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Exploring the Impact of Big Data Analytics on Organizational Decision-Making and Performance: Insights from Pakistan's Industrial Sector

Assad Latif[1], Raheela Fairdous[2], Raheel Akhtar[3], Muffarah Ambreen[4]

[1] School of Management and Economics, North China University of Water Resources and Electric Power China. Email: assadlatif5@gmail.com
[2] School of Management and Economics, North China University of Water Resources and Electric Power China. Email: raheelafairdous@gmail.com
[3] National College of Business Administration and Economics Sub Campus Multan, Collection Control Unit, Retail Risk Management Department, Faysal Bank Limited, Pakistan. Email: mianraheel19@gmail.com
[4] School of Management and Economics, North China University of Water Resources and Electric Power China. Email: muffarahassad@yahoo.com

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ABSTRACT

Little is known about how big data analytics affects decision-making and how choices have an impact on organizational performance. The research model presented in this study, which is based on the information processing view and survey-based ratings, links Big Data Analytics to organizational decision-making effectiveness and performance of organizations in Pakistan's textile industrial sector. The purpose of this paper is to examine the relationship between BDA and organizational decision-making as well as the degree to which BDA influences decision-making. Based on an adopted questionnaire, data was collected from 570 respondents. Data analysis using statistics reveals that Big Data Analytics has a favorable impact on an organization's capacity for decision-making and effectiveness. The results also show that there are no statistical differences between major firms and medium-sized businesses when it comes to the pathways from Big Data analytics to successful decision-making. Our findings advance managers' knowledge and comprehension by illuminating how Big Data Analytics might improve the effectiveness of decisions.

Corresponding Author's Email: mianraheel19@gmail.com

1. Introduction

Massive data sets are referred to as "big data" when they are computationally analyzed to find patterns, trends, and linkages, especially those relating to human behavior and interaction. Because of their enormous size, these information collections need to be analyzed using cutting-edge computational methods. The term "Big Data Analytics" has gained significant popularity in professional and academic settings, such as conferences, journals, and publications. Essentially, it refers to the vast amount, diversity, and speed at which data is generated and made available today. Big data, which is described as high-volume, high-velocity, high-variety, and high-value information assets, necessitates the use of innovative and cost-effective information processing techniques in order to yield insights and allow for sound decision-making. While there are compelling success stories in Big Data Analytics, many organizations face significant expenses and challenges that hinder their adoption. Moreover, there is limited experimental evidence of the overall net benefits. Hence, whether information-driven decision making utilizing Big Data Analytics results in better performance and a competitive edge in Pakistan's production sector is the research topic stated in this article. Successful business narratives emphasize the importance of thoughtful decision making based on reliable information. The industrial sector demands high-quality data to enhance productivity and the efficiency of business systems. Organizational decision-making processes rely on reliable data to transform inputs into actionable knowledge, forming the foundation for data-driven decisions.

Unfortunately, traditional decision support systems and Business Intelligence methodologies heavily rely on historical data and basic analysis techniques, which may not suffice for predicting future decisions, detecting biases, or uncovering new opportunities. By 2023The enormous potential of BDA is demonstrated by the market's anticipated growth to $103 billion. In 2019 alone, each person generated approximately 1.7 megabytes of digital data every second. While Big Data presents significant opportunities for large and medium-sized businesses, it also comes with substantial costs. Making informed business judgments requires creative and proactive problem-solving approaches that can transform challenges into opportunities, even in challenging economic conditions.

Big Data's characteristics—volume, velocity, diversity, authenticity, and value—play a critical role in enabling informed decision-making. The major goal of this study is to comprehend how these Big Data properties affect organizational effectiveness. In particular, the research seeks to examine the connection between the "5Vs" of Big Data and decision-making in Pakistan's industrial industry. Undoubtedly, a large volume of data is essential for establishing an effective and cohesive decision-making system. However, it is important to recognize that the other four Vs also significantly influence how this data is utilized. Variety and reliability of information, for instance, are vital for comprehending client purchasing patterns, exploring the potential of data-driven marketing strategies, and enabling prompt reassessment of risk exposure. The study seeks to shed light on the extent to which these Big Data characteristics impact decision making in the context of Pakistan's manufacturing industry.

This study tries to establish the value of BDA for increased output and performance in the garment industry. Pakistan's industrial sector is currently struggling financially as a result of the depreciation of its currency in relation to the US dollar. Currently, it is challenging to pay for things like labor, electricity, transportation, and raw supplies. In these conditions, they must make challenging choices including make and buy, downsizing, and temporary shutdown. In addition to these challenging decisions, market-based goals are achieved through effective decision-making, which is impossible without accurate and trustworthy information. Another objective of this study is to identify the relationship between BDA and decision-making in Pakistan's industrial sector, which will aid in ensuring that any decisions are well-informed. The study's goal is to determine how decision-making and BDA impact organizational output and performance. This study, which compares successful and unsuccessful decisions, will give the managing director a new way to make decisions using big data analytics.

