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BIG DATA AND FIRMS' FINANCIAL PERFORMANCE IN A DEVELOPING COUNTRY: A LITERATURE REVIEW APPROACH

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ABSTRACT

This review explored the relationship between big data adoption and firm performance in a developing country context. By examining various studies and reports, we highlight how firms in developing economies leverage big data to enhance business operations, decision-making processes, and competitive advantage. The review emphasizes the unique challenges faced by these firms, including limited infrastructure, a scarcity of skilled personnel, and nascent regulatory frameworks. Despite these challenges, the paper identified significant opportunities where big data has positively impacted firm performance, particularly in sectors like finance, retail, and telecommunications. The paper also discussed the role of governmental support and international collaboration in facilitating big data adoption in these settings. Conclusively, this review provided insights into how big data serves as a catalyst for business growth and efficiency in developing countries, offering a nuanced understanding of its benefits and limitations in these environments. This analysis is pivotal for policymakers, business leaders, and academics aiming to harness the potential of big data in emerging markets

Keywords: Big Data, Firms, Financial Performance, Developing Country, Big Data Adoption.

1.0 INTRODUCTION

In today's data-driven world, big data has emerged as a powerful force, transforming industries and reshaping business landscapes. Firms are increasingly harnessing the vast potential of big data analytics (BDA) to gain deeper insights into their operations, customers, and markets, ultimately aiming to improve their financial performance. The rapid technological evolution and the subsequent heightened reliance of both society and organizations on the Internet have led to an extraordinary surge in the volume and diversity of data in recent years. Notably, on a daily basis, Facebook alone generates around 4 petabytes of data, while each networked car contributes 4 terabytes of data. Additionally, a staggering 65 billion messages circulate on WhatsApp, and a whopping 294 billion email messages are

exchanged (Desjardins, 2019). According to projections by the World Economic Forum, it is estimated that by the end of 2025, a staggering 463 exabytes of data will be generated daily (Desjardins, 2019).

This exponential growth can be primarily attributed to the proliferation of the Internet of Things (IoT) and the widespread adoption of social networks and cloud computing. These trends have led to an increase in both the number of devices connected to the Internet and the user base (Dai et al., 2020; Islam & Reza, 2019; Kumar et al., 2019). It is essential to note that these projections may be considered rather conservative, especially in light of the recent COVID-19 pandemic. The pandemic has significantly accelerated teleworking and prompted a swift digitalization of businesses, potentially further amplifying the volume of data generated (Berger, 2020).

As organizations navigate these transformative shifts, a paradigm change becomes imperative. The competitive dynamics of the market demand that organizations adapt to the need for storing vast amounts of information originating from diverse sources. The evolving landscape underscores the necessity for organizations to embrace advanced data management strategies to remain competitive and responsive to the demands of the digitally-driven era.

Big Data arises in this context and has been used to describe the exponential growth of data. This concept is related to a set of technologies, processes and practices that enable organizations to gain insights and improve decision-making processes from the analysis of the large volume of data (Almeida, 2018). The concept of Big Data has evolved over time involving increasingly new perspectives. In 2001, Laney (2001) presented the perspective of data exploration in three dimensions, namely, volume, velocity, and variety. Albeit, several authors have added other perspectives such as the relevance of knowledge exploration from the data (Manyika et al., 2011), the relevance of adopting Big Data in decision-making processes (Gartner, 2012), the truthfulness of the data to reduce the risks of uncertainty or the importance of data distribution through the cloud to allow distributed processing (Wang et al., 2013). This evolution of the Big Data concept has led to the acceptance that Big Data consists of 10 dimensions, which encompass volume, velocity, variety, value, veracity, visualization, variability, validity, vulnerability, and volatility (Khan et al., 2018).

Furthermore, the advent of big data has revolutionized the way organizations collect, analyze, and utilize information. Big data, characterized by the massive volume, variety, and velocity of data, has become a valuable asset for organizations seeking to enhance their performance in various aspects. Majorly, big data which is the study of the behaviour and structure of financial markets in great detail has become a new game in the world. The development of information and communication technology has resulted in an unprecedented explosion of data, known as Big Data (Abdurahman & Sari, 2023). This phenomenon has influenced various aspects of the economy and every business segments in both developed and developing countries. Big Data is simply the massive volume of structured and unstructured data generated by various sources such as social media, sensors, devices, and business transactions. The processing and analysis of such vast datasets have become a critical aspect of modern information management.

