

Big Data Technology Adoption in Chinese Small and Medium-sized Enterprises

W.K. Chong, K.L. Man, and S. Rho

Abstract— Enterprises adopt big data technologies in order to use real-time information from sensors, mobile devices, and cloud computing to achieve scalability, and to understand the flexibility of business operations in responding to change. However, the uptake of big data technologies faces several challenges, including data privacy, ownership of data, and legal and regulatory issues, to name a few. Whilst a number of papers have been written on this context, few attempts have been made to investigate the adoption of big data technologies in China. Particularly, little is known about the issues surrounding the adoption of big data in Chinese small and medium-sized enterprises (SMEs), which face unique challenges due to operational, strategic and cultural differences. This study will consist of two stages: a qualitative exploratory stage based in Suzhou Industrial Park (SIP), China in order to develop a theoretical framework for the study, and a quantitative confirmatory stage based in several cities in the Yangtze River Delta (YDR) region. YRD and SIP have been specifically recognized as global leaders in technological innovation, making them a suitable location for the study.

Index Terms— Big data technologies, Cloud computing, SMEs, Yangtze River Delta region

I. INTRODUCTION

DESPITE the explosion of the big data industry and the benefits and challenges of adopting big data technologies, little is known about the challenges faced by Chinese businesses in this regard. The majority of research on big data has concentrated on the perspective of western countries (e.g. [1], [2]). Only a few papers have addressed these topics in emerging economies. Due to the social, economic, political, technological and cultural differences between developed and emerging economies, firms from the latter may behave very differently. Investigating big data issues for firms from those economies could complement the current knowledge greatly. This study is based on the current literature, and uses China, as an important context, to answer the following research questions:

1) What are the drivers, motivators and facilitators of the adoption of big data technologies?

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*W.K. Chong is with the International Business School Suzhou, Xi'an Jiaotong-Liverpool University, Suzhou, China (phone: +86(0)512 8816 1717; fax: +86 (0)512 8816 1730 e-mail: woonkian.chong@xjtlu.edu.cn).

Ka Lok Man is with the Department of Computer Science & Software Engineering, Xi'an Jiaotong-Liverpool University, China (e-mail: ka.man@xjtlu.edu.cn).

Seungmin Rho is with the Department of Multimedia, Sungkyul University, Anyang, Republic of Korea (email: smrho@sungkyul.ac.kr).

2) What are the issues, concerns, and inhibitors with respect to the adoption of big data technologies?

The adoption of big data technologies poses several challenges, which have resulted in research by both academics and practitioners (e.g. [1], [2], [3]), identifying factors that influence the adoption of big data. Other researchers (e.g. [4], [5], [6], [7]) have investigated the challenges and barriers to big data technologies, emanating from privacy of data, the requirement for urgency, talent shortages, the lack of practice (e.g. inter-operability issues among big data applications, and legal and regulatory concerns), and the lack of educational institutions offering training, to name a few (please see Fig. 1). However, little research exists on the issues that are relevant to the Chinese context. The Chinese business environment differs in several ways from other business environments and is to some extent unique in terms of operational, managerial, cultural and strategic dimensions. The peculiarities of the Chinese business context imply that an investigation of the drivers of and challenges to big data technologies in China is merited. It is expected that such an understanding will help in the development of policies and strategies, and the shaping of organizational behaviors towards the adoption of big data technologies.

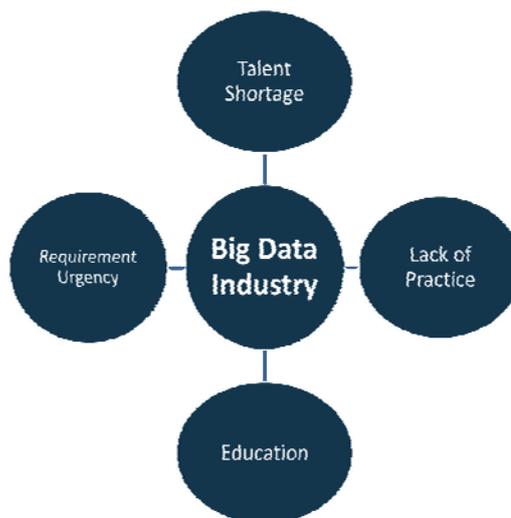


Fig. 1. Big data industry challenges

II. METHODS

A triangulation that combined qualitative and quantitative methods was determined to be the best approach for answering the research questions, as it would enhance the perceived quality of the research and provide the best means for exploring and examining the topic under study [8].

Specifically, the first stage of the proposed project will be exploratory research to identify potentially critical characteristics of big data technology adoption through qualitative methods. Data will be coded and analyzed using thematic analysis, namely template analysis. Subsequently, a theoretical research framework and specific research hypotheses will be proposed. We then propose to conduct a large sample survey to collect empirical data in several cities in the YRD region in order to test the hypotheses and verify the research framework. A quantitative approach will be used in stage 2, based on a survey, followed by statistical tests, namely structural equation modeling.

III. POTENTIAL CONTRIBUTIONS

Big data research in western economies has been the subject of a number of research papers. However, it has received relatively little attention in the Chinese context. We are therefore taking the initiative in this study. Through a literature review and pilot study, we will propose a conceptual framework, and empirically test and evaluate what are the drivers, motivators and facilitators of the adoption of big data technologies in China. Thus, the generated results will be both academically and managerially meaningful. Equally, the findings will have relevance for the Chinese Government.

From an academic perspective, this study will contribute knowledge to internet of things, data management and big data theories. We employ a mixed methods approach in this study, in order to build and improve a conceptual framework. Big data research has to date adopted single research methods. Thus our mixed methods approach represents a methodological contribution. Initially, a literature review will be conducted to help build the theoretical framework. Through the qualitative phase we will identify key factors for big data adoption and firm performance to try to enrich the previous framework. Several hypotheses will then be proposed. Finally, we will use a quantitative approach to address the validity of the framework, which is so far a relatively unused method in big data research.

From a managerial perspective, this study will provide an original attempt to develop a big data technology adoption model in the SME context. It is important for managers to develop a systematic approach for identifying and prioritizing key factors in the implementation process, in line with the environment in which the adaptation is located. Managers will be able to establish a comprehensive approach for manipulating and adapting each factor based on the findings and interpretations of this study. As the participants in the study will be SMEs or their partners, the findings will be generalizable to the population. We will present the key factors that managers may find useful for analyzing the big data adoption patterns in China. Firms need to be aware of their own particular market environment when determining a business strategy that will optimize overall firm performance through the combination of critical success factors.

From a governmental perspective, we will present a

strategic big data adoption model that will be useful for analyzing the big data industry patterns in China. Policy makers need to be aware of the country's particular market environment so as to develop effective big data "ecosystems" that are able to provide a portfolio of effective practices. Our proposed model could be a framework for the long-term viability of doing business in China, demonstrating how risks can be minimized so as to make China one of the easiest places in which to do business. This will be possible as we will seek to identify the importance of location-specific factors (for the YRD) relative to other factors in determining the performance of big data.

IV. CONCLUSION

This paper addresses the following two comprehensive research questions (RQs): (1) What are the drivers, motivators and facilitators of the adoption of big data technologies? (2) What are the issues, concerns, and inhibitors with respect to the adoption of big data technologies? The proposed framework is intended to be used as a guideline for managers and practitioners who wish to adopt a proactive approach in using big data technologies for competitive advantage and the exploration of business performance. The proposed framework will also provide a balance of theoretical and practical perspectives for sustaining effective practices in the big data industry.

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