Summer 5-28-2021

The Relationship Amongst Big Data Capability, Supply Chain Dynamic Capability, And Dynamic Innovation Capability

Guangqian Peng
College of Business Administration, Capital University of Economics and Business, China, gqpeng@cueb.edu.cn

Yang Zhang
College of Business Administration, Capital University of Economics and Business, China

Ping Gao
School of Environment, Education and Development, The University of Manchester, United Kingdom

Junfeng Yin
Patent Examination Cooperation (Beijing), Center of the Patent Office, China

Full Research Paper

The Relationship Amongst Big Data Capability, Supply Chain Dynamic Capability, And Dynamic Innovation Capability

Guangqian Peng[1*], *Yang Zhang*[1], *Ping Gao*[2] , *Junfeng Yin*[3]

[1]College of Business Administration, Capital University of Economics and Business, China

[2]School of Environment, Education and Development, The University of Manchester, United Kingdom

[3]Patent Examination Cooperation (Beijing), Center of the Patent Office, China

1. INTRODUCTION AND RESEARCH FRAMEWORK

With the thriving of digital age, big data is being produced from all industries at an unprecedented rate. This induces organizations to attempt to leverage big data in order to create vale. However, very few companies in practice have so far obtained benefits from big data, though with surge of investments in it. Meanwhile, there is still limited studies in academy on what business value can be derived and how to be derived from big data [1-2].

To realize the potential huge value of big data, companies need to develop organizational big data capability to extract relevant information and make sense of it to make decisions. The big data capability of a company is constantly changing over time, including the improvement of analysis technology and market changes. In other words, big data capability is an important dynamic capability of enterprises.

In order to address the critical gaps in the literature and the practice, and to explore the potential value of big data capability, hereby we propose the central research question as: what is the impact of big data capability on companies? To approach the answer to this research question, the sub-research questions are proposed as:

- What are the impacts of big data capability on companies' other dynamic capabilities, specifically, on supply chain dynamic capability?
- What are the impacts of big data capability on companies' other dynamic capabilities, specifically, on dynamic innovation capability?

Grounded on resource-based view, supply chain theory, innovation theory, and expert interview, the hypotheses and research framework are proposed herein (Figure 1).

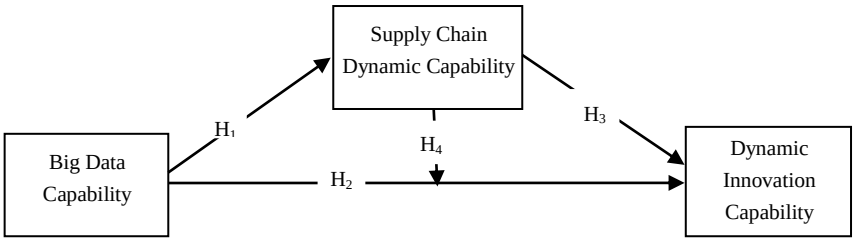

Figure 1. The conceptual framework

The dataset was derived from a data mining of 303 listed hi-tech companies in China. The firms ages range from 3 to over 15 years. Construct validity and reliability were examined. We conducted partial least squares (PLS) modeling to test the proposed model and hypotheses. The overall model explains about 67.5% of the variance of the endogenous constructs, which indicates a satisfactory model fit [3].

* Corresponding author. Email: gqpeng@cueb.edu.cn (Guangqian Peng). Gratitude goes to the National Natural Science Foundation of China (Grant 71472128).

2. MAJOR FINDINGS

This study observed some valuable and interesting findings: (1) The results indicate that, generally speaking, the level of big data capability of the companies in China are still in its infancy. (2) Although so, a company's big data capability already tends to significantly help to improve its supply chain dynamic capability. (3) However, strangely, the big data capability of a company does not necessarily help to improve its dynamic innovation capability currently. On the contrary, the current direct effect of big data capability on dynamic innovation capability tends to be significantly negative. These results are in line with the studies by Shah *et al.* (2012)[4] and Wamba *et al.* (2015)[5]. In our opinion, the possibly reason is that big data capability is just initiated recently in most companies, thus, may lead to certain disorders. (4) Meanwhile, a company's supply chain dynamic capability tends to influence its dynamic innovation capability directly and positively. (5) Moreover, supply chain dynamic capability has shown mediating and moderating positive effects on the relationship between big data capability and dynamic innovation capability. (5) Furthermore, owing to the positive mediating and moderating effects of supply chain capability, big data capability tends to have positive total effect on dynamic innovation capability.

3. CONTRIBUTION

This study is amongst the first to explore the potential impact of big data capability on companies' other dynamic capabilities.

First, this study called on scholars and practitioners to distinguish amongst big data, big data analytic capability, and big data capability. Then, based on extant literature and field study, it proposed three dimensions of big data capability, including: resource integration capability, depth analysis capability, and real-time prediction capability. Further, we designed the measurement items of these three dimensions, which can be used to measure and assess the levels of big data capability and its sub-capabilities of a company.

Moreover, grounded on supply chain theory and innovation theory, this study proposed a Big data-supply chain-innovation Model, which is composed of three main parts: big data capability, supply chain dynamic capability and dynamic innovation capability. The model can be used to understand, examine, and assess the impact of big data capability on companies' other dynamic capability. Specifically, this model can be used to understand, examine, and assess how big data capability can help to improve supply chain dynamic capability, and further contribute to higher dynamic innovation capability (indirectly currently).

This study also contributes to the extension of our knowledge on the impacts of company characteristics on the interrelationship of big data capability and companies' other dynamic capabilities. An important finding herein is that company characteristics (firm age, size, and ownership) are likely to affect the levels (magnitude) of supply chain dynamic capability and of dynamic innovation capability, but do not necessarily change the interrelationships between big data capability, supply chain dynamic capability, and dynamic innovation capability.

REFERENCES

[1] Gupta M, George JF (2016). Toward the development of a big data analytics capability. Info&Manag 53(8): 1049-1064.

[2] Mikalef P, Boura M, Lekakos G, and Krogstie J. (2019). Big data analytics capabilities and innovation: the mediating role of dynamic capabilities and moderating effect of the environment. Brit J of Manag 30(2): 272-298.

[3] Hulland J. (1999). Use of Partial Least Squares (PLS) in Strategic management research: a review of four recent studies. Strateg Manag J 20(2): 159.

[4] Shah S, Horne A, and Capella J. (2012). Good data won't guarantee good decisions. Harv Bus Rev, 90(4): 23-25.

[5] Wamba F F, Akter S, Edwards A, Chopin G, and Gnanzou D. (2015) How 'big data' can make big impact: findings from a systematic review and a longitudinal case study," Int'l J of Prod Econ, (165): 234-246.