Companies are increasingly leveraging Big Data Analytics to enhance their performance. Big Data technologies, as emphasized by Mazumdar et al. (2019), provide cost advantages through distributed storage of large datasets. This facilitates quicker and more efficient identification of new business opportunities. According to Hajli et al. (2020), the speed and flexibility of Big Data Analytics enable the analysis of diverse structured and unstructured data from sources like enterprise resource planning, supply chain management, customer relationship management, social networks, and websites (Holmlund et al., 2020; Maheshwari et al., 2021). In today's information society, data plays a crucial role, but its true business value emerges when it is properly treated and analyzed. How Big Data influences the performance of organizations in the context of a developing country is relatively unknown. Hence the need to conceptually examine the subject matter.

Big Data is not just transforming technology and management processes; it's reshaping organizational strategies and culture. Traditional ways of thinking about and creating business strategies are no longer sufficient in light of the new opportunities offered by Big Data. Numerous studies, such as those by Maroufkhani et al. (2019) highlight the impact of Big Data on organizational performance, using a mix of quantitative and qualitative methods. However, there's no unanimous agreement on the quantitative impact of the relationship between Big Data adoption and firm performance. Existing studies using Structural Equation Modelling (SEM) show diverse associations depending on factors like country, industry, and the number of firms involved. This study aims to address this gap by exploring existing literature on the subject matter.

In academia, while there is widespread interest in Big Data and analytics across various domains, there is a noticeable absence of concrete evidence showcasing the benefits of Business Data Analytics (BDA). Particularly, there's a surprising lack of focus on empirically studying the influence of BDA on financial performance, despite its crucial role in achieving strategic goals. This gap may stem from the challenge of integrating diverse research areas and disciplinary frameworks, requiring a cohesive interdisciplinary effort.

2.1 Conceptual Review

2.1.1 Big Data

Big Data refers to extensive, rapidly generated, and diverse sets of information resources that require efficient and creative approaches for acquiring, storing, disseminating, overseeing, and scrutinizing such data in a cost-effective manner. Big Data refers to large and complex sets of data that cannot be effectively managed, processed, or analyzed using traditional data processing tools or methods. The term "Big Data" encompasses three main dimensions, often referred to as the three Vs; and they include volume, velocity and value.

By volume, Big Data involves a massive amount of data. This could be data of various types, including structured, semi-structured, and unstructured data. The sheer volume of data generated from various sources, such as social media, sensors, and transactional systems, is a defining characteristic of Big Data. In terms of velocity, Big Data is generated at a high speed. The data flows rapidly and needs to be captured, processed, and analyzed in real-time or near-real-time to extract meaningful insights. This is particularly relevant in applications like financial trading, social media monitoring, and online retail (Gartner, 2012). Considering variety, Big Data comes in various formats. It includes structured data such as databases,

semi-structured data such as XML files and unstructured data such as text documents, images, and videos. Managing and analyzing data of different types and formats is a significant challenge in Big Data analytics.

Additionally, some definitions of Big Data include two more Vs; and it encompasses veracity and value. In their book "Big Data: A Revolution That Will Transform How We Live, Work, and Think," Mayer-Schönberger and Cukier (2013) emphasize the importance of addressing the veracity of Big Data, stating that "dealing with the uncertainties in the data is a key challenge in the era of Big Data". Big Data often comes with uncertainties and inaccuracies. Veracity refers to the quality of the data, including issues such as data accuracy, reliability, and trustworthiness. Dealing with the veracity of data is crucial in ensuring that analytics and decision-making processes are based on reliable information. The ultimate goal of Big Data is to derive value from the information it contains. Extracting meaningful insights, making informed decisions, and gaining a competitive advantage are some of the ways organizations can derive value from Big Data. In a Harvard Business Review article, Manyika et al. argue that the value of Big Data lies in its potential to drive business innovation and competitive advantage (Manyika et al., 2011).

