Summer 5-27-2016

Digital Business Strategy and Firm Performance: the Mediation Effects of E-collaboration Capability

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Abstract: Nowadays, digital technologies (e.g., big data, cloud and mobility) have changed the firms' activities. Many firms begin to utilize digital resources to formulate and execute digital business strategy. However, there is little empirical research focusing on explaining this novel phenomenon. In this paper, we proposed a framework which describes the value creation and appropriation process of digital business strategy in the digital settings. Our research model is tested by survey data and financial data from a sample of 138 manufacturing firms which adopted e-selling process. The result provides strong supports to the proposed research model. In particular, we find that, as hypothesized, the impact of digital business strategy on firm performance is completely mediated by e-collaboration capability which is one kind of digital capabilities. Theoretical and practical implications of the research are discussed.

Keywords: digital business strategy, e-collaboration capability, mediation effects

1. INTRODUCTION

In the past decades, the popular studies of IT strategy are mainly on the research theme of IT-strategy alignment [1-5]. Those scholars treat IT strategy in the alignment studies as a functional-level strategy, which means IT strategy subordinates to business strategy [6]. For example, Sabherwal and Chan proposed theoretical profiles for IS strategies, which are developed in terms of four types of systems—operational support systems, market information systems, strategic decision-support systems, and inter-organizational systems [7]. These IS strategies support the implementation of business strategy.

Nowadays, pervasive connectivity, information abundance, global supply chains, growth of cloud computing, and emergence of big data have brought our society to the new digital era [6]. These digital technologies are fundamentally reshaping traditional business strategy, as modular, distributed, cross-functional, and global business processes, which enable work to be carried out across boundaries of time, distance, and function [6, 8-11]. Therefore, digital business strategy, which is a fusion between IT strategy and business strategy [6], emerges as the role of IT strategy is changed.

Hereby, digital business strategy is a business-level strategy which affects the business-level value of IT [12]. Prior researches focused on studying the relationship between functional-level IT strategy and firm-level performance. A key research gap is that to frame of IT investments as local functional level activities, while scholars expected to identify a statistically meaningful firm-level effect on overall financial performance. The research paradigm indicates a substantial and serious theoretical disconnect [12] (as suggested in Bharadwaj et al. 2009 [13]). Therefore, we aim to bridge the gap between functional-level IT strategy and overall business value by digital business strategy. Specifically, this paper explores the sources of business value creation and capture in digital business strategy (as suggested in "key questions on digital business strategy themes" [6]).

In addition, capturing value through coordination in networks is one of the main forms in the digital era [6]. For example, in the case of platform ecosystems, the value capture involves complex coordination between focal firms, suppliers, retailers and customers. Therefore, the e-collaboration which ''facilitates coordination of various decisions and activities beyond transactions among the supply chain partners over the Internet'' [14] has become a critical factor for firm to create and appropriate value by utilizing digital strategy.

Then, our research question is proposed: ***how effective is digital business strategy in appropriating value through the control of a firm's digital capability which is enabled by digital technologies (i.e., e-collaboration capability)***? In this paper, we explore the value creation and appropriation process of digital business strategy in the e-selling process. This study contributes to the evolving literature in digital business strategy and e-collaboration capability in two respects. First, unlike prior researches, we measure IT investment through the business level, namely digital business strategy and e-collaboration capability, which bridges the key gap of former researches [6, 12]. Second, the mediation test reflects the value creation and appropriation is mainly through e-collaborating with alliances and partnerships in the digital setting.

The remainder of this paper is arranged as follows. We first review the theoretical foundations of our model, and propose our hypotheses. Next, we introduce our methodology and data, drawn from 138 Chinese manufacturing firms which all have e-collaboration with their distributors or customers. The following sections describe the research method, present the study's results, and discuss the study's implications.

2. THEORETICAL FOUNDATION

2.1 Digital business strategy

Digital business strategy is one kind of organizational strategy which formulated and executed by leveraging digital resources to create differential value [6]. This definition reflects (1) digital business strategy is from the pervasive usage and adoption of new digital technology, such as cloud computing, big data, etc.; (2) digital business strategy is a business-level or firm-level strategy, not a functional-level IT strategy; (3) the aim of digital business strategy is to appropriate value for firms through digital technologies. In the following paragraphs, we discuss these three aspects more in details.

