasizes the acquisition and communication of social information through social media; thus, firms with high social-information processing capability are highly effective at leveraging social information in response to the varying demands of their customers. This discussion thus led us to propose the following hypothesis:

H1. Social-information processing capability is positively related to social media agility.

2.4. Impact of customer co-creation on social media agility

Customers can use social media to communicate ideas for new product and service offerings (Bashir, Papamichail, & Malik, 2017; Chirumalla et al., 2018). This is referred to as co-creation, a process in which customers become engaged as an external driving force for product and service development in collaboration with the firm. Buonincontri, Morvillo, Okumus, and van Niekerk (2017) defined co-creation as “a demand-centric and interactive process that involves at least two willing resource-integrating actors who are engaged in specific forms of mutually beneficial collaboration that results in value creation for them” (p. 1). Although customer co-creation encompasses customer-driven customization and co-design to enable firms to

integrate customer ideas into new creations (Leclercq, Hammadi, & Poncin, 2018; Petri & Jacob, 2016), recently have scholars attempted to delve deeper into the use of external information to enhance customer satisfaction (Grissmann & Stokburger-Sauer, 2012). The integration of customer ideas is beneficial to innovation because it is considered to be the most evolved form of support to new product/service development and customer satisfaction.

In this study, customer co-creation represented customers as active participants who use social media to engage in the development of new products and services. Social media effectively assists customer co-creation by allowing customers to more easily interact with firms and communicate their ideas, granting firms access to insights on their customers' demands and preferences (Koivisto & Mattila, 2018). Kang (2017) proposed that social media facilitates both customer-generated design and customer engagement, which facilitate the development of new product and service offerings. Our study examined co-creation between firms and customers to enhance agility, which has emerged as a priority for B2B relationships.

Numerous studies have shown that value co-creation can improve a firm's agility compared with that of its competitors and rivals (Aarikka-Stenroos & Jaakkola, 2012; Andreu, Sánchez, & Mele, 2010). However, empirical evidence suggesting a positive effect of customer-firm co-creation on rapidly sensing and responding to opportunities and threats remains scarce. Some studies have suggested that co-creation with customers can increase both customer satisfaction and loyalty and hence spending (Grissmann & Stokburger-Sauer, 2012; Navarro, Llinares, & Garzon, 2016; Prebensen & Xie, 2017), whereas co-creation with a wide range of external participants and collaborators has a positive effect on operational agility in supply chains (Swafford et al., 2008). Interaction and collaboration drive co-creation by generating service experience and value-in-use for customers and data on customer preferences and needs for firms. Employees of firms that rely heavily on external sources regard social media as likely to have a radical impact and are consequently more inclined to use social media merely as a means of improving their existing offerings. Suppliers engage in co-creation with customers to access external perspectives, gain access to customer information, converse with customers for reciprocal learning, and improve responsiveness (i.e., the ability to identify changes in demands and market opportunities and respond appropriately). Thus, co-creation between firms and customers and involving customers in the development of new products and service offerings could accelerate the delivery of a firm's offerings and improve the effectiveness of its responses to external changes.

H2. Customer co-creation is positively related to social media agility.

2.5. Social-information processing and co-creation complementarity

Achieving complementarity between internal and external driving forces is a considerable challenge that requires various managerial capabilities (Chuang & Lin, 2015; Zhang & Wu, 2017; Zouaghi et al., 2018). Social-information processing capability emphasizes the use and integration of social media as meaningful firm-specific resources. This capability increases a firm's flexibility and its ability to develop new products and services and commercialize external information (Zhang & Wu, 2017). For example, a firm's information processing capability enables it to acquire information, analyze market trends, and respond to customer complaints gathered from social media. The processing and integration of this information can effectively equip employees to absorb information, coordinate with customers, and collaborate with them to improve product and service offerings and adapt to market changes. To maximize operational agility, a firm's decision-making process should be aligned with its external conditions (Rindfleisch & Moorman, 2001). In the context of a competitive environment, this entails not only reacting swiftly to information processing but also engaging in co-creation with customers.

H3. The complementarity between social-information processing capability and customer co-creation is positively related to social media agility.