The investigation's results will help firms understand the advantages of using BDA and decision-making to run their organizations. Studies will help businesses understand the value of big data for the financial development of Pakistan's economy and society. Businesses will receive fresh information from a variety of experts so they may come up with innovative solutions for improving operational performance and methodological change. They will benefit from the study's explanation of how market-based decisions in Pakistan's economy present a variety of opportunities, as well as how to take advantage of them while juggling a restricted budget by making data-driven decisions based on big analytics. This study will give business owners and operation managers the option to use cutting-edge technologies and take on the world with their expertise.

Since the work offers quantitative information on huge data qualities that can serve as the basis for panel data and literature evaluations, it is important for aspiring BDA researchers. One standout benefit of the report is how it discusses the 5Vs as relevant to business decisions in the Pakistani market. The study also offers areas for conducting business and making decisions. This provides excellent data for upcoming studies about the Pakistan market, which has not yet been properly investigated. Microsoft is putting all of its enormous resources into big data services for B2B companies, where it first found success with its operating system and office suite. For enterprises of all sizes to be able to perform huge data analysis operations, it provides its own "big data in a box" solutions that blend proprietary and open-source technology.

Businesses have access to a wide variety of data types that are gathered from several platforms, including websites, social networking sites, mobile devices, and other active or passive data gathering techniques. The volume of business data continues to expand rapidly. By harnessing Big Data tools and techniques in their decision-making processes, businesses can enhance real-time customer relationships, optimize operational efficiency, and achieve improved organizational performance without the need for additional funding.

Table 1: Lists the Top Five Big Data Analytics Tools

S. No.	Tools & Techniques	Description	Decision Making
1	Apache Hadoop	Using a clustered file system and the MapReduce programming methodology, handle massive data. holds all types of file systems, including text, XML, and images.	50 leading organizations utilize the Hadoop tool to identify consumer patterns and online purchasing behavior.
2	Cloudera Distribution	Apache Hadoop, Apache Spark, and Apache Impala are all distributed for free and in a freely available format.	used by numerous businesses to gather vast amounts of consumer data in a secure setting for use in the service industry and financial service management decision-making.
3	Cassandra	Open source/NoSQL DBMS Structured queries Fast, long array for storage, massive database and simple and linear scalability	Troubleshooting and maintenance take more work, and only large organizations utilize it to make strategic decisions.
4	Knime	Konstanz Information Miner/ high integration of languages and technologies/automates manual work	utilized for business intelligence, CRM, data mining, data analytics, enterprise reporting, and integration.
5	Datawrapper	Data Visualization/simple, precise and embeddable charts production/ Handling Image data with accuracy	utilized by internet service providers for operational choices based on marketing

1.1. Study Background

The industrial sector contributes around 24% to Pakistan's GDP. The country's primary industries are clothing manufacturing and cotton textiles, which together employ approximately 40% of the workforce and account for about 65% of total goods exports. Cotton and cotton-based products contribute to 61% of Pakistan's export earnings (Ara, 2019).

Despite Pakistan's comparatively less developed economy and its neighbors' (China, India, and Malaysia) stronger economic standing, prominent brands are actively involved in Pakistan's manufacturing sector, investing significant capital and operational costs. Over the past decade, Pakistan has faced ongoing financial challenges, leading to business closures and employee layoffs. The government has increased spending to strengthen defense against internal threats and external terrorism. Consequently, the industrial sector faces high taxes on raw material imports, energy purchases, and fuel procurement for manufacturing operations. The prevailing economic conditions, including the strengthening of the US Dollar ($) against the Pakistani Rupee, have made it increasingly difficult for the financial system to sustain subsidies for businesses. Big Data analytics is essential for enhancing Pakistan's manufacturing sector and aiding efficient decision-making in this difficult climate.

In the manufacturing sector of Pakistan, the decision to continue operations is a critical one, considering the potential drain on funds. Therefore, the importance of having access to a huge volume of data that includes accurate and trustworthy information has risen. Operational decisions encompass choices such as make or buy, scale back or maintain, and close down or remain open. The implementation of "Big Data" analytics, despite its significant cost, becomes a crucial decision, particularly given the challenging circumstances faced by Pakistan's manufacturing industry, where revenues are declining. Convincing business systems about the worthiness of the opportunity cost requires comprehensive empirical investigation and a wealth of literary knowledge to transform challenges into opportunities.

Realizing that intelligent decision-making tools and Big Data analytics are essential for industrial transformation, the research focuses on the vibrant city of Karachi, Pakistan's largest city and an industrial hub and labor zone. Approximately 70% of Pakistan's manufacturing sector is concentrated in Karachi, hosting major brands such as Dadabhoy, Dewan, Gul Ahmed, Al-Karam, Abbott, Atlas, Askari, Bolan, Alfalah, Fateh, Fauji, Ghazi, and Arif Habib. With a population

of 15,741,000, Karachi ranks as the fifth most populous city globally and boasts both dry and maritime ports. The study presents findings derived from a survey conducted in the Karachi industrial zone, involving the selection of 10 manufacturing companies with sufficient financial resources to support the implementation of "Big Data Analytics."