First, digital technologies shape the new business infrastructure and influence the new organizational logic and patterns of coordination within and across firms [6]. As industries or firms become more digitalized and rely on information, communication, and connectivity functionality, both CEOs and CIOs also begin to rethink the roles of IT strategy. For example, Google and Microsoft, they continue to adjust and fine-tune their corporate scope to take advantage of the rapidly developments in hardware, software, and Internet connectivity [6]. Also, Nike's digitized product development is supported by Apple's iOS and iPods [15]. These firms have begun to develop the digital strategy by digital resources.

Second, digital business strategy transcends traditional functional areas (such as procurement and logistics) and various IT-enabled business process (such as e-selling and e-purchasing) [6]. With the aid of inter-firm IT capabilities [9], business- or firm-level strategy can improve the functional-level efficiency and effectiveness (e.g., marketing, customer service, and procurement). Digital business strategy is a good starting point for analyzing how IS assets, IS capabilities, and socio-organizational capabilities jointly contribute towards achieving competitive value [16].

Third, digital business strategy also induces novel forms of value creation and appropriation for firms. The value comes from multisided business models, coordinated business models in networks, and control of digital industry architecture [6]. For example, in the mobile ecosystems, the value capture involves complex coordination and collaboration between app developers, the mobile OS (Apple, Android, Windows, or Blackberry), hardware manufacturers, telecom operators, and service providers such as Facebook, YouTube, etc [6]. Another example, Apple becomes one of the leaders in the mobile industry as it earns profits not only through its iPhone and Mac OSX, but also receives a share of the follow-on revenue from the telecom carriers(e.g., AT&T, Sprint, Verizon)[6].

2.2 E-collaboration capability

E-collaboration capability is the extent of facilitating coordination of various decisions and activities beyond transactions among the partners and end-users using digital technologies [14, 17]. As the downstream

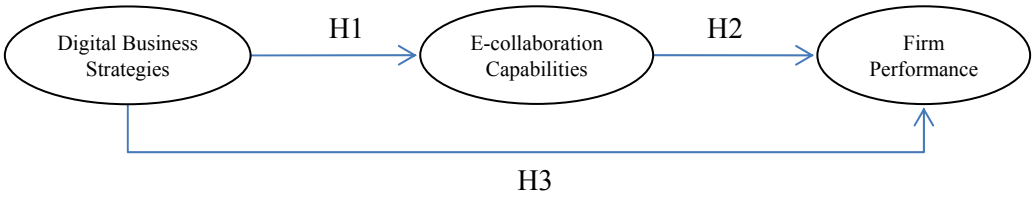
side process becomes popular to adopt digital technologies, we focus on the focal firm's e-collaboration with its distributors or customers. A large number of papers in operations found coordinating and sharing information through IT can induce high level operational performance and financial performance [14, 18-20]. Rai et al.(2006) argue IT infrastructure integration for SCM can improve firm performance through supply chain process integration which influenced by information flow integration, physical flow integration, and financial flow integration [20]. Barratt and Oke (2007) explore the antecedents of high levels of supply chain visibility from a resource based theory perspective across five different external supply chain linkages [18].

In the digital era, digital technologies make the information more abundant and visible to players in the market. This combination of digital intensity, connectivity, and big data provides a context of networked abundance [6]. Therefore, we need to reconsider the utilization of IT (especially digital technologies) in improving firm performance. Furthermore, many firms develop digital capability which allocates and utilizes digital technologies to acquire the sustainable competitive advantage. For example, Orbitz developed an advanced IT platform (digital technology) to become the most transparent online travel agency (digital capability), effectively disrupting the industry's transparency regime [21]. Therefore, in order to create and capture value, CEOs need to begin to formulate and execute digital business strategy, and then form digital capabilities (e.g., e-collaboration capability) for their companies [6].

3. RESEARCH MODEL AND HYPOTHESES

3.1 Research model

Based on the prior discussions, we forward our basic thesis. This paper draws on the literatures of digital business strategy and e-collaboration capability to shed light on the issue of how effective the digital business strategy in creating and appropriating value through the control of the firm's digital capability is. As per the research framework in Figure 1, we will examine how (1) digital business strategy enhanced e-collaboration capability and firm performance, and (2) high level of e-collaboration capability can improve firm performance. This can help firm to understand the value creation and appropriation process in the digital era. Below, we discuss the each individual hypothesis.



