IMPACT OF IT INFRASTRUCTURE ON CUSTOMER SERVICE PERFORMANCE: THE ROLE OF MICRO-IT CAPABILITIES AND ONLINE CUSTOMER ENGAGEMENT

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Abstract

This research argues that information technology (IT) capabilities can be classified in macro- and micro-IT capabilities. We propose a conceptual model in which IT infrastructure capability (a macro-IT capability) enables the development of social media and e-business technology capabilities (two micro-IT capabilities) to online engage customers and improve the firm's customer service performance. We test the proposed model by using the variance-based structural equation modelling technique and the method of estimation of partial least squares employing an innovative secondary dataset on a sample of 100 small firms included in the 2013 Forbes America's Best Small Companies ranking. The empirical analysis suggests that IT infrastructure capability positively affects customer service performance through two micro-IT capabilities (social media and e-business technology) and social and conventional online customer engagement.

Keywords: Macro- and Micro-IT Capabilities, Online Customer Engagement, Customer Service Performance.

1 INTRODUCTION

Information technology (IT) is changing the way firms operate internally as well as improving the firm's relationship with its suppliers and customers (Sanders 2007). However, since IT can be relatively easy to acquire from the market, what is key in explaining IT-based performance variation is how the firm leverages IT instead of how much invests in IT (Bharadwaj 2000; Pavlou & El Sawy 2006).

Different levels/types of IT capabilities can coexist in a firm. Attending to the level and time implication of the decision, and their degree of complexity, we argue that a firm can develop macro- and micro-IT capabilities. Leveraging IT infrastructure is based on a macro-level and can imply a high degree of complexity (Bhatt & Grover 2005). Thus, IT infrastructure can be considered a macro-IT capability. Leveraging social media and web technology has a lower degree of complexity and enables firms and individuals to execute micro-level activities (Bala 2013) to achieve process differentiation (e.g., helping employees in managing data and information needed to develop new products or to solve customer complaints). Social media and e-business technology can be considered micro-IT capabilities.

This study is positioned on the relationship between macro- and micro-IT capabilities and customer service performance. Prior research on IT and customer service performance has studied the effects of IT infrastructure flexibility and shared knowledge on customer service performance (Ray et al. 2005), and the impact of supplier/customer-side IT investment on customer service performance (Mithas et al. 2005; Xue et al. 2013). What is lacking is to explore the role of different macro- and micro-IT capabilities (e.g., social media and web technology) and the IT-enabled customer engagement on the firm's customer service performance. This study tries to complete this critical research gap.

We examine the impact of IT infrastructure capability on customer service performance by introducing into the same equation two new variables: Micro-IT capabilities and the online engagement of customers. Our central thesis is that IT infrastructure capability can create customer value by developing social media and e-business technology capabilities to online engage customers. Social media capability enables social online customer engagement and e-business technology capability facilitates conventional online customer engagement to improve customer service performance. The proposed model is tested using the variance-based structural equation modelling (SEM) technique on a sample of 100 small U.S. firms.

2 THEORY AND HYPOTHESES

2.1 The Organizational Capabilities-based Theory, the Micro-foundations Approach and the IT-enabled Organizational Capabilities Perspective

The organizational capabilities-based theory suggests that firms design and implement their strategies based on their organizational capabilities, which explains the difference in competitiveness among firms (Grant 1996). Prior research on organizational capabilities has distinguished three types of organizational capabilities: Dynamic, operational and dual-purpose capabilities (Helfat & Winter 2011). Dynamic capabilities refer to the firm's proficiency in building, integrating and reconfiguring its resource base in response to changes in the business environment (Teece 2007). Operational routines are patterns of activities/processes that a firm performs at the operations level. Better execution of similar operational routines leads to superior firm performance (Peng et al. 2008). Operational capabilities are the firm's proficiency in using a collection of interrelated operational routines to solve operational problems and implement the operations strategy (Benitez-Amado et al. 2015; Wu et al. 2010). Dual-purpose capabilities refer to those organizational capabilities that can be developed and exploited at both strategic and operational level, that is, they are dynamic as well as operational capabilities (Benitez-Amado & Ray 2012; Helfat & Winter 2011). The theory of organizational capabilities provides a useful theoretical framework to conceptualize IT infrastructure capability, social media capability, e-business technology capability, and to link IT infrastructure to social media and e-business technology.

Micro-foundations are a novel approach proposed in the strategy field that decomposes the firm into macro-level (firm-level) and micro-level (individual or group level) components (Teece 2007). This approach can be considered as an extension of the organizational capabilities-based theory that suggests that individual/group member actions are the key source of firm heterogeneity in developing organizational capabilities and creating value (Felin et al. 2012). In this sense, the individual actions and processes can explain a significant portion of firm-level outcome variance (Bala 2013). We use the micro-foundations approach to conceptualize online customer engagement as an individual behavior of the customer and to link social media and e-business technology capabilities, and social and conventional online customer engagement. To the best of our knowledge, this is the first study that uses the micro-foundations approach to explain how IT creates business value.

The IT enabled-organizational capabilities perspective has argued that organizational capabilities are key mechanisms through which IT helps firms to create value. Some examples of these capabilities are organizational learning, knowledge management, new product development, supply chain management or business flexibility (Benitez-Amado & Ray 2012; Sambamurthy et al. 2003). This study builds on the literature on IT-enabled organizational capabilities to link theoretically IT infrastructure, social media and e-business technology capabilities.

2.2 Macro- and Micro-IT Capabilities

2.2.1 IT Infrastructure Capability and Social Media Capability

IT infrastructure capability is the firm's proficiency in leveraging its technical and human IT resources to develop other IT and business capabilities (Pavlou & El Sawy 2006). IT-infrastructure is a macro-IT capability. Social media capability is the firm's proficiency in leveraging Facebook, Twitter and blogs to execute business activities (Braojos-Gomez et al. 2015). Social media is the first micro-IT capability examined in this study.

IT infrastructure capability can enable the firm to develop a social media capability. First, the firm's technical IT resources such as computers, laptops, operating systems and electronic communication networks are the base to early adopt social media and develop a social media capability through time and experience. Similarly, human IT resources can help the firm to embed social media with the firm's IT applications to acquire/provide fine-grained data to enable key users to better interact with customers (Braojos-Gomez et al. 2015). Second, firms with more experience and higher development of an IT infrastructure capability can develop more easily a social media capability due to its greater experience leveraging IT to acquire/provide timely information from/to the market. In other words, firms can use their macro-IT expertise to develop a social media capability (i.e., a micro-IT capability), which suggests a positive relationship between IT infrastructure and social media capabilities. Thus, we hypothesize the following:

Hypothesis 1 (H1): There is a positive relationship between IT infrastructure capability and social media capability.

2.2.2 IT Infrastructure Capability and E-business Technology Capability

E-business technology capability is the firm's proficiency in leveraging web technology in order to exchange information within and outside for buying and selling activities (Daniel & Grimshaw 2002; Devaraj et al. 2007). E-business technology is the second micro-IT capability that is examined in this research.