2. Literature Review

It gets more difficult to manage larger datasets (Russom, 2011). The term "big data" refers to databases grow to be so large conventional database management solutions struggle to manage them. Furthermore, big data's scope exceeds capability of existing methods for managing, storing, and processing data (Almeida, Brás, Sargento, & Pinto, 2023). Big data has three main characteristics: volume, velocity, and variety (Alshawabkeh et al., 2022). The ability to make informed decisions inside an organization depends on three factors: volume, velocity, and variety. Volume describes the magnitude of the data; velocity describes the rate at which it is changing; and variety describes the various formats and types of data. Veracity, the fourth V from IBM, was unveiled (Jagadish, 2015), additionally, some academics regard the importance of data as the fifth V in the decision-making process (Visvizi, Troisi, & Grimaldi, 2023).

BDA employs advanced methods of analysis on large datasets. However, larger datasets also present more challenges and difficulties (Russom, 2011). Advanced analytics can facilitate better decision making, risk reduction, and the discovery of valuable insights. Over the years, various scholars have conducted in-depth research on managerial decision making, which holds significant importance. Decision makers frequently use Simon's four stages of decision making—intelligence, design, choice, and execution—in a variety of contexts (Santoso, 2017). Additionally, the pipeline for big data analysis involves multiple processes, each with its own challenges and decision-making requirements (Jagadish, 2015). These choices encompass data collection methods, determining which data to collect, data representation after extraction for analysis, and decision making based on the collected data. Santoso (2017) additionally emphasizes that changing the environment of organizations, leadership, HRM, and other management practices is necessary in order to embrace a data-driven approach to decision making.

Implementing these adjustments has the potential to drive operational efficiency, mitigate management risks, and strengthen customer relationships, ultimately enhancing a company's competitive position (Davenport, 2014). The perspective on big data has evolved in strategic management, recognizing it as a crucial enterprise asset for organizational success (Russom, 2011). Big data must be integrated with other resources and competencies to create a framework that supports making decisions, improves company efficiency, and grants a long-term competitive edge (Kiron, 2013). For decisions to have a substantial influence, especially in the case of nations like Pakistan with an underdeveloped economy, decision effectiveness must be increased (Rahman, Abdullah, & Khan, 2018). The findings from a literature review indicate that different research studies utilize a range of theoretical and practical techniques for data collection and refinement, while some studies employ similar methods. Presently, every organization relies on decision making driven by information. Big data analytics offers useful tools and insights to improve conventional mining of data and algorithms that make decisions in this area.

Every organization has as its main goal improving performance. The improvement of organizational performance is seen as the ultimate goal of corporate strategic management. As a result, organizations have concentrated their efforts on this area. There is little agreement among researchers regarding what is meant by organizational performance and how it will be measured, as seen by the variety of definitions, points of view, and measurement indicators that have been offered. The ability of an organization to define, conceptualize, and assess performance is therefore rather challenging (Ali et al., 2020).

Drawing on the principles of the resource-based view (RBV), this study offers a model that examines the effects of BA adoption on business process performance (BPER) and the mediating role that BPER plays in the relationship between BA adoption and firm performance (FP). The results of this empirical study, which were based on information acquired from 204 medium- to high-level business leaders in diverse industries, suggest that the implementation of BA favorably influences BPER. Additionally, BPER and FP get along well. The results also show that BPER fully mediates the link between FP and BA adoption (Aydiner, Tatoglu, Bayraktar, Zaim, & Delen, 2019).

His study convincingly illustrates the use of big data-driven technologies in the intelligent manufacturing industry, along with the significant advantages and internal motivation it offers. It also gives big data-driven technologies a theoretical analysis foundation to support decision-making in intelligent manufacturing. This study suggests a conceptual framework of intelligent decision-making based on commercial big data-driven technology, which provides creative solutions to challenging issues and prospective future research areas in this field (Aydiner et al., 2019).

3. Theoretical Framework

Making decisions in the age of big data frequently involves reducing complex problems down into manageable components people can understand and act upon. To do this, nevertheless, a number of formidable obstacles must be overcome (Cook & Sadeghein, 2018a). (Provost & Fawcett, 2013) emphasizes how data analytics and Data-Driven Decision-making (DDD) are becoming more and more common in business, where decisions are made based on data analysis rather than intuition. Data-centered decision-making and interpretation of the world offer numerous possibilities. The evolution of decision-making processes in organizations can be traced back to Simon's model in 1977, as demonstrated by (Zaraté & Liu, 2016). Simon's concept emphasized that the administrative background and decision-makers' behavioral characteristics have an impact on rational decisions, setting the foundation for information influenced decision-making (Lu, Yu, & Lu, 2001). Herbert Simon (1977) had a huge impact on our comprehension of the procedure for making decisions and is credited with creating the field of decision support systems. Simon (1960) and his later partnership with Newell (1972) claimed that decision-making is a process with three separate phases: intelligence, design, and choice. In all three stages of Simon's decision-making model, recent research on data-driven decision-making and information-based decision-making adds a plethora of information, emphasizing the significance of large volume and high value of information (Ara, 2019).