Notes: Mediation effects H4: Digital Business Strategies ->E-collaboration Capabilities ->Firm Performance; Control variables: log (firm size), Industry type; The signs of all of the hypotheses are positive

Figure 1. Conceptual Model

3.2 Hypotheses

3.2.1 Digital business strategy and e-collaboration capability

Digital business strategy is one kind of business- or firm-level strategy, which can influence the utilization of digital resources and capabilities [6]. At the same time, e-collaboration capability with distributors is a functional level. Digital business strategy is the start point to formulate and execute this e-collaboration capability through digital technologies. Google is an example of using business strategy to formulate digital technologies and capabilities to meet customers demand. For example, Google's unbiased organic search engine, a key component of its business strategy, was supported by an innovative ranking algorithm and technology infrastructure to crawl the World Wide Web [22].Therefore,

H1: Digital business strategy will be positively related with e-collaboration capability.

3.2.2 E-collaboration capability and firm performance

Prior supply chain researchers proved that the focal firm's e-collaboration with its supply chain partners can enhance operation performance and financial performance [14]. In the digital era, e-collaboration capability is one kind of digital capability which utilized digital resources. In this paper, e-collaboration capability with distributors or customers can improve information sharing and the visibility of supply chain, and hence, reduce the coordinate cost. Accordingly, e-collaboration capability will enhance firm performance eventually. Therefore,

H2: E-collaboration capability will be positively related with firm performance.

3.2.3 Digital business strategy and firm performance

For decades, former researches have studied the relationship between functional-level strategy and firm performance. One majority of those researches is called "IT alignment" which treats IT strategy as functional or process level [1,2,23]. However, this is questionable, as these two constructs are not at the same measurement level [12, 24]. In this paper, we measure digital business strategy as a business or firm level strategy, which can induce the firm-level financial performance. Therefore,

H3: Digital business strategy will be positively related with firm performance.

While e-collaboration capability is argued to have a positive effect on firm performance, this study contends that digital business strategy would also influence firm performance with e-collaboration capability. One of forms to create and appropriate value is to coordinate business model in networks [6]. Following this logic, value creation and appropriation in digital settings often involves complex and dynamic coordination across multiple companies [6].Therefore, digital business strategy captures value through e-collaboration capabilities. As such, we propose a hypothesis is that digital business strategy generates a positive, indirect effect on firm performance through the leverage of e-collaboration capability. Therefore,

H4: The greater the degree of a focal firm utilizes digital business strategy, the greater is the firm performance achieved through the leverage of the e-collaboration capability.

4. RESEARCH METHODOLOGY

4.1 Survey procedure

A cross-sectional mail survey was administrated to collect data from randomly selected manufacturing firms in China. Our initial survey was developed mainly based on the measurements identified in the prior literature. To ensure the translation accuracy of the survey instrument, all items were translated into Chinese by six master students and then independently translated back into English by another two Ph.D. students. We compared the two English versions and made minor changes to the Chinese questionnaires to ensure that we preserved the meanings of all original items. Then, the Chinese version of the draft survey was pretested with business and IS managers from 10 firms in central China to assess if the measurements sufficiently captured the variances of the constructs, resulting in our final version of the survey.

The Chinese Electronic Commerce Association (CECA), Committee of Economics and Commerce in the major cities of China (i.e., Beijing, Wuhan, etc.) supported the conduction of this survey and provided us with a list of manufacturing firms which all adopted e-selling process. A stratified random sample of 600 firms was selected from the list. From December 2006 to August 2007, we sent out 600 questionnaires to the enterprises in China by e-mails or letters. The questionnaires were completed by the managers of the information department or the chief managers of the firms. 218 responses were received, and the usable response rate was about 30%. We checked the sample for consistency and dropped invalid responses, resulting in a final dataset of 138 valid cases. Table 1 describes the characteristics of the established sample. Additionally, we examined the dataset for potential non-response biases and found no significant biases among the different periods during which responses were collected ($p > 0.05$).

In addition, in order to assess the non-response error, we compared the number of employees and the annual revenues of the firms that responded to the survey and those that did not participate in our study by using one-way ANOVA [25]. Results revealed no evidence of non-response bias in the collected data.

4.2 Measure

Digital business strategy focuses on deploying and leveraging organizational resources to support inter-organizational e-business activities (e.g., e-selling process) [22, 26]. Respondents were asked to evaluate whether their firms had pursued digital business strategy by planning, investing, implementing digital business strategy and adjustment and construct of organizational structures and IT groups in the e-business process [26]. Responses were indicated to use a 5-point Likert scale with anchors from very bad(1) to very good(5). Higher scores indicate greater effort in pursuing digital business strategy.

