Analytical Capability and Firm Performance

TREO Talk Paper

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Abstract

A rising topic in information systems (IS) research and practice is the role of business analytics (BA) in firms and its impact. While prior works have primarily focused on the technical and methodological aspects of analytics (e.g., applying analytics techniques to predict outcomes of interest), this study focuses on developing the notion of analytical capability enabled by various BA techniques and applications, and its impact on firm performance. We define analytical capability as the extent to which a firm is able to develop and leverage BA techniques and applications for decision support and firm success. Although prior studies assessed the role of BA in certain domains such as customer service and supply chain, a holistic view of analytical capability in firms is still largely unknown. In particular, there is a need to conceptualize and operationalize analytical capability as a multidimensional concept and examine how it can lead to operational and strategic outcomes. Our broad research question is: how is analytical capability associated with firm performance?

We suggest that absorptive capacity (ACAP), a firm’s ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends, will be a key mediating mechanism between analytical capability and firm performance. We adopt a dichotomized view of ACAP—potential (PACAP; identifying and acquiring external knowledge) and realized (RACAP; internal knowledge transformation and exploitation) from prior research. We suggest that analytical capability can play an important role in external knowledge acquisition and internal knowledge utilization. This relationship will be moderated by environmental turbulence, which refers to the rate of change and complexity in the external environment, such as technological change and market uncertainty. We draw on a pair of adaptive capabilities to reflect the firm’s ability in leveraging knowledge resources to cope with changing environments: dynamic capabilities (adapt to predictable environmental changes, like waves) and improvisational capabilities (adapt to unexpected situations, like storms). Both address the firm’s adaptive ability and serve as outcome of interest. Firm performance has been shown to be positively associated with adaptive capabilities in prior research. Our key hypotheses include:

H1: Analytical capability is positively associated with PACAP (H1a) and RACAP (H1b).
H2: The positive associations between analytical capability and PACAP (H2a)/RACAP (H2b) are moderated by environmental turbulence, such that PACAP (H2a)/RACAP (H2b) will be stronger when environmental turbulence is high.
H3: PACAP (H3a) and RACAP (H3b) are positively associated with dynamic capabilities.
H4: PACAP (H4a) and RACAP (H4b) are positively associated with improvisational capabilities.
H5: PACAP and RACAP partially mediate the effect of analytical capability on dynamic and improvisational capabilities.

We plan to collect data through a matched-pair field survey across U.S. firms. Survey instruments will be pilot tested to ensure clarity and accuracy. Two questionnaires will be developed and distributed via email to 1,000 firms. The one for examining the firm’s analytical capability will be sent to IT executives (e.g. CIOs, CTOs, IT directors/managers), while the other one with questions related to firm performance, absorptive capacity, adaptive capabilities, and environmental turbulence, will be sent to business executives (e.g. CEOs, COOs). We will evaluate the measurement model using psychometric approaches, and test the structural model using SEM.

This study aims to contribute in several ways. First, it explores how BA facilitates organizational learning and capabilities. Second, it assesses the association between analytical capability and firm performance in a generalized setting. Third, we juxtapose two prevailing theoretical views from the strategic area, ACAP and adaptive capabilities, as a holistic mechanism to study antecedents of firm performance.