2.6. Social media agility and strength of customer-firm relationships

We defined the strength of a customer-firm relationship as the social closeness between a firm and its customers. The benefits of a strong relationship include mutual trust, mutual gratification, and the ability to jointly solve problems (Gao, Xie, & Zhou, 2015; Yang, Zhang, & Xie, 2017). Studies on marketing management have reported that the advantages of social media use include improving user trust (Chang, Shen, & Liu, 2016), enhancing customer satisfaction and responsiveness (Agnihotri et al., 2016), and improving customer-firm relationships (Parveen et al., 2015). The IS literature is consistent in its assessment of social media use as a method of enhancing knowledge creation (Kao & Wu, 2016).

The impact of social media on the strength of customer-firm relationships depends on the products and services offered (Bashir et al., 2017) and the firm's communication and responsiveness (Agnihotri et al., 2016). Specifically, internal and external social media agility can assist in quickly, accurately, cost-efficiently, and flexibly meeting demands and changes, which in turn strengthens customer-firm relationships. Internal social media agility provides a firm and its customers with greater flexibility in their day-to-day operations and accelerates the delivery of product and service offerings, benefiting both parties. Similarly, external social media agility can smoothen adjustments to operational changes and responses to customer demands, enabling a firm and its customers to solve problems collaboratively. A firm's ability to respond quickly to customer requirements is therefore likely to improve its relationship with customers.

H4. Social media agility is positively related to the strength of customer-firm relationships.

2.7. Moderating influences of social media use

The level of business technology use has been shown to influence how firms leverage resources to adapt to their technological environment (Kim, Pae, Han, & Srivastava, 2010). The perceived characteristics of a technology contribute to individual employee attitudes toward its use (Ashok, Day, & Narula, 2018; Limbu, Jayachandran, & Babin, 2014). The perceptions of individual employees may be aggregated to influence an entire firm's attitude toward the technology (Venkatesh & Davis, 2000). Research acknowledged that a firm's operational agility is influenced by its implementation and use of digital technology (Tan et al., 2017). Firms residing in a social media environment tend to adjust and adapt more flexibly based on information they process than firms operating in a traditional environment.

Research argued that firms adapt to new technological environments by improving their technical and administrative agility, which in turn improves supply chain relationships (Swafford et al., 2008). Our study accounted for levels of social media use and examined their interaction with agility and the strength of customer-firm relationships. We suggested that firms that heavily use social media are particularly sensitive to operational agility, which can enhance customer-firm relationships. Levels of social media use have historically been shown to influence the desire of firms to enhance mutual trust with their customers. We extended this framework by suggesting that levels of social media use drive firms to increase their engagement in collaborative problem solving with customers to achieve mutual gratification.

H5. Levels of social media use have a positive moderating influence on the relationship between social media agility and the strength of customer-firm relationships.

3. Methods

3.1. Sample selection and collection

We selected B2B sales as our sample framework based on the findings of Agnihotri et al. (2016), who argue that social media plays a vital role in firm responsiveness and customer satisfaction. The sample was drawn from the top 5000 largest corporations in Taiwan list, which was published by the Taiwan Credit Information Center. Moreover, target companies were selected based on the criteria that they must operate in the B2B arena and their sales manager must have an ongoing and long-term engagement in B2B sales. Sales managers use social media as a means of communication to mediate customer-firm relationships. In B2B sales, sales managers often have more direct and intimate contact with customers and the market environment compared with other employees.

We developed a questionnaire in three phases, based on the findings of Chuang and Lin (2013). Data for the study were collected in Taiwan, and the original items were translated from English into Chinese. Extensive efforts were made to preserve the validity of the survey; we initially interviewed two professors and two Ph.D. candidates in the field of business management to verify the validity of the instruments. These four experts analyzed the questionnaire and provided suggestions for the interviewees. After the interviews were conducted, minor modifications were made to the questionnaire to ensure semantic consistency between English and Chinese. The instruments, scales, and questions used in the survey were then reviewed by six B2B sales managers and three academic experts to cater to the B2B sales context in Taiwan. Finally, 16 B2B sales managers in Taiwan were selected to pretest the questionnaire. Data from the pretest were collected to detect any problems with the questionnaire and assess its overall reliability.