The stage of choice involves selecting the best decision to address a problem and transform it into an opportunity (Newell, Shaw, & Simon, 1958). Intelligence focuses on identifying challenges and gathering relevant data. Design entails exploring different potential solutions. The vast amount of data that needs to be comprehended and transformed into sound and effective decisions surpasses the capabilities of human abilities alone. Throughout history, philosophers have presented various stages of decision-making. In order for each stage to yield successful outcomes, decision-making must be proactive, intelligent, and grounded in knowledge and accurate data. Advent of BDA must provide people the convenience understanding data to enhance decision-making driven by information (Augier, 2000).

Figure 1: Simon's Decision Making Model 1977

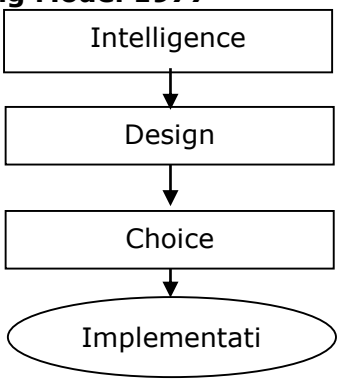
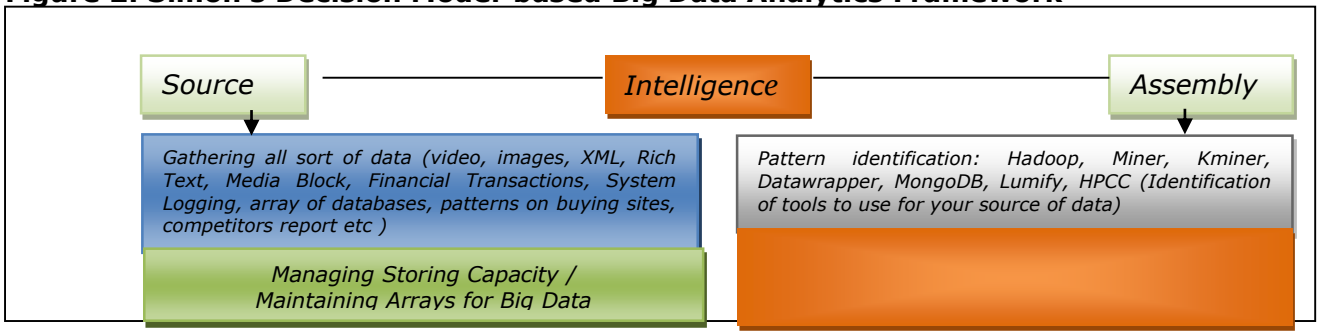
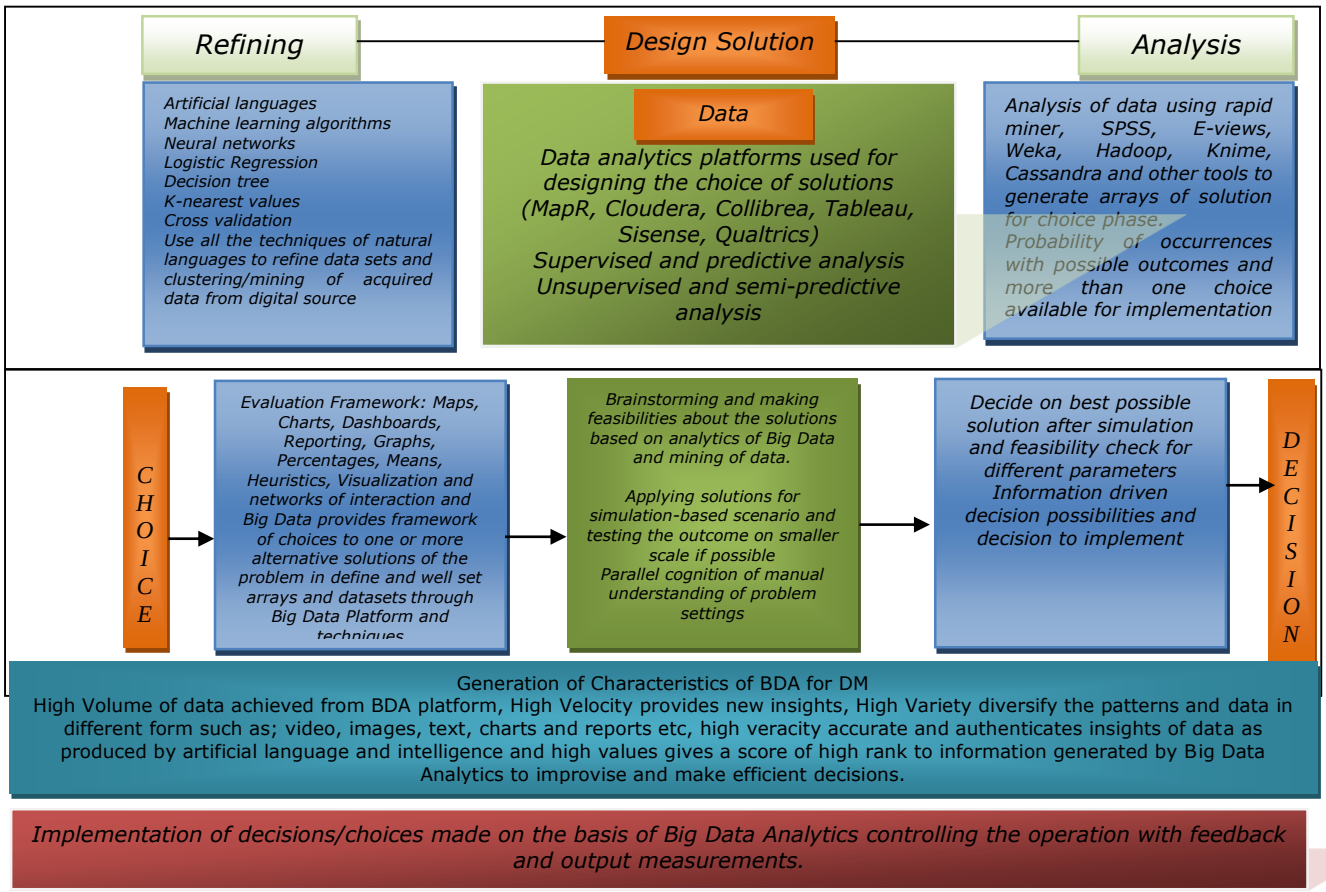