IT infrastructure capability can enable the firm to develop an e-business technology capability. The technical and human IT resource infrastructure provides the firm the foundation to use and leverage its web technology. Prior research also found a positive relationship between IT infrastructure and e-business technology capabilities (e.g., Zhu et al. 2006). Thus, we hypothesize:

Hypothesis 2 (H2): There is a positive relationship between IT infrastructure capability and e-business technology capability.

2.2.3 E-business Technology Capability and Social Media Capability

We also expect a positive relationship between e-business technology and social media capabilities. E-business technology governance can be the starting point of how much the firm invests in social media and how social media are managed (Culnan et al. 2010). Firms with a higher proficiency in leveraging its web technology are thus motivated to also be involved in social media platforms to be where their customers are, solve the customer problems and to run electronic selling advertisement. For example, SEUR (a leading express transport service in Spain) has adopted social media as a support platform for promoting the electronic selling and solving the customer requests to reinforce its e-business platform (Foncillas & Gonzalez 2013). Similarly, Papa John's (a leading firm in the pizza industry) pursues to integrate social media with their previously implemented e-commerce system to facilitate the ordering of pizza (He et al. 2013). Therefore, we hypothesize:

Hypothesis 3 (H3): There is a positive relationship between e-business technology capability and social media capability.

2.3 Micro-IT Capabilities and Online Customer Engagement

2.3.1 Social Media Capability and Social Online Customer Engagement

Online customer engagement refers to the degree of customer's virtual emotional commitment, involvement and motivation to collaborate, participate and contribute with the firm's business activities (Li et al. 2013; Ray et al. 2014) entering in an interactive process of multiple experiences with the firm online community (Brodie et al. 2013; Pagani & Mirabello 2011). Yu et al. (2013) discriminate between social and conventional media. Drawn from Yu et al.'s (2013) paper, we distinguish and focus on two types of online customer engagement: Social online customer engagement and conventional online customer engagement. While social online customer engagement is enabled by social media, conventional online customer engagement is enabled by web technology. To the best of our knowledge, this is the first study in examining these two types of online customer engagement in the context of IT capabilities and customer service performance.

Based on the micro-foundations approach we argue that the micro-IT capability of social media can enable the execution of individual actions such as social online customer engagement. Social media capability can enable social online engagement of customers. Social media is a tool for mass collaboration between suppliers, executives, employees and customers (Kiron 2012a) and the firm's proficiency in sharing, co-creating, discussing and modifying user-generated content facilitates information sharing (Goh et al. 2013), interaction and connection with customers (Rishika et al. 2013), hence improving customer participation and interrelatedness. An argument based on the trust can be also presented here. The development of a social media capability shows the firm's effort in cultivating trust with customers. Social customers perceive the effort the firm makes for supporting the community so the risk to reveal personal information diminishes at the time the motivation to express reciprocity toward the trusted party increases. This motivation can lead to cooperating in new product development and loyalty (Porter & Donthu 2008). Thus, the firm's effort to build a social media capability can increase the probability to interact and socially engage with customers. We therefore hypothesize:

Hypothesis 4 (H4): There is a positive relationship between social media capability and social online customer engagement.

2.3.2 E-business Technology Capability and Conventional Online Customer Engagement

The micro-IT capability of e-business technology can also enable the execution of individual actions such as conventional online customer engagement. Thus, we argue a positive relationship between e-business technology capability and conventional online customer engagement. Firms leverage their web technology to exchange information with customers for selling and supporting activities, interchanging ideas and creating a sense of brand identification and commitment (Casalo et al. 2010; Kim et al. 2011). Thus, we hypothesize:

Hypothesis 5 (H5): There is a positive relationship between e-business technology capability and conventional online customer engagement.

2.3.3 Conventional Online Customer Engagement and Social Online Customer Engagement

We expect a positive relationship between conventional and social online customer engagement. Firms with greater conventional online customer engagement can increase customer involvement through social media tools. Similarly, customers with a prior positive experience in online conventional engagement with a firm will be motivated to also engage by using social media (Yu et al. 2013). Thus, we hypothesize:

Hypothesis 6 (H6): There is a positive relationship between conventional online customer engagement and social online customer engagement.

2.4 Online Customer Engagement and Customer Service Performance

2.4.1 Social Online Customer Engagement and Customer Service Performance

Customer service performance refers to the extent a firm is able to sense, understand and satisfy customer needs and expectations by providing high quality products to achieve a higher retention rate, better customer satisfaction and a lower number of complaints (Xue et al. 2013). Social online customer engagement can improve customer service performance (Brodie et al. 2013). Social customer involvement and participation provide the firm data and information on customer needs, ideas for enhancing service and new product development which can improve customer service performance (He et al. 2013; Lim et al. 2011; Trainor et al. 2014). Social online engagement can also help firms to agilely solve complaints thus improving customer service performance (Kiron 2012b; Kiron et al. 2013; Zhao et al. 2012). The sense of social participation can simply improve the customer perception toward service quality, thus increasing customer service performance (Nambisan & Watt 2011). We thus hypothesize:

Hypothesis 7 (H7): There is a positive relationship between social online customer engagement and customer service performance.

2.4.2 Conventional Online Customer Engagement and Customer Service Performance

Conventional online customer engagement can also improve customer service performance. Online customer engagement enabled by Internet (e.g., website) provides the firm data and information on customer preferences and records to improve its customer service performance. Therefore, we hypothesize:

Hypothesis 8 (H8): There is a positive relationship between conventional online customer engagement and customer service performance.

Figure 1 presents the proposed conceptual model.

3 RESEARCH METHODOLOGY

3.1 Sample

We test 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. The firms of the sample came from 30 industries: Consulting (18 firms), IT (16), food manufacturing (seven), semiconductor manufacturing (six), healthcare (five), chemical (five) and other industries (43).

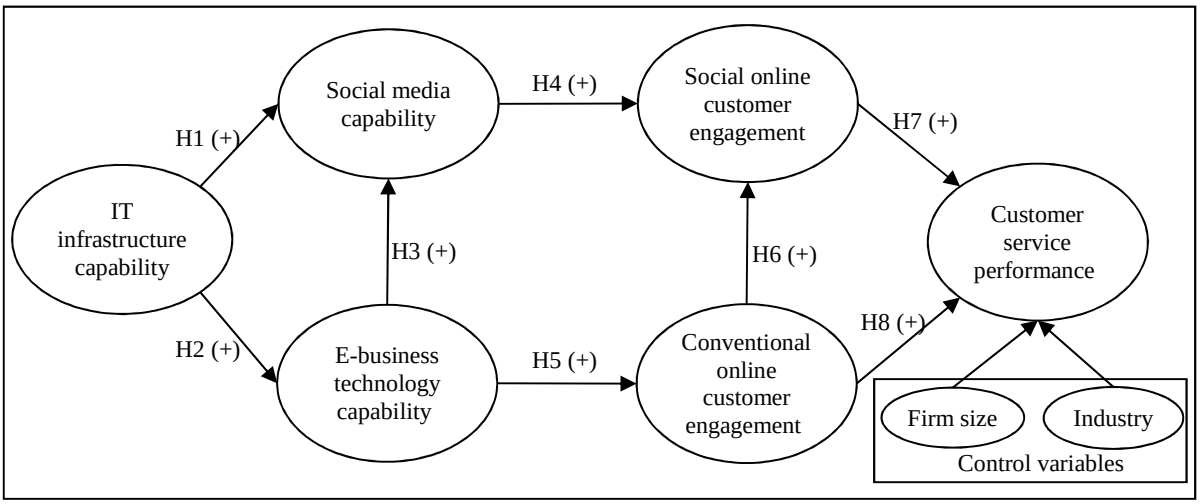

Figure 1. Conceptual model

3.2 Data and Measures

We measure all our variables using an innovative 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 the other databases.