To collect the surveys, a package comprising a cover letter, a questionnaire, and a prepaid reply envelope was sent to prospective respondents through both post and e-mail. The cover letter and questionnaire explained the role of social media and its effects on the sales process in a B2B setting and asked the sales managers whether they had used it to communicate with customers over the past 2 years. The respondents stated that their businesses had used social media. The first round of data collection yielded 158 responses. Because the initial response rate was low, telephone calls were subsequently made to solicit additional responses. The second round of collection yielded an additional 83 responses, thus raising the total number of responses to 241 and producing a final response rate of 24.1%. The final sample excluded 7 incomplete questionnaires, thus leaving 234 valid questionnaires. The respondents to the valid questionnaires consisted of B2B salespeople selling industrial products and services in both manufacturing and service sectors. The sales experience of the respondents ranged from 2 to 25 years. Moreover, 83% respondents were men, with an average age of 35.6 years. The average number of employees (firm size) was approximately 85. Respondents originated from an array of industries, including food and beverages, plastic, textiles and fiber, machinery, electric equipment and cables, chemistry, papermaking, steel, transportation, electronics, construction, healthcare, information technology, banking, financial services, insurance, auto services, and pharmaceuticals. Respondents working in the service sector constituted 68% of the study sample.

To examine whether these responses were representative of the population, nonresponse bias was assessed by comparing early respondents with late respondents in terms of two key organizational characteristics of the sample. The rationale for this test was that late respondents were likely to have similar characteristics to nonrespondents. The two characteristics were the number of employees per firm and sales revenues. A chi-square test indicated no significant differences between the two groups of respondents in terms of numbers of employees ($\chi^2 = 3.768$, $p = .573$) and sales revenues ($\chi^2 = 4.522$, $p = .511$) at the 5% significance level, thus suggesting that nonresponse

bias was not a concern in this study.

3.2. Measurement of the variables

The multi-item scales used in this study have been validated through scales used in prior research. Our study group edited the questionnaire items to relate specifically to the context of social media. Social-information processing capability was measured as a second-order construct using three formative interdependent constructs: information acquirement (3 items), information communication (3 items), and information responsiveness (3 items), and was adapted from constructs used by Srinivasan and Moorman (2005) and Trainor, Andzulis, Rapp, and Agnihotri (2014). We evaluated social-information processing capability by measuring the extent to which social media is used for acquiring, communicating, and responding to customer information. Customer cocreation was assessed using four items adapted from Khanagha et al. (2017) and was modified to fit the social media context. Based on our conceptualization of social media agility, we modeled social media agility as a second-order latent construct with two formative first-order constructs: internal social media agility (4 items) and external social media agility (4 items; Akhtar et al., 2018). The customer-firm relational strength was measured using a 3-item scale adapted from Yang et al. (2017). The utilization level of social media was measured using a 3-item scale adapted from (Leonard-Barton & Deschamps, 1988). This study uses a 7-point Likert scale, with 1 indicating “strongly disagree” and 7 indicating “strongly agree”.

3.3. Control variables

The marketing management literature emphasizes the contribution of organizational factors, such as industry and firm size, to communication and information exchange (Agnihotri et al., 2016; Churchill Jr., Ford, Hartley, & Walker Jr, 1985). To filter the potential effects of organizational factors on social media agility, we included the industry, firm size, and sales experience of each respondent in our analysis as control variables. Industry sector was coded as a dummy variable, with 0 representing manufacturing and 1 representing services. Kiron, Palmer, Phillips, and Kruschwitz (2012) propose that customers in some industries, such as energy, utilities, and financial services, do not usually engage with firms through social media, which limits opportunities for these firms to create value through it. Firm size was measured based on the number of employees, which may influence the quality of customer information and relationships, because larger firms enjoy greater access to resources that can translate to higher information quality and performance (Chuang & Lin, 2013). We measured sales experience using a single item, indicating the number of years of experience that the respondent considers in salesperson behavioral outcomes (Yilmaz & Hunt, 2001).

4. Analysis and results

Structural equation modeling is widely used because of its accuracy and utility. Our study involved conducting a partial least squares (PLS) regression using SmartPLS 3.0 to analyze the data. The use of PLS in the analysis provides sufficient flexibility to represent both formative and reflective latent constructs while placing minimal demands on measurement scales, sample size, and distributional assumptions. The data analysis process was conducted in two stages: We first assessed the measurement model by subjecting our measures to a series of confirmatory factor analyses and then developed a structural model to test our hypotheses.

