Integrating AI and Big Data Analytics to Enhance Business Performance: A Moderated Framework of Organizational Culture

Muhammad Sohail javaid
Ph.D. from University of Central Punjab
taimhoorain379@gmail.com
Rana Basharat Faraz
Master of Business Management, Vilnius University
rbfaraz@gmail.com
Jawad Hassan Qureshi
Master of Business Management, Vilnius University
JAWAD_QUR@MSN.COM
Khizra Qassar
M.Phil Statistics, Forman Christian College (FCC)
khizraqaisar12@gmail.com
Emaan Shahzad
BS in Business Intelligence and Analytics, Hailey college of commerce (PU)
Emansk788@gmail.com

ABSTRACT

Artificial Intelligence (AI) and Big Data Analytics (BDA) are emerging as critical technologies that enhance organizational decision-making, operational efficiency, and overall business performance. This study examines the influence of AI on business performance, while analyzing the mediating role of Big Data Analytics and the moderating effect of organizational culture. Using a quantitative research approach grounded in the positivist paradigm, primary data were collected through structured questionnaires from IT professionals and employees working in software companies in Lahore, Pakistan. The collected data were analyzed using SPSS and AMOS through reliability, validity, correlation, regression, mediation, and moderation analyses. The findings reveal that AI has a statistically significant but relatively weak direct impact on business performance, indicating that AI alone is insufficient to substantially improve organizational outcomes. However, Big Data Analytics plays a crucial mediating role by transforming AI-generated data into actionable insights that enhance efficiency, innovation, and strategic decision-making. Furthermore, organizational culture significantly moderates the relationships between AI, BDA, and business performance. Organizations with supportive, innovative, and data-driven cultures demonstrate stronger technology adoption and improved performance outcomes compared to those with rigid and resistant cultures. This study contributes to the Resource-Based View (RBV) theory by emphasizing AI and BDA as strategic organizational resources that create competitive advantage when supported by an enabling culture. The research also provides practical implications for managers and policymakers in developing countries, particularly Pakistan, by highlighting the importance of investing in digital infrastructure, analytics capabilities, and cultural transformation to fully leverage AI technologies. Overall, the study concludes that the combined integration of AI, Big Data Analytics, and supportive organizational culture significantly enhances business performance.

Introduction

Businesses around the world are making use of Artificial Intelligence (AI) and Big Data Analytics (BDA) to make better decisions in today's technologically advanced business world. Being able to use data has become important for any business that desires to succeed in a fast-moving market. How businesses understand their operations, analyze markets and interpret consumer behavior has changed a lot thanks to artificial intelligence (AI). Teamwork between AI and BDA makes it possible for companies to find hidden information, make work easier and encourage creativity by investigating large, difficult data (Aljumah et al., 2021). Operations and ways of sharing knowledge are now different across many industries thanks to the volume, speed and diversity found in BDA (Pauleen et al., 2017). Over time, AI and BDA have developed in a strategic partnership that enables companies to make the best decisions to enhance company performance. Additionally, organizational culture is the main moderator affecting the outcomes of AI and BDA initiatives (Belhadi et al., 2021). AI's impact on how firms operate is growing continuously. The way artificial intelligence is changing human connections is causing businesses to reconsider their customer service and product and process planning goals. Analysts predict that this year's $122 billion global market for AI software will represent a 20% increase. Today's flurry of digitalization is changing the playing ground for businesses in every line of business. A smarter, more affordable, and more efficient way to do business is through artificial intelligence (Mele, 2023). In the midst of an extremely unstable global economy, this opens the door for businesses to build operations that are more agile and robust. From the perspective of an expert, businesses and organizations of all kinds are prepared to use AI as the engine for their upcoming projects. The best approach to do this is to expand your horizons and strive for a convergence in the manner that AI-enhanced technology is incorporated into current operating procedures. Among the many benefits of this approach are better customer service, increased productivity, gaining ground in competitive markets, and fostering a more satisfying work environment (Kristel et al., 2025)."The more organizations incorporate AI into their operations, the more of an impact AI will have on enterprises throughout the world." Businesses will need to rely on their networks to meet the everyday demands of the cutthroat, fast-paced commercial world of today. In spite of this, the demands and challenges of the market continue to grow. In order to withstand the uncertainties of the future, we need to set up networking systems that are prepared to tackle these challenges head-on. Autonomy in the form of AI and other technologies will be essential (Ghasemaghaei, 2021). Prior scholarly works highlight how AI fosters creativity and improve company performance. Agrawal, Gans, and Goldfarb (2018) pointed out in their study that artificial intelligence (AI) is a predictive capacity that lowers forecasting costs and promotes more effective decision-making. However, there are a number of problems in the business sector that come with the use of new AI technology. The incompatibility of technology and the organizational environment is one of them. Accordingly, organizational culture is defined in this research as a collection of values, principles, and approaches of operation that influence how staff members feel about new technology within a company (Tan, 2019). Research indicates that even the perception of cultural preparedness can hinder AI and Big Data analytics, perhaps leading to inappropriate performance (Brock et al., 2019). Furthermore, even though AI technologies yield

useful approaches, their use depends on organizational transparency and the ability to integrate the insights gained from AI applications into frameworks for decision-making (Ghasemaghaei, 2021). The use of AI in Africa is still quite minimal. Global markets are rapidly adopting AI, despite factors including poor internet connectivity, ambiguous data legislation, a lack of skilled labor, and a lack of technological infrastructure impeding poorer nations. Organizational performance is becoming more recognized after AI's innovative potential to expand regional competitiveness. Seeking to close the technology gap, nations are investing more in AI research and digital skills development. Particularly among SMEs, which are crucial for regional innovation, job creation, and GDP growth, digital technology use is increasing in developing countries. Nonetheless, issues remain with digital infrastructure, human capital development, and technological readiness. Even though artificial intelligence is still in its infancy, its applications are growing, especially in the finance, education, and telecommunications industries (Kassa et al., 2025). Institutions and policymakers are becoming more aware of how AI may increase national productivity, improve services, and spur innovation. To adequately utilize AI's promise to improve national corporate performance, however, strategic frameworks and capacity-building programs are needed. Businesses are beginning to comprehend the significance of AI and data technologies for economic growth in emerging nations like Pakistan. However, infrastructure limitations, lack of technical skills, and opposition to change continue to be barriers to adoption. Notwithstanding these obstacles, a number of public and private entities have started integrating AI technologies into supply chain management, marketing, and customer support. Small and medium-sized businesses (SMEs), the foundation of the national economy, are cautiously optimistic about the particularly forward-thinking trend toward digital transformation. Nationally, government-led innovation hubs and changes to digital rules are promoting the use of AI in company operations. The extent to which these technical investments have observable impacts on business performance is unknown, though (Brock et al., 2019).