We performed a structured content analysis of the 2013 firm's annual reports collected from the U.S. Securities and Exchange Commission Filling database, and measure IT infrastructure capability as the accumulated total number of firm's initiatives/mentions on technical and human IT resource infrastructure in 2013 (Braojos-Gomez et al. 2015; Joshi et al. 2010; Luo et al. 2012).

We measure social media capability as a multidimensional construct determined by Facebook capability, Twitter capability and blog capability with information collected from Facebook, Twitter, Twopchart database (http://www.twopcharts.com) and blog firm's site in June 2014. We conducted a structured content analysis of the firm's website to measure e-business technology capability as the accumulated total number of firm's web functionalities (e.g., product information, online transactions, interaction and customization) in June 2014 (Zhu & Kraemer 2002).

Social online customer engagement is specified as a multidimensional construct 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). Conventional online customer engagement is a first-order construct measured as the degree of customer activity, interaction and contribution to the firm's web platform through the relative traffic rank position of the firm's website with data collected from Alexa database from June to August 2014 (Benitez-Amado & Walczuch 2012; Heath et al. 2013).

Customer service performance is measured with information on the firm's reliability and customer satisfaction collected from the Better Business Bureau database in October 2014 (Ma et al. 2012). Finally, we control for firm size and industry on customer service performance. We measure firm size as the natural logarithm of the number of employees in 2013 with information collected from COMPUSTAT database. We measure industry as a dummy variable (0: Manufacturing, 1: Service firm) with information collected from the 2013 Forbes database. Our constructs are specified as reflective at first-order level and formative at second-order level (Petter et al. 2007).

4 EMPIRICAL ANALYSIS

We test the proposed model by using the variance-based SEM technique and the method of estimation of partial least squares (PLS). We use the statistical software package SmartPLS 3 Professional

(Ringle et al. 2014). The usage of PLS is extremely appropriate in our research due to our small sample size and the specification of the second-order constructs as formative which makes unable to evaluate the model using the covariance-based SEM technique (Benitez-Amado et al. 2013; Peng & Lai 2012; Tiwana & Konsynski 2010; Wang et al. 2015).

4.1 Measurement Model Evaluation

We assess reliability, convergent and discriminant validity of the reflective first-order constructs. We assess reliability by checking whether the construct composite reliability and its indicator loadings are above the suggested threshold of 0.707 (Chin 2010). We drop six indicators with a loading lower than 0.707. We test convergent validity by examining the construct average variance extracted (AVE) values, which are well above the recommended value of 0.5. Finally, the first-order constructs show discriminant validity as the square root of the construct AVE is greater than the horizontal and vertical correlation among constructs (Chin 2010).

Reliability and validity check is not appropriate to assess formative constructs (Peng & Lai 2012), which indicates that reflective and formative constructs should be assessed differently. We assess the multi-collinearity, weights and its level of significance, loadings and its level of significance of the dimensions of the formative second-order constructs. There is no multi-collinearity problem if variance inflation factors (VIFs) of the dimensions are lower than 10 (Petter et al. 2007). VIF values are well below 10 so multi-collinearity is not a problem in our data. A formative dimension should be retained if its weight and/or loading are significant (Benitez-Amado & Ray 2012; Cenfetelli & Basellier 2009). We perform a bootstrap analysis with 5000 subsamples to obtain the significance level of indicator loadings, dimension weights and loadings, and beta coefficients. All the dimension weights and loadings are significant at 0.05 level. Overall, this analysis shows good measurement properties for the proposed model. Table 1 (in the appendix) presents the details of the measurement model evaluation at first- and second-order level.

4.2 Test of Hypotheses

Figure 2 presents the results of the test of hypotheses. All the hypotheses are supported for the empirical analysis. IT infrastructure capability enables the development of social media and e-business technology capabilities (0.001 and 0.05 levels). E-business technology also contributes to the development of a social media capability (0.001 level). Social media capability facilitates social online customer engagement (0.001 level) and e-business technology capability facilitates conventional online customer engagement (0.001 level). There is a positive relationship between conventional and social online customer engagement (0.05 level). Social and conventional customer engagement improves customer service performance (0.05 level).

The beta coefficients of the hypothesized relationships range from 0.134^{*} to 0.498^{***}. Hypotheses 1, 3, 4 and 5 are supported by the data with 0.001 level of significance while the rest of the hypotheses are significant at 0.05 level. R^2 values for the key relationships of the proposed model range from 0.018 to 0.542. The R^2 value for e-business technology capability is low (0.018). The effect size (f^2) values of the key relationships of the model range from 0.018 to 0.531. Overall, this analysis shows a good explanatory power for the proposed model (Chin 2010).

4.3 Test of Robustness

We check for the robustness of the proposed model by estimating five alternative models. In the first alternative model, we triangulate our measurement model by measuring firm size as natural logarithm of total assets (Figure 3 in the appendix). In the second alternative model we specify our constructs as reflective at both first- and second-order level (Figure 4 in the appendix). The third alternative model assumes that our second-order constructs are formative at first- and second-order level (Figure 5 in the appendix). In the fourth alternative model, we specify customer service performance as formative but every other specification and relationship keeps the same (Figure 6 in the appendix). These four alternative models yield similar results to those obtained in the proposed model (Figure 2), which suggest that construct specification is not a concern in our analysis (Braojos-Gomez et al. 2015).

Finally, a better firm's IT infrastructure can enable customer engagement on the firm's website (Erat et al. 2006). The fifth alternative model adds a link between IT infrastructure capability and conventional online customer engagement but every other relationship keeps the same (Figure 7 in the appendix). This model yields similar results to those obtained in the proposed model although the relationship between IT infrastructure capability and conventional online customer engagement is not significant (beta = 0.051, $f^2 = 0.003$). Overall, this test of robustness suggests that the proposed model is the best explanation of the data (Benitez-Amado & Ray 2012; Benitez-Amado et al. 2013, 2015).

