Empirical Studies on the links between IT, Operational Effectiveness and Firm Performance

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Abstract

Over the last few decades, there has been phenomenal advancement in Information Technology and allied services. Digitization in the form of Social, Mobility, Analytics, and Cloud (SMAC) is poised to establish a new paradigm of IT-enabled business processes. Not far behind is the adoption of Big Data and the Internet of Things. These changes allow firms to create competency by providing faster and efficient information processing capability, thereby easing the information processing burden on managers. Firms in search of new customers are extending operations to non-host territories and thereby maintaining top-line growth. Coincidentally, on the supply side, to support the bottom line, firms are continually looking for cheaper factors of production (e.g., labor, material). As a result, both upstream and downstream supply chains are stretching. Diversification is aiding complexity regarding the need for colossal information processing and dissemination of insights within a firm's internal functions and beyond. Digitization has been the keyword in present-day organizations. Due to this rapidly evolving business landscape and constantly improving IT capability, there is a need to visit new causal links between IT/ICT components and operational performance indicators. Specifically,

the focus of supply chain management is shifting from merely managing material to managing all the three essential flows, namely information, finance, and material together. Hence, aspects like supply chain finance, trade credit management, or supply chain agility are gaining importance. However, research investigating the effect of IT/ICT components (both traditional and emerging) on these evolving supply chain performance indicators are lacking. In this thesis, we venture to bridge this research gap. We grounded this thesis on the premise that under current circumstances, conventional (i.e., infrastructure, labor) and emerging (e.g., analytics, IoT) IT artifacts play a decisive role in managing less explored operational performance indicators (e.g., trade credit management, supply chain agility).

This dissertation is based on four independent and fairly exhaustive studies where we explored the links between different IT/IS artifacts, operational effectiveness, and firm performance. We explore IT infrastructure, IT labor, Analytics, and IoT based on smart RFID as four key IS artifacts. Likewise, on the operational effectiveness dimension, we explored the indicators such as supply chain finance, trade credit, and supply chain agility as a proxy of supply chain management operational effectiveness indicators. We examine how the above-mentioned operational indicators impact overall firm performance and the role of different IS/ICT artifacts (i.e., IT infrastructure, IT labor, Analytics) influencing the same. The second and third chapters are based on secondary data, whereby and fourth chapter is based on primary data. The fifth chapter is based on publicly available research publications.

We begin by setting up the context by elaborating the current challenges faced by supply chain managers based on practice-based industry reports and academic research in the first chapter. We also elaborate on the core IT, operational effectiveness variables in light of the current research work and briefly elaborate on our contribution. In the second chapter, we study

the contingent effects of IT infrastructure intensity on the relationship between firm-level supply chain finance indicators and firm performance. We observe a significant contingent effect of IT infrastructure on the relationship between days inventory outstanding (DIO) and days payable outstanding (DPO) to firm performance. In the third chapter, we review the effect of IT labor intensity on firm performance and the role of trade credit management (also known as receivable management). Trade credit is critical functionality for managing supply chain operations as well as financing working capital. Evidence from this chapter suggests a significant indirect effect of IT labor on firm performance while trade credit acts as a mediator. In the fourth chapter, we explore the relationship between supply chain analytics and supply chain agility. Using a web-based survey of senior supply chain managers based out of Indian firms, we observe supply chain analytics has a significant impact on firm performance, while supply chain agility help mediate this benefit. We adopt the SCOR framework to define analytics usage in different sub-processes (i.e., plan, source, make and deliver). The second, third and fourth chapters are independent empirical investigations where we used different data sets and research methodology to seek insights about some of the less explored causal links between IT and operational effectiveness indicators. We also covered detailed discussions on managerial and academic implications, limitations, and future research extensions.

In the fifth chapter, we navigate the extant literature on IoT in supply chain management and logically establish the current research agenda as well as future research possibilities. Mainly, we focused on the adoption of IoT using smart RFID in supply chain processes. In this structured literature review we also, pinpoint core research methodologies that are currently prevailing in the academic world. We observe the majority of IoT in supply chain research is primarily at the conceptualization stage with minimal analytical models. Empirical studies

exploring specific usage of IoT using RFID or otherwise and the potential impacts in supply chain processes and firm performance are minuscule. We observe using a sub-process level heat-map matrix; currently, research is focused on piecemeal applications ignoring the full capability of IoT.

The findings of this thesis have important managerial and as well as scholarly implications. Our work establishes empirically that conventional and emerging IS artifacts play a decisive role in managing the operational effectiveness of supply chain firms, especially operational indicators that are critical under contemporary circumstances. We hope that this thesis will create avenues and ideas for new research agenda in emerging trends in IS and supply chain management.