Big data analytics sentiment: US-China reaction to data collection by business and government

Ryan C. LaBrie⁎, Gerhard H. Steinke⁎, Xiangmin Li⁎, Joseph A. Cazier⁎

⁎ School of Business, Government, & Economics, Seattle Pacific University, 3307 Third Avenue West, Seattle, WA 98119, USA
⁎ School of English Education, Beijing International Studies University, No.1 Ding Fu Zhaung Nanli, Chaoyang District, Beijing 100024, China
⁎ Walker College of Business, Appalachian State University, 287 Rivers Street, Boone, NC 28608, USA

ABSTRACT

As society continues its rapid change to a digitized individual, corporate, and government environment it is prudent for researchers to investigate the zeitgeist of the global citizenry. The technological changes brought about by big data analytics are changing the way we gather and view data. This big data analytics sentiment research examines how Chinese and American respondents may view big data collection and analytics differently. The paper follows with an analysis of reported attitudes toward possible viewpoints from each country on various big data analytics topics ranging from individual to business and governmental focus. Hofstede’s cultural dimensions are used to inform and frame our research hypotheses. Findings suggest that Chinese and American perspectives differ on individual data values, with the Chinese being more open to data collection and analytic techniques targeted toward individuals. Furthermore, support is found that US respondents have a more favorable view of businesses’ use of data analytics. Finally, there is a strong difference in the attitudes toward governmental use of data, where US respondents do not favor governmental big data analytics usage and the Chinese respondents indicated a greater acceptance of governmental data usage. These findings are helpful in better understanding appropriate technological change and adoption from a societal perspective. Specifically, this research provides insights for corporate business and government entities suggesting how they might adjust their approach to big data collection and management in order to better support and sustain their organization’s services and products.

1. Introduction

The collection and management of “big data” has become a charged topic not only within the information technology (IT) field, but more broadly in society, including the corporate and government arenas (Chen et al., 2012; Wang et al., 2016). First perceived as just another technology used for forecasting, to better target customers and to increase corporate growth, its use, and misuse, has propagated into other societal realms. Big data can provide benefits such as more focused advertising and marketing of products and services – leading to higher prosperity and more adoptable and sustainable products and services. However, there is also the concern of privacy and intrusion into one’s personal life (van de Pas and van Bussel, 2015). There is tension between a corporation’s desire for economic growth and the consumers’ desire for privacy. Do personalized advertisements increase sales by focusing on an individual’s specific needs and wants or do they create frustration by demonstrating to an individual that some entity knows a lot more about them then they would like others to know? Continuously convincing an individual of new products they “need” (assuming the analytics produce an accurate calculation of the “need”) is a great business model for creating profit for the corporation, but may have the opposite effect on societal and environmental progress toward lack of privacy and sustainability. While technology can contributes toward environmentally unfriendly practices (i.e. planned obsolescence of computing and mobile devices), it can be used toward environmentally sustainable practices such as reducing waste. For example, enabling mailings to go to individuals who more likely have an interest or need for a particular service or product—rather than to everyone, thus saving on mail delivery, ink toner and paper product usage.

While there is no grand theory for “big data” at this time there is no doubt that this phenomenon is taking the research world by storm. Abbasi et al. (2016) provide a research framework that spans disciplines and research methodologies arguing the impact big data will have on research. At its heart big data differs from traditional data when you consider the big Vs of Big Data (Buhl et al., 2013; McAfee and Brynjolfsson, 2012), namely volume, variety, velocity, and
veracity. Volume in terms of gigabytes to petabytes (and beyond) of data to analyze requiring new hardware and software solutions to handle this size. Variety considers that all data is not just text and numbers but rather more complex objects such as documents, images, sound, and video that could be analyzed for additional insights. Velocity reflects the incoming pace of new data. Consider a smart city solution that tracks people and automobile traffic through its intersections. Finally, veracity, one of the major underlying themes of this research, deals with the privacy, confidentiality, integrity, trustworthiness, and availability of big data. Chen et al. (2012) and Wang et al. (2016) discuss how the advances in business intelligence, analytics, and big data technologies are reaching into the political and governmental arenas ranging from healthcare to transportation and national infrastructure. It is in this spirit, with an eye toward business and governmental usage of big data that we conducted this research, to gauge the concerns of respondents from the two largest economies in the world.