4.1. Measurement model

We examined the loading of individual items and average variance explained (AVE), composite reliability (CR), and Cronbach α for each

Table 1
Measurement model.

| Constructs | Items | Loading | t-Values |
|---|---|---------|----------|
| Social-information processing capability survey items AVE = 0.684; CR = 0.866; Cronbach α = 0.767 | | | |
| Information acquisition AVE = 0.807; CR = 0.926; Cronbach α = 0.883 | IA1: Our company uses social media to conduct market research. | 0.924 | 68.591 |
| | IA2: Our company uses social media to collect information from customers. | 0.897 | 26.399 |
| | IA3: Our company uses social media to collect information about the activities of major competitors. | 0.873 | 27.408 |
| Information communication AVE = 0.618; CR = 0.828; Cronbach α = 0.708 | IC1: Our company uses social media to discuss market trends with other departments. | 0.675 | 9.356 |
| | IC2: Our salesperson uses social media to discuss customers' future needs with other departments. | 0.806 | 16.993 |
| | IC3: One department uses social media to share important information with other departments. | 0.865 | 24.406 |
| Information responsiveness AVE = 0.747; CR = 0.899; Cronbach α = 0.831 | IR1: Our company uses social media to respond to price changes by our competitors. | 0.817 | 21.065 |
| | IR2: Our company uses social media to respond to the launch of campaigns targeting our customers by our major competitors. | 0.882 | 41.557 |
| | IR3: Our company uses social media to respond to customer complaints. | 0.892 | 44.181 |
| Customer co-creation AVE = 0.803; CR = 0.942; Cronbach α = 0.919 | CC1: Our company uses social media to collaborate with our customers to collectively improve or develop new products/services. | 0.866 | 35.051 |
| | CC2: Our company uses social media to directly communicate ideas for new product/service offerings with our customers. | 0.920 | 58.372 |
| | CC3: Our company uses social media to collaborate with our customers to devise solutions to problems relating to product/service offerings. | 0.909 | 61.245 |
| | CC4: Our company uses social media to collaborate with our customers to track changes in consumer needs, preferences, and behavior. | 0.890 | 43.253 |
| Social media agility AVE = 0.838; CR = 0.912; Cronbach α = 0.808 | | | |
| Internal social media agility AVE = 0.769; CR = 0.930; Cronbach α = 0.900 | IS1: Since our company started using social media, the reliability of our company's offer of products and services has increased. | 0.849 | 27.107 |
| | IS2: Since our company started using social media, its day-to-day operations have been flexible for customized demand. | 0.864 | 29.789 |
| | IS3: Since our company started using social media, its offerings (i.e., products and services) have been more cost efficient than those of our competitors. | 0.897 | 54.130 |
| | IS4: Since our company started using social media, our company has delivered our offerings (i.e., products and services) more quickly. | 0.898 | 53.791 |
| External social media agility AVE = 0.699; CR = 0.903; Cronbach α = 0.856 | ES1: Since our company started using social media, it has responded very reliably to market changes. | 0.829 | 35.180 |
| | ES2: Since our company started using social media, it has had greater flexibility in our offerings to adapt to market changes. | 0.826 | 25.292 |
| | ES3: Since our company started using social media, it has efficiently redesigned our offerings to adapt to market changes. | 0.849 | 25.833 |
| | ES4: Since our company started using social media, it has been very quick to adapt to market opportunities. | 0.840 | 33.930 |
| Strength of customer-firm relationships AVE = 0.799; CR = 0.923; Cronbach α = 0.874 | CF1: Since our company started using social media, the company and customers have experienced an increase in mutual trust. | 0.883 | 40.549 |
| | CF2: Since our company started using social media, the company and customers have been willing to jointly solve problems emerging in collaborations. | 0.864 | 32.931 |
| | CF3: Since our company started using social media, the ties between our company and customers have been describable as "mutually gratifying." | 0.926 | 67.351 |
| Levels of social media use AVE = 0.796; CR = 0.921; Cronbach α = 0.872 | UL1: Social media has been used by many salespersons in our company. | 0.887 | 45.213 |
| | UL2: Social media is widely recognized among our salespersons. | 0.913 | 73.870 |
| | UL3: Social media is used by our salespersons almost every day. | 0.875 | 43.083 |