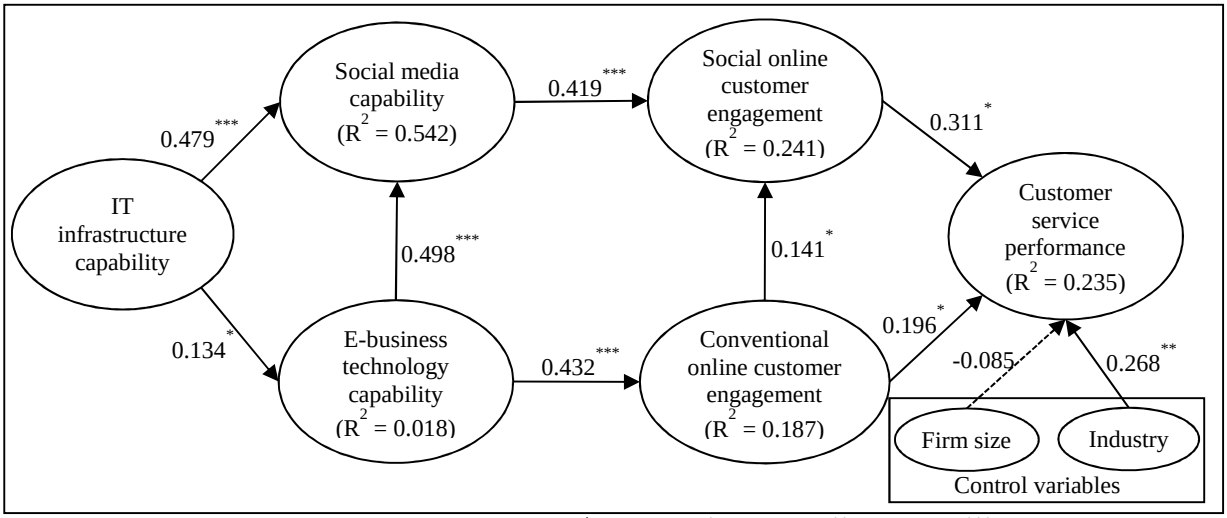

Figure 2. Results of the test of hypotheses ($^{\dagger}p < 0.10$, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$)

4.4 Post-hoc Mediation Analysis

We perform a post-hoc mediation analysis in two ways: (1) Adding a link between IT infrastructure/social media/e-business technology capability and customer service performance (Figure 8 in the appendix), and (2) estimating and analyzing the indirect effects involved in the proposed model (Table 2 in the appendix). These two analyses reinforce the results obtained in the test of hypotheses and suggest that IT infrastructure positively affects customer service performance through two micro-IT capabilities (social media and e-business technology) and online customer engagement.

4.5 Post-hoc Multi-group Analysis: Business-to-business (B2B) vs. Business-to-customer (B2C)

Prior studies have suggested the business benefits of engaging customers for B2B (e.g., Heath et al. 2013) and B2C models (e.g., Gangi et al. 2010). It is thus rational to expect that our model can vary depending on the B2B/B2C firm's strategy. We perform a multi-group analysis splitting our sample in two groups: B2B and B2C firms. Table 3 in the appendix presents the results of this multi-group analysis. This analysis suggests that social online customer engagement has a greater positive impact in B2C than in B2B firms, which it is rational because B2C firms are more interested in social media than B2B firms (Michaelidou et al. 2011). Conventional online customer engagement seems to be more critical for B2B firms. However, this finding needs of a future exploration.

5 DISCUSSION AND CONCLUSION

This research examines the impact of IT infrastructure on customer service performance on a sample of 100 U.S. small firms. Since IT can be relatively easy to acquire in the market, what is strategic in explaining customer service performance variation are IT capabilities instead of how much the firm invests in IT (Bhatt & Grover 2005). We argue that IT capabilities can be classified in macro- and micro-IT capabilities. IT infrastructure is a macro-IT capability because is based on a macro-level and imply a high degree of complexity for its development. Leveraging social media and web technology

is less complex and enables firms and individuals (i.e., employees and customers) to execute micro-level activities. We discuss that social media and e-business technology are micro-IT capabilities.

This study is theoretically positioned on the relationship between macro- and micro-IT capabilities and customer service performance. Our goal was to examine the impact of IT infrastructure capability on customer service performance by introducing into the same equation two new variables/arguments: Micro-IT capabilities and the online engagement of customers. Our central proposition was that IT infrastructure capability can create customer value by serving as the foundation to develop social media and e-business technology capabilities to online engage customers. Social media capability enabled social online customer engagement and e-business technology capability facilitated conventional social customer engagement to improve customer service performance. This proposition is supported by the empirical analysis. Specifically, the empirical analysis suggests that IT infrastructure capability positively affects customer service performance through two micro-IT capabilities (social media and e-business technology) and social and conventional online customer engagement.

How does IT influence customer service performance? This is our new and interesting way to answer this critical question: Firms that better leverage its IT infrastructure achieve a greater customer service performance through the development of social media and e-business technology capabilities and engaging customers virtually at social media and the firm's websites. Technical IT resource infrastructure is the base to early adopt web technology/social media and develop an e-business technology and social media capabilities through time and experience. Firms with a higher proficiency in leveraging its web technology are motivated to also be involved in social media platforms to be where their customers are, solve the customer problems and to run electronic selling advertisement (Foncillas & Gonzalez 2013). Thus, to put together macro- and micro-IT capabilities matters. Firm's social media and e-business technology capabilities enable to online engage customers in social media and the firm's website to interchange ideas and creating a sense of brand identification, commitment and loyalty (Casalo et al. 2010). Customers with a prior positive experience in online conventional engagement with a firm are motivated to also engage by using social media. Social and conventional customer involvement and participation provide the firm data and information on customer needs, ideas for enhancing service and new product development which the firm leverage to pursue customer satisfaction and improving customer service performance. Social online customer engagement (beta coefficient = 0.311^{*}) is more critical than conventional online customer engagement (beta = 0.196^{*}) to improve customer service performance.

This research has four key contributions to the field of information systems (IS). First, we find that firms that invest and develop macro- and micro-IT capabilities achieve intangible business benefits such as higher customer service performance. This research put into the same equation macro- and micro-IT capabilities to explain customer service performance variation. The first key contribution of this paper is to show novel and interesting mechanisms (micro-IT capabilities and online customer engagement) through which IT infrastructure affects customer service performance, as compared with prior research on this topic (Mithas et al. 2005; Ray et al. 2005; Xue et al. 2013). Second, this is the first study in classifying IT capabilities into macro- and micro levels considering its complexity and the proficiency to conduct individual processes. IT infrastructure provides the foundation through which micro-IT capabilities are built in order to engage customers to address micro-level issues to pursue a better customer satisfaction. The third key contribution is the exploration of online customer engagement in the context of IT capabilities and customer service performance.

Finally, the micro-foundations 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 key to explain the overcoming of diverse dynamic capabilities (Singh et al. 2011; Teece 2012). We use the micro-foundations approach to conceptualize online customer engagement as an individual behavior of the customer and to link social media and e-business technology capabilities, and social and conventional online customer engagement. To the best of our knowledge, this is the first study that uses the micro-foundations approach to explain how IT creates business value. This seems to be a promising avenue for further research in the field of IS.