Figure 2: Simon's Decision Model-based Big Data Analytics Framework





4. Conceptual Framework

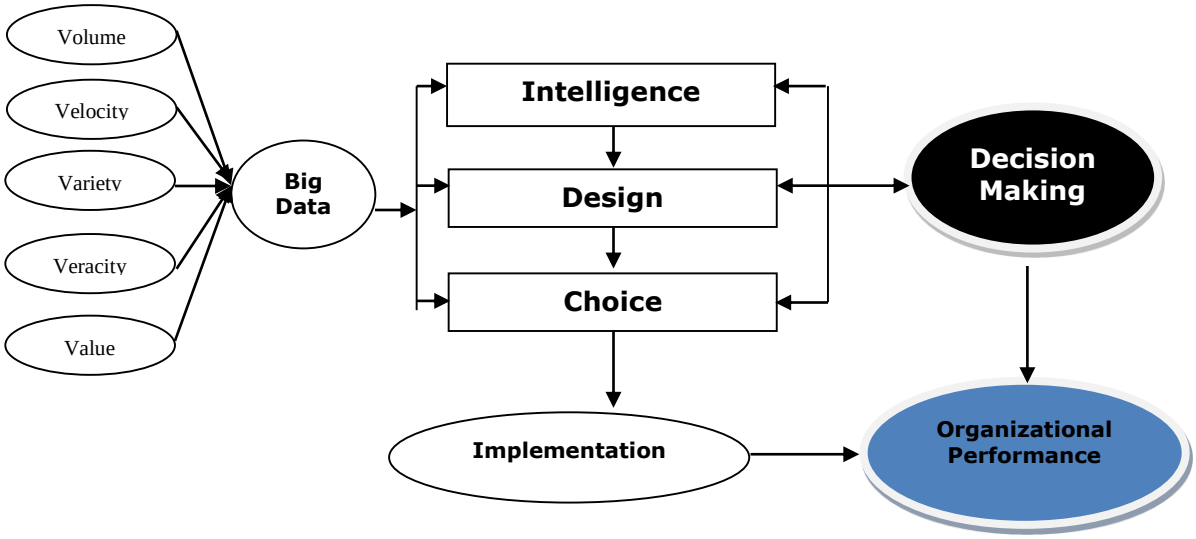
Internal and external sources are employed to gather information solely for the purpose of identifying issues and opportunities during the first phase of the decision-making process, which is referred to as the intelligence phase. The current study is based on Simon's decision making model in figure 3 (Simon, 1979). During this phase, the diversity and volume of data from various sources used for big data analytics are the major topics (Fayyad, 1966). Some of the sources of such big data are unknown, thus they must be handled with caution and attention (Reif & Schmücker, 2020).Obtaining and keeping such data becomes a problem again after data sources are identified and verified. The data is stored and maintained using Big Data Pipeline, Oracle, Net framework, and other dependable platforms in order to use it to develop solutions to issues and opportunities (Reif & Schmücker, 2020). Traditional DBMS (SQL, MPP, Cassandra, and EDWs) and the distributed file system of the digital world, HDFS, can be utilized to collect and store enormous volumes of data. HBase and Couch Db are also excellent choices for managing Big Data storage.