Table 2
Discriminant validity.

| | M | SD | IA | IC | IR | CC | IS | ES | CF | UL |
|----|-------|-------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| IA | 5.342 | 1.043 | 0.899 | | | | | | | |
| IC | 5.173 | 0.925 | 0.502 | 0.786 | | | | | | |
| IR | 5.235 | 0.983 | 0.444 | 0.626 | 0.864 | | | | | |
| CC | 4.285 | 1.340 | -0.027 | -0.019 | -0.110 | 0.896 | | | | |
| IS | 5.109 | 1.210 | 0.354 | 0.364 | 0.333 | 0.261 | 0.877 | | | |
| ES | 4.608 | 1.176 | 0.170 | 0.303 | 0.264 | 0.294 | 0.678 | 0.836 | | |
| CF | 4.750 | 1.044 | 0.337 | 0.258 | 0.280 | 0.256 | 0.587 | 0.510 | 0.891 | |
| UL | 4.997 | 1.247 | 0.124 | 0.135 | 0.087 | 0.289 | 0.470 | 0.508 | 0.448 | 0.892 |

Notes: Diagonals represents the square root of average variance extracted, while the other matrix entries represent the correlation; IA: Information Acquisition; IC: Information Communication; IR: Information Responsiveness; CC: Customer Co-creation; IS: Internal Social Media Agility; ES: External Social Media Agility; CF: Strength of customer-firm relationships; UL: Levels of social media use.

construct. Table 1 presents the analysis results including the first-order and second-order constructs. The CR metrics for all the first- and second-order constructs, ranging from 0.828 to 0.942, exceeded the recommended threshold of 0.70 (Segars, 1997) and were thus acceptable. All AVE values exceeded the recommended threshold of 0.50

(Segars, 1997), ranging from 0.618 to 0.807. Table 2 shows the discriminant validity of the measurements. Discriminant validity requires that the square root of the AVE of a construct be larger than that of the construct's correlations with the other constructs (Fornell & Larcker, 1981). The data indicate that our constructs satisfied this criterion, thus

Table 3
Descriptive statistics and correlations among variables.

| Variables | M | SD | 1 | 2 | 3 | 4 | 5 |
|---|-------|-------|--------|-------|-------|-------|---|
| 1. Social Information processing capability | 5.250 | 0.812 | 1 | | | | |
| 2. Customer co-creation | 4.285 | 1.340 | -0.063 | 1 | | | |
| 3. Social media agility | 4.859 | 1.093 | 0.394 | 0.303 | 1 | | |
| 4. Strength of customer-firm relationships | 4.750 | 1.044 | 0.356 | 0.256 | 0.599 | 1 | |
| 5. Levels of social medial use | 4.997 | 1.247 | 0.140 | 0.289 | 0.534 | 0.448 | 1 |

confirming discriminant validity. Table 3 presents the correlations between variables and shows that no individual construct correlations are higher than their respective reliability.

4.2. Structural model

The structural model was examined by considering the coefficients of the causal relationships between constructs, which validated the hypothesized effects and the R-square values. These in turn indicated the amount of variance in dependent variables as explained by their antecedents. To test the complementarity hypothesis, we analyzed the interaction between social-information processing capability and customer co-creation and its effects on social media agility. This procedure eliminates nonessential multicollinearity between the predictors. The results of the structural model analysis are shown in Fig. 2. Social media agility was significantly influenced by social-information processing capability ($\beta = 0.365$, $t = 3.468$), customer co-creation ($\beta = 0.362$, $t = 5.734$), and the complementarity between social-information processing capability and customer co-creation ($\beta = 0.177$, $t = 2.125$). These factors explained 29.6% of the variance in social media agility. Accordingly, H1, H2, and H3 were supported. A firm's social media agility had a significant effect on customer-firm relational strength ($\beta = 0.588$, $t = 11.596$), which supports H4. The utilization level of social media did not have a moderator the relationship between social media agility and customer-firm relational strength; thus, H5 is not supported. These factors explained 43.6% of variance in customer-firm relational strength. The findings for the three control variables that the study examines indicate that sales experience and firm size has no significant effects on social media agility, industry have significant effects on social media agility. This may be because fundamental economic conditions, product lifecycles, market structures, and market behaviors vary across different industries, and thus, different industries will adopt different strategies when confronting internal and external environments. As such, this study finds that industrial differences

positively affect social media agility.

