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The Impact of Big Data Capability on Supply Chain Dynamic Capability and Dynamic Innovation Capability

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1. INTRODUCTION AND RESEARCH FRAMEWORK

Big data is being produced from all industries at an unprecedented rate^[1]. However, very few companies in practice have obtained benefits from big data, though with surge of investments in it^[2]. Meanwhile, empirical research on the value of big data is still at a rudimentary stage. There is limited understanding about how the investments in big data may lead to measurable business value, and what is the impact of big data capability (BDC) of a company on its the other capabilities. This article aims to partly address these issues.

BDC is the big data awareness presented by companies in the process of big data development, management and utilization^[3]. The BDC of a company keeps changing over time with the improvement of analysis technology and market changes. Thus, BDC is an important dynamic capability of companies. In order to realize the potential value of big data, companies need to develop BDC to extract relevant information and take use of it to make decisions^[4].

In order to address the critical gaps in the literature and the practice, and to explore the potential value of BDC, this article focuses on the potential impact of big data capability on companies. Specifically, what is the impact of big data capability of a firm on its supply chain dynamic capability (SCDC) and dynamic innovation capability (DIC)? Grounded on resource-based view, supply chain theory, innovation theory, and expert interview, the hypotheses and research framework are proposed as below (Figure 1):

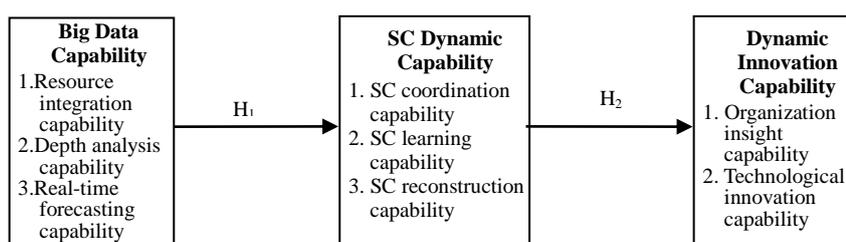


Figure 1. The conceptual framework

Considering only large organizations can afford surge investments on big data at present^[5], we used a dataset derived from a data mining survey of 303 listed hi-tech companies in China to assess the level of BDC, SCDC, and IDC, and further, to test their relationships. Partial least squares (PLS) modeling is applied to test the proposed model and hypotheses.

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2. MAJOR FINDINGS AND CONCLUSIONS

Grounded on dynamic capabilities view and empirical study, this article found

- A sub-capability of BDC, resource integration capability, has positive and significant impact on all of the three sub-capabilities of SCDC.
- However, the other two sub-capabilities of BDC, namely, in-depth analysis capability, and real-time forecasting capability, do not show significant impact on any of the three sub-capabilities of SCDC.
- Meanwhile, all of the three sub-capabilities of SCDC have shown positive and significant impact on all of the two sub-capabilities of DIC.
- Further, according to total effect, resource integration capability has positive and significant impact on all of the two sub-capabilities of DIC.
- However, the other two sub-capabilities of BDC have not shown significant impact on any sub-capabilities of DIC.

3. CONTRIBUTION AND FUTURE STUDY

This study makes several contributions to the literature. BDC is a new type of competitive capability. This paper is one of the first with attempt to explore the impact of BDC of a firm on its other important competitive capabilities. Further, this paper is the first trying to explore further the impact of sub-capabilities of BDC on the sub-capability of SCDC and of DIC.

First, we believe that BDC is a kind of rare and intangible knowledge capability of a company. Then we proposed three dimensions of BDC based on existing research, including: resource integration capability, in-depth analysis capability, and real-time prediction capability. Further, we designed the measurement items of these three dimensions, and with which to measure and assess the levels of BDC and its sub-capabilities.

In addition, we proposed a big data-supply chain-innovation Model, which include three main parts: BDC, SCDC, and DIC. The model can be used to understand and assess how each sub-capability of BDC helps to improve each sub-capability of SCDC, and further contribute to a higher level of each sub-capability of DIC with the mediating effects of the increased SCDC.

Considering that BDC is at initial stage currently and will continue to develop quickly in the foreseeable future, we believe the influence of (sub-capabilities of) BDC on companies' other capabilities is dynamic and changing with its own development. Thus, it would be meaningful to check the influence of (sub-capabilities of) BDC further at different development stage of big data technology in future study.

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