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Research on Supply Chain Resilience and Core Competency: Considering Big Data Analytics

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Abstract: There are several uncertainties in the current global economic and political situation, which are compounded by natural catastrophes and other emergencies. Frequently, corporate supply chains have become more vulnerable and face enormous risks of supply disruptions, putting supply chain resilience to the test. Supply chain rigidity can result in huge losses for the organization if the supply chain is suspended. In this setting, the notion of supply chain resilience emerges at a critical juncture in history. With the development of environmental uncertainty, supply chain flexibility is becoming increasingly vital for the practical relevance of the organization. Big data, artificial intelligence, and other technologies have had a significant influence on supply chain management in recent years, thanks to the ongoing appearance of new technology. Big data analysis capability is one of them, and it has a particularly large influence on supply chain resilience management as one of the critical competencies that supply chain organizations should have.

Keywords: Core competency; Resilience of supply chain; Big data

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1. Introduction

1.1. Research background

Due to the continual increase of consumer consumption levels and individualised demand since the beginning of the 21st century, the process of global economic integration has quickened, and company competition has increasingly converted into supply chain competition. Supply chain management is now widely considered as a management philosophy as well as a type of company. The meaning of supply chain has deepened with the expansion of business ecology, and it has become the key for businesses to gain competitive advantages and increase their competitiveness.

While economic globalisation has provided benefits to the corporate sector, it has also created obstacles, such as increased market competitiveness, consumer expectations, supply chain risk, and complexity. Currently, the COVID-19 epidemic is wreaking havoc on the global economy, causing a slew of issues related to inefficient supply networks. The influence of COVID-19, for example, has had a significant impact on the whole global supply chain system. The administration and distribution of medical and food supplies, in particular, were out of order. Ironically, it was due to inadequate supply chain management, not a scarcity of these critical items, that thousands of gifts were backlogged and stacked up in Red Cross warehouses. The horrific epidemic that killed thousands of people due to a lack of food and medical supplies enhances public awareness of the uncertainties, dangers, and flaws in supply chain management [1].

To address the aforementioned flaws, one option appears to be the use of new technologies in supply chain management, with big data technology being one of the most promising. The application of big data is seen to have the potential to disrupt the existing ways of managing supply chains, which are fragmented and characterised by pricing negotiations, restricted information interchange, and internal rivalry that takes place behind closed doors [2]. In 2015, China's State Council announced the "'Internet Plus' strategy," which encourages the integration of big data technologies with the Internet of Things (IoT) to improve data gathering, analysis, tracking, and resource management in many industries (China Daily, 2015). From a policy perspective, this provides a framework for using big data to manage supply chains. Furthermore, China is presently vying with the United States in the sphere of high-tech industries, whereas the United States has heavily invested in the use and study of big data as a pillar of rising industry growth. The implementation of its surveillance systems, such as the traffic surveillance system, is an example of effective big data application in China. The successful examples may inspire new sectors, and they are thought to help even the poorest regions.

1.2. Main research objective

However, because the issue of big data and supply chain management is still relatively new, there is a shortage of literature on the subject. As a result, the suggested study's goal is to investigate the link between corporate supply chain resilience and core competency using big data analytics. The study tries to answer this issue in the context of Chinese e-commerce businesses [3]. The study's projected results will fill in the gaps in knowing how to deal with uncertainties and risks utilising a big data enhanced supply chain, as well as give some insight into e-commerce firms' readiness to use the mode of big data enhanced supply chain in China.