Although there are companies using AI and BDA, adoption is not yet popular throughout the country. Both insufficient IT infrastructure and not many companies being aware of IOT are reasons why many industries don't use it yet (OECD 2020).

Table 1.1(a): Level of AI and BDA in different Industries of Pakistan

Industry	Level of AI and BDA	Remarks
Banking	Moderate	Adoption primarily for fraud detection and customer insights.
Telecommunications	Moderate	Usage in network optimization and customer experience management.
Manufacturing	Low	Limited to predictive maintenance and supply chain analytics.
Healthcare	Low	Emerging applications in diagnostics and patient management.

Digital capital is one of the biggest issues for Pakistan, since it focuses on the resources important for running AI and Big Data projects. Clear evidence suggests that data-driven ecosystems are struggling to grow because funding for new technology solutions is missing, according to the OECD (2020). Cost and the desire to avoid too many risks hold back many organizations from investing in developing new technologies. A lack of clear proof of fast profits is leading many companies to hold back from using advanced technology (OECD, 2020).

The short supply of people who know how to manage and handle AI and Big Data remains a serious problem. The situation is made worse by not having many training courses that prepare businesses for new technologies (OECD, 2020). Pakistan's organizations are usually structured in a straight line, often leading to greater difficulties in dealing with change. In their study, H et al., 2014 argue that old ways of making decisions and similar ideas slow the embrace of new technology. Businesses find it tough to switch from fixed ways of working to processes based on information.

Table 1.1(b): Challenges

Challenge	Description	Reference
Digital Capital	Lack of technological infrastructure and resources.	OECD (2020)
Investment	Low funding for AI and Big Data projects.	OECD (2020)
Skills Gap	Shortage of trained professionals.	OECD (2020)
Organizational Culture	Resistance to change and hierarchical structures.	H et al. (2014)

 Still, Pakistan is gearing up for changes brought by AI. Pakistan's government has come to understand why countries are adopting new technological approaches. The environment is being shaped by supports for new technology. The government has supported several efforts to boost the use of AI and BDA. These factors are working with major IT companies, financial support for research, development and creating innovation clusters. Greater numbers of firms in Pakistan are discovering how AI and BDA can be used in several fields. Older companies are taking such steps and turning to them as sources of inspiration for new improvements. These two fields, AI and BDA, are able to transform how business is done in agriculture, healthcare and e-commerce. AI applied in diagnostics is meant to improve medical findings, whereas analytics in forecasting is designed to help boost what farmers produce.

Though there are important obstacles in the use of AI and BDA, there is still a large area for growth in Pakistan. It is important to deal with issues related to digital capital, investments, skills and business culture. Sustainable growth and making use of fresh opportunities may be achieved in Pakistan by starting policy reforms that use data and building settings that encourage technological advancements. One must understand how the culture of a company affects the way big data analytics functions to meet this promise (Al-Surmi et al., 2022).

Research Gap

However, there is limited study done involving the topical combination of AI and BDA and their connection to performance in organizations especially in developing countries such as Pakistan and mediating role of BDA (Dwivedi et al., 2021). Second, there is limited understanding of the moderating role that organizational culture is however still very ambiguous in relation to technologies (Akumaa et al., 2024).

Problem Statement

AI may lead to more automation and more accurate outcomes for businesses, but recording these results puts a challenge in front of leaders. It usually happens because people are opposed

to changes in the organization and because data-driven practices are not popular. Converting AI into valuable information depends a lot on using Big Data Analytics (BDA). Limited analytics tools and understanding stop organizations from learning important insights, so AI has a limited effect on major business numbers. The use of AI technologies becomes more challenging if either the company culture supports or opposes it. It is thought that individual and corporate adoption of AI is greatly affected by expectancy-value attitudes and favorable conditions (Wang et al., 2023; Chiu et al., 2023).

Often, AI or its technology is highlighted more than how culture and analytics affect and change things. As a result, the purpose of this study is to focus on the lack of understanding about business performance and AI when an organization's culture and big data analytics are involved. Even though AI and BDA are expected to transform business, research findings are mixed about their impact on business success. To achieve success in combining AI and Big Data analytics, organizational culture is very important. A company that wants to use new technology should foster a workplace that is both adaptable and imaginative. Because it helps mediate between various parts of the organization, big data analytics makes choices and processes more effective. When organizations review extensive data, they can discover new things that improve how they operate and decide on future actions. How Big Data analytics impacts business largely relies on the company's culture. If the environment stresses working together and learning from information, people become more open to technology. Yet in spite of the difficulties, Pakistan has a good opportunity to grow within this field. Paying attention to problems in digital capital, investment, skills and business culture is necessary. Using information from data and supporting new technology, Pakistan has an opportunity to advance and keep its economy strong. For this promise to be achieved, managers should be aware of the association between company culture and BDA (Al-Surmi et al., 2022).

Research Objectives

This study focuses on these gaps by addressing the following objectives:

RO1: To study the influence of AI on business performance.

RO2: To analyze the mediating role of BDA in enhancing business outcomes.

RO3: To evaluate the moderating effect of organizational culture in the adoption of AI and BDA.

Research Questions

This study answers these questions

RQ1: How does AI impact business performance?

RQ2: How does BDA mediate the relationship between AI and business performance?

RQ3: How does organizational culture moderate the effectiveness of AI and BDA?

Significance of the Study

The findings here provide new ideas for thinking and practical applications. By putting organizational culture, corporate performance, AI and BDA together, the approach advances the scholarly discussion at the theoretical level. It provides additional data lacking in older research and examines the advancements in the field using bibliometrics and SQLR techniques (Perez et al., 2022). Co-citation networks are formed and notable papers in the subject are highlighted with VOSviewer software (OULED et al., 2024; Ziky et al., 2025).