Acknowledgements

This research was sponsored by the European Regional Development Fund (European Union) and the Government of Spain (Research Projects ECO2010-15885 and ECO2013-47027-P), the Regional Government of Andalusia (Research Project P11-SEJ-7294), and the School of Human Resources and Labor Relations of the University of Granada (Research Project SHRLR2015-11).

References

Bala, H. (2013). The effects of IT-enabled supply chain process change on job and process outcomes: A longitudinal investigation. Journal of Operations Management, 31 (6), 450-473.

Benitez-Amado, J., and Walczuch, R.M. (2012). Information technology, the organizational capability of proactive corporate environmental strategy and firm performance: A resource-based analysis. European Journal of Information Systems, 21 (6), 664-679.

Benitez-Amado, J., and Ray, G. (2012). Introducing IT-enabled business flexibility and IT integration in the acquirer's M&A performance equation. In Proceedings of the 33rd International Conference on Information Systems, pp. 1-21. Orlando, Florida, USA.

Benitez-Amado, J., Llorens-Montes, F.J., and Fernandez-Perez, V. (2013). The relationship between IT infrastructure leveraging, talent management and operational sustainability, and their effects on the business value of the operations strategy. In Proceedings of the 19th Americas Conference on Information Systems, pp. 1-8. Chicago, Illinois, USA.

Benitez-Amado, J., Llorens-Montes, F.J., and Fernandez-Perez, V. (2015). IT impact on talent management and operational environmental sustainability. Information Technology & Management, http://dx.doi.org/10.1007/s10799-015-0226-4, 1-14.

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

Bhatt G.D. and Grover V. (2005). Types of information technology capabilities and their role in competitive advantage: An empirical study. Journal of Management Information Systems, 22 (2), 253-277.

Braojos-Gomez, J., Benitez-Amado, J., and Llorens-Montes, F.J. (2015). How do small firms learn to develop a social media competence? International Journal of Information Management, 35 (4), 443-458.

Brodie, R.J., Ilic, A., Juric, B., and Hollebeek, L. (2013). Consumer engagement in a virtual brand community: An exploratory analysis. Journal of Business Research, 66 (1), 105-114.

Casalo, L.V., Flavian, C., and Guinaliu, M. (2010). Relationship quality, community promotion and brand loyalty in virtual communities: Evidence from free software communities. International Journal of Information Management, 30 (4), 357-367.

Cenfetelli, R.T., and Basellier, G. (2009). Interpretation of formative measurement in information systems research. MIS Quarterly, 33 (4), 689-707.

Culnan, M.J., McHugh, P.J., and Ubillaga, J.I. (2010). How large U.S. companies can use Twitter and other social media to gain business value. MIS Quarterly Executive, 9 (4), 243-259.

Chin, W.W. (2010). How to write up and report PLS analyses. In Handbook of Partial Least Squares: Concepts, Methods and Applications, V. Esposito-Vinzi, W.W. Chin, J. Henseler, and H. Wang (eds.). Springer, pp. 655-690. Berlin, Germany.

Daniel, E.M., and Grimshaw, D.J. (2002). An exploratory comparison of electronic commerce adoption in large and small enterprises. Journal of Information Technology, 17 (3), 133-147.

Devaraj, S., Krajewski, L., and Wei, J.C. (2007). Impact of ebusiness technologies on operational performance: The role of production information integration in the supply chain. Journal of Operations Management, 25 (6), 1199-1216.

Erat, P., Desouza, K.C., Schafer-Jugel, A., and Kurzawa, M. (2006). Business customer communities and knowledge sharing: Exploratory study of critical issues. European Journal of Information Systems, 15 (5), 511-524.

Felin, T., Foss, N., Heimeriks, K., and Madsen, T. (2012). Microfoundations of routines and capabilities: Individuals, processes, and structure. Journal of Management Studies, 49 (8), 1351-1374.

Foncillas, P., and Gonzalez, J. (2013). SEUR: Digitalizing express shipping. IESE Business School Case, (M-1309-E), 1-22.
Gangi, P. M., Wasko, M., and Hooker, R. (2010). Getting customers' ideas to work for you: Learning from Dell how to succeed with online user innovation communities. MIS Quarterly Executive, 9 (4), 213-228.
Goh, K. Y., Heng, C.S., and Lin, Z. (2013). Social media brand community and consumer behavior: Quantifying the relative impact of user- and marketer-generated content. Information Systems Research, 24 (1), 88-107.
Grant, R. M. (1996). Prospering in dynamically-competitive environments: Organizational capability as knowledge integration. Organization Science, 7 (4), 375-387.
He, W., Zha, S., and Li, L. (2013). Social media competitive analysis and text mining: A case study in the pizza industry. International Journal of Information Management, 33 (3), 464-472.
Heath, D., Singh, R., Ganesh, J., and Taube, L. (2013). Building thought leadership through business-to-business social media engagement at Infosys. MIS Quarterly Executive, 12 (2), 77-92.
Helfat, C.E., and Winter, S.G. (2011). Untangling dynamic and operational capabilities: Strategy for the (n)ever-changing world. Strategic Management Journal, 32 (11), 1243-1250.
Joshi, K.D., Chi, L., Datta, A., and Han, S. (2010). Changing the competitive landscape: Continuous innovation through IT-enabled knowledge capabilities. Information Systems Research, 21 (3), 472-495.
Kim, D, Basu, C, Naidu, G.M., and Cavusgil, E. (2011). The innovativeness of born-globals and customer orientation: Learning from Indian born-globals. Journal of Business Research, 64 (8), 879-886.
Kiron, D. (2012a). The amplified enterprise: Using social media to expand organizational capabilities. MIT Sloan Management Review, 53 (2), 1-6.
Kiron, D. (2012b). Social business at Kaiser Permanente: Using social tools to improve customer service, research and internal collaboration. MIT Sloan Management Review, 53 (3), 1-6.
Kiron, D., Palmer, D., Phillips, A.N., and Berkman, R. (2013). Social business: Shifting out of first gear. MIT Sloan Management Review, 55 (1), 1-32.
Li, T., Berens, G., and de Maertelaere, M. (2013). Corporate Twitter channels: The impact of engagement and informedness on corporate reputation. International Journal of Electronic Commerce, 18 (2), 97-125.
Lim, J.H., Stratopoulos, T.C., and Wirjanto, T.S. (2011). Path dependence of dynamic information technology capability: An empirical investigation. Journal of Management Information Systems, 28 (3), 45-84.
Luo, J., Fan, M., and Zhang, H. (2012). Information technology and organizational capabilities: A longitudinal study of the apparel industry. Decision Support Systems, 53 (1), 186-194.
Ma, Z., Liu Sheng, O.R., Pant, G., and Iriberri. A. (2012). Can visible cues in search results indicate vendors' reliability? Decision Support Systems, 52 (3), 768-775.
Michaelidou, N., Siamagka, N.T., and Christodoulides, G. (2011). Usage, barriers, and measurement of social media marketing: An exploratory investigation of small and medium B2B brands. Industrial Marketing Management, 40 (7), 1153-1159.
Mithas, S., Krishnan, M.S., and Fornell, C. (2005). Why do customer relationship management applications affect customer satisfaction? Journal of Marketing, 69 (4), 201-209.
Nambisan, P. and Watt, J. H. (2011). Managing customer service in online product communities. Journal of Business Research, 64 (8), 889-895.
Pagani, M., and Mirabello, A. (2011). The influence of personal and social-interactive engagement in social TV web sites. International Journal of Electronic Commerce, 16 (2), 41-67.
Pavlou, P. A., and El Sawy, O. A. (2006). From IT leveraging competence to competitive advantage in turbulent environments: The case of new product development. Information Systems Research, 17 (3), 198-227.
Peng, D.X., Schroeder, R., and Shah, R. (2008). Linking routines to operations capabilities: A new perspective. Journal of Operations Management, 26 (6), 730-748.
Peng, D.X., and Lai, F. (2012). Using partial least squares in operations management research: A practical guideline and summary of past research. Journal of Operations Management, 30 (6), 467-480.