5. Discussion

The aim of this study was to analyze the factors influencing social media agility and hence the strength of customer-firm relationships. Our empirical results are provided in Fig. 2. The results of the path analysis demonstrate an association between social-information processing capability and social media agility. This finding is consistent with the suggestion by Akhtar et al. (2018) that using the use of the Internet of things can enhance a firm's dynamic information processing by enabling the collection of valuable marketing insights that can be used to improve social media agility. This finding is consistent with the assertion by Swafford et al. (2008) that IOS can enhance a firm's information processing, making promoted supply chain operations more easily attainable. The results offer solid support for our view that social-information processing capability, as an internal driving force, contributes to the development of social media agility.

The results demonstrate that the successful development of customer co-creation capability can directly improve social media agility. They also suggest that co-creation with customers holds even greater promise for the development of new products and services by encouraging customer participation in the design of products and services. It can endow a firm with a considerable competitive advantage by tailoring services to meet customer demands and enabling a firm to react more quickly to external changes and adjust its offerings accordingly. Consistent with previous studies, such as Aarikka-Stenroos and Jaakkola (2012) and Andreu et al. (2010), our findings suggest that customer co-creation in the operational agility process can enable customers to contribute their complementary skills and knowledge and hence improve a firm's flexibility in adjusting to market changes.

As with previous studies (Chuang & Lin, 2015; Zhang & Wu, 2017; Zouaghi et al., 2018), we adopted dynamic capability view to provide evidence that internal and external capabilities are both relevant factors that shape a firm's develop innovation in the Internet environment. Our findings highlight the importance of a firm's capabilities and co-creation with customers, which should therefore be considered by firms as a means of enhancing social media agility. The results are in line with the findings by Lokshin et al. (2008), Teece et al. (1997), Salonen and Jaakkola (2015), and Zhang and Wu (2017) that firms leverage internal and external sourcing knowledge to improve their flexibility. They support our hypothesis that social media agility should ideally involve customer-firm co-creation rather than be merely a firm-specific resource taker. A firm with high agility must use new perceptions of responses to market changes and flexible operations to meet customized demand, which in turn increases its agility in a virtuous cycle.

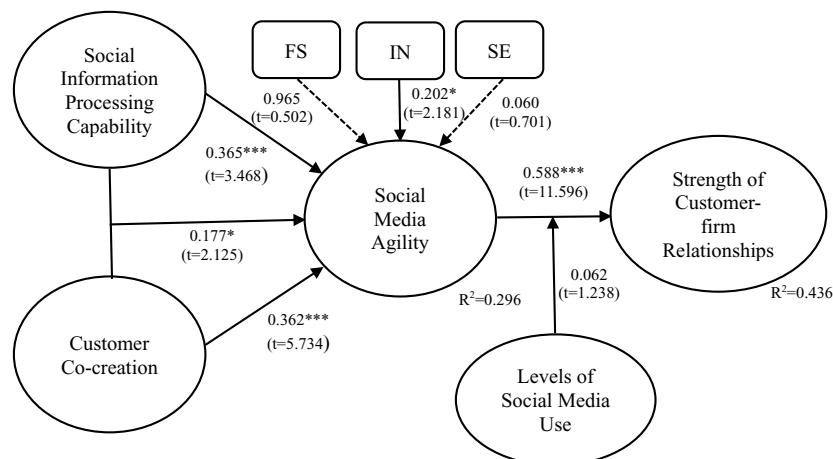


Fig. 2. Model and hypothesized relationships.

Based on our empirical data, social media agility has a positive effect on the strength of customer-firm relationships. This result implies that B2B responsiveness can improve customer-firm relationships by accruing benefits to customers, which is consistent with the findings on competitive advantage by [Bashir et al. \(2017\)](#) and [Agnihotri et al. \(2016\)](#).

