

The Moderating Effect of Big Data Analytics Capabilities on the Relationship Between Organizational Culture and Administrative Effectiveness at Higher Education Institution in Sichuan

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ABSTRACT

In the rapidly evolving landscape of higher education, the role of organizational culture and administrative effectiveness has garnered significant attention. This study aims to investigate the moderating effect of big data analytics capabilities on the relationship between organizational culture and administrative effectiveness in higher education institutions in Sichuan, China. The study will employ a mixed-methods approach, combining quantitative analysis through surveys and qualitative insights through interviews. The sample will consist of faculty members, administrative staff, and management personnel from various higher education institutions across Sichuan province. The theoretical framework will draw upon literature on organizational culture, administrative effectiveness, and big data analytics capabilities. Organizational culture dimensions such as innovation, adaptability, collaboration, and leadership will be evaluated using established scales. Administrative effectiveness will be assessed based on factors such as efficiency, responsiveness, transparency, and stakeholder satisfaction. The research will explore how the organizational culture of higher education institutions in Sichuan influences administrative effectiveness. Additionally, it will investigate the role of big data analytics capabilities in moderating this relationship. Specifically, it will examine how institutions with varying levels of big data analytics capabilities leverage data-driven insights to enhance administrative practices and overall effectiveness. Findings from this study are expected to provide valuable insights for higher education institutions in Sichuan, enabling them to cultivate a conducive organizational culture and leverage big data analytics capabilities to improve administrative effectiveness. The results will also contribute to the broader literature on organizational culture, administrative effectiveness, and the role of technology in shaping organizational outcomes.

KEYWORDS: organizational culture, big data analytics, higher education institutions, China

I. INTRODUCTION

A. Issue on the Big Data Analytics Capabilities

Big data analytics capabilities hold significant promise in transforming organizational operations across various sectors, including higher education. However, their effective utilization is not devoid of challenges. One pertinent issue revolves around the acquisition, management, and analysis of vast amounts of data generated within educational institutions. As highlighted by Chen and Huang (2019), the sheer volume, velocity, and variety of data present formidable obstacles, requiring sophisticated infrastructure, skilled personnel, and robust analytical tools. Moreover, ensuring data quality, privacy, and security remains paramount (Chen & Huang, 2019). In the context of higher education institutions in Sichuan, China, where the adoption of big data analytics is burgeoning, addressing these challenges becomes imperative. This necessitates strategic investments in technology, capacity building, and governance frameworks to harness the full potential of big data analytics while mitigating associated risks (Gandomi & Haider, 2015). Consequently, exploring how institutions navigate these challenges and capitalize on big data analytics capabilities to enhance administrative effectiveness becomes crucial for shaping future strategies and policies.

B. Problem Statement

The integration of big data analytics capabilities into higher education institutions presents both opportunities and challenges in enhancing administrative effectiveness through organizational culture. However, a significant problem arises in understanding how these elements interact within the unique context of higher education institutions, particularly in Sichuan, China. Despite the growing emphasis on leveraging big data analytics for decision-making and performance improvement, there is a lack of comprehensive research on the specific mechanisms through which organizational culture influences administrative effectiveness in the presence of robust big data analytics capabilities. Furthermore, existing studies often overlook the contextual nuances of organizational culture within the higher education landscape. This knowledge gap hampers the development of tailored strategies for optimizing administrative practices and organizational culture in higher education institutions. Consequently, there is a pressing need to investigate the intricate interplay between big data analytics capabilities, organizational culture, and administrative effectiveness within the specific socio-cultural and institutional context of Sichuan, China's higher education institutions.

II. LITERATURE REVIEW

A. Defining Big Data Analytics Capabilities

Defining big data analytics capabilities involves understanding the technological, organizational, and analytical capacities required to effectively collect, process, analyze, and derive actionable insights from large and complex datasets. According to Manyika et al. (2011), big data analytics capabilities encompass the tools,

techniques, and practices used to extract value from massive volumes of structured and unstructured data, often characterized by the 3Vs: volume, velocity, and variety. These capabilities typically involve advanced data processing technologies such as distributed computing frameworks (e.g., Hadoop), scalable storage solutions, machine learning algorithms, and data visualization tools. Furthermore, as emphasized by Davenport and Dyché (2013), organizational capabilities such as data governance, talent management, and culture play a crucial role in enabling effective utilization of big data analytics. In the context of higher education institutions, big data analytics capabilities entail not only technological infrastructure but also the development of data-driven decision-making cultures and the cultivation of data science expertise among faculty and staff. Thus, defining big data analytics capabilities requires a holistic understanding of both technical and organizational dimensions to harness the transformative potential of data in driving administrative effectiveness and strategic decision-making in higher education.