Consistent with earlier research [14](e.g., Rosenzweig, 2009), the e-collaboration capability with distributors was measured with four items including collaborative forecasting planning, production planning, logistics planning, and online ordering. Responses were indicated to use the same 5-point Likert scale with higher scores indicating greater e-collaboration capability.

Consistent with studies of IT and firm performance conducted by Bharadwaj [27](2000) and Tallon and Pinsonneault [1](2011), we assessed firm performance using two standard financial metrics: return on assets (ROA) and the ratio of operating income to assets (OI/A). Since e-collaboration capabilities reflect an ability of applying and leveraging digital technologies, the benefits of e-collaboration capabilities are likely to arise in the future [1]. Thus, for the firms in our sample, we used firm performance data retrieved from the Oriana Asia-Pacific company information database (https://oriana.bvdep.com) from 2007 (when the survey was administered) to two subsequent years: 2008 and 2009. Following the approach adopted by other IS researchers (e.g., [1, 28]), we used the mean of three-year financial performance to measure final outcomes.

Finally, we included two control variables: firm size and industry type. Firm size records the natural log of the annual revenue. Larger firms with more slack resources for IT investment, are more likely to achieve economies of scale [29], hence, are more capable of bearing the risks associated with IT investment. Additionally, we controlled industry type for its effect on firm performance. The types of Industry groups are shown in Table 1.

Table 1. Demographic Characteristics of the Responding Firms (n = 138)

	No.	Rate（%）		No.	Rate （%）
Industry			**No. of employees**		
Computers/communications	25	19.1	<=100	15	10.9
Oil/petroleum	11	8.4	101-500	30	21.7
Electronics Machinery	15	11.5	501-1,000	21	15.2
Utilities	13	10.0	1,001-5,000	28	20.3
Transportation	14	10.6	5,001-10,000	20	14.5
Metals/Plastics	16	12.1	>10,000	22	15.9
Pharmaceuticals/Healthcare	18	13.0	Missing	2	1.4
Others	22	16.8			
Missing	4	3.1	**Ownership type**		
Annual Revenue			State owned	52	37.7
<¥10 Million	15	10.9	Joint venture	32	23.2
10–¥50 Million	15	10.9	Privately owned	34	24.6
¥50–¥100 Million	16	11.6	Foreign invest	15	10.9
¥100–¥1,000 Million	35	25.4	Missing	5	3.6
>¥1 Billion	51	37.0			
Missing	6	4.3			

5. DATA RESULTS

Our analysis focused on measurement validation and hypothesis testing. Validation efforts assessed the absence of common method bias and the reliability and validity of the measures, while hypothesis testing analyzed the proffered hypotheses. Structural equation modeling with partial least squares (PLS) was used to perform a simultaneous evaluation of both measurement quality (measurement model) and construct interrelationship (structural model). PLS provides the ability to model latent constructs even under conditions of non-normality and small- to medium-size samples [30]. By using ordinary least squares as the estimation technique, PLS performs an iterative set of factor analyses and a bootstrap procedure to estimate the significance of the paths. In this study, we used Smart PLS 2.0 evaluate the measurement properties and test hypotheses [31].

5.1 Common Method Bias

We adopted a single-informant approach to collect survey data and therefore the possibility of common method bias should be assessed [32]. Therefore, this paper adopted following procedures to avoid and check common method bias. First, we collected the data from different sources. To measure firm performance, we collected secondary data using standard financial metrics. Information about the other constructs was collected through the survey. Second, Harman's single factor test was employed to examine whether a significant amount of common variance exists in the data [32]. All the construct items were cast into principal components factor analysis. The result yielded 3 factors with eigenvalues greater than 1.0, which accounted for 79.2 percent of the total variance. However, the first factor captured only 35.9 percent of the variance in the data. These results indicated the absence of a substantial amount of common method variance in the data. Consequently, common method bias should not be a problem in the study.

5.2 Measurement model

Item reliability, convergent validity, and discriminant validity serve to evaluate measurement properties in PLS. Individual item reliability can be examined by observing the item-to-construct loadings. A factor loading of 0.707 and above indicates 50 percent or more of the variance in the item is shared with the latent construct, while a factor loading less than 0.5 should be dropped [33]. In Table 2, all of the factor loadings are greater than 0.88 and hence, exhibit an acceptable quality of item reliability.