6. Conclusions

In summary, this study confirms that social media agility clearly has a positive and significant effect on the strength of customer-firm relationships. To efficiently and effectively achieve operational agility using social media, B2B firms should acquire, communicate, and respond to the information gathered and the products of customer-firm co-creation. Additionally, this study demonstrated that a firm's internal and external driving forces can complement each other in shaping the relationships between social-information processing capability, customer co-creation, and social media agility. Using a survey of 231 Taiwan businesses, we show that B2B firms use social media to serve various purposes in various perceived constructs.

6.1. Theoretical implications

Our findings hold several critical implications for marketing management research. First, although previous studies have examined the use of social media to improve service offerings, to our knowledge, models have yet to be developed to describe the assimilation of operational agility using social media to develop the relationships of B2B firms. Our study extends the traditional concept of operational agility by accounting for social media agility rooted in the competitive environment. Our findings highlight the importance of using social media to increase the speed, accuracy, cost efficiency, and flexibility with which services and products are offered in response to market changes.

Second, our study answered a critical question in revealing that in a competitive environment, the use of social media achieves operational agility to directly influence B2B relationships. B2B firms that use social media platforms can effectively interact and communicate with customers while focusing on the exchange of information related to products and services. This helps such firms understand customer needs across organizations and may encourage more B2B firms to share information on social media platforms. However, B2B firms already have close relationships with existing customers, and have therefore responded to customer needs with increased effectiveness (effectiveness indicates a firm's ability to deliver innovative products or services in a timely and cost-effective manner) compared with competitors, which may result in firms' ability to jointly solve problems. Social media agility is associated with strong customer-firm relationships.

Third, this study is the first to explain the importance of enhancing agility by creating complementarity between internal and external driving forces. The findings confirm that social-information processing capability interacts with customer co-creation to positively influence operational agility using social media. Because this interaction was determined as strongly influencing the firm's ability to do business in a competitive environment, these two factors should be considered complementary to, rather than competing with, each other. Our study findings support our supposition that firms' acquired information through collaborations with customers may help them to improve their understanding of the changing needs of customers and develop appropriate responses.

The implication that the complementarity between social-information processing capability and customer co-creation can be viewed as specific information capabilities offers an appealing opportunity for researchers in the B2B sales fields. Our findings provide further evidence that taking internal and external resources into account while examining a philosophy of complementarity can lead to new insights into how B2B sales firms can develop, integrate, and deploy internal

and external driving forces to create a sustained competitive advantage. The marketing management literature demonstrates the appropriateness of the dynamic capability and provides a B2B firm foundation from which this research is built. It is our hope that this study will inspire the examination of other key internal and external capabilities using the dynamic capability view as a guide.

Finally, our study contributes to the information management literature by proposing and testing the influence of social-information processing capability on social media agility. This is an important contribution because although the literature highlights the importance of traditional information management capabilities, there has hitherto been limited empirical support for how modern information and the Internet influence agility.

6.2. Managerial implications

This study also suggests several implications for practitioners. In a competitive environment, sales managers of B2B firms must continually acquire and cultivate information and data to develop new capabilities to attain a sustainable strategic position. B2B managers are positioned to scan for opportunities to position products and services while simultaneously identifying the capabilities that enable firms to provide competitive services. Our study highlights the major influence of social media on operational agility. The advent of social media may have considerably affected B2B firms by facilitating firms' real-time information acquisition, communication with customers, and responsiveness to customer needs.

Our study indicates the importance of social-information processing capability to fully exploiting information gathered from social media. The use of social media can be combined with customer co-creation to provide large datasets containing valuable insights with which to improve social media agility. Effective social-information processing capability can play a central role in bridging the gap between the use of social media and the benefits of customer co-creation. This complementary relationship has been highlighted by B2B practitioners and highlights the need for sales managers to equip themselves with social media techniques aimed at improving agility, such as customer-based processes or product development.

Although studies have highlighted the benefits of operational agility, the literature offers insufficient guidance for B2B managers to identify or develop B2B firms through not only their internal processes but also their external operational processes. Because B2B managers are faced with the challenges of competition and the resulting accelerating changes in their environment, it has become increasingly critical to detect such changes ahead of the competition and capitalize on them. This study draws attention to the importance of using social media to increase operational agility. In addition, B2B managers should cultivate media-based cultures that support the introduction of internal and external agility to enhance their competitive advantage with the real-time information offered by social media.