2.2 Big Data in Developing Countries

Developing countries, characterized by their lower income levels, rapid population growth, and ongoing efforts towards industrialization and modernization, present a unique context for the adoption and utilization of big data technologies. The integration of big data in these countries is influenced by various economic, technological, and infrastructural aspects.In terms of economic characteristics, developing countries typically have emerging economies with growing industrial sectors and increasing participation in global markets (World Bank, 2020).There is often a focus on economic diversification and reducing dependency on a few key industries or commodities (IMF, 2019).Limited financial resources and budget constraints can impact investment in new technologies, including big data infrastructure and tools (African Development Bank Group, 2018).

Considering technological landscape in developing countries, while there is a rapidly growing digital presence in many developing countries, there remains a significant digital divide in terms of access to technology and the internet (ITU, 2019).Mobile technology is often more widespread than fixed-line internet, leading to a unique pattern of digital engagement and data generation (GSMA, 2020).There is an increasing interest in leveraging technology for development goals, including big data analytics (United Nations, 2021).Many developing countries face infrastructural challenges such as inadequate power supply, limited internet connectivity, and less-developed technological infrastructure (World Economic Forum, 2020).There is often a lack of local data centers and cloud infrastructure, leading to reliance on external providers (AWS, 2021).Infrastructure development is frequently a focus of government policy and international aid (Asian Development Bank, 2019).It is worthy to note that in the context of developing countries, with its unique economic, technological, and infrastructural characteristics, presents both challenges and opportunities for the adoption and effective use of big data. However, understanding these contextual factors is crucial for developing strategies that leverage big data for economic growth and improved business performance in these environments.

2.3 Current State of Big Data in Developing Countries

The adoption and application of big data in developing countries have been increasing, driven by the potential to leverage data analytics for economic development, business growth, and social improvements. Developing countries are increasingly recognizing the value of big data in driving innovation and competitiveness (Kshetri, 2014). Businesses in these regions are adopting big data analytics to gain insights, improve decision-making, and enhance customer experiences (Accenture, 2017).Big data is being used to optimize farming practices, predict weather patterns, and increase crop yields (FAO, 2019).Healthcare providers are utilizing big data for disease surveillance, patient care, and research (WHO, 2018).Financial institutions are leveraging big data for risk assessment, fraud detection, and customer segmentation (IMF, 2020).Retailers are using big data to analyze consumer behavior, optimize supply chains, and personalize marketing (McKinsey & Company, 2016).Firms using big data analytics in developing countries have reported improvements in efficiency, customer satisfaction, and market reach (Deloitte, 2018).

Big data has the potential to contribute significantly to revenue growth and cost reduction in these markets (PwC, 2019).

Despite the potential, the adoption of big data faces challenges such as inadequate technological infrastructure, limited access to quality data, and a shortage of skilled personnel (World Bank, 2020).Governments in developing countries are increasingly implementing policies to support digitalization and data-driven technologies (United Nations Conference on Trade and Development, 2021).Initiatives to improve digital infrastructure and promote IT education are underway in several countries (ITU, 2020).

2.4 Sectors Utilizing Big Data in Developing Countries

Big data is transforming various sectors by enabling more informed decision-making, enhancing efficiency, and fostering innovation. In developing countries, certain sectors are harnessing the power of big data more effectively, leveraging it to drive growth and development. The most common sectors which are effectively using big data include finance sector, health care sector as well as retail and e-commerce sector.

In the finance sector, big data is utilized for risk assessment, fraud detection, and enhancing customer experiences (Bholat, 2015).Financial institutions are leveraging big data to offer customized financial products and services, especially in mobile banking, which is prevalent in many developing countries (GSMA, 2020).Big data analytics helps in analyzing large volumes of transaction data, enabling better credit scoring and financial inclusion for the unbanked population (Manyika et al., 2011).Healthcare sector in developing countries is being transformed by big data through improved patient care, disease tracking, and health management (Raghupathi & Raghupathi, 2014).Big data enables the analysis of large-scale health data, facilitating better disease prediction, treatment personalization, and resource allocation (WHO, 2018).Data-driven approaches are critical in managing public health crises, such as epidemics, where timely and accurate information is essential (Murray et al., 2020). In the retail sector, big data is used to understand consumer behavior, optimize supply chains, and personalize marketing strategies (Berman, 2012).E-commerce platforms in developing countries utilize big data for customer segmentation, product recommendation systems, and enhancing the overall shopping experience (McKinsey & Company, 2016).Data analytics in

retail helps in managing inventory, predicting market trends, and improving customer engagement (Chen et al., 2012).