Convergent validity can be examined in terms of reliability of constructs, composite reliability of constructs, and average variance extracted (AVE) by constructs [34]. Cronbach's alpha can be utilized for assessing construct reliability, which measures homogeneity of items in a construct based on the assumption that each item in the scale contributes equally to the latent construct. Composite reliability of constructs uses item loadings estimated in the measurement model to compute the measure of internal consistency [35]. Both measurement properties are interpreted as acceptable with a score of 0.70 or above [36]. AVE reflects the variance captured by indicators. A score of 0.5 or above is desirable, meaning that the variance captured by indicators is greater than the measurement errors. In Table 2, the values of Cronbach's alpha, composite reliability, and AVE indicate that all constructs meet the tests of convergent validity.

Discriminant validity can be assessed by observing the factor loading of indicators to verify whether the measures of constructs are different from each other [37]. Discriminant validity is assured when (1) each item's correlation with its own construct is greater than its cross-correlation with other constructs, (2) the value of the square root of the AVE of each construct is larger than the correlations of this construct to all other constructs, and (3) correlation between pairs of constructs is below 0.9. We assessed discriminant validity by comparing the correlation between latent constructs and the square root of the AVE for each construct [34]. The correlation matrix in Table 3 shows that these square roots – shown on the diagonal – were greater than the corresponding off-diagonal elements. Table 2 also shows each item's correlation with its own construct (factor loading), and Table 3 depicts the descriptive statistics and correlation matrix of the research constructs. The results

demonstrate that the above conditions for discriminant validity were met.

Table 2. Summary of the Measurement Model

Variables	Indicators	PLS Loading/Weights	Cronbach's Alpha	Composite Reliability	AVE
Digital Business Strategy	DBS1	0.89***	0.93	0.95	0.80
	DBS2	0.92***			
	DBS3	0.88***			
	DBS4	0.88***			
	DBS5	0.88***			
E-Collaboration Capabilities	ESC1	0.93***	0.95	0.97	0.87
	ESC2	0.91***			
	ESC3	0.95***			
	ESC4	0.95***			
Firm Performance	OI/A	0.56+ (weights)	NA	NA	NA
	ROA	0.90***(weights)			

Notes:***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; +$p < 0.1$; Firm performance is measured with formative indicator weights.

Table 3. Discriminant Validity Test

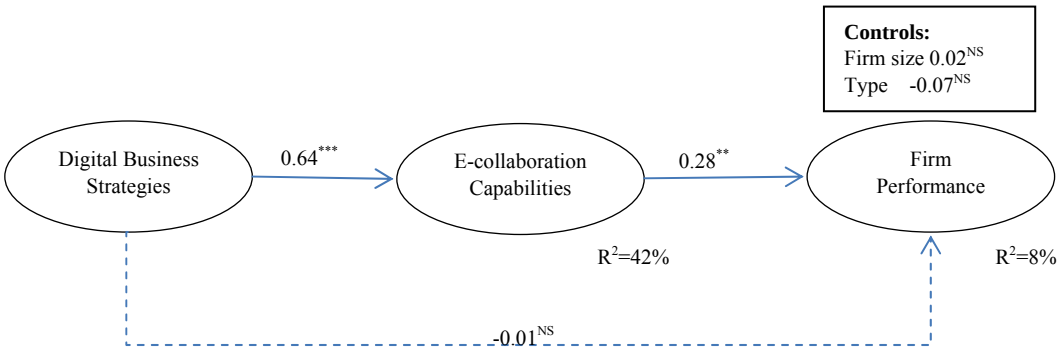
	Mean	Standard Deviation	DBS	ESC	FP	TYPE	SIZE
DBS	3.26	1.06	**0.89**				
ECC	2.82	1.11	0.64	**0.93**			
FP	3.68	5.06	0.17	0.27	**NA**		
TYPE	NA	NA	-0.01	0.09	-0.04	**NA**	
SIZE	NA	NA	-0.09	0.06	0.04	-0.02	**NA**

Notes:(1) DBS=Digital Business Strategy, ESC=E-collaboration capabilities, FP=Firm Performance, TYPE= Industry TYPE, SIZE=Firm Size. (2) Diagonal elements in bold are square roots of average variance extracted.

