Development of Analytics Capability in Supply Chain Organizations

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Developing analytics capability has become one of the main priorities in organizations today. Despite the increasing use of analytics, the necessary conditions to obtain the expected benefits from such investment still need to be examined. Supply chain process integration enhances firms' analytics capability. Analytics capability alone is not sufficient in improving firm performance; it must be complemented with employees' analytics skills.

analytics capability supply chain process integration firm performance employees' analytics skills

1. Introduction

Recently, data analytics has gained significant attention from both practitioners and academics. Many firms have attempted to incorporate analytics in order to improve their performance. According to reports, analytics is among the top priorities in organizations' agendas [1]. One of the areas that deploying analytics would have great impacts on is supply chain management [2]. According to a survey conducted by Accenture, more than one-third of surveyed organizations reported that they were starting to integrate data analytics in their supply chain management [3]. Despite the promising benefits of analytics for organizations, reports and studies show that many organizations still do not receive their expected outcomes from using analytics (e.g., [4][5][6][7][8]). A reason for this unsuccessful employment is that many organizations are not still completely familiar with the necessary conditions for utilizing data analytics effectively [9]. Existing evidence of the use of supply chain analytics is mostly anecdotal [10][11][12][13] or comprises cases and applications that are specific [14][15][16]. Hence, the use of analytics in supply chain management and the role of supply chain elements are still largely unknown.

To better understand the integration of analytics and supply chain elements, relying on organizational information processing theory (OIPT) [17][18][19][20], researchers examine the role of supply chain process integration and employees' analytics skills in improving analytics-based performance. Using OIPT, researchers examine the effects of lateral relations and vertical information systems on increasing the information processing capacity [19], which leads to enhancing the organization's performance. The current literature has mostly explored the technological aspects of analytics; hence, analytics capability has mainly been conceptualized as the ability to utilize tools and technology for processing data and gathering relevant insights [21][22][23]. Following the study by Srinivasan and Swink [20], researchers use an expanded definition for analytics capability which includes "organization and process

elements of analytics capability, positing that, from an organizational information processing theory perspective, processing large volumes and varieties of data is both a challenge and an opportunity" ([20], p. 1850).

2. Organizational Information Processing Theory (OIPT)

As an essential resource, information should be utilized effectively by firms, especially in uncertain environments [17][18]. According to OIPT, in uncertain situations, organizations may follow two strategies: develop mechanistic organizational processes to reduce their needs for information; or enhance their information processing capacity [17][18]. Galbraith [18] suggests that firms may reduce their information processing needs by developing slack resources and/or developing self-contained tasks; however, these actions require great investments, and they do not enhance the firms' responsiveness [20].

The alternative strategy is to increase the information processing capacity, which can occur by investing in lateral relations and vertical information systems [24]. Lateral relations can include firms' processes and relationships that are associated with external sources (suppliers and customers) and the internal integration of functions within the firm. For instance, firms that engage in supply chain integration increase their information processing capacity through enhancing their lateral relations [24]. The other way to increase the information processing capacity is by employing vertical information systems, which refer to mechanisms that enable firms to process information efficiently during task performance [17][24].

3. Supply Chain Integration

Supply chain process integration is defined as "the degree to which a focal firm has integrated the flow of information, material, and finances with its supply chain partners" ([25], p. 230). According to the current literature, supply chain process integration consists of three parts: integrating information flow, physical flow, and financial flow [25][26]. Integrating information flow refers to the extent to which a firm shares operational, tactical, and strategic information with its supply chain partners. Specifically, a firm needs to share its supply-and-demand-related information to have a successful integrated information flow [25][27]. Information flow integration allows firms to better understand and anticipate the changes in the customer and supply markets. Physical flow integration is defined as the firm's level of using global optimization with its supply chain partners to manage and control the flow of materials and goods [25]. Physical flow integration is the building block of efficient inventory management and enables firms to implement some of the well-known yet complex supply chain strategies, such as just-in-time and mass customization [28]. Financial flow integration refers to the exchange of the financial resources with the supply chain partners [25]. Some examples of financial flows are prices, invoices, payments, account payables, and credit terms [25][27].

4. Analytics Capability

Analytics capability has been used in current research to refer to the capabilities that allow firms to collect, process, and analyze data in order to drive valuable insights (e.g., [29][30][31][32]). According to current reports, many organizations are investing heavily in technology to help them manage and analyze their ever-increasing data [33]. Despite this growing popularity, the academic literature on data analytics capability is still nascent [20][34], and most of the existing studies are conceptual [35]. Moreover, there are some inconsistencies in the findings of the current literature. Most of the existing studies emphasized the use of IT tools as data analytics capability [36]; however, according to the study of Srinivasan and Swink, analytics capability includes both IT tools and firms' processes. Hence, researchers define analytics capability as organizations' investments in developing the required tools, techniques, and processes to be able to process, organize, and analyze data to gain critical insights [20].

The existing studies have explored the role of analytics capability in enhancing organizations' performance and have defined different elements that can increase firms' analytics capability. For instance, a firm's size has been found to be positively associated with a firm's analytics capability [37]. Studies suggested that firms' managerial practices and data capability are essential factors in driving better performance [38]. Specific to the supply chain, studies have shown that analytics capability increases supply chain agility, which leads to a competitive advantage of the firms [39] and enhances the supply chain resilience [40]. Moreover, studies have suggested different supply chain related factors that can lead to analytics capability. For instance, supply chain visibility has been found as a functional resource for developing analytics capability [20]. Another stream of research has studied the relationship between analytics capability and sustainable supply chains; for instance, Cetindamar et al. [41] conducted an exploratory study and suggested that data analytics capability can play a critical role in developing sustainable practices in organizations.

Recent studies [42][43] have argued that the integration of supply chain resources would lead to improved data analytics capability and called for future studies to empirically test this argument. To follow these recent calls, one of the main objectives of the study is to empirically test the effect of supply chain process integration on data analytics capability.

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