2.5 Challenges in the Adoption and Utilization of Big Data in Developing Countries

While the potential of big data in enhancing business performance and decision-making is widely recognized, its adoption and utilization, particularly in developing countries, face several significant challenges. These challenges range from technological and infrastructural limitations to skill gaps and policy issues. Developing countries often struggle with basic technological infrastructure, including limited internet connectivity and inadequate data storage facilities (Aker & Mbiti, 2010).The lack of reliable and affordable high-speed internet access hampers the ability to collect, store, and analyze large data sets effectively (World Bank, 2016).There is often a lack of high-quality, reliable data. In many cases, data is either not collected systematically or is outdated (Kshetri, 2014).

Issues of data privacy, security, and ownership also pose significant challenges, especially in regions lacking robust data protection laws (UNESCO, 2019).A major barrier to the effective use of big data is the shortage of skilled professionals in data science and analytics (McKinsey Global Institute, 2011).Developing countries face a significant challenge in training and retaining data scientists and analysts, impacting the adoption of data-driven decision-making (Manyika et al., 2011).Resistance to change in organizational culture can impede the adoption of big data analytics (Bughin, Chui & Manyika, 2010).There is often a lack of understanding or skepticism about the benefits of big data, leading to slow adoption rates (IBM, 2012).Inconsistent or underdeveloped regulatory frameworks regarding data can hinder the adoption of big data technologies (World Economic Forum, 2012).Challenges in aligning big data initiatives with existing legal and regulatory standards are prevalent (OECD, 2015).The high costs associated with setting up big data infrastructure and tools can be prohibitive for businesses, especially small and medium-sized enterprises (SMEs) in developing countries (Accenture, 2017).

2.6 Association between Big Data, Innovation and Economic Growth in Developing Countries

Big data has the potential to be a significant driver of innovation and economic growth in developing countries. By harnessing large volumes of data and applying analytics, these countries can unlock new opportunities, enhance efficiency, and solve complex problems. Big data allows for more informed decision-making by providing insights derived from the analysis of vast amounts of information (Brynjolfsson & McAfee, 2012).It enables governments and businesses to make data-driven decisions, leading to increased efficiency and effectiveness in operations (Manyika et al., 2011).

Governments can use big data to improve public services, such as healthcare, education, and urban planning (UN Global Pulse, 2012).Big data analytics can help in better allocation of resources, predicting and responding to public needs, and improving transparency and accountability (World Bank, 2016).In the financial sector, big data can play a crucial role in extending financial services to the unbanked and underbanked populations (Demirguc-Kunt et al., 2018).By analyzing alternative data sources, financial institutions can provide credit and other financial services to individuals and businesses that lack traditional banking histories (GSMA, 2020).Big data analytics in agriculture can lead to higher productivity and efficiency

through precision farming, crop yield prediction, and resource optimization (FAO, 2019).This is particularly important in developing countries where agriculture plays a critical role in the economy (World Bank, 2017).

Big data opens up new avenues for entrepreneurship and innovation, particularly in technology-based sectors (Kshetri, 2014).Startups and SMEs can leverage big data to identify market needs, optimize their products and services, and compete effectively (Accenture, 2017).Big data can improve competitiveness in the global market by enabling businesses to better understand market trends, consumer behavior, and optimize supply chains (WEF, 2013).It can also assist in identifying new trade opportunities and enhancing export capabilities (UNCTAD, 2021).

2.7 The Potential of Big Data in Solving Local Problems in Developing Countries

Big data holds immense potential in addressing local problems in developing countries, particularly in areas like agriculture, healthcare, and the growth of small and medium-sized enterprises (SMEs). By leveraging data analytics, these sectors can experience significant improvements in efficiency, effectiveness, and innovation. Big data can transform agriculture in developing countries by enabling precision farming, which involves using data to optimize farming techniques, improve crop yields, and reduce waste (Sonka, 2014).Data analytics can assist in monitoring soil health, weather patterns, and crop growth, leading to more informed decisions about planting, fertilization, and harvesting (FAO, 2017).Big data also helps in predicting pest outbreaks and managing agricultural resources more effectively (Liakos et al., 2018).