5.3 STRUCTURAL MODEL

5.3.1 Direct Effect

The proposed research model was assessed by examining the significance of paths in the structural model. With PLS, a bootstrap procedure with 5000 subsamples was used to generate T-statistics and standard errors [37].Figure 2 shows the estimated path coefficients with significance level in the structural model. Except for hypothesis 3, all other path coefficients are significant. In addition, the R-square values of the e-collaboration capability larger than 25 percent, indicating that significant amounts of variance in these variables are well explained by the proposed independents. Firm performance only explains 8% of variance which is acceptable, as firm performance is a secondary data and a prior study only got 5.8% of variance in firm performance which is accepted by the top journal in MIS field [38].



Note :***$p < 0.001$; **$p < 0.01$; *$p < 0.05$; +$p < 0.1$;NS: no significance

Figure 2. PLS Results

5.3.2 Mediation Effect

We further used mediation analysis techniques to assess the mediation effects suggested by H4 [39]. The first approach compares two sets of research models (fully mediated models) against their competing, partially mediated model. In each set of research models, the competing models are nested and, hence, the significance of the added explanatory power of the newly introduced paths can be evaluated by (1) calculating the f^2 statistic in terms of(R^2 partial mediation – R^2 full mediation)/(1–R^2partial mediation), and(2) computing a pseudo F-statistic(The pseudo F-statistic is computed using the formula $f^2 \times (n–k–1)$, with 1,(n–k) degrees of freedom where n is the sample size and k is the number of constructs in the model.)[40]. Based on this procedure, the f^2 was 0.009 for the partially mediated models, resulting in non-significant pseudo F(1, 133)-statistic of 1.20, respectively , indicating that the additional variance explained by the newly introduced direct paths did not significantly add to the explanatory power of the respective models.

The second approach assesses the mediation effect, as depicted in Table 4, by examining the magnitude and the significance level of the effect. The magnitude of mediation is examined by Sobel test [41]. The yielded z-statistic shown in Table 4 indicates that the examined mediation effect is significant at $p<0.001$. Furthermore, as bootstrapping has become one of the more highly recommended approaches for inference about indirect effects [42], we run the bootstrapping (5000 bootstrap samples) in the SPSS18.0 to detect our indirect effect. The bootstrapping results in Table 4 also show that our proposed mediation effect is significant.

Overall, we found support for two of the three direct-effect hypotheses (H1 and H2) in the research model. Our results also reveal that a full mediation-effect hypothesis (H4) is empirically supported. These findings are further discussed below.

Table 4.Significance of Mediated Path from DBS to FP

Indirect Effect	Mediated Path	Hypothesis	Sobel test	z-statistics	Bootstrapping		
					Mean	LL99CI	UL99CI
DBS -> FP	DBS->ECC-> FP	H4	2.8	*p < 0.01*	0.75	0.08	1.69

6. DISCUSSION AND IMPLICATIONS

Prior IS studies shows a mixed results (e.g., positive, negative, and no relationships) on the relationship between IT strategy/IT alignment and firm performance [1], as these researches measured IT strategy as a functional-level strategy. The objective of this paper is to extend our understanding of functional-level strategy to business-level strategy (namely digital business strategy in this paper), principally in resolving the gap in the prior literature. We also investigated how digital business strategy enhances firm performance through the

mediator (e-collaboration capability) in the e-selling process in the digital setting. Our main findings and implications of this paper will be presented in the following part.

6.1 Main findings

6.1.1 Digital business strategy is the enabler to create and appropriate value in the digital setting

Our finding shows that digital business strategy enhances e-collaboration capability (β=0.64,p<0.001), which improves firm performance(β=0.28,p<0.01). Therefore, digital business strategy is the start point to appropriate value in the digital setting. As a business level strategy, digital business strategy can guide and formulate functional level e-collaboration capability. Furthermore, e-collaboration capability with downstream partners can also enhance firm performance. This results support the findings of Setia et al.(2013), who proved that digital design is an antecedent to two customer service capabilities(customer orientation capability and customer response capability), which enhances customer service performance [28].

Previous studies treat functional-level strategy as having a direct effect on firm performance, however, we instead examine the value creation and appropriation path from business-level strategy to firm performance. Accordingly, we found digital business strategy is the enabler of value creation and appropriation in the digital setting.