Theoretical Significance

If politicians, corporate leaders and technology implementers want to improve performance with AI, the insights from this study will be very helpful. The analysis in this book supports researchers

and executives in choosing where to use AI, showing how OC plays a role in this. The study also suggests an approach that other developing nations with similar conditions should try. Gaining the best benefits for companies from AI involves focusing on both AI technology and on making sure the organization is ready for it. Lastly, this study supports the country's effort to digitalize by giving accurate information and advice for adopting AI. The conclusions of this research consist of implications academia, theoretical and managerial. This work continues existing methods by considering organizational culture, AI and big data analytics all in one framework to study their combined effects on business performance. The adoption of technology due to motivation and situation is explored within this approach (Yurt et al., 2024).

Literature Review

There are several studies that analyze the transformation of different industries due to Artificial Intelligence (AI). They show in their study that AI lets machines make better decisions, gain knowledge and tackle issues. According to Brynjolfsson et al., (2017), AI makes it easy for companies to access useful data and make decisions based on what they discover. They argue in their 2019 study that using AI gives companies an edge, allowing them to predict what customers and industries will do. The researchers found that AI-powered recommendation systems at Amazon help both increase customer satisfaction and lead to more sales. They think that using AI for predictions helps businesses plan their products and marketing more effectively.

In 2020 the author said that to handles unstructured or semi-structured data and mainly focuses on predictive and prescriptive analysis, putting ahead of ordinary analytics. He improves how it uses data to make its inventory work better and anticipate factors that may affect demand for products (Ghasemaghaei 2021). These authors Makowski and Kajikawa point out that BDA gives businesses the chance to use unstructured data. They determined using BDA allows companies to deliver better service to customers, create simpler ways to work and make future decisions based on data insight. In addition, Audzeyeva and Hudson note that you need reliable data, the latest equipment and qualified team members for BDA to succeed (Makowski et al., 2021). It is noticed that strategy goals are achieved more efficiently in advanced businesses when fit with culture exists. It is evident from the study that firms that emphasize innovation and adjustment are often better able to use AI and BDA. Rather, Choueke and Armstrong (n.d.) note that people in a culture that rejects new ideas might not take advantage of recently developed technologies (Tan, 2019). Changes to the organization-wide culture are heavily influenced by the national culture the company operates within, as (B et al., 2014). The research team suggests that using AI and BDA may be tough for organizations in cultures with major power gaps and a low tolerance for risk. Mele makes it clear that a focus on learning, teamwork and flexibility is necessary for any organization. Organizations that adopt an AI and data culture are better prepared to integrate AI and BDA and will benefit from being more competitive (Mele, 2003).

Artificial Intelligence (AI)

Business operations and choices are being transformed by the use of AI. The authors Agrawal et al., (2018) explain that AI makes it possible for technology to learn, adapt and reason like humans. Because of AI, customer-driven recommendations from Amazon help to improve the retail industry and enhance shopping for buyers. In addition, IBM Watson's technology supports studying medical records to make accurate diagnoses in the healthcare field. These instances explain how AI is able to change different business environments. Large data analysis helps bring about innovation and completes operational goals by supplying useful information (Brynjolfsson

et al., 2017). According to Brock et al., (2019), AI helps organizations plan ahead by forecasting what could happen in the market and who the customers will be. Even so, AI can only be used successfully when privacy and ethical issues, as well as changes within the workforce, are fixed (Bundy, 2017). For example, healthcare struggles with how to judge AI algorithms when making patient diagnoses, while worker adaptation to new systems is a concern in the retail industry. This industry has struggled with data privacy as they regularly rely on AI for detecting fraud online (Smith, 2020; Johnson, 2021). In their view, Brock and von Wangenheim argue that AI makes it possible for companies to prepare ahead for market and consumer changes (Brock et al., 2022).

Big Data Analytics (BDA)

BDA refers to big data analytics, meaning the analysis of vast and complicated data to discover patterns, relationships and intriguing insights based on Ghasemaghaei (2021). While ordinary data analytics works with structured data to provide descriptive results, BDA explores disorderly data and adds predictions and solutions. BDA predictions allow national retailers like Walmart to better manage their inventories. BDA enables hospitals to pinpoint changes in how patients are treated and work harder to improve care. They demonstrate how BDA can discover meaningful results from data that is complex. BDA allows businesses to gather useful information from data that hasn't been put into a structured format (Makowski et al, 2021).

Organizational Culture (OC)

The culture within a business serves to improve results when it affects employee skills, how leadership motives them and how much resistance there is to new changes. If a company promotes teamwork and knowledge, staff will probably use modern AI tools, but in places where conformity is key, AI might be ignored. Knowing the main traits of a culture, especially how open they are to risk, how flexible and how they share information, helps guide AI and BDA use. The values, beliefs and methods common to employees are part of the organization's culture (Childress, 2013). A good workplace helps people generate new ideas and use AI and BDA more easily (Khazanchi et al., 2007).

Hypothesis Development

Effect of AI adoption on BP

It is generally agreed that artificial intelligence (AI) consists of various ways to help computers learn from experiences they have had and take in new information. It boosts cognitive support that helps humans carry out intricate tasks in businesses, claim Kar et al. (2023). It is now possible to practice parts of an industrial process by using machines that behave like humans, all thanks to AI (Belhadi et al., 2021a). Many industries today have grown and developed with AI due to advances in large datasets, new algorithms and improved processing equipment (Nayal et al., 2024). Advanced algorithms for images in artificial intelligence are transforming how healthcare professionals diagnose by altering practices and uncovering problems from scans (Nasseef et al., 2022). When people can be identified as patients more promptly and accurately, their outcomes get better and things move more quickly in the clinic. Retail AI uses information about customer behavior to help retailers recommend what their customers may like and improve sales (Dhiman et al., 2023). The positive link between AI and business achievement is explained by Kassa et al., (2025) in RBVT. RBVT stresses that organizational resources play a crucial role in helping a business stay ahead. When applied properly, artificial intelligence supports a company in competing successfully in the market and reaching higher levels of productivity (Kassa et al.,

2025). The end result of these resources is AI skills unique to the firm which help drive operational smartness (Kassa et al., 2025).

H1: AI Adoption Positively Impacts BP.