In healthcare, big data can be instrumental in improving patient care and managing health resources (Raghupathi & Raghupathi, 2014).Data analytics aids in tracking disease outbreaks, understanding public health trends, and enhancing the delivery of healthcare services, especially in remote and underserved areas (Bates et al., 2014). Big data can also support telemedicine and mobile health initiatives, which are crucial in regions with limited access to traditional healthcare facilities (WHO, 2017).For SMEs, big data provides opportunities to better understand market demands, customer preferences, and operational efficiency (Manyika et al., 2011). It enables SMEs to compete with larger companies by offering insights into consumer behavior, optimizing supply chains, and improving product or service offerings (Kshetri, 2014).Data-driven decision-making can also assist SMEs in managing financial resources more effectively and identifying new market opportunities (OECD, 2019).

2.8 The Role of Government in Promoting Big Data

The role of the government in facilitating big data adoption is critical and multifaceted. It encompasses investments in infrastructure, education, and supportive policies, each of which plays a significant part in fostering an environment conducive to the effective use of big data. Governments can play a pivotal role in building the necessary infrastructure for big data. This includes not only physical infrastructure, such as high-speed internet and data centers, but also the digital infrastructure required for data storage, processing, and security (Manyika et al., 2011). For example, the European Commission has invested in the European Open Science Cloud to support scientific data sharing and re-use in Europe (European Commission, 2020).
As big data technologies evolve rapidly, there is a growing need for skilled professionals who can manage and analyze large datasets. Governments can facilitate this through investments

in education and training programs. Government policies play a crucial role in the adoption of big data. This includes creating a regulatory environment that balances the need for innovation with privacy and security concerns (Kshetri, 2014). For instance, the General Data Protection Regulation (GDPR) in the European Union sets guidelines for data protection and privacy, influencing how businesses handle big data (European Parliament, 2016).

Governments can encourage big data innovation through research grants and partnerships between academia, industry, and government agencies. The National Science Foundation in the U.S., for example, has funded research in big data and data science (National Science Foundation, 2018).

Governments can lead by example in the adoption of big data. By using big data in public services, governments can improve efficiency, transparency, and citizen engagement. Initiatives like the GovLab in the U.S. aim to improve people's lives by changing how decisions are made using big data (GovLab, 2021).In our globally connected world, cross-border data flows are essential. Governments can facilitate big data adoption by engaging in international collaborations and agreements that ease data sharing and address global challenges (G20 Digital Economy Task Force, 2019).

2.9 Role of International Bodies in Supporting Big Data in Developing Countries

International organizations play a crucial role in supporting big data initiatives in developing countries. Their involvement typically revolves around providing technical assistance, funding, and facilitating knowledge transfer to harness the potential of big data for development. The United Nations has been at the forefront in leveraging big data for sustainable development. The UN Global Pulse initiative, launched in 2009, is a notable example. It uses big data analytics to improve decision-making and policy development in areas such as poverty, health, and climate change in developing countries (UN Global Pulse, 2021).

The World Bank provides substantial support to developing countries in the field of big data. This includes financial assistance, research, and policy advice. The World Bank's Data for Development program is an example of such an initiative, which aims to improve the capacity of developing countries to collect, analyze, and use big data (World Bank, 2020).International telecommunication union (ITU) plays a critical role in enhancing the technological infrastructure required for big data in developing countries. It assists in implementing ICT infrastructure, which is fundamental for big data analytics, and offers guidance on policy and regulatory frameworks (ITU, 2019).

Food and agriculture organization (FAO) utilizes big data to improve agricultural practices in developing countries. Through its various projects, the FAO provides data and analysis tools to farmers and policymakers, helping to enhance food security and agricultural productivity (FAO, 2018).World Health Organization (WHO) leverages big data to improve health outcomes in developing nations. It collects and analyzes data to monitor health trends, which is crucial in responding to public health emergencies and in planning health services (WHO, 2021).

UNESCO supports big data initiatives in education and cultural preservation in developing countries. By providing access to educational resources and data, UNESCO aims to improve educational outcomes and preserve cultural heritage through digitization and data analysis (UNESCO, 2019).These organizations, through their various programs and initiatives, are instrumental in helping developing countries overcome the technical, financial, and knowledge barriers to effectively utilizing big data for development.

