Big Data Analytics Capability and Governmental Performance:
An Empirical Examination

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ABSTRACT

Although governments are investing heavily in big data analytics, reports show mixed results in terms of performance. Whilst big data analytics capability provided a valuable lens in business and seems useful for the public sector, there is little knowledge of its relationship with governmental performance. This study aims to explain how big data analytics capability led to governmental performance. Using a survey research methodology, an integrated conceptual model is proposed highlighting a comprehensive set of big data analytics resources influencing governmental performance. The conceptual model was developed based on prior literature. Using a PLS-SEM approach, the results strongly support the posited hypotheses. Big data analytics capability has a strong impact on governmental efficiency, effectiveness, and fairness. The findings of this paper confirmed the imperative role of big data analytics capability in governmental performance in the public sector, which earlier studies found in the private sector. This study also validated measures of governmental performance.

KEYWORDS

Big Data Analytics Capability, Effectiveness, Efficiency, Fairness, Governmental Performance, Structural Equation Modeling

INTRODUCTION

Propelled by increased accessible infrastructure and computing power, and the acquisition of more volumes of data accumulate into big data it is thought to be one of the most valuable strategic business sources in the coming years (McAfee & Brynjolfsson, 2012). This impact of big data analytics is potentially noticeable in a wide variety of sectors. Many scholars stipulate the future importance and value creation of big data analytics in hospitality (Horng, Lio, Chou, Yu, & Hu, 2022), healthcare (Yu, Zhao, Liu, & Song, 2021), retail (Santoro, Fiano, Bertoldi, & Ciampi, 2019), circular economy (Kristoffersen, Mikalef, Blomsma, & Li, 2021), food industry (Chakraborty, Rana, Khorana, Singu, & Luthra, 2022), and supply chain (Gopal, Rana, Krishna, & Ramkumar, 2022). The same rule applies

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to the public sector. Big data analytics have potentially many advantages, in terms of smart services, intelligent adaptive forms and predictive service delivery to its citizen, if they are used efficiently and effectively (Merhi & Bregu, 2020), also for smaller governments like municipalities (Milakovich, 2012). For this reason, governments are investing heavily in (big) data analytics (Gartner, 2019).

To reap the benefits of big data analytics it is imperative to gain an understanding of how organizations build big data analytics capabilities. This is important since we know from previous research, that adopted the theoretical lens of the resource-based theory (RBT), that organizations achieve competitive advantage by building capabilities, which in turn are created by combining and deploying several resources. Based on the RBT, Gupta and George (2016) suggests that organizations should focus on creating a big data capability to achieve sustainable competitive advantage by integrating its tangible resources (e.g., data), human resources (e.g., technical skills) and intangibles resources (e.g., data-driven culture). They juxtaposed these three resources that together build a big data analytics capability. Studies found empirical evidence that these resources contribute to the organization's performance (Wamba, et al., 2017; Ferraris, Devalle, & Couturier, 2019; Mikalef, Krogstie, Pappas, & Pavlou, 2020). A big data analytics capability has thus been shown to positively impact business performance in studies on business organizations.

Unfortunately, how big data analytics capability creates value for the public sector is not sufficiently empirically assessed in the extant literature. Most reports on the value of big data to date have been from consultancy firms (e.g., EY, 2021), and conceptual studies (e.g., Merhi & Bregu, 2020) that lack empirical theoretical insight. As a result, there is limited understanding of how organizations should approach their big data initiatives and scarce empirical support to back-up the claim that these investments result in any measurable administrative value. This study extends the stream of research on big data analytics capability and organizational performance by examining factors that contribute to improved governmental performance because of investments in big data analytics. More specifically, the study aims to examine the following research question:

Does a big data analytics capability result in governmental performance gains?

This study addresses this research question by developing a conceptual model to study the big data analytics capability in relation to governmental performance (i.e., fairness, efficiency, and effectiveness). In doing so, concepts from the big data analytics capabilities literature are adopted (Gupta & George, 2016) that stem from business management research and combine these with governmental performance based on measures developed in public administration research (Kim, 2005; Brewer & Selden, 2000). To operationalize this, a survey was developed based on previous measures and was distributed to municipalities in the Netherlands. A robust quantitative analysis was performed by adopting a structural equation modelling approach. Our results indicate an imperative role of big data analytics capabilities as it significantly affects governmental performance.

The rest of the paper is structured as follows. In the literature review section that follows, the relevant academic literature is described in this study highlighting the need to look at the big data analytics capabilities of public organizations. In Section 3 the research model is introduced as are the corresponding research hypotheses. In Section 4, the followed research method is presented to actualize the study's objectives, followed in Section 5 by the empirical analysis and the outcomes that include an assessment of the measurement model and the structural model. Section 6 concludes by discussing the findings from a research and practical standpoint and outlining some key limitations that underpinned this study.

LITERATURE REVIEW

Big Data Analytics Capability

Big data analytics is generally characterized by its Three V's that have emerged as a common framework to describe big data (Chen, Chiang, & Storey, 2012): volume (refers to the large magnitude

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