Mediating effect of BDA on relationship between AI and BP

The value of AI and businesses is powered by big data analytics which transforms the results of AI into usable outcomes and strategies. Access to advanced analytical tools and methods is now possible because of the huge and complicated data that AI makes easier to work with. So, insights help businesses improve and change their performance. BDA strives to make sure companies can take advantage of AI for better customer relationships, more efficient processes and fresh ideas by making technology work with effective business actions (Ghasemaghaei, 2021; Jarrahi, 2018). Safety benefits and efficiencies from BDA help organizations respond quickly, innovate and improve both their operations and finances (Rialti et al., 2019). These benefits are reinforced by measuring aspects of customer service, income and competition (Wamba et al., 2017; Sheshadri, 2020b; Upadhyay et al., 2020; Siachou et al., 2022). BDA investments are more highly associated with enhanced results for organizations in situations specific to their industry (Müller et al., 2018; Koohang et al., 2023). When businesses take actions to strengthen their BDA abilities, they usually achieve long-term edge over others. BDA infrastructures help carry information from one system or file format to another by data collection (Aljumah et al., 2021).

H2: BDA Positively Mediates AI and BP.

Moderating effect of OC on relationship between AI adoption and BP

A business's use of AI, along with new technology, depends a lot on its culture. The process of using AI in business is often better if workers like to be creative, ride with the changes and improve their knowledge. When positive practices and feedback are shared, workers may be more likely to use AI, according to the researchers Khazanchi et al., (2007).

Nevertheless, AI might not be able to make companies perform better when there is a resistance to change in the culture. Therefore, if businesses want to measure their performance well, culture and AI adoption must support one another. Organizational culture describes the typical values, beliefs, routines and actions people have within an organization (Hartmann et al., 2022). In addition, organizations with well-established corporate cultures that put importance on innovation, the environment and future aim often use AI effectively and practice eco-friendly marketing (Akumaa et al., 2024). Artifacts are the easiest way to see how AI technology is being used in daily jobs (Alkhoraif et al., 2018). The clear presence of AI may cause employees to think differently which changes their flexibility and ultimately affects how successful AI is for business. It may be tough to tell who owns and who manages a small or medium-sized business. The culture and pathway forward in the company are usually built by the owner-manager (Zhuang et al., 2020).

H3: OC moderates the relationship between AI adoption and BP.

Moderating effect of OC on relationship between BDA and BP

To see full benefits of BDA, they should become part of the way the company works. If analytics is embraced in company culture through BDA, it becomes an important aspect of making both operational and strategic choices. The way individuals are trained to use and understand data depends greatly on the organization's culture. Financial data analytics projects are more likely to succeed when people are encouraged to think critically and welcome insights from data. A main part of promoting more use of BDA is ensuring employees are on board. Businesses that place

importance on being accountable, transparent and working together as a team usually support the success of their analytics work. It is important for employees to use data, trust data-backed approaches and work well with colleagues from other parts of the organization. Based on Tan's view, when data transparency and joint ownership are present, BDA contributions to the company's results are more impressive (Tan's 2019).

H4: OC moderates the relationship between BDA and BP.

Combined effect of AI and BDA on BP

The combination of AI and BDA give better results and greatly boosts how well a business does. When these two technologies combine, they efficiently analyze many sources of data, give insights quickly and assist in making future decisions rapidly and without errors. Through computer vision, machine learning and natural language processing, AI can collect data, produce it and assess what it obtains in real time. Therefore, companies get data from a range of places, like social media, market information, sensors and the way customers interact. Though AI can identify and explore data, the best outcomes are achieved when BDA is part of the process, letting businesses plan well. AI-generated data is subjected to analysis using the latest techniques from BDA. It supports decision-makers by assessing trends of the future, exploring key trends and forecasting them using models. Therefore, businesses can prepare for what's to come and act more efficiently if problems occur. These two authors both agree that this kind of partnership streamlines workflows, supports better work decisions and helps respond to issues fast (Belhadi et al 2021: Koliousis 2022). Appreciations to this connection, organizations can deal with unexpected changes using data-supported plans. Businesses in fast-changing markets can reduce their uncertainty and become stronger thanks to real-time information and predictive abilities that make it easier to decide quickly (Belhadi et al., 2021).

H5: The combined use of AI and BDA has a greater impact on BP compared to their independent application

Theoretical Foundation

The theoretical framework shows how AI, BDA, organizational culture and business performance are related to each other. AI comes first in the chain, with BDA acting as a type of middleman. Cultural aspects in organizations affect the relationship among AI, BDA and the success of the business. The dependent variable shows business performance which can be measured by its efficiency, profitability and results from innovation.

Conceptual Model
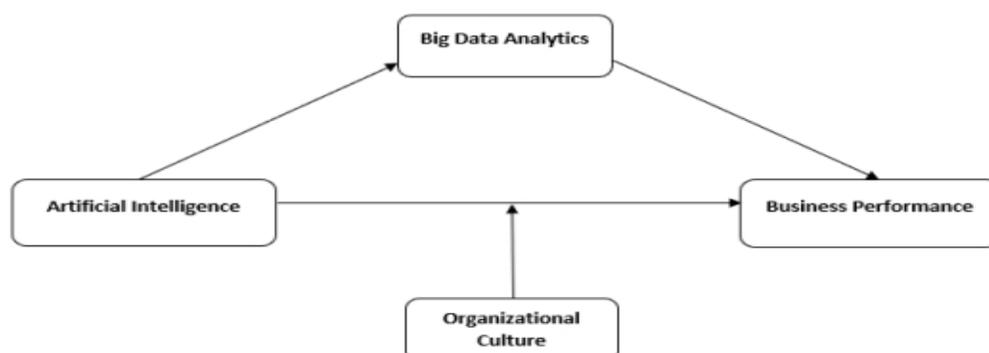
AI, BDA, OC, and the business performance are important aspects being studied in modern organizational research. The words AI increasingly appears, making it a major force behind

technology and organizational improvements. BDA supports the way that AI affects business performance by offering useful insights and supporting decisions based on data. AI and BDA implementation is also impacted by the company's unique organizational culture. All these factors working together impact how a business performs in terms of efficiency, profitability and innovation. This discussion explores how these elements are closely tied, paying special attention to their mutual impacts and effects, relying on studies and reports for authority.