The underpinning theory to big data analytics capabilities often draws from several fields, including information systems, computer science, and management. One prominent theoretical framework that informs the understanding of big data analytics capabilities is the Resource-Based View (RBV) of the firm. According to RBV, organizations can achieve competitive advantage by leveraging their unique and valuable resources, including technological assets (Barney, 1991). In the context of big data analytics, this perspective suggests that organizations can gain a competitive edge by harnessing data as a strategic resource. Additionally, the Dynamic Capabilities Theory emphasizes the importance of an organization's ability to adapt and innovate in response to changing environments (Teece et al., 1997). Big data analytics capabilities enable organizations to dynamically integrate, reconfigure, and leverage data-driven insights to enhance decision-making and performance.

Moreover, the Information Processing Theory posits that organizations process information to make decisions and take actions (Galbraith, 1974). Big data analytics capabilities enable organizations to efficiently process vast amounts of data, facilitating more informed and timely decision-making processes. Furthermore, the Institutional Theory emphasizes the role of institutional pressures and norms in shaping organizational behavior (DiMaggio & Powell, 1983). In the context of big data analytics, institutional pressures, such as regulatory requirements or industry standards, may influence organizations' adoption and implementation of analytics capabilities.

Overall, these theoretical perspectives provide a robust foundation for understanding the development, deployment, and impact of big data analytics capabilities in organizations.

B. Defining Organisational Culture

Defining organizational culture within higher education institutions entails understanding the shared values, beliefs, norms, and behaviors that shape the institution's identity and guide its members' actions. Schein (1985) defines organizational culture as "a pattern of shared basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems." In the context of higher education, organizational culture encompasses the institution's mission, vision,

traditions, and academic practices. It influences various aspects of institutional life, including teaching methodologies, research priorities, student interactions, and administrative processes (Birnbaum, 1988).

Furthermore, organizational culture in higher education is often characterized by a blend of professional, academic, and bureaucratic subcultures, each with its own set of values and norms (Tierney, 1988). For example, academic cultures may prioritize intellectual freedom, critical inquiry, and collegiality, while bureaucratic cultures may emphasize efficiency, accountability, and adherence to procedures. These cultural dynamics influence decision-making, resource allocation, and institutional change efforts within higher education institutions.

Understanding the nuances of organizational culture is essential for effectively managing change, fostering innovation, and enhancing organizational effectiveness in higher education settings. By recognizing and leveraging the cultural strengths and addressing the cultural challenges, institutions can cultivate environments that support their missions and aspirations while adapting to evolving external pressures and internal needs.

Understanding organizational culture often draws from various theoretical perspectives in organizational studies. One such influential framework is Edgar Schein's model of organizational culture. According to Schein (1985), organizational culture consists of three layers: artifacts and symbols, espoused values, and underlying assumptions. Artifacts and symbols are the visible aspects of culture, such as rituals, language, and physical environment. Espoused values represent the stated beliefs and ideals that members of the organization profess to follow. Underlying assumptions are the deeply ingrained, unconscious beliefs and perceptions that guide behavior and decision-making within the organization.

Another theoretical perspective that informs the understanding of organizational culture is the Cultural Dimensions Theory proposed by Hofstede (1980). This theory identifies dimensions such as individualism vs. collectivism, power distance, uncertainty avoidance, and masculinity vs. femininity, which shape cultural differences across societies and organizations. Understanding these dimensions can provide insights into how organizational culture is shaped by broader societal values and norms.

Moreover, the Institutional Theory, particularly its concept of isomorphism, helps explain how organizations conform to external institutional pressures and norms (DiMaggio & Powell, 1983). Institutions such as higher education institutions are subject to pressures from accrediting bodies, government regulations, and professional associations, which influence their culture and practices.

These theoretical perspectives offer valuable insights into the dynamics of organizational culture, its formation, maintenance, and change processes within higher education institutions.

C. Defining Administrative Effectiveness

Defining administrative effectiveness within higher education institutions involves evaluating the efficiency, responsiveness, and quality of administrative processes and services that support the institution's mission and goals. Administrative effectiveness encompasses various functions such as financial management, human resources, student services, facilities management, and strategic planning (Trower, 2010). It involves ensuring that

administrative systems and procedures are well-designed, transparent, and aligned with the institution's objectives, policies, and regulations. Moreover, administrative effectiveness extends to fostering a positive organizational climate, promoting collaboration and communication among administrative units, and meeting the needs and expectations of internal and external stakeholders (Pounder, 2010). Assessing administrative effectiveness often involves using performance indicators, benchmarks, and feedback mechanisms to monitor and evaluate administrative practices and outcomes. By enhancing administrative effectiveness, higher education institutions can streamline operations, allocate resources efficiently, and enhance overall institutional performance and reputation.