Social media has become ubiquitous across a broad variety of disciplines, and has become an integral part of fields ranging from business-to-consumer (B2C) to B2B. In B2B sales, firms are required to understand customers' voices and needs, such that they can resolve issues related to products jointly with social groups or customers, and adapt to rapid market changes. Initially, when firms make direct use of social media tools and customer interactions, they may inevitably encounter potential miscommunication or risks related to product or service malfunctions. However, during social media interactions, it is also possible for B2B firms to accumulate an understanding of their customer community, in addition to gaining customer confidence. Furthermore, when confronting crises, accumulating sufficient mutual gratification and communication skills from previous interactions can help B2B firms to properly handle such events.

Through the above theoretical and managerial implications, this study has demonstrated the importance of social media and social

media agility for B2B firms. Based on the results, we propose the following suggestions to B2B managers to help them gain insights into the improvements needed for their firms in a social-media environment:

- (1) When B2B firms market their products and services on social media, dedicated employees are required on the social media platforms to respond to customer reviews, including any comments, questions, and complaints. Whether customers' reviews are properly handled by a dedicated staff is a matter that will have great implications for the purchase intention of potential customers and repetitive purchases. As sales performance is affected at every step, it is imperative for B2B firms to pay due attention to each post on social media platforms.
- (2) B2B firms should leverage their philanthropic activities on social media platforms as publicity campaigns, so as to create goodwill among their customer base.
- (3) B2B firms are advised to test the popularity of their new products on social media, as brand awareness is expected to drive significant growth once a novel product makes a splash.
- (4) LinkedIn is frequently used in B2B marketing. As reported by LinkedIn, 60% of its online members are willing to share their opinions and interact with industry peers on social media platforms. Therefore, B2B managers are advised to leverage LinkedIn and market their products with professional yet lively posts, which will encourage LinkedIn to recognize an entity as a prominent industry insider or a key opinion leader. At that point in time, one will be able to promote and thereby improve the perception of their brand.
- (5) B2B firms are advised to create success stories on social media platforms, differentiate themselves from industry peers, and most importantly, direct viewer traffic back to the corporate website.
- (6) Community services will help strengthen customer relationships, improve service quality, and ensure timely knowledge of market feedback, thereby allowing a company to mitigate a brand crisis by reacting in time when there is a negative review, or conversely, seize the opportunity by following up with more expedient plans in the case of a positive one. Therefore, it is advised that B2B marketing teams make business decisions that are most relevant to customers through consolidation and in-depth analysis of all related information gained via social media channels.

6.3. Limitations and directions for future research

Several key limitations of our study should be considered in future studies.

- (1) This study focuses on social media agility to build strong customer-firm relationships. Live streaming has today become the mainstream on the social media, and various brands are using it to attract customers and fans. It is recommended that future research should discuss the impact of social media live streaming on customer relationship management.
- (2) Most B2B firms typically focus on reaching out to customers through basic social networks with limited investment of time and money. However, social platforms such as WhatsApp, Messenger, and Kik can be used to provide customer service through voice assistants and chatbots. It is suggested that future research should discuss the use of artificial intelligence to help firms provide personalized services to customers and determine whether it will affect customer-firm relationships.
- (3) Facebook has developed the Spaces feature that allows corporate users to interact with customers in a “cartoonized” virtual reality (VR). Amazon introduced a new augmented reality (AR) feature that enables customers to understand how products look in a real-world placement. It is recommended that future research should discuss whether the use of VR and AR features on the social media will affect customer-firm relationship.

- (4) The results indicate that social media agility varies widely between industries, and these variations in B2B sales may be a promising topic for future research.
- (5) Some variables that can potentially influence social media agility, such as organizational cultural barriers to modern applications and the skills and knowledge required to develop a firm's information processing capability, can be considered in future studies.
- (6) The response to this study were voluntary and thus inevitably subject to self-selection variance. We checked for this potential problem with the Harman one-factor test. The test resulted that each principal construct explains roughly equal variance, indicating that our data do not suffer from high common method variance.
- (7) This study only examines one dependent relationship (i.e., B2B relationships). Future research may examine other outcomes, such as those related to the successful launch of new products, the centripetal force of cohesive internal employees, and innovation capability. The benefits of social media agility may extend beyond relationship-based benefits for both buying and supplying firms.

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