Research article

Is Ecommerce Capabilities Superior Predictor of Organizational Performance? Empirical Test

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Abstract

This paper empirically examined two research questions theoretically anchored on the resource-based theory. Empirical evidence suggested that US female entrepreneurs' ecommerce capabilities and creditworthiness jointly predicted their firm performance, albeit the former was better than the latter variable in accomplishing this purpose. Managerially, the study offers strategic insights to U.S. female entrepreneurs on the link between these variables and their firm performance, given their roles as subset of U.S. engine of growth and employment.
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Keywords: ecommerce capabilities, female entrepreneurs, creditworthiness, resource-based theory

Introduction

Capabilities are the organizational processes that enable a firm to develop and transform resources into business value for its market, and previous research has long demonstrated that organizational capabilities are major sources for competitive advantage and economic performance (Day, 1994). Parallel to this, ecommerce is a phenomenon that enables an economic agent to collate, maintain, share and engage in business interactions implemented through telecommunication networks capabilities (Zwass, 1996). Previous research demonstrated that organizational capabilities including ecommerce capabilities are internally derived or externally derived in the organization (Day, 1994).Hence, ecommerce has significant capabilities that are major sources of business value creation for organizations (Statista, 2018; Zhu, 2005; Allison, 2017); Daniel & Grimshaw, 2002).Importantly, however, highly

successful organizations strive to maintain a balance between internally derived and externally derived organizational capabilities (Venkatesan & Kuma, 2004). Furthermore, research found that some firms have preference for the exploitation of internally derived capabilities while other firms prefer to exploit externally derived capabilities (Leonard-Barton, 1992; Ozsomer & Gencturk, 2003). Either way, more research scholars have found that organizational capabilities are interlinked with superior organizational competitive advantage and economic performance of firms (Venkatesan & Kuma, 2004; Zhu, 2005; Allison, 2017).

In this paper, we focus on two organizational capabilities---ecommerce capabilities and creditworthiness capabilities---arguing that the former is internally derived and the latter externally derived. Importantly, these two forms of capabilities are interlinked to superior organizational competitive advantage and economic performance (Venkatesan & Kuma, 2004; Zhu, 2005; Allison, 2017).Therefore, our computational model for the present study is anchored on the empirical investigation of the hypotheses that ecommerce capabilities and creditworthiness capability are interlinked to superior organizational competitive advantage and economic performance. To this end, the present study used a unique secondary data on US female entrepreneurs in 2017, to test two hypotheses as discussed further below.

Literature Review& Hypotheses

Research on ecommerce activities of US female entrepreneurs theoretically underpinned in the resource-based theory (RBT) is almost nonexistent, to the best of our knowledge. With this in mind, we argue that the RBT provides a useful theoretical lens to seek empirical explanation of whether ecommerce capabilities and creditworthiness of US female entrepreneur will predict economic performance because the firm is a collection of resources (Barney, 1986; Peteraf, 1993). Complementary to this, the RBT assumes that a sustainable competitive advantage is possible conditional on the resources being valuable, rare, and difficult to imitate allowing managers to strategically exploit the resources (Barney, 1986). However, while these near-prescriptive stipulations of the RBT may appear laudable and attractive, rebuttals against these postulations have been documented in the field of strategic management, as scholars observed that testing the RBT is empirically daunting because its tautological logics render it difficult to parameterize (Priem & Butler, 2001; Hoopes et al. 2003).Interestingly, however, counter-rebuttals have also been reported in the literature. For example, empirical scholarly scientific evidence has compellingly demonstrated that the RBT parameterization is not beyond empirical solution (e.g., see Silva, Gerwe, & Becerra, 2017).