The understanding of administrative effectiveness in higher education institutions can be informed by various theoretical perspectives in organizational theory and management. One such framework is the Contingency Theory, which suggests that there is no one-size-fits-all approach to administrative effectiveness, and the effectiveness of administrative practices is contingent upon various internal and external factors (Donaldson, 2001). According to this theory, effective administrative practices must be tailored to the specific context, goals, and challenges faced by the institution. For example, a decentralized decision-making structure may enhance administrative effectiveness in a large, complex institution, whereas a centralized approach may be more suitable for smaller institutions.

Additionally, the Resource Dependency Theory posits that organizations depend on external resources and stakeholders to survive and thrive (Pfeffer & Salancik, 1978). In the context of higher education institutions, administrative effectiveness may be influenced by the institution's ability to manage relationships with external stakeholders such as government agencies, accrediting bodies, donors, alumni, and industry partners. Effective administrative practices involve identifying and leveraging resources from these external sources while minimizing dependence on any single entity.

Furthermore, the Institutional Theory suggests that organizations conform to institutional norms, values, and expectations to gain legitimacy and support (Meyer & Rowan, 1977). In higher education, administrative effectiveness may be influenced by the institution's adherence to institutional norms and standards set by accrediting agencies, professional associations, and peer institutions. Institutions that align their administrative practices with these norms are perceived as more effective and reputable within the higher education community.

By drawing on these theoretical perspectives, administrators can gain insights into the complex factors that contribute to administrative effectiveness and develop strategies to enhance organizational performance in higher education institutions.

III. CONCEPTUAL DEVELOPMENT

A. The Relationship between Organisational Culture and Administrative Effectiveness

The hypothesized relationship between organizational culture and administrative effectiveness within higher education institutions suggests that a positive organizational culture, characterized by traits such as collaboration, innovation, adaptability, and a focus on student success, will lead to higher levels of administrative effectiveness. This hypothesis is supported by the notion that organizational culture shapes the attitudes, behaviors, and practices of individuals within the institution, including administrators and staff (Tierney, 1988). For example, in a culture that values transparency and communication, administrators may be more likely to share information, collaborate across departments, and solicit feedback from stakeholders, leading to more effective decision-making processes and outcomes (Birnbaum, 1988).

Furthermore, a strong organizational culture can contribute to employee satisfaction, engagement, and commitment, which are essential factors in enhancing administrative effectiveness (Schein, 1985). Administrators who feel supported, motivated, and aligned with the institution's values are more likely to perform their roles effectively and contribute to the achievement of organizational goals (Trower, 2010).

However, it is important to acknowledge that the relationship between organizational culture and administrative effectiveness may be influenced by contextual factors, such as the size, structure, and mission of the institution, as well as external pressures and dynamics within the higher education sector (Tierney, 1988). Additionally, the presence of supportive organizational culture alone may not guarantee administrative effectiveness; effective leadership, resources, and systems are also crucial factors in achieving desired outcomes (Pounder, 2010).

By empirically testing this hypothesized relationship, researchers can provide valuable insights into the mechanisms through which organizational culture influences administrative effectiveness within higher education institutions, thereby informing strategies for organizational development and improvement.

B. Moderating Effect of Big Data Capabilities

The hypothesized development regarding the moderating effect of big data capabilities on the relationship between organizational culture and administrative effectiveness within higher education institutions posits that the presence of robust big data analytics capabilities will strengthen the positive impact of organizational culture on administrative effectiveness. This hypothesis is grounded in the idea that big data analytics capabilities enable institutions to leverage data-driven insights to enhance decision-making, streamline administrative processes, and allocate resources more efficiently (Chen & Huang, 2019). In the context of organizational culture, institutions with a supportive culture that values data-informed decision-making, collaboration, and innovation are likely to benefit the most from big data analytics capabilities.

Big data analytics can provide administrators with timely, relevant, and actionable information that allows them to identify trends, anticipate challenges, and make informed decisions to improve administrative effectiveness (Manyika et al., 2011). For example, in an institution with a culture of transparency and collaboration, big data analytics capabilities can facilitate the sharing of data and insights across departments, enabling administrators to collaborate more effectively and align their efforts with institutional goals (Davenport & Dyché, 2013).

Moreover, big data analytics capabilities can help institutions overcome some of the challenges associated with measuring and evaluating the impact of organizational culture on administrative effectiveness. By analyzing large datasets, institutions can identify patterns, correlations, and causal relationships between cultural factors and administrative outcomes, providing empirical evidence to support the effectiveness of cultural interventions (Gandomi & Haider, 2015).

However, it is important to recognize that the effectiveness of big data analytics capabilities may be contingent upon organizational readiness, technological infrastructure, and data governance practices within the institution (Manyika et al., 2011). Additionally, the impact of big data analytics capabilities on the relationship between organizational culture and administrative effectiveness may vary depending on contextual factors such as institutional size, mission, and external environment.

By empirically testing this hypothesized development, researchers can advance our understanding of how big data analytics capabilities influence the relationship between organizational culture and administrative effectiveness within higher education institutions, informing strategic decision-making and resource allocation.

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