AI as an Independent Variable

AI is central to this model, since it is the main factor behind innovation and decision-making in organizations. When discussing AI, Brynjolfsson et al., (2017) state that it is like electricity in the 21st century, helping to drive change in many fields. Because AI can deal with repetitive tasks, forecast trends and address complex problems, it is very useful for enhancing a company's results. In Bundy's opinion (2017), those nations that do not use AI successfully might end up behind. The Australian Computer Society (2017) pointed out in their report that those who have invested heavily in AI tend to be both more productive and more competitive. In addition, Jarrahi points out that AI and human intelligence support one another and encourages companies to add AI as a tool for strengthening human choices (Jarrahi, 2018)

BDA as a Mediating Variable

AI and business performance are linked by Big Data Analytics which changes raw data into useful information. Businesses adopting BDA are able to perform more efficiently, provide better services to customers and introduce new products and services. According to Ghasemaghaei (2021), companies need to be aware of the volume, variety and every detail of velocity in data to achieve higher performance. Belhadi et al. (2021) also show that AI-supported BDA plays a crucial role in ensuring the resilience and accomplishment of supply chains, mainly when market circumstances change. Organizations can use the combination of AI's predictions and BDA's analytics to predict happenings in the market, deal with risks and improve how operations are carried out. In Alphabeta, it is explained that the benefits of AI and BDA come from helping companies take advantage of automation and see improved results in their work (Alphabeta, 2018)

The Moderating Role of OC

How business performs is largely affected by the way culture affects the link between AI and BDA. A company with a positive culture is more likely to support innovation, teamwork and flexibility, important for success in adopting AI and BDA. According to Khazanchi and his fellows, a culture that values innovation supports process innovation which improves a company's performance (Khazanchi et al., 2007).

Resource-Based View (RBV) Theory

According to RBV, a business is successful and competitive due to their exclusive resources, strengths and abilities. It shows that effective management requires a company to use excellent resources. Use of AI and similar tools increases a company's competitive edge. Sometimes, imparting knowledge from AI experts to companies helps important tasks to be automated, leads to smoother sharing of resources and quicker business decision outcomes. Analyzing big data through AI lets companies learn from their customers, change how they do business and seek changes to their processes, all of which help the company improve. From the RBV hypothesis, we see that making use of data and technology boosts a business strategy.

Methodology

Research Paradigm

To develop research plan, we use research paradigm which is a structure that integrates theories and practices, which includes research tools, design, objectives, and process of analysis. There are four types of paradigms that are being used in research. Firstly, there is pragmatism, then interpretivism, realism and lastly positivism. The only one reality could be easily measurable, understood and quantified according to this positivist paradigm. The interpretivism is qualitative in nature, and plenty of realities are referred to this approach based on complex human behavior. The pragmatic approach blends positivist and interpretivist perspectives. This perspective holds that conditions and reality are always changing together. The realism paradigm, which is closed to positivism, distinguishes between the visible and real worlds. This study has a positivist perspective. This plan made advantage of the quantitative research method. Since there is only one reality that can be comprehended and quantified, this worldview holds. This method yields a generalizable conclusion (Mehmood et al., 2024).

Research Approach

Methods for gathering, evaluating, and interpreting data are known as research methodologies. The researcher gathers and examines data using three techniques: deduction, induction, and abduction. In order to bridge the gap, the deductive approach emphasizes the argument based on existing knowledge. It goes from general to specific. This approach is sometimes referred to as active reading. In contrast, the inductive technique starts with a specific topic, creates an argument, and then establishes a theory based the argument. This tactic is sometimes referred to as reactive reality (Hassan et al., 2021).

Research Strategy

Research questions can be addressed with the help of a research strategy. Qualitative and quantitative are the two categories into which research strategies fall. In this study, the quantitative research approach is employed. Variables are properly well-defined and hypotheses are well-developed in a quantitative method. It uses a deductive, premeditated, and defined design. Four other types of quantitative analysis exist. quasi-experimental, descriptive, experimental, and correlational. Experimental and quasi-experimental analysis are used to examine cause-and effect relationships, whereas descriptive and correlational analysis are used to quantify and characterize the relationship between variables.

Study Setting

This research uses a non-contrived study setting since it observes events as they naturally occur. Instances of non-contrived situations include field studies and experiments. A field study is one in which a researcher conducts their investigation in the natural situation with slight interference.

Population

Individuals or organizational units actively involved in data analytics, AI adoption, decision-making processes, and IT experts who apply AI in different fields form the population.

Unit of Analysis

Unit of analysis is individuals who are familiar with the technology and tools like AI and BDA in Pakistan.

Sample

A sample is a particular person chosen by the scholar to gather data from a larger group. The population as a whole keep increasing. Because time, money, and accessibility limitations sometimes make it impossible or difficult for researchers to study the entire population, sampling

is required. The research process is more manageable, successful, and economical when a representative sample is chosen.

Sampling Technique

Collecting the data from each member of the group or the whole population is not the easy task to perform. By keeping this problem in mind, the researcher uses the sampling method by which the data collection is possible. There are two kinds of sampling that are following below,

1. Probability
2. Non-probability

Data collection Method

Primary and secondary data collection techniques are the two types. The basis of this research will be primary data collection. Interviews, experiments, surveys, and observational studies are examples of primary data collection techniques. In this study, the questionnaire method is applied. Strongly disagree, disagree, agree, and extremely agree are among the closed-ended questions with a preset list of answers used in this study's questionnaire (Mehmood et al., 2024). Data Collection Timeline: From February to March 2025, a two-month period, the data was collected.

Data Analysis Techniques

The collected data was cleaned, coded, and then imported into version 26 of SPSS (Statistical Package for Social Sciences) for analysis. The following methods of analysis were used:

Reliability and Validity Testing:

- Cronbach's Alpha for reliability
- KMO and Bartlett's Test for sampling adequacy
- Confirmatory Factor Analysis (CFA) using AMOS for construct validity

Correlation Analysis:

- To examine relationships among AI, Big Data, Organizational Culture, and Business Performance.

Regression Analysis:

- Simple and multiple regression to identify direct impacts of AI on business performance.

Mediation Analysis:

Using Hayes' PROCESS Macro (Model 4) to assess the mediating role of Big Data Analytics.