Following the conclusion of the second phase of information gathering and storing, the third phase of data processing, known as the lifespan and transformation phase in KDD kernel based integration, begins. It is your responsibility to organize, develop, and follow a process for integrating solutions from sets of challenges and opportunities. When integrating modules or using DBA processing tools, high-speed internet networking known as ETL/ELT is used. To transform unprocessed data into information, Hadoop, MapReduce, and memory management are used (Dasari & Kaluri, 2023). For statistical analysis of bid data, which may be employed in process calculation and managing the suggested alternatives, data can be applied using a variety of languages, including SQL, HIV, Pig, and R. Vertica, Greenplum, and IBM Nateza are just a few of the solutions that certain Vendors manage using various ways. The design process comes after, and it comprises three primary parts: planning, analytics, and analysis. The best suited decision solution is created using WEKA and Rapid Miner. Classification (Decision tree, Foresting, SVM, etc.), Clustering (Boosting, XGboost), and Regression (Simple, Linear, and Logistic) are the approaches that are utilized the most. To analyze the most ideal occurrences, these rules of analysis (Machine Learning Language) are utilized. In this step, predictive analysis is presented along with the raw data and potential outcomes for decision-making process. Third step of the BDA's decision-making modules is called the Choice step.

During the decision-making stage, an examination of the potential impacts of various solutions takes place. In this study, BDA is used to conceptualize Simon's decision-making model and examine the effects of volume, velocity, variety, truthfulness, and value as independent factors on information-driven decisions. All three phases are proven to have a good correlation with big data analytics' properties (Intelligence, Design, and Choice) of Simon's Decision Model. Intense concentration and brainstorming are required for effective problem-solving and handling of urgent situations, which can lead to decisions that have varying outcomes for organizations (Kiron, 2013). The third phase of decision-making follows the Knowledge Discovery in Databases (KDD) process and an integration module for evaluating and processing potential solutions. Different options, such as graph-based or text-based solutions, are available for selecting alternative solutions, and various tools can be employed to implement the chosen decision. The reliability and veracity of the information used to make a decision is crucial, and decisions are justified by practical solutions that are then put into practice by the administration through carefully monitored implementations that determine organizational effectiveness (Çelik & Arslankaya, 2023).

Managers and executives face the challenge of dealing with a vast array of information and limited intuition when making decisions. However, creating alternate solution datasets is now simpler thanks to the quantity of electronic information (Cook & Sadeghein, 2018b) In a competitive market flooded with competitors and agencies vying for clients and loyalty, decision-making in Pakistan's manufacturing sector needs to be not only wise but also timely. Big Data's velocity and value features emphasize how crucial it is to use business intelligence to handle problems and take advantage of opportunities as they arise quickly. The study investigates how the "5Vs" of big data affect decision-making and finds a link between it and organizational effectiveness.

Figure 3: Conceptual Framework Based on Simon's Decision Making Model 1977



4.1. Hypotheses

Using the conceptual framework, related theories of big data analytics, and decision-making model as a foundation, the following null hypotheses were created for the study:

H_1: There is no significant relationship between Big Data Analytics and decision making of the organization in manufacturing industry of Pakistan.

H_2: Decision making of manufacturing industries in Pakistan is positively correlated with the organizational performance

5. Research Methodology

The study employs a quantitative research design using a survey-based approach. To examine the influence of the "5Vs" (independent variable) on decision-making (dependent variable), a custom questionnaire with a 5-point Likert scale was created. The survey was conducted among executives, directors, and managers from 10 well-known corporations in Pakistan's textile manufacturing sector. The selection of these companies was based on their

financial capacity to afford the installation and management costs of Big Data Analytics. Data was collected from 570 respondents using convenient sampling method and 160 responses were rejected, however 410 were used for final analysis. To collect primary data, a traditional paper-and-pencil procedure was adopted. Ethical considerations were followed, ensuring informed consent and maintaining the confidentiality of participants to ensure unbiased data collection.

Table 2: Composition of Sample

S/No.	*Categories*	*N*	*Percentage*	*Course of Responsibilities*
1	Board of Directors	80	19.51%	Strategic Decisions
2	Executives	120	29.03%	Tactical Decisions
3	Managers	210	51.21%	Operational Decisions
Total		410	100%	

Source: Survey Data @ 2019 Labor Zone, Karachi, Pakistan

The involvement of Big Data analytics in decision-making has shown significant impact, which can be measured through past decisions that have been modified and led to successful outcomes. The responsibility of making informed and timely decisions lies with the Board of Directors, particularly in the R&D department, which has faced challenges in the past due to limited information and time constraints as valuable resources. In the European market, companies that have embraced Big Data analytics in their decision-making processes have demonstrated improved timeliness in product development compared to those that have not utilized BDA. Executive-level strategies are shaped by the guidance of the Board of Directors and involve the transformation of strategic directions into tactical decision-making processes. Supply chain management problems can be tactically addressed with the help of BDA. For example, companies like Ford and Mercedes have utilized BDA to predict and cluster natural disasters such as tsunamis in Indonesia, enabling them to manage logistics more efficiently.