6.1.2 E-collaboration capability is the full mediator between digital business strategy and firm performance

This paper did not find the direct relationship between digital business strategy and firm performance (β=-0.01, p>0.1). Instead, the effect of digital business strategy on firm performance is fully mediated by e-collaboration capabilities. This result reflects that digital business strategy will first improve on the operational level performance (e.g., e-collaboration capabilities, customer service capabilities induced by customer service unit (CSU) digital design [28]), and then enhance firm level performance. Therefore, digital business strategy should capture the internal performance (adopting social-organizational changes to form digital capability) at first [16].

Prior research shows that IT strategy/IT alignment matters to firm performance, and our results help explain why digital business strategy matters. Digital business strategy can direct key digital resources to support the strategic need of the business and to apply existing IT capabilities to discover new business opportunities [2]. We found that the effects of digital business strategy on firm performance are fully mediated by e-collaboration capability and it shows that the ultimate value of digital business strategy lies in how digital business strategy prepares firms for forming digital capabilities. If digital business strategy did not create digital capabilities, it would produce little value for firms. If digital business strategy enabled firms to create and form digital capability, digital business strategy could emerge as a critical source of value.

6.2 Implications

This paper has two implications for IS literature. First, we argued the relationship between business or firm-level digital business strategy and firm performance. Therefore, this paper bridged the gap of former research which studied the relationship between functional-level strategy and firm performance. Second, we introduced e-collaboration capability into the relationship between digital business strategy and firm performance. Furthermore, we found the fully mediated effect of e-collaboration capability. This study explained why and how digital business strategy can create and appropriate value [16].

Our findings are also relevant for IS practice. First, both CEOs and CIOs should develop digital business strategy to guide their actions and capture opportunities in the digital setting. Second, digital business strategy should be used to guide the functional-level digital capabilities (such as, e-collaboration capability, customer service capabilities induced by CSU digital design [28]), as this internal performance is the mediator to capture firm performance or competitive advantage [16].

6.3 Limitations

Although our investigation on digital strategy and e-collaboration is ground in digital strategy and operational management literature and is conducted empirically following the best practices in the field, certain limitations still exist. First, we collected data only from manufacturing firms. To increase the generalizability of our findings, future research may test our model using data from other industry like service, etc in the future. Second, while focusing on the outcomes of digital strategy in this study, future research may examine the antecedents of digital strategy, and guide managers to establish and implement digital business strategy.

7. CONCLUSION

Our research builds a framework of digital business strategy that shows how to leverage digital resources and capabilities for create and appropriate value. As digital technologies are becoming more and more pervasive, this paper suggests that using digital business strategy leverage digital technologies to build e-collaboration capability with distributors or customers and capture business value. To build such e-collaboration capability, we emphasize a greater focus on establishing digital business strategy. Another notable strength of our study is that we use both survey and financial data collected from 138 firms to empirically test our model. Our study leads to a better understanding of digital business strategy and e-collaboration capability with downstream partners and is likely to open many new directions for future research on digital business strategy.

ACKNOWLEDGEMENT

This research was supported by the National Natural Science Foundation of China under Grant 71372174, 71072080, and 71372174.

Appendix Survey Instrument

DBS: Digital business strategy (*Grandon and Pearson, 2004; Zhao, Huang and Zhu, 2008; Grover and Kohli, 2013*) *(5-point Likert Scale, 1=Very Bad, 5= Very Good)*	
DBS1	Our firm has planned e-business strategy to support the establishment of e-selling process.
DBS2	Both IT and business managers in our firm have consistently developed and implemented e-business strategy to support the establishment of e-selling process.
DBS3	Our firm has plans of organizing IT groups to support the establishment of e-selling process.
DBS4	Our firm has plans of adjustments of organizational structures to support the establishment of e-selling process.
DBS5	Our firm has plans of capital investment to support the establishment of e-business process (e.g., e-selling process).
ESCs: E-collaboration Capabilities (Rosenzweig,2009;Zhu,2002; Saraf, et al.2007) *(5-point Likert Scale, 1=Very Bad, 5=Very Good)*	
ESC1	We have utilized e-business technology to facilitate online ordering with our primary distributors.
ESC2	We have utilized e-business technology to facilitate collaborative forecasting planning with our primary distributors.
ESC3	We have utilized e-business technology to facilitate collaborative production planning with our primary distributors.
ESC4	We have utilized e-business technology to facilitate collaborative logistics planning with our primary distributors.
FP: Firm Performance (*Devaraj and Kohli 2003; Melville et al.2004; Tallon and Pinsonneault, 2011*)	
ROA	Return on assets
OI/A	The ratio of operating income to assets

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