Petter, S., Straub, D., and Rai, A. (2007). Specifying formative constructs in information systems research. MIS Quarterly, 31 (4), 623-656.
Porter, C.E., and Donthu, N. (2008). Cultivating trust and harvesting value in virtual communities. Management Science, 54 (1), 113-128.
Ray, G., Muhanna, W.A., and Barney, J.B. (2005). Information technology and the performance of the customer service process: A resource-based analysis. MIS Quarterly, 29 (4), 625-652.
Ray, S., Kim, S.S., and Morris, J.G. (2014). The central role of engagement in online communities. Information Systems Research, 25 (3), 528-546.
Ringle, C.M., Wende, S., and Becker, J.M. (2014). SmartPLS 3. Hamburg, Germany: University of Hamburg, retrieved from http://www.smartpls.com.
Rishika, R., Kumar, A., Janakiraman, R., and Bezawada, R. (2013). The effect of customers' social media participation on customer visit frequency and profitability: An empirical investigation. Information Systems Research, 24 (1), 108-127.
Sambamurthy, V., Bharadwaj, A., and Grover, V. (2003). Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. MIS Quarterly, 27 (2), 237-263.
Sanders, N.R. (2007). An empirical study of the impact of e-business technologies on organizational collaboration and performance. Journal of Operations Management, 25 (6), 1332-1347.
Singh, R. Mathiassen, L, Stachura, M.E., and Astapova, E.V. (2011). Dynamic capabilities in home health: IT-enabled transformation of post-acute care. Journal of the Association for Information Systems, 12 (2), 163-188.
Teece, D.J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. Strategic Management Journal, 28 (13), 1319-1350.
Teece, D.J. (2012). Dynamic capabilities: Routines versus entrepreneurial action. Journal of Management Studies, 49 (8), 1395-1401.
Tiwana, A., and Konsynski, B. (2010). Complementarities between organizational IT architecture and governance structure. Information Systems Research, 21 (2), 288-304.
Trainor, K.J., Andzulis, J., Rapp, A., and Agnihotri, R. (2014). Social media technology usage and customer relationship performance: A capabilities-based examination of social CRM. Journal of Business Research, 67 (6), 1201-1208.
Wang, Y., Chen, Y., and Benitez-Amado, J. (2015). How information technology influences environmental performance: Empirical evidence from China. International Journal of Information Management, 35 (2), 160-170.
Wu, S.J., Melnyk, S.A., and Flynn, B.B. (2010). Operational capabilities: The secret ingredient. Decision Sciences, 41 (4), 721-754.
Xue, L., Ray, G., and Sambamurthy, V. (2013). The impact of supply-side electronic integration on customer service performance. Journal of Operations Management, 31 (6), 363-375.
Yu, Y., Duan, W., and Cao, Q. (2013). The impact of social and conventional media on firm equity value: A sentiment analysis approach. Decision Support Systems, 55 (4), 919-926.
Zhao, L., Lu, Y., Wang, B., Chau, P.Y.K, and Zhang, L. (2012). Cultivating the sense of belonging and motivating user participation in virtual communities: A social capital perspective. International Journal of Information Management, 32 (6), 574-588.
Zhu, K., and Kraemer, K.L. (2002). E-commerce metrics for net-enhanced organizations: Assessing the value of e-commerce to firm performance in the manufacturing sector. Information Systems Research, 13 (3), 275-295.
Zhu, K., Dong, S., Xu, S.X., and Kraemer, K.L. (2006). Innovation diffusion in global contexts: Determinants of post-adoption digital transformation of European companies. European Journal of Information Systems, 15 (6), 601-616.

Appendix

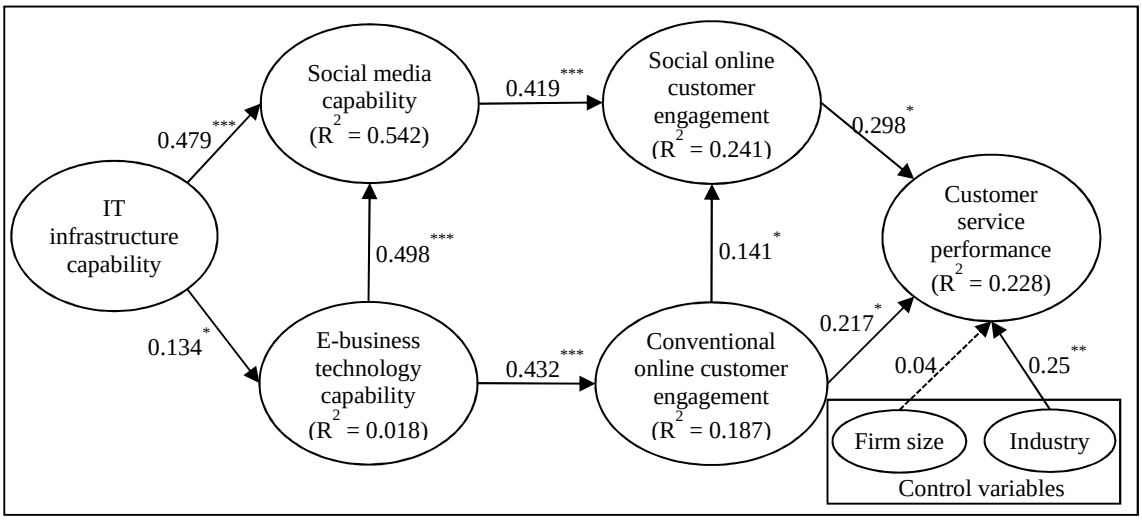

Figure 3. Results of the first alternative model (firm size measured as natural logarithm of assets)