As corporations and governments use technology to better identify and track their customers and citizens, it is important to determine appropriate, acceptable, and sustainable limits. Otherwise customers and citizens may complain and rebel—even leading to the organization's demise and downfall. This paper examines perceptions of the use of new technologies to collect and analyze big data by respondents from China and the United States. We analyze how these new big data and data analytics technologies impact consumer behavior in adopting new products and services, often with serious concerns of privacy—within two quite different countries and cultures. Chinese and US respondents report on their attitudes toward the collection and use of personal data, big data, data mining, and data warehousing usage by business and government. Finally, this work provides insights for corporate business and government entities suggesting how they might adjust their approach to big data collection and management in order to better support and sustain their organization's services and products.

2. Background

Examining some general country metrics show that the United States of America (US) and the People's Republic of China (China) share many similarities. Both countries cover approximately the same total area and land area; the US has a total area of 9,629,090 km² and covers a land area of 9,158,960 km²; China has a total area of 9,596,961 km² and covers a land area of 9,327,420 (United Nations, 2006). The US and China are the two largest economies by gross domestic product (GDP) and each year the incoming pace of new data. Consider a smart city solution that tracks people and automobile traffic through its intersections. China and the United States. We analyze how these new big data and data analytics technologies impact consumer behavior in adopting new products and services, often with serious concerns of privacy—within two quite different countries and cultures. Chinese and US respondents report on their attitudes toward the collection and use of personal data, big data, data mining, and data warehousing usage by business and government. Finally, this work provides insights for corporate business and government entities suggesting how they might adjust their approach to big data collection and management in order to better support and sustain their organization's services and products.

3. Research framework

This big data analytics sentiment research gathers data on perceptions of individuals toward big data collection and analysis—especially as they relate to data collected by corporate business and government. In order to decipher the differences and similarities between the US and China in how their citizens view big data collection, analytics and technology usage, and how they may perceive them in the future, a theoretical framework can be useful in framing our data analysis. There have emerged a few multinational cultural frameworks to draw from. Two of the most well known frameworks include Hofstede's Cultural Dimensions framework (Hofstede, 1983, 2011) and the GLOBE project (House et al., 1999, 2002). Both frameworks have their supporters (Bauer, 2015; Capece et al., 2013; Ngoc, 2016) and their critics (Graen, 2006; Martinsons and Ma, 2009; Orr and Hauser, 2008). However, in the end for this research we followed the likes of Li and Persons (2011) and Villaroto et al. (2014) and utilized Hofstede's framework to guide this research examining user sentiment on big data usage and analytics from US and Chinese populations. Li and Persons (2011) work used Hofstede's cultural dimensions to frame their study on business ethics between US and Chinese students, in a similar manner as our study. Villaroto et al. (2014) also employed Hofstede's framework (in addition to using Forsyth's (1980) ethics position theory) when studying ethics and values from subjects in China, Mexico, and the US.

3.1. Hofstede framework

The Hofstede framework examines countries, organizations, institutions and societies on six cultural dimensions. These include power distance, uncertainty avoidance, individualism versus collectivism, masculinity versus femininity, long term versus short term orientation, and indulgence versus restraint (Hofstede, 2011). Table 1 below provides a brief description of each of these dimensions.

Fig. 1 below displays the six dimensions of both China and the US as measured by Hofstede's research. On the dimension of masculinity both China and the US are quite close. There is some difference in the uncertainty avoidance dimension between the two countries. However, it is worth to note that across the remaining four dimensions (power distance, individualism, long term orientation, and indulgence) there is quite a significant difference.

Hofstede metrics on the US and China from a cultural perspective are used to help inform the development of the research hypotheses in

<table>
<thead>
<tr>
<th>National culture dimension</th>
<th>Description</th>
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<tr>
<td>Power distance</td>
<td>The degree of acceptance by the less powerful that there are inequities in power distribution within an organization, institution or society.</td>
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<tr>
<td>Uncertainty avoidance</td>
<td>The level of stress within a society when outcomes are unknown or unknowable.</td>
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<tr>
<td>Individualism versus collectivism</td>
<td>The degree to which members of society identify as individuals or as a group.</td>
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<tr>
<td>Masculinity versus femininity</td>
<td>The measure of the division of emotional roles of males and females within a society.</td>
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<tr>
<td>Long term versus short term orientation</td>
<td>The measure of the range of focus for members of a society's efforts, whether they are far sighted or short sighted.</td>
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<tr>
<td>Indulgence versus restraint</td>
<td>The measure of how much people in a society try to control immediate gratification</td>
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