Moderation Analysis:

Using Hayes' PROCESS Macro (Model 1) to test whether Organizational Culture moderates the relationship between AI and business performance.

Moderated Mediation Analysis:

PROCESS Macro (Model 7 or 14) to analyze the interaction between Big Data (mediator) and Organizational Culture (moderator) on the AI-Business Performance link.

Construct Reliability

Reliability analysis assesses the internal consistency of a measurement instrument, typically using Cronbach's Alpha. A higher Cronbach's Alpha indicates better reliability, meaning the items within each scale are measuring the same underlying construct consistently.

The 20 items used to measure Artificial Intelligence gave a Cronbach's Alpha of 0.620. The outcome is placed higher than most values seen as showing reliable findings. Even though it is over 0.60, the figure is still below 0.70 which is needed for strong reliability. This shows that the different items measuring AI do agree with each other, but there is still a chance to make the

scale even more internally consistent. There being so many items (20) could result in some inconsistency which may be caused by repeating items or ambiguous questions and so on…

Construct Reliability

Variable Name	Number of Items	Cronbach's Alpha	Interpretation
Artificial Intelligence	20	0.620	Moderate Reliability
Big Data Analytics	16	0.634	Moderate Reliability
Organizational Culture	17	0.736	Acceptable Reliability
Business Performance	3	0.828	Good Reliability

Construct Validity:

Validity refers to the extent to which an instrument measures what it is supposed to measure. The table evaluates construct validity using three key indicators: Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy, Bartlett's Test of Sphericity, and the percentage of variance explained by the construct.

Construct Validity

Construct	KMO	Bartlett's Sig.	Variance Explained	Validity Conclusion
Artificial Intelligence (AI)	0.841	p < 0.001	69.62%	Strong construct validity
Big Data Analytics (BDA)	0.914	p < 0.001	64.84%	Excellent construct validity
Organizational Culture (OC)	0.877	p < 0.001	68.5%	Strong construct validity
Business Performance (BP)	0.795	p < 0.001	63.63%	Good construct validity

Correlation

Correlation analysis is used to examine the strength and direction of relationships between pairs of variables. The table shows Pearson correlation coefficients among four key constructs:

Artificial Intelligence (AI), Big Data Analytics (BDA), Organizational Culture (OC), and Business Performance (BP). All the correlations marked with an asterisk (*) are statistically significant at the 0.05 level, meaning there is a low probability that these correlations occurred by chance.

Correlation

Variable	Avg-AI	Avg-BDA	Avg-OC	Avg-BP
Avg-AI	1			
Avg-BDA	.249*	1		
Avg-OC	.544*	.298*	1	
Avg-BP	.126*	.261*	.285*	1

Note: All correlations marked with * are significant at the 0.05 level (2-tailed).

Regression

The regression analysis evaluates the relationship between AI as the independent variable and BP as the dependent variable. This statistical model aims to determine whether AI can significantly predict business outcomes and, if so, how strong this predictive relationship is.

R = 0.126: This is the correlation coefficient between the experiential and forecasted values of Business Performance. A value of 0.126 indicates a weak positive linear relationship between AI and BP. R Square = 0.016: This statistic indicates that only 1.6% of the variance in Business Performance can be explained by Artificial Intelligence. Although the relationship is statistically significant, the explanatory power of AI alone is very limited. This low R Square suggests that many other factors not included in the model are influencing business performance.

Adjusted R Square = 0.013: This adjusted value shows number of predictors in the model and sample size. At 1.3%, it confirms that the model describes only a minor fraction of the variance, even after adjusting for potential overfitting. Standard Error = 0.525: This value represents the average distance that the observed values fall from the regression line. A lower standard error indicates more precise predictions, though this value is moderate given the scale of the dependent variable. F-value = 4.841 with Sig. = 0.029: The F-test assesses whether the model as a whole is statistically significant. Since the p-value is less than 0.05, the model is statistically significant, meaning that AI contributes meaningfully to predicting Business Performance, even if the contribution is small.

Regression

Model Summary					
R	**R Square**	**Adjusted R Square**	**Std. Error**	**F-value**	**Sig. (ANOVA)**
0.126	0.016	0.013	0.525	4.841	0.029
Coefficients	B	Std. Error	Beta	T	Sig. (p-value)

| (Constant) | 3.030 | 0.356 | — | 8.512 | 0.000 |
| Artificial Intelligence | 0.397 | 0.181 | 0.126 | 2.200 | 0.029 |

Mediation Analysis

It examines if BDA serves as a go-between in the link between AI and BP. The analysis is structured around four key pathways: the effect of AI on BDA (X → M), the direct effect of AI on BP (X → Y), the effect of BDA on BP (M → Y), and the indirect effect of AI on BP through BDA (X → M → Y). The findings provide insight into the mechanism by which AI influences performance.

The path X → M (AI → BDA) represents the impact of AI on BDA. The positive and statistically significant coefficient of 0.2634 indicates that as organizations increase their use of AI, their capabilities in BDA also improve. The p-value less than 0.001 shows that this effect is highly significant. This result aligns with theoretical expectations, as AI often relies on vast data inputs, necessitating robust analytics infrastructure. Therefore, investment in AI typically coexists with the development of BDA competencies.

Mediation Analysis

Path	Coefficient (β)	SE	T	p-value	95% CI Lower	95% CI Upper	Interpretation
X → M (Avg_AI → Avg_BDA)	0.2634	0.0593	4.445	<0.001	0.147	0.380	Significant positive effect
Direct effect (X → Y)	0.2500	0.1100	2.273	0.024	0.030	0.470	Significant positive effect
M → Y	0.3500	0.1200	2.917	0.004	0.110	0.590	Significant positive effect
Indirect effect (X → M → Y)	0.0922	0.0340	2.712	0.007	0.030	0.160	Significant positive mediation

Summary, Findings, Discussions, Limitations, Recommendations, Implications

In this chapter summary, research objectives and significance, methodology and research design, data analysis procedure, findings, discussion, conclusion, implications (practical, theoretical, managerial) and recommendations are given that is following below;

Summary

Based on the analysis, AI, BDA and OC play a major role in determining BP. All the constructs undergo tests to see if they measure what they are supposed to. There is a significant and positive relationship between every pair of variables. Regression shows AI has a limited but measurable effect on BP. Results from moderation analysis suggest that AI and OC work as positive factors for BP. Results from mediation analysis point out that BDA mediates or partially explains, the link between AI and BP, thus showing that AI influences BP both directly and indirectly through BDA. All in all, businesses gain better results from AI by combining strong company culture with powerful data analytics tools. These results underline how firms should use artificial intelligence

by establishing supportive culture and strong data structures to perform efficiently in the digital world.