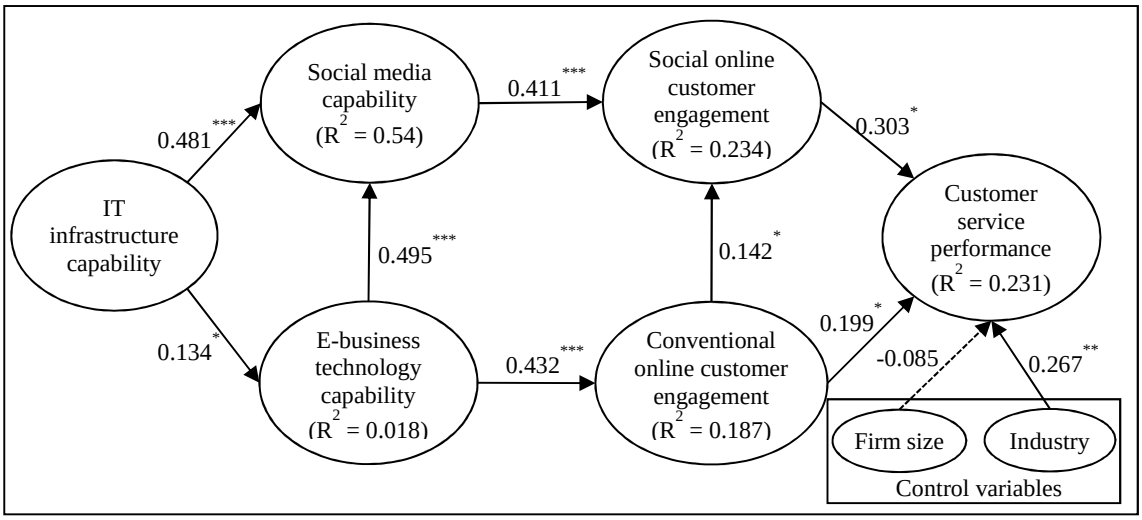

Figure 4. Results of the second alternative model (reflective at first-and second-order level)

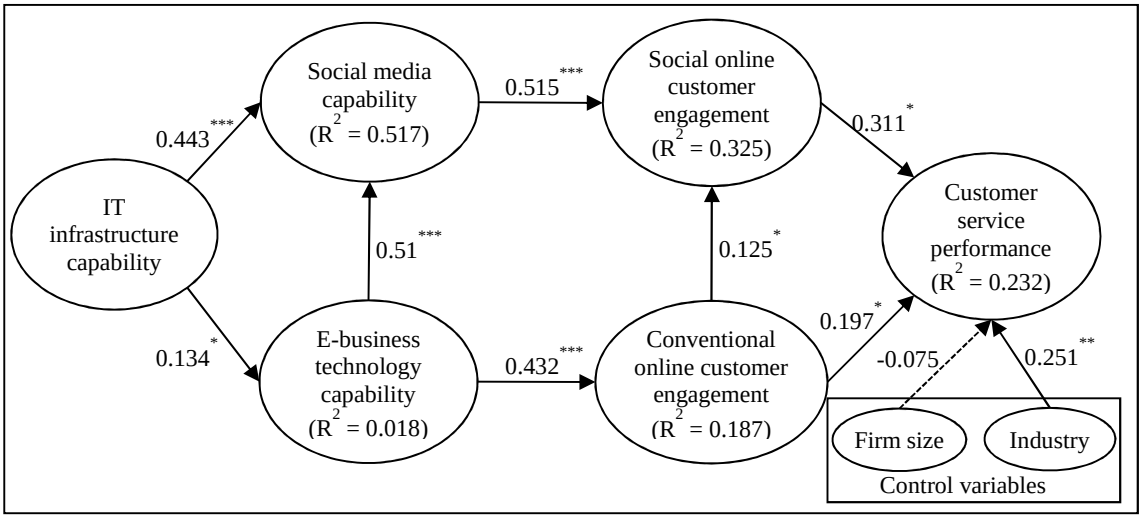

Figure 5. Results of the third alternative model (second-order constructs as formative at first and second-order level)

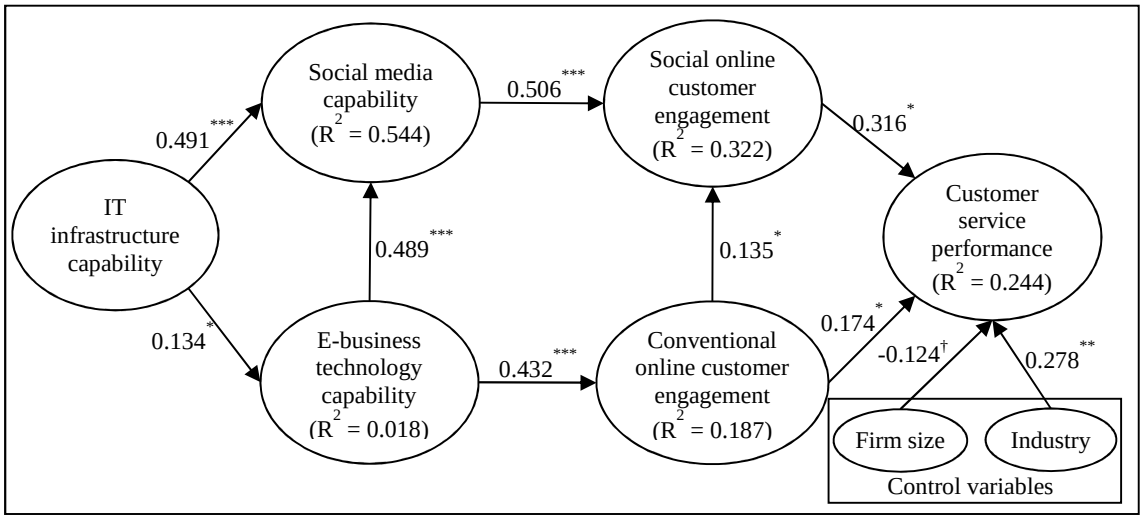

Figure 6. Results of the fourth alternative model (customer service performance as formative)

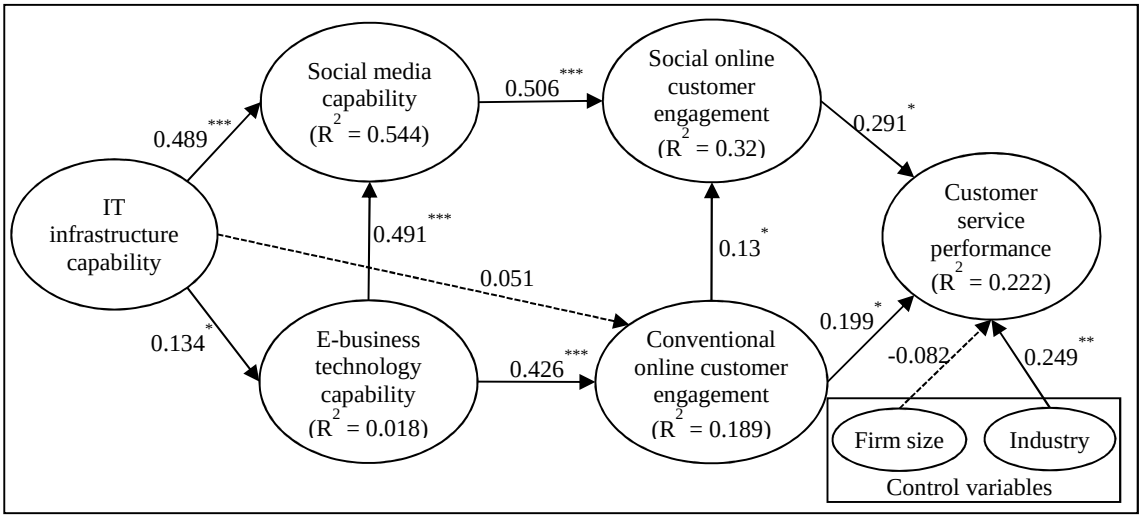

Figure 7. Results of the fifth alternative model (adding a link between IT infrastructure capability and conventional online customer engagement)