2.10 Comparing and Contrasting Big Data Landscape in Developing and Developed Countries

Comparing and contrasting the big data landscape in developing countries with that in developed countries reveals both distinct challenges and unique opportunities. This difference arises from varying levels of technological infrastructure, economic resources, educational systems, and policy environments. Developed countries typically possess more advanced technological infrastructures, including widespread high-speed internet access and robust data storage and processing capabilities. This infrastructure supports extensive data collection and analytics (Manyika et al., 2011). In contrast, developing countries often struggle with limited or uneven internet access and lack the necessary data infrastructure, impeding big data initiatives (ITU, 2019).

Developed countries generally have a larger pool of skilled professionals trained in data science and analytics. Higher education systems in these countries often include specialized programs in big data (U.S. Department of Commerce, 2016). Developing countries, however, face a shortage of such skills, which limits their ability to leverage big data effectively (World Bank, 2020).Developed countries have more financial resources to invest in big data technologies and initiatives. This investment accelerates innovation and adoption in various sectors (European Commission, 2020). Developing countries, on the other hand, may have limited budgets for such investments, often relying on international aid and partnerships (UN Global Pulse, 2021).Developed countries usually have more established policies and regulations regarding data privacy, security, and ethics (European Parliament, 2016). In developing countries, the regulatory landscape might be less developed, raising concerns about data misuse and privacy (Kshetri, 2014).In developed countries, big data is often used for enhancing business efficiency, consumer insights, and technological innovation (McKinsey Global Institute, 2011). In developing countries, big data has the potential to make a significant impact in areas like agriculture, healthcare, and disaster management, offering solutions to critical development challenges (FAO, 2018; WHO, 2021).Developing countries have the opportunity to "leapfrog" by adopting the latest technologies without the need to overhaul existing systems. This can lead to rapid advancements in certain sectors, such as mobile banking in Africa (GSMA, 2020).

2.11Merits of Big Data on Firms' Financial Performance

In today's data-driven world, firms are increasingly harnessing the power of big data to gain a competitive edge and improve their financial performance. Big data, defined as the vast and complex datasets that traditional data processing methods struggle to handle, offers a wealth of insights into customer behaviour, operational efficiency, and market trends. By leveraging big data analytics (BDA), firms can unlock these insights and translate them into actionable strategies that can boost profitability, market share, and overall financial health.One of the primary merits of big data lies in its ability to provide organizations with unprecedented

insights into their operations and markets. As Gandomi and Haider (2015) argue, the analysis of large datasets enables organizations to make data-driven decisions, reducing uncertainty and increasing the likelihood of success. The use of advanced analytics tools allows for the identification of patterns, trends, and correlations that may go unnoticed in traditional data analysis methods (Davenport & Harris, 2007).

Big data not only facilitates informed decision-making but also acts as a catalyst for innovation within organizations. The analysis of vast and diverse datasets can uncover new opportunities, customer preferences, and emerging trends (Chen, Chiang, & Storey, 2012). By leveraging big data analytics, organizations can gain a competitive edge by developing innovative products and services that resonate with the evolving needs of their target audience. By leveraging Big Data analytics, organizations can optimize their operations and resource utilization. This is especially crucial in developing countries where resource constraints may be more pronounced. Predictive analytics, for instance, can assist in inventory management, supply chain optimization, and resource allocation, leading to cost savings and increased efficiency (McAfee & Brynjolfsson, 2012).

In other words, the integration of big data analytics into organizational processes can lead to improved operational efficiency. Real-time analysis of data streams enables organizations to identify bottlenecks, streamline workflows, and optimize resource allocation (Manyika et al., 2011). This, in turn, contributes to cost savings and enhances overall organizational performance. Big Data allows organizations to gain deeper insights into customer behaviors, preferences, and needs. This knowledge enables the customization of products and services, enhancing customer satisfaction and loyalty (Manyika et al., 2011). In the context of a developing country, understanding local market dynamics through Big Data analytics can be a strategic advantage for organizations aiming to meet the unique demands of their target audience.

Big Data analytics provides organizations with the ability to analyze vast amounts of structured and unstructured data in real-time. This capability enables more informed decision-making, allowing organizations to identify trends, patterns, and correlations that might otherwise go unnoticed (Davenport & Harris, 2007). In the context of a developing country, improved decision-making can be particularly impactful, helping organizations navigate complex and dynamic environments. Big data provides firms with a wealth of information that can be used to make more informed decisions across all business functions (Chen et al., 2012). By analyzing customer behavior, market trends, and operational data, firms can identify opportunities to optimize pricing strategies, improve product development, and enhance marketing campaigns (Gupta & Seetharaman, 2004). This data-driven approach can lead to more efficient resource allocation, reduced costs, and ultimately, improved profitability (McAfee & Brynjolfsson, 2014).

Big data analytics empowers firms to gain a deeper understanding of their customers' needs, preferences, and buying patterns (Lee et al., 2016). This granular level of insight enables firms to personalize their offerings, target their marketing efforts more effectively, and build stronger customer relationships (Verhoef et al., 2010). This, in turn, can lead to increased customer satisfaction, loyalty, and ultimately, revenue growth (Reichheld & Schefter, 2000).

Big data analytics can be used to optimize internal operations and identify areas for improvement. By analyzing production processes, logistics networks, and supply chains, firms can identify bottlenecks, reduce waste, and improve overall efficiency (Gunasekaran et al., 2017). Additionally, big data can be used to fuel innovation by providing insights into emerging trends and customer needs, leading to the development of new products and services (Chari et al., 2015).

BDA can also be used to identify emerging trends and customer needs, informing the development of innovative products and services that resonate with the market (Lee et al., 2016). Additionally, BDA can be used to optimize product design and performance, leading to higher customer satisfaction and brand loyalty.

2.12 Demerits of Big Data on Firms' Financial Performance

While the benefits of Big Data are significant, organizations in developing countries face unique challenges in implementation. Limited technological infrastructure, data security concerns, and a shortage of skilled personnel are some of the hurdles that need to be addressed (Laney, 2001).Implementing and utilizing big data effectively requires significant investments in data infrastructure, storage, and analytical tools (Chen et al., 2012). Additionally, firms need to build a team of skilled professionals who can extract meaningful insights from the vast amounts of data (Brynjolfsson et al., 2011). The shortage of data scientists and analysts can be a major hurdle for firms seeking to leverage big data effectively.

Big data often contains sensitive information about customers, employees, and operations. Firms need to implement robust security measures to protect this data from breaches and ensure compliance with privacy regulations (Bahreini et al., 2016). Data breaches can not only damage a firm's reputation but also lead to significant financial losses.

Successfully adopting big data requires a shift in organizational culture, where data-driven decision-making becomes the norm. This necessitates changes in leadership styles, employee training, and communication strategies (Davenport, 2014). Implementing such changes can be challenging and requires strong leadership commitment.

2.13 Importance of Big Data Analytics and Firm Financial Performance

By facilitating easier access to data for stakeholders and integrating information from various organizational units, Big Data promotes transparency. Big Data allows organizations to experiment, uncover needs, identify variability, and enhance performance. This involves collecting accurate performance data, analyzing it, and implementing controlled measures to improve overall performance. Utilizing specific segmentation tools, Big Data enables the customization of actions by segmenting populations. This facilitates targeted and personalized approaches. Big Data supports or replaces human decision-making processes with automated algorithms. By applying sophisticated analytics to large datasets, organizations can optimize decision-making processes. Big Data plays a pivotal role in fostering innovation by enhancing existing products and services or creating new ones. This involves analyzing data derived from the usage of current products to inform business model and product/service enhancements.

2.14 Theoretical Framework

The relationship between big data and firms' financial performance is an area of increasing interest in both academic and business circles. Several theories have been proposed to explain how the use of big data can impact a company's financial outcomes. However, this paper relies on resource- based view theory, dynamic capabilities theory, information processing theory, knowledge-based theory and value chain analysis theory. These theories provide different perspectives on how big data can influence a firm's financial performance, highlighting its role in gaining competitive advantage, enhancing capabilities, processing information, managing knowledge, and optimizing the value chain.

Resource-based view theory suggests that big data can be a valuable, rare, inimitable, and non-substitutable resource, providing a competitive advantage that can lead to superior financial performance (Barney, 1991). Firms that effectively leverage big data can develop unique insights, optimize operations, and make better strategic decisions. Dynamic capabilities theory posits that in rapidly changing environments, the ability of a firm to integrate, build, and reconfigure internal and external competencies is critical for sustainable competitive advantage (Teece, Pisano, & Shuen, 1997). Big data analytics can enhance a firm's dynamic capabilities by providing timely insights and enabling rapid adaptation to market changes.

Information processing theory focuses on the efficiency and effectiveness of information processing within an organization (Galbraith, 1973). Big data technologies can enhance information processing capabilities by facilitating the collection, storage, and analysis of large volumes of data, leading to more informed decision-making and better financial performance. Knowledge-based view theory emphasizes the role of knowledge as a critical organizational resource (Grant, 1996). Big data analytics can be seen as a tool for creating, disseminating, and applying knowledge within a firm, thereby enhancing innovation and financial performance. Value chain analysis theory was propounded by Porter in 1985. The theory suggests that competitive advantage is derived from adding value in the production process (Porter, 1985). Big data can optimize various components of the value chain, such as supply chain management, operations, marketing, and customer service, thereby improving financial performance.

2.15 Empirical Review

Big data, characterized by its volume, velocity, and variety, has emerged as a crucial asset for firms seeking competitive advantage (Mayer-Schönberger & Cukier, 2013). In developing countries, the integration of big data analytics into business operations is increasingly viewed as a key driver of financial success (Bughin, Chui, & Manyika, 2010). Developing countries offer a unique context for the adoption of big data technologies. Issues such as infrastructure limitations, data privacy concerns, and skill shortages present both challenges and opportunities for firms (George, Haas, & Pentland, 2014). Despite these challenges, the increasing availability of mobile technology and internet access has facilitated the growth of big data applications (Kshetri, 2014).

Several studies have found a positive relationship between big data analytics and financial performance in developing countries. A study by Akter, Wamba, Gunasekaran, Dubey, and Childe (2016) in the retail sector showed that big data capabilities significantly improved firm

performance. Similarly, Gupta and George (2016) found that firms in the service sector that adopted big data analytics experienced higher profitability and market valuation. The literature suggests several mechanisms through which big data impacts financial performance. These include improved customer insights, enhanced operational efficiency, and better risk management (Wamba, Akter, Edwards, Chopin, & Gnanzou, 2015). In a developing country context, these benefits may be even more pronounced due to the lack of established market intelligence and data-driven practices (Brown, Chui, & Manyika, 2011).Despite the potential benefits, firms in developing countries face specific challenges in harnessing big data. These include limited technical infrastructure, data quality issues, and a shortage of skilled personnel (Davenport, 2014). Furthermore, the empirical literature is still nascent, and more rigorous, context-specific research is needed.

3.0 CONCLUSION AND RECOMMENDATIONS

The goal of this paper was to review literature on the association between big data and the financial performance of firms in the context of a developing country. The review highlighted on the importance of big data, merits and demerits of big data, compared and contrasted big data landscape in developing and developed countries. It examined the role of international bodies in supporting big data in developing countries. It evaluated the role of government in facilitating big data the potential of big data in solving local problems in developing countries. The paper further examined the association between big data, innovation and economic growth in developing countries, x-rayed sectors utilizing big data in developing countries and assessed the challenges in the adoption and utilization of big data in developing countries. The review suggests a generally positive association between big data and financial performance in developing countries, driven by improved operational efficiency and customer insights.

Stemming from the critical review of literature, the following recommendations are encouraged:

i. Firms should prioritize establishing basic but robust big data infrastructure. This will include investing in affordable and scalable data storage solutions, basic data analytics tools, and reliable internet connectivity. Even simple cloud-based analytics services can be a starting point for small and medium-sized enterprises (SMEs) to leverage big data without heavy upfront investments.

ii. Firms should invest in training their employees in basic data literacy and analytics skills. Collaborations with local educational institutions for tailored training programs or utilizing online learning platforms can be cost-effective ways to build a workforce capable of handling big data. This will not only enhance the firm's capacity to use big data but also improve employee productivity and innovation.

iii. Firms should focus on collecting and analyzing local data to gain insights that are relevant to their specific market. This includes customer data, local market trends, and operational data. By understanding local consumer behavior and preferences, firms can tailor their products and services to better meet the needs of their target market.

iv. Given the resource constraints in developing countries, firms can benefit from forming partnerships with other companies, government agencies, or academic institutions. These collaborations can facilitate knowledge sharing, reduce the cost of big data initiatives, and enable access to more advanced technologies and

expertise. Joint ventures or collaborative projects can also open new avenues for innovation and market expansion.

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