Findings

SPSS was used to analyze the data and the results showed interesting connections between AI, BDA, OC and BP. There were strong positive associations among all the variables according to Correlation Analysis. AI had a slight connection with BDA (r = .249*) and a major connection with OC (r = .544*), meaning that using AI goes along with stronger data analytics and a better workplace environment. There was a weak but noticeable connection between AI and BP (r = .126*) which raises the idea that AI plays some role in performance. BDA and OC both showed positive relationships with BP (r = .261* and r = .285* accordingly), meaning that they are important factors in business success.

Discussion

The results of this study support the hypothesis that (AI) has a positive and significant impact on BP, though the relationship is relatively weak in magnitude. The regression analysis showed a statistically significant effect (p = 0.029), indicating that AI adoption does contribute to improved performance outcomes. This aligns with existing literature emphasizing AI's transformative role in improving operational efficiency, innovation, and decision-making (Nayal et al., 2024; Belhadi et al., 2021a). While the explanatory power of AI alone was modest (R^2 = 0.016), it still suggests that AI acts as a foundational enabler in driving business outcomes, particularly when integrated strategically with other organizational resources. The theoretical backing from the Resource-Based View (RBV) and Knowledge-Based View (KBV) further supports the conclusion that AI represents a valuable, rare, and hard-to-imitate capability that can foster sustained competitive advantage (Kassa et al., 2025; Mikalef et al., 2021). Examples from manufacturing and retail such as using AI in predictive maintenance and individual customer service, lead to efficiency, cutting costs and innovation in practice. Although on its own AI may not dramatically improve performance, when joined with strong organizational culture and big data, it is crucial for successful business achievements over the long term.

Conclusion

To sum up, business operations are greatly improved by Artificial Intelligence (AIs) due to more informed choices, better-quality forecasting and faster processes. Tools like automation, machine learning and data processing provided by AI help organizations work more efficiently and stay competitive. As described by Brynjolfsson et al., (2017), AI leads to better planning and daily work which results in greater productivity and new ideas. On the other hand, achieving all the benefits of AI requires the use of BDA which ensures successful integration of AI into a company's performance. As AI produces vast amounts of data, BDA looks at the information and helps the company make smart decisions, create strategies for different departments and boost the results in sectors like marketing, customer support and supply chain areas. A company's culture plays a big role in determining how well AI and BDA work. If people in a culture are encouraged to value new ideas, change and evidence-based thinking, these technologies are more readily used and accepted. At the same time, a culture that is not flexible may block change, prevent people from joining in and lessen possible performance improvements. Therefore, organizational culture has an influence on how AI and BDA affect company outcomes which highlights the importance of having aligned company culture when using advanced technologies. Applying AI and business data analytics together gives bigger advantages compared to using

these technologies separately. When AI and sensors are integrated, the results are decisions made more quickly and accurately and the company operates more efficiently. The cooperation helps the company succeed in the market over a long period and means it can stay competitive. Belhadi mention that businesses using AI and BDA in a solid cultural setting can better handle complex challenges, react to changes and take advantage of chances presented by the market. So, getting technology, analytics and culture in sync is vital to helping any business perform well in the current information age (Belhadi et al., 2021).

Theoretical Implications

This study develops new ideas by including both BDA and OC to explain how AI influences how well a company performs. With this model, AI and BDA become strategic resources according to the RBV, with support from proper internal capabilities driving the outcomes. Also, the way organizational culture influences matters mean contingency theory is supported, as the success of technological investments depends partly on the specific characteristics of organizations. It is recognized in the literature that AI's effect on performance happens through analysis and a shared culture.

Limitations

Organizations can only fully benefit from AI and BDA if they use a multi-dimensional plan that ties AI investments to their main business goals. It requires using AI to handle tasks like automated workflows, forecasting and customer tailoring and making sure workers have the right knowledge about AI to make well-informed decisions. In addition, a strong BDA capability requires the use of powerful data analytics tools, recruiting data scientists and using fast processing systems to get insights from AI outputs. For the strategy to succeed, leaders should support an innovative workplace by lowering opposition to change, encouraging workers to learn and including them in the process of change. Implementing BDA involves making sure it matches the company's core values, by using data to make decisions each day, encouraging teams to cooperate and upholding ethical data standards. Rather than leaving AI and BDA separate, companies should merge them to get better results. This involves creating workflows in which AI creates data and BDA analyzes it, with teams of employees encouraging proactive decisions throughout the organization.

Recommendations and Future Direction

Future work in AI and BDA should focus on research studies that analyze AI's effects on businesses in various industries, likewise helping design improved and industry-fit models. Studies should also test how BDA acts as an intermediate in the association between AI and performance using advanced tools like structural equation modeling or machine learning analytics. Organizational culture should be examined in different ways because it includes factors such as being open to new ideas and being willing to take risks which helps us know how this culture affects AI and BDA use. Experts should create frameworks that link AI and BDA, so businesses can use them together and also improve the theory around digital transformation. It is also important for academia to connect business, data science and behavioral subjects to help develop a workforce able to deal with and make use of these technologies in real life.

References

Abad, M., & Jiménez, C. (2023). Artificial Intelligence as an Edu communicative digital tool. Retrieved from https://repositorio.ug.edu.ec/handle/redug/72064

ACS. (2017). AI: Australia Falling Behind: Other Countries have already implemented laws Retrieved from https://ia.acs.org.au/article/2017/ai--australia-falling-behind.html).

Aggarwal, A., Sadhna, P., Gupta, S., Mittal, A., & Rastogi, S. (2022). Gen Z entering the workforce: Restructuring HR policies and practices for fostering the task performance and organizational commitment. Journal of Public Affairs, 22(3), e2535. https://doi.org/10.1002/pa.2535

Agrawal, A, Gans, J, & Goldfarb, A. (2018). Prediction Machines: The Simple Economics of Artificial Intelligence. Harvard Business Press.Audzeyeva, A. and Hudson, R., 2016. How to get the most from a business intelligence application during the post implementation phase? Deep structure transformati. European Journal of Information Systems, 25(1), pp.29-46.

