

HOW AND WHEN DOES BIG DATA ANALYTICS CAPABILITY CONTRIBUTE TO MARKET PERFORMANCE?

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Description: This study looks at the relationship between big data analytics capability and market performance and how this relationship can be facilitated by adopting disruptive business models in competitive environments.

EXTENDED ABSTRACT

RESEARCH QUESTION

Despite prior research demonstrating a potential direct relationship between BDAC and performance, the mechanisms, and conditions under which this relationship occur is not fully understood. Importantly, theoretical articulation is limited on the mechanisms that explain how BDAC,

as a data-driven knowledge-based resource, contributes to firm performance (Yasmin et al., 2020; Ferraris et al., 2019). Additionally, past research has ignored the conditions under which BDAC drives performance; thus, denying scholars and managers knowledge about when BDAC becomes an enabler of firm performance (Vitari & Raguseo, 2020).

This study addresses these two deficiencies by drawing insights from the Knowledge-based view (KBV) and contingency theory to explain how disruptive business model – “activity systems that include new partners and activities configured in a way that is unprecedented in comparison to existing incumbents” (Snihur, Thomas, and Burgelman 2018, p. 1279) – acts as a facilitating mechanism on the relationship between BDAC and performance, and the extent to which this relationship is dependent upon different magnitudes of competitive intensity – “the behavior, resources, and ability of competitors to differentiate” (Jaworski & Kohli, 1993, p. 60).

By doing so, this study addresses three interrelated research questions: (1) how does BDAC contribute to improvement in market performance; (2) how does disruptive business model (DBM) act as a facilitating mechanism on the BDAC–market performance relationship; and (3) to what extent does competitive intensity condition the relationship between BDAC, disruptive business model, and firm performance?

METHOD AND DATA

The first stage of the data collection process involved conducting in-depth interviews with 15 small, medium, and large organizations in the United Kingdom (UK). We thereafter proceeded to the quantitative approach based on findings from the exploratory study in order to ensure that the study’s conceptual framework was tested empirically. Following relevant precedent (e.g., Wamba et al., 2017), the study began with assessment of extant literature on the dimensionality of BDAC and its performance outcomes using KBV and contingency theory as theoretical lenses. In addition, the data

collection instrument was first pretested by twenty-five managers in order to ensure that the questionnaire was well understood. The conceptual model of this study was empirically tested on primary data from 360 firms in the United Kingdom.

The measurement properties of the multi-item constructs in the conceptual model were evaluated using CFA. The items were restricted to load on their preassigned factor, while the latent factors were set to correlate freely (Gerbing & Anderson, 1988). Overall, two CFA models were estimated for the first- and second-order factors respectively in order to maintain acceptable observation-to-parameter ratios.

To ensure robust results, we used dual methods consisting of both covariance-based structural equation modelling (CB-SEM) and a series of ordinary least squares (OLS) regressions to test the hypotheses. Following Ping (1995), a multiplicative CB-SEM approach using the ERLS method was used to test the moderating effect hypotheses.

SUMMARY OF FINDINGS

This study argues in hypothesis 1 that BDAC is positively related to market performance. This hypothesis is supported as both the CB-SEM and OLS results show that BDAC is positively associated with market performance ($p < 0.05$). Hypothesis 2, as an alternative argument to H1, argues that how BDAC contributes to improvement in market performance is channeled through disruptive business model. To account for mediating path, a mediation test was conducted using the SPSS macro syntax PROCESS as this estimation method allows for use of bootstrapping procedures to estimate of indirect effect paths (Hayes, 2009, 2017). Mediation is supported if the confidence interval does not include zero and is rejected if the confidence interval includes zero values (Zhao, Lynch Jr, & Chen, 2010). The results support the hypothesis as the conditional indirect effect does not contain zero values (Preacher & Hayes, 2004; Yoshida, Sendjaya, Hirst, Cooper, 2014). Therefore, the conditional

indirect effect of BDAC on market performance through disruptive business model is positive and significant at $-1SD$ below the mean (LLCI = .0213; ULCI = .1236), Mean (LLCI = .0503; ULCI = .1592), and $+1SD$ above the mean (LLCI = .0699; ULCI = .2076).

An additional alternative argument to H1 and H2 is captured in H3 that argues that the positive association between BDAC and market performance through disruptive business model is strengthened when levels of competitive intensity increase in magnitude. Results show that H3 receives support from the data in the SEM results ($\beta = .16$; $p < 0.001$), OLS results ($\beta = .07$; $p < 0.05$), and SPSS process results as the index of moderated mediation does not contain zero values ($\beta = .028$; LLCI = .0072; ULCI = .0484). Thus, the indirect association between BDAC and market performance through disruptive business model is strengthened as competitive intensity takes on larger values above the mean.

STATEMENT OF KEY CONTRIBUTIONS

By extending the Resource Based view, this study draws insights from the Knowledge based view logic and empirical data to demonstrate that beyond the widely accepted direct association between BDAC and market performance, BDAC is also indirectly related to market performance by contributing to firms' ability to develop disruptive business models (DBMs). As Xu, Frankwick, and Ramirez (2016) and Chaudhary, Pandey, and Pandey (2016) suggest, a greater capability in big data analytics might not contribute to competitive advantage, rather from a KBV perspective, sustained competitive advantage may emerge when BDAC is used to develop data-driven customized knowledge and insights that allows firms to proactively use DBMs to provide new combinations of solutions that market rivals might find unrealistic to duplicate.

An additional deficiency in the BDAC literature is a lack of articulation of the conditions under which investment in BDAC pays off. The existing literature suggests that greater investment in big data analytics capability is a good thing to do because big data provides firms with economic benefits

(Mills, 2019). However, some studies have raised questions about whether big data is always a useful determinant of business success (Côte-Real, Oliveira, and Ruivo 2017; Ross, Beath, and Quaadgras 2013). This study draws on the contingency theory to argue that the economic benefits of investing in BDACs and DBMs might not be realized in an environment characterized by low and predictable competitive activities.

An implication for big data managers is that it is important to mobilize resources within and beyond the organization to build big data related capabilities to pioneer DBMs to generate sustained performance. As such organizations can facilitate the development of DBMs by investing in personnel expertise in big data analytics (Ciampi et al., 2020) and developing an organizational culture that prioritizes data-driven and evidence-based decision-making (Mikalef et al., 2019a).