Ecommerce Capabilities

Arguably, the Schumpeterian revolutionary idea of creative destruction offers a powerful perspective to understand the genesis of the impact of technological changes on the global industrial economies (Diamond, 2009). Sequel to the Schumpeterian revolutionary thesis of creative destruction of technological changes, scholars began to research the impacts of technological changes on the global industrial economy. For example, Porter's (1985) industrial structure analysis and research was pivoted on the thesis that new technology adopters are birthed by new technology changes at the industry levels. Complementary to this notion, Porter's (1985) analysis on technological change has also been extended to organizational levelsas it looked at the impacts of ecommerce (Porter, 2001; Allison, 2017). Specifically, new technology adopters at the organizational levels are profoundly prominent in the Internet-driven ecommerce revolution (Lu, Li, Zhang, & Rai, 2014; Porter, 2001). At the firm level, managers have made irreversible strategic assets deployment investments to exploit the complementarily between information technology infrastructure and ecommerce capabilities as linked to firm performance (Zhu, 2005).

With all these in focus, a factual evidence informing that the impact of ecommerce on global businesses is a paradigm shiftis captured by exponential growth in ecommerce and ecommerce related activities at an unprecedented level of 2.3 trillion U.S dollars in 2017, and commentators contend that it will grow to about 18 per cent in 2021 (e.g., see Statista, 2018).Furthermore, with the preceding analysis in mind, our operationalization of ecommerce and its link to organizational economic performance draws support from recent research (e.g., Zhu, 2005).

Crucially importantly, we must underscore that since over a decade ago, research has documented the benefits of the Internet-driven ecommerce revolution to large firms with minimal attention to small firms (e.g., Coppel, 2000).Thus, it is not surprising that previous research demonstrated that unlike large firms, managers of small firms have not yet started to maximally exploit the full benefits of the Internet-powered ecommerce phenomenon (Grandon & Pearson, 2003). This disparity has persisted in spite of documented benefits of ecommerce

capabilities to small firms including but not limited to: access to international market at minimal costs, reductions in transaction cost, and economies of scale, to mention just a few (Lal, 2002; Chan & Lee, 2003).Additionally, given the documented scholarly research evidence that the contributions of ecommerce to small businesses are grossly a research-neglected phenomenon(Daniel & Grimshaw, 2002), the present study focuses on ecommerce activities of US female entrepreneurs as a neglected subset of small business research area. Simply stated, empirical research focusing on the predictive link between ecommerce and creditworthiness, to economic performance of US female entrepreneurs, is nonexistent to the best of our knowledge. Regrettably, this research void persists in spite of the role US female owner-managers play as a subset of the engine of growth and employment in the US economy and the global political economy (OECD, 2014). Unfortunately, however, as these owner-managers are performing engine of growth and employment functions, they are simultaneously capital-starved fueled by inadequate creditworthiness (Geiger & Oranburg, 2018).

Credit Worthiness

It has long been well established that a firm in default is incapable of servicing its financial liabilities (Altman, 1968; Ohlson, 1980). Understandably, a firm in default sends signal to capital providers and other stakeholders that its default probabilities are high as a credit risk firm (Altman, 1968). Understandably then, the level of creditworthiness of a firm is of crucial importance to its stakeholders who use that information to glean solid probability of the firm remaining in business (Ohlson, 1980). Consequently, a variety of methods have been used to capture credit ratings of small and large firms (Heflin, Shaw, & Wild, 2011), including female entrepreneurs' firms for the present study. As discussed further below, the credit rating of the female entrepreneurs' firms in the present study has three categories: Good=1, Very Good=2, and Excellent=3. The implicit assumption subsumed in this categorization is that the latent creditworthiness construct is monotonically increasing from level 1 to 3, such that higher scores capture higher level of the latent creditworthiness construct. However, this approach is not new as the same reasoning underlies earlier scholarly research on credit rating schemes (Altman, 1968; Ohlson, 1980). Finally, our operationalization of all variables for the present study is presented in Table 1.

Synchronicity of Female entrepreneurs' Ecommerce Capability and Creditworthiness

While the preceding discussion has established that the US female entrepreneurs' ecommerce capabilities and creditworthiness are critically vital to their organizational performance, it remains to be empirically established that both variables synchronized to predict organizational performance. Hence, the preceding discussion suggests our hypothesis 1 stated in the null.

H1: US female entrepreneurs' ecommerce capabilities and creditworthiness will not jointly predict their organizational economic performance.