In daily operational decision-making, BDA provides enhanced effectiveness and efficiency. Implementing daily decisions requires in-depth and up-to-date knowledge, and BDA facilitates this process. Manufacturing sectors in countries like Ethiopia, Uganda, Tanzania, as well as French companies in steel manufacturing and British companies in chemical manufacturing, have experienced improvements in their operational decision-making through the utilization of BDA. These advancements are evident in reports on enhanced production capacity, labor efficiency, and effective elaboration of changes in decision-making brought about by BDA.

Data was gathered by instrumenting a questionnaire and distributing it to participants. Volatility, Velocity, Variety, Validity, and Validity are characteristics of the population are the six primary components of the questionnaire. These five elements are further broken down into several constructions and variables (a collection of claims for member rating). All the survey respondents were asked these questions in an effort to get the best response possible from their experience in order to better understand; how the characteristics of huge data affect and how decisions are made. Six sections make up the questionnaire, the first of which includes easy inquiries about the participants' demographics. The remaining inquiries are posed in the open-ended part of the questionnaire.

To gather information, a survey is conducted online in Pakistan. For our data collection to be objective, we got in touch with companies that had a lot of employees and ample financial resources. Ten firms were selected to collect the data. Company executives are contacted via phone and email to obtain data. A Gmail account was reserved for downloading and submitting surveys after a random selection of employees. Timing concerns and ethical considerations are fully addressed throughout the data gathering process because respondents are given codes rather than names codes and the firm name will appear in the questionnaire.

6. Results and Discussion

Descriptive statistics, weighted means, frequency, mode, and median are used to assess how descriptive the study is. To get closer to the data's normal distribution, tests such as T-tests, Z-tests, and P-value analyses are employed. Various formulas, including kurtosis, are used to test the hypothesis. To test hypotheses, the IBM SPSS tool employs specialized tests. To forecast the results collectively and unambiguously, the study chooses means for the idea ratings. To determine the sample size for the study, Slovin's formula was employed, considering the known population size. As a result, a total of 410 participants were sampled for the study, as shown in Table 2. The selection of participants was carried out convenient basis from textile manufacturing

corporations in Pakistan once the sample size was determined. Prior to filling out the questionnaire, Participants received a thorough explanation of the study's goals as well as instruction on how to complete the questionnaire. Response options for the questionnaire were labelled from 1 to 5 and ranged from "strongly disagree" to "strongly agree," with a 5-point Likert scale being used.

Table 3: Impact Ratings of questionnaire

	Scale	***Categories***
1	1 to 1.49	Strongly Disagree
2	1.50 to 2.49	Disagree
3	2.50 to 3.49	Neutral
4	3.50 to 4.49	Agree
5	4.49 to 5.0	Strongly Agree

6.1. Reliability Analysis

Before proceeding with data collection from the complete sample of participants, a reliability test was conducted to assess the authenticity of the questionnaire. For a preliminary test, a subset of 30 receivers was randomly chosen from the sample and given the questionnaire. Utilizing the internal consistency metric Cronbach's Alpha, the questionnaire's dependability was assessed. Table 4's findings show that the Cronbach's Alpha scores for each of the questionnaire's five categories are all statistically significant (volume, velocity, variety, veracity, and value) exceeded required threshold 0.70 or 70%. These findings indicate that the questionnaire exhibited satisfactory reliability and can be deemed suitable for further data collection and analysis.

Table 4: Reliability Analysis Test

S/No.	***Variables***	***No.***	***Cronbach's Alpha***	***%***
1	Volume	30	.853	85.3%
2	Velocity	30	.788	78.8%
3	Variety	30	.923	92.3%
4	Veracity	30	.914	91.4%
5	Value	30	.862	86.2%
6	Overall	30	.902	90.2%

6.2. Hypotheses Testing

It seems that in the study, T-values and p-values were used to evaluate null hypotheses to see if they could be discarded in favor of the study's hypotheses. An independent sample test with a two-tailed approach was applied, as mentioned in Table 4. After conducting the independent sample test, a Kurtosis test was performed to provide additional confirmation for rejecting the null hypotheses in the study. However, specific details about the Kurtosis test and its results were not provided.