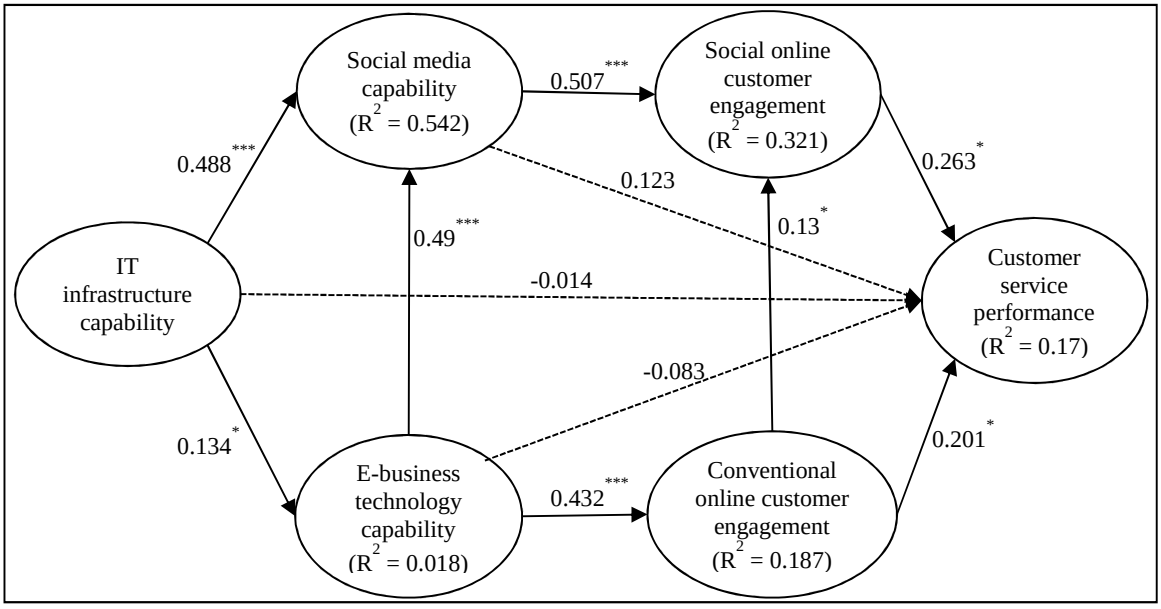

Figure 8. Post-hoc full mediation analysis

Construct/indicator	Composite reliability	AVE	Loading	VIF	Weight
Social media capability					
Facebook capability: Facebook activity of the firm in terms of:	0.93	0.87	0.785***	2.118	0.196*
Number of events			Dropped		
Experience			0.937***		
Updates			0.928***		
Twitter capability: Twitter activity of the firm in terms of:	0.871	0.692	0.918***	2.382	0.543***
Spent time			0.767***		
Experience			0.859***		
Updates			0.866***		
Blog capability: Blog activity of the firm in terms of:	0.916	0.845	0.814***	1.445	0.426**
Experience			0.93***		
Updates			0.908***		
Social online customer engagement					
Facebook engagement: Facebook engagement of the customer in terms of:	0.998	0.995	0.644***	1.054	0.53**
Fan evolution			Dropped		
Number of comments per post			Dropped		
Number of likes per post			0.998***		
Number of shares per post			0.998***		
Twitter engagement: Twitter engagement of the customer in terms of:	0.943	0.846	0.664***	1.054	0.535**
Number of following			0.923***		
Follower evolution			Dropped		
Number of customer tweets per firm tweet			Dropped		
Number of favorites per tweet			0.946***		
Number of retweets per tweet			0.89***		
Blog engagement: Blog engagement of the customer in terms of:	1	1	0.552**	1	0.55**
Number of comments per post			1		
Number of shares per post			Dropped		
Customer service performance	0.857	0.751			
Percentage of solved complaints			0.906***		
Awarded firm			0.826***		

Table 1. Measurement model evaluation at first- and second-order level

Indirect effects	Coefficient	Lower confidence interval	Upper confidence interval
IT infrastructure capability → E-business technology capability → Social media capability	0.066*	0.001	0.134
Conventional online customer engagement → Social online customer engagement → Customer service performance	0.034	-0.005	0.109
IT infrastructure capability → Social media capability → Social online customer engagement → Customer service performance + IT infrastructure capability → E-business technology capability → Conventional online customer engagement → Customer service performance + IT infrastructure capability → Social media capability → Customer service performance + IT infrastructure capability → E-business technology capability → Customer service performance + IT infrastructure capability → E-business technology	0.144*	0.022	0.322

capability → Social media capability → Social online customer engagement → Customer service performance + IT infrastructure capability → E-business technology capability → Conventional online customer engagement → Social online customer engagement → Customer service performance + IT infrastructure capability → E-business technology capability → Social media capability → Customer service performance			
Social media capability → Social online customer engagement → Customer service performance	0.133	-0.169	0.285
E-business technology capability → Conventional online customer engagement → Customer service performance + E-business technology capability → Conventional online customer engagement → Social online customer engagement → Customer service performance + E-business technology capability → Social media capability → Social online customer engagement → Customer service performance + E-business technology capability → Social media capability → Customer service performance	0.227**	0.107	0.387

Table 2. Post-hoc indirect effect analysis

Coefficient	B2B firms (N = 80)	B2C firms (N = 20)	Is the difference in the beta coefficient statistically significant?
IT infrastructure capability → Social media capability (H1)	0.496***	0.591***	No (not significant)
IT infrastructure capability → E-business technology capability (H2)	0.149*	0.152	No (not significant)
E-business technology capability → Social media capability (H3)	0.495***	0.268**	No (not significant)
Social media capability → Social online customer engagement (H4)	0.641***	0.727***	No (not significant)
E-business technology capability → Conventional online customer engagement (H5)	0.313***	0.319*	No (not significant)
Conventional online customer engagement → Social online customer engagement (H6)	-0.048	0.077	No (not significant)
Social online customer engagement → Customer service performance (H7)	-0.164*	0.518**	Yes ($p < 0.001$)
Conventional online customer engagement → Customer service performance (H8)	0.105	-0.079	No (not significant)
Firm size → Customer service performance (control variable)	-0.016	-0.284	No (not significant)
Industry → Customer service performance (control variable)	0.387***	0.21	No (not significant)

Table 3. Post-hoc multi-group analysis