Even if we empirically establish that US female entrepreneurs' ecommerce capabilities and creditworthiness will or will not jointly predict their organizational economic performance, yet another empirical question springs up: Of these two variables which one is statistically a superior predictor of organizational performance? Hence, this question triggers our second testable hypothesis stated in the null

H2: US female entrepreneurs ecommerce capabilities is not statistically superior to creditworthiness in predicting organizational economic performance

Control Variables

Statistical methodology requires that potential confounding variables on the estimation of our model to test the hypotheses of the study, be controlled. For the purpose of the present study, two control variables were first entered into the estimation process before the predictor variables were entered. These control variables were: Service and Survival. Our in-depth examination of the study database (discussed below) revealed that most of the female owner-managers' businesses are concentrated in the service industry. Hence, we used the Service control variable such that Service is a binary variable = 1 if the focal firm belongs to the service industry, and Service = 0 otherwise. Survival was used as a control variable in this study for the following reason. The small business literature suggests that,

typically most small businesses fail to survive beyond three years from the date they were founded (OECD, 2014; Headd, 2003). Hence, Survival is a control variable =1 if the focal firm has existed for 3 years or more, and Survival = 0 otherwise.

Method

Econometric Specification
In this study, our computational model appears in equation 1 as the econometric regression model to empirically test hypotheses 1 and 2.

$$YR = b_0 + b_1 SV + b_2 SL + b_3 ECCB + b_4 Crating + e \qquad (1)$$

YR = Annual Revenue of the firm

b_0 = Constant term

b_1 SV =Service Industry Member or not

b_2 SL=Firm survived 3 or more years or not

b_3 ECCB = Ecommerce Capabilities

b_4 Crating =Credit Rating (Creditworthiness)

e = White Noise Error Term (captures net effects of all unspecified factors).

As part of a larger study reported elsewhere (Oladapo & Onyeaso, 2018), the unique secondary data for the present study were collected from*AtoZDatabase.com*. On this database, our data were gathered on "Only women-owned businesses" in 2017. Using this secondary database, we drew a random sample of 480 female entrepreneurs from a population of 713, 675 female entrepreneurs in the U.S. These data were extracted on the variables presented in Table 1.

Specifically, our operationalization of the variables in Table 1 (as in equation1)was as follows. The dependent variable of the study was total firm revenue in 2017 (natural log). This operationalization is consistent with empirical research focusing on ecommerce (Gunwoo Yoon, Li, Yi Hong, & Liu, 2018). Of the two independent variables of the study, ecommerce capabilities were measured by each firm's yearly financial capital investments in 2017 deployed in three key IT-related infrastructure expenditures: (a) technology (b) telecom, (c) website capability. In this framework, website capability is a binary variable =1 if the firm has a website, and website = 0, if the firm had no website. The other two variables were metrically measured following extant empirical literature on ecommerce research (Luo, Fan & Zhang, 2016, Allison, 2016; Luo et al. 2016).Importantly, the operationalization of these two metric variables followed scholars who reasoned that business strategy is fundamentally "the art of nurturing, accumulating and deploying rent-yielding resources…"(Foss, 1996, p.1; Hofer, 1989). As a control variable, Survival was measured as a binary variable =1 if a firm survived for more than three consecutive years, and Survival=0 otherwise. This operationalization was based on the fact that female entrepreneurs are a subset of the U.S. small business population. As such, it has been well established that, typically small businesses rarely survive longer than three years from the date of their founding (OECD, 2014; Headd, 2003). For this reason, we controlled for this phenomenon and its ramifications in the present study (Headd, 2003). Similarly, Service as a control binary variable was =1 if the firm belonged to the service industry, and Service=0 if the firm does not belong to the service industry.

Table 1
List of Variables Used in the Study

Variables	Description
(1) LnARev.	Annual Revenue in 2017 (natural log)
Ecommerce Capabilities:	Annual Revenue in 2017 deployed in IT-related expenditure on (a) Technology, and (b) telecom, for ecommerce capabilities (natural log). (c)Website as a binary variable =1 if the firm has a website, and =0, if the firm has none.
Credit Rating	Good=1, Very Good=2, and Excellent=3.
Service.	Binary variable =1 if firm is a service firm & =0, otherwise.
Survival	Binary variable=1 if firm is 3 or more years in existence, 0 otherwise.