Table 5 presents the t-values and p-values of independent sample two-tailed tests determined by details that have been handed over. The t-values are as follows: $t_{Volume} = 3.31$, $t_{velocity} = 2.23$, $t_{variety} = 2.58$, $t_{veracity} = 1.89$, and $t_{value} = 2.56$. According to the information provided, all these t-values are greater than t-table values for degree of freedom at 138. When t-values are greater than the critical t-value for the given degrees of freedom, it indicates that the corresponding null hypotheses can be rejected. Therefore, in this case, all null hypotheses of the study can be rejected, suggesting support for the study hypotheses.

Additionally, the p-values shown in Table 5 are less than 0.50, as is specified. The results are statistically significant if the p-value is less than the selected significance level, which is commonly 0.05 or 0.01. In this case, p-values being less than 0.50 suggests that the model used in the study is significantly different from what would be expected by chance alone and is suitable for prediction. It is important to note that while the information provided suggests that the null hypotheses were rejected and the study hypotheses were accepted, a thorough understanding of the research question and methodology is necessary to fully interpret the results. Additionally, the specific significance level and hypotheses being tested should be considered.

Considering the outcomes of the impartial sample test (two-tailed), it has been determined that the model used in the study is a good fit. The null hypotheses of the study have

been rejected, indicating that there is evidence to support the study hypotheses. In qualitative terms, this can be expressed as follows: "The 5Vs (Volume, Velocity, Variety, Veracity, and Value) of Big Data Analytics have an impact on decision making in the manufacturing industry of Pakistan. The level of impact varies across different characteristics, with some having a high impact and others having a low impact." To further ensure the reliability of the results obtained from the t-value and p-value statistics, Kurtosis test values were examined. The Kurtosis test's findings, which were used to test hypotheses, are shown in Table 6. The specific details and interpretation of the Kurtosis test values would be necessary to provide a more comprehensive analysis of their impact on the study findings.

Table 5: Testing of Hypotheses (Independent Sample Test)

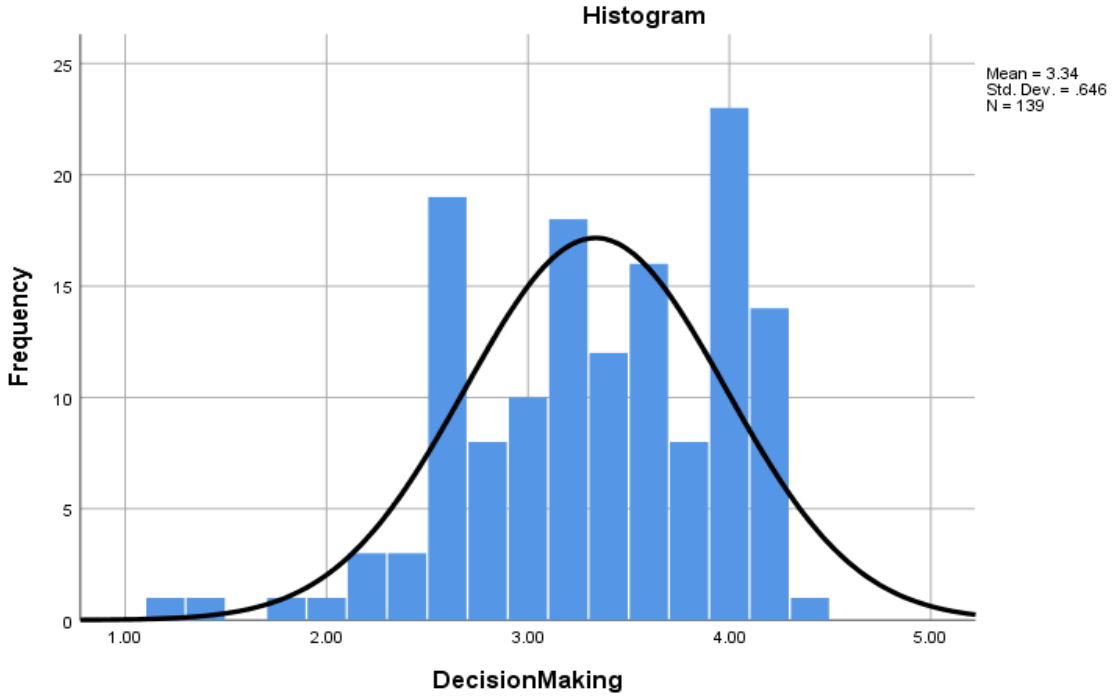
S/No.	Factors	Numbers	t-test statistic	P Value	t-table value
1	Volume	6	3.3180	.021	> T table value
2	Velocity	7	2.2396	.000	> T table value
3	Variety	7	2.5867	.012	> T table value
4	Veracity	5	1.8997	.023	> T table value
5	Value	6	2.5689	.000	> T table value

Table 6: Kurtosis (Normality Test) for Hypotheses Testing

S/No.	*Factors*	*Z value*	*Error*	*Z value/Error*	*Kurtosis Range*
1	Volume	3.756	.387	6.5330	