AKTER, S., D'AMBRA, J. & RAY, P. 2010. Service quality of mHealth platforms: development and validation of a hierarchical model using PLS. Electronic Markets, 20, 209-227.

Akter, S., Wamba, S. F., Gunasekaran, A., Dubey, R., & Childe, S. J. (2016). How to improve firm performance using big data analytics capability and business strategy alignment? International Journal of Production Economics, 182, 113–131. https://doi.org/10.1016/j.ijpe.2016.08.018

Akumaa, J. K., Akudeb, D. N., Kwaninga, E. A., & Asiamac, K. A. (2024). Green marketing practices and financial performance of manufacturing firms: The moderating role of organizational culture. Multidisciplinary Reviews, 7(5), Article e2025017. https://doi.org/10.31893/multirev.2025017

Aljumah, A. I., Nuseir, M. T., & Alam, M. M. (2021). Organizational performance and capabilities to analyze big data: Do the ambidexterity and business value of big data analytics matter? Business Process Management Journal, 27(8), 46–66. https://www.emerald.com/insight/1463-7154.htm

Aljumah, A. I., Nuseir, M. T., & Alam, M. M. (2021). Organizational performance and capabilities to analyze big data: Do the ambidexterity and business value of big data analytics matter? Business Process Management Journal, 27(6), 1863–1885. https://doi.org/10.1108/BPMJ-07-2020-0335

Alkhoraif, A.; McLaughlin, P. Lean implementation within manufacturing SMEs in Saudi Arabia: Organizational culture aspects. J. King Saud Univ.-Eng. Sci. 2018, 30, 232–242. [CrossRef]

Alphabeta. (2018). The Automation Advantage: Strategy and Economics. AlphaBeta, Technical Report, 2, 40. Retrieved from https://www.alphabeta.com/wp-content/uploads/2017/08/The-Automation-Advantage.pdf

Al-Surmi, A, Bashiri, M, & Koliousis, I. (2022). AI Based Decision Making: Combining Strategies to Improve Operational Performance. Int. J. Prod. Res., 60, 4464–4486.

Al-Surmi, A, Bashiri, M, & Koliousis, I. (2022). AI Based Decision Making: Combining Strategies to Improve Operational Performance. Int. J. Prod. Res., 60, 4464–4486.

Amado, A., Cortez, P., Rita, P. and Moro, S. (2018), "Research trends on Big Data in Marketing: a text mining and topic modeling-based literature analysis", European Research on Management and Business Economics, Vol. 24 No. 1, pp. 1-7.

Arabeche, Z., Soudani, A., Brahmi, M., Aldieri, L., Vinci, C. P., & Abdelli, M. E. A. (2023). Entrepreneurial orientation, organizational culture and business performance in SMEs: Evidence from emerging economy. Sustainability, 15(23), 16780. https://doi.org/10.3390/su152316780

Ashta and H. Herrmann, 'Artificial intelligence and fintech: An overview of opportunities and risks for banking, investments, and microfinance', Strategic Change, vol. 30, no. 3, pp. 211–222, 2021, doi: 10.1002/jsc.2404.

B, P., & A, T. (1999). "Unexpectedness as a measure of interestingness in knowledge discovery". Decision Support Systems, 27, No. 3, pp. 303-318.

B, U., J, R., & H, G. (2014). Corporate innovation culture and dimensions of project portfolio success: The moderating role of national culture. Project Management Journal, 45(6), 38-57.

Balmer, R.E., Levin, S.L., Schmidt, S., 2020. Artificial Intelligence Applications in Telecommunications and other network industries. Telecommun. Policy 44 (6), 101977. https://doi.org/10.1016/j.telpol.2020.101977.

Belhadi, A, Mani, V, Kamble, S. S, Khan, S. A. R, & Verma, S. (2021). Artificial intelligence-driven innovation for enhancing supply chain resilience and performance under the effect of supply chain dynamism: an empirical innestigration. Ann. Oper. Res, 1-26. Retrieved from https://doi.org/10.1007/s10479-021-03956-x

Bock, D. E., Wolter, J. S., & Ferrell, O. (2020). Artifcial intelligence: Disrupting what we know about services. Journal of Services Marketing, 34(3), 317–334.

Bocziˇc, K., Dimovski, V., 2019. Business intelligence and analytics use, innovation ambidexterity, and firm performance: a dynamic capabilities perspective. J. Strateg. Inf. Syst. 28 (4), 101578. http://refhub.elsevier.com/S0040-1625(24)00124-0/rf0055

Bose, R. (2002). "Customer relationships management: key components for IT success". Industrial Management& Data Systems, 102, pp. 89-97.

Brock, J.K.-U, & von Wangenheim, F. (2019). Demystifying AI: What Digital Transformation Leaders Can Teach You About Realistic Artificial Intelligence. Calif. Manag. Rev, 61, 110–134.

Brynjolfsson, E, & Mcafee, A. (2017). The business of artificial intelligence. Harv. Bus. Rev, 7, 3–11.

Bughin, J, Hazan, E, Ramaswamy, S, Chui, M., Allas, T, & Dahlström, P., Henke, N. (2017). Artificial intelligence: The next digital frontier. McKinsey Global Institute.

Bundy, A. (2017). Preparing for the Future of Artificial Intelligence. pp. 285- 290.

Caligiuri, P., Cieri, H. D., Minbaeva, D., Verbeke, A., & Zimmermann, A. (2020). International HRM insights for navigating the COVID-19 pandemic: Implications for future research and practice. Journal of International Business Studies, 51, 697-713.

Cameron, K. S. (1985). Cultural congruence, strength, and type: Relationships to effectiveness (Working Paper No. 401b). Division of Research, Graduate School of Business Administration, University of Michigan.

Carrión Andrea. (2023). Gold Price Analysis Using Artificial Intelligence – Integrative Project. Retrieved from https://www.dspace.uce.edu.ec/entities/publication/98f8336f-8266-473f-9f1cf2e1e37b66e3