We determined that this operationalization was necessary as the businesses of the female entrepreneurs are skewed towards service businesses. As such, we reasoned that this phenomenon should be controlled as a potential confounder in our model estimation process, even though it has long been suggested by research methodologists that it is practically impossible to control for all potential confounders in any empirical study (e.g., Donaldson & Davis, 1993). Additionally, even though we implemented this industry effect control, we did so to err on the side of caution because controlling for industry effects appeared not to be necessary as our study was theoretically underpinned in the resource-based theory grounded in the assumption that performance differences are fundamentally caused by firm effects and not by industry effects (Barney, 1991; Hawawini, Subramanian, & Verdin, 2003). Again, we still used the Service control variable to err on the side of caution, not that we are unaware that parsimony is the hallmark of science. Chan, Bhargava, & Street (2006) compellingly suggested that the major organizational challenges of small firms are not driven by the types industry they belong to. Moreover, we were cognizant that fundamentally ecommerce is an Internet-driven paradigm blurring industry and market boundaries (Amit & Zott, 2001). To sum up, the preceding discussion appears to suggest that controlling for industry effect may be unnecessary for the present study and focus should be on firm effect as our study was conceptually underpinned in the resource-based theory (Barney, 1991; Chan et al, 2006; Amit & Zott, 2001). Table 2 reports the descriptive statistics of the study variables.

Analysis

Table 2
Descriptive Statistics

	N	Minimum	Maximum	Mean	Standard Deviation
Firm Year Revenue	480	23.0	65.0	44.3	9.8
Ecommerce Capabilities	480	23.0	59.0	40.6	9.9
Credit Rating	480	1.0	59.0	22.4	19.0
Service	480	0.0	1.0	0.3	0.5
Survival	480	0.0	1.0	0.4	0.5

Table 3
Model Summary

Model 1	R	R-Square	Adjusted R-Square	Std. Error of Estimate
	.557	.310	.304	8.19

Predictors: Constant Survivor, Service, Ecommerce Capabilities, Creditworthiness
Dependent Variable: Organizational Performance.

Table 4

ANOVA

Model 1	Sum of Squares	df	Mean Square	F	Sig.
Regression	14323.58	4	3580.89	53.37	.000
Residual	31867.45	475	67.08		
Total	46191.04	479			

Coefficients

Model 1	Unstandardized B	Standardized Std. Error	Beta	t	Sig
(Constant)	26.67	1.62		16.39	.000
Ecommerce Capabilities	.531	.039	.53	13.58	.000
Creditworthiness	.11	.020	.231	5.79	.000
Service	.172	.83	.08	.20	.837
Survival	3.4	.79	.17	4.30	.000

We performed a standard multiple regression analysis to quantitatively evaluate how well female entrepreneurs ecommerce capabilities and creditworthiness predicted organizational performance, after the control variables were entered first in the estimation process. As reported in Table 4, the results were encouraging. Ecommerce capabilities and creditworthiness predicted organizational performance, F $(4,475)=53.375$, p < .001). The multiple correlation coefficient was .557 so that this empirical evidence allowed the inference that about 30% of the variance in organizational performance was accounted for by ecommerce capabilities and creditworthiness, as reported in Table 3. These results are discussed with the study hypotheses presented below.

Table 5

Sequential Regression of Creditworthiness & Ecommerce Capabilities on Firm Performance

Model 1.	R	R-Square	Adjusted R-square	Std. Error	R-Square	Δ F Δ	Sig. F
	.2	.042	0.36	9.6	.042	6.9	.000
Model 2.	0.55	.31	.30	8.1	.268	184.6	.000

Model 1 Predictors: Constant, Survival, Service, Creditworthiness.

Model 2 Predictors: Constant, Survival, Service, Creditworthiness, and Ecommerce Capabilities.

Hypothesis 1 (H1): H1 stated in the null postulated that, jointly ecommerce capabilities and creditworthiness do not predict organizational performance. As can be seen in Table 4, after entering the control variables, ecommerce capabilities and creditworthiness were regressed on firm performance to obtain the following results. Ecommerce capabilities significantly predicted organizational performance, b=.53, t=13.58, p<.001. Likewise, creditworthiness significantly predicted organizational performance, b=.11, t=5.7, p<.001. Hence,H1 should not be retained. That is, US female entrepreneurs ecommerce capabilities and creditworthiness jointly predict organizational economic performance.

Hypothesis 2 (H2): H2stated in the null postulated that female entrepreneurs ecommerce capabilities was not statistically superior to creditworthiness in predicting organizational performance. As can be observed in Table 5, we employed a sequential regression approach to test H2. In the first step, the control variables and creditworthiness were entered in the model, and this explained 4% of the variance in organizational performance. We found that creditworthiness explained 4% of the variance in organizational performance. In the second step, we added ecommerce capabilities to the first step to determine the additional percent of the variance in organizational performance explained solely by ecommerce capabilities. Almost 27% of the variance in organizational performance was explained solely by ecommerce capabilities, R-Square Change (.268, p <. 001), F-Change (184.6, p <. 001). Hence, H2 was rejected. Female entrepreneurs' ecommerce capabilities were statistically superior to creditworthiness in predicting organizational performance.

Examination of Multiple Regression Assumptions

Understandably, before we estimated our econometric our model expressed in equation 1, the data were examined for potential influential outliers. For this reason, we computed Q-Q plots and other descriptive statistics to ascertain whether the data departed from parametric model assumptions. We computed histograms of each metric variable in the data to assess the normality of each variable. Overall, these pre-estimation results encouraged us to proceed with the model estimation. Consequently, post-estimation of the Normal P-P Plot of Regression Standardized Residual of the dependent Variable and the histogram, indicated no serious departure from normality. These results were not surprising given our large sample size (N=480), as recent empirical research demonstrated that multiple regression is robust to a large sample size (Lin et al, 2013). Beyond these, we also computed VIF suggesting no serious multicollearity in the data. These statistical indicators encouraged us to conclude that the results of the study have no serious departure from the assumptions of parametric models as to undermine the results of the study. Interested readers may obtain the printouts of the above procedures from the authors of this study.

Results and Discussion

The study descriptive statistics are reported in Table 2. This study employed the theoretical guide of the resource-based theory (RBT) to empirically test the following two hypotheses stated in the null:(1) H1: US female entrepreneurs' ecommerce capabilities and creditworthiness will not jointly predict organizational economic performance, andH2: US female entrepreneurs' ecommerce capabilities was not statistically superior than creditworthiness in predicting organizational economic performance. Both hypotheses were rejected. That is,(1): US female entrepreneurs ecommerce capabilities and creditworthiness jointly predict organizational economic performance, and (2):US female entrepreneurs ecommerce capabilities was statistically superior to creditworthiness in predicting organizational performance.

The managerial policy significance of the study is straightforward. At a minimum, the study results will assist female entrepreneurs in their strategic planning at least in two ways. First, strategic capital investments in creditworthiness and ecommerce capabilities are critically linked to their organizational economic performance. Second, while these two strategy variables are critically beneficial to their organizational performance, ecommerce capabilities appear to be superior to creditworthiness in driving their organizational economic performance. Beyond these, our study makes a contribution to the scant literature on the use of secondary data to examine the link between ecommerce capabilities and creditworthiness to organizational performance of female entrepreneurs in the U. S---a neglected research area (Oladapo & Onyeaso, 2018).

Conclusion

All in all, this paper empirically investigated research questions crafted into two hypotheses proposing that: (1) US female entrepreneurs' ecommerce capabilities and creditworthiness will not jointly predict their organizational performance, and (2) US female entrepreneurs' ecommerce capabilities was not statistically superior than creditworthiness in predicting organizational performance. Thus, rejecting both hypotheses stated in the null allowed the inference that both creditworthiness and ecommerce capabilities were critical drivers of organizational performance, albeit the latter variable is statistically superior in this respect. Given the managerial implications of the study, another unique contribution of the study relates to using secondary data set on U.S. female entrepreneurs to examine the research questions---an uncommon approach in the literature (Oladapo & Onyeaso, 2018).

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