2. Literature review

2.1. Supply chain resilience and big data

The literature on supply chain resilience has focused on the significance of supply chain resilience to business resilience and its links to an enterprise's core capability. In particular, supply chain management must employ new strategies to provide improved responses to consumer requirements in an unpredictable environment, implying that supply networks must be structured to be competent and nimble in the face of disruptions [4]. Resilience has been characterised in several studies as "...adaptive competence and capacity, preparedness, responsiveness, connectivity and control, as well as rapid recovery to the original or, preferably, enhanced condition" [5]. Nevertheless, supply chain resilience has not been considered in terms of cost efficiency (considering that a resilient supply chain is not always the most cost-effective), even if, as the World Economic Forum [6] states, supply network resilience and cost efficiency may be complimentary. Only the responsibilities of critical links, stages, or stakeholders in developing a resilient supply chain have been explored in previous research. Tukamuhabwa [5] investigated constructing strategies using a comparative dynamic system, while Lee & Rha [7] discussed the need of having strategies with dynamic capabilities. As a result, there may be a theoretical study vacuum in the literature of supply chain resilience as to whether a big data augmented supply chain may serve as a source of supply chain resilience while still being cost effective. Risks, costs, and data related to the flow of resources may thus be detected and analysed utilising the resources-based approach and risk management [8] from both a risk management and cost efficiency perspective. Apart from resources, information flows through various operations and supply chain management (OSCM) processes and among important stakeholders, allowing the roles and functions of big data to be examined.

As a result, supply chain resilience may be investigated by taking into account both risks and costs throughout a big data enhanced supply chain (BDSC). When studying the possibilities of big data technology in OSCM, researchers have used the phrase big data in a variety of ways, referring to the many functions, forms, and roles that can be utilised in OSCM. Many research [9-12] have looked at the possibilities of using big data predictive analytics to improve business values and company performance. However, the predictive capacity of big data has yet to be conceptualised in terms of supply chain resilience. In practise, as Tiwari, Wee, and Daryanto [12] concur, many managers have struggled to deal with the massive volume of data generated by end-to-end OSCM. As a result, adopting big data predictive analytics in OSCM may assist in providing predictive power to improve prediction accuracy and minimise uncertainty for businesses to obtain competitive advantages [13]. In general, the key word in applying big data in OSCM studies has been "transfer," which has included a) transferring the traditional top-to-bottom management hierarchy toward a predictive analytics and big data assimilation OSCM [11] and b) using big data to transfer traditional supply chain management practises and operations from location-based marketing to supply chain inventory optimization in order to achieve supplier risk assessment [14]. Furthermore, certain research, such as Lamba & Singh [15], have recognised the major areas of big data use in OSCM, like manufacturing, procurement and logistics, where they did not clearly identify the specific subfield of big data technology to be used in the three areas. Barbosa et al. [16] concluded the demand management and order fulfilment processes were the primary areas where predictive analytics of big data can be applied.

Aside from the numerous research concentrating on Big Data's analytical capacity and uses in various OSCM sectors, other studies have highlighted the significance of clearly defining Big Data's applications at various phases of OSCM. For example, in the field of OSCM, Brinch [17] and Richey et al. [18] characterised Big Data as having four dimensions: veracity, velocity, volume, and variety (four Vs), each of which has to be tied to OSCM strategy and performance. Barbosa et al. [16] and Addo-Tenkorang & Helo [19] offered a value-adding viewpoint of using big data in OSCM, combining the four "Vs" to produce value in controlling the whole corporate supply chain.

2.2. Contribution and research gap

To summarize the potential research gap, first, the integration of big data into OSCM has not been theoretically framed in literature of supply chain resilience. Second, rarely has studies attempted to understand the role of BDSC in building both supply chain resilience and core competency of firms, considering the co-existence of resilience and cost efficiency. For an example, how big data can help reduce risks and uncertainties so as to bring value (what value) to firms. Third, although many studies have started the discussion of applying big data technology in OSCM, the integration of big data into OSCM has being at an early stage, and thus rarely have studies attempted to applied big data technology in real business context or cases. Last, given the fact that new implementations in supply chain are shifting from big data to a broader concept of distributed ledger technology, such as blockchain, research needs to consider the integration of other types of new IoTs into the application big data in OSCM.

3. Research objective and research questions

The big data technology is still in its early-stage development. Nevertheless, it has already showed considerable potential for future development, especially in the field of OSCM. The proposed study aims to identify opportunities of integrating big data analytics into every stage of supply chain management, namely big data-enhanced supply chain, given the potential risks and uncertainties in the current global business environment. Specifically, from a risk management and cost efficiency perspectives. Besides resources flow, information flow across different OSCM processes and amongst the key players, and thus

the roles and functions of big data can be analysed with the information flow.

Disclosure statement

The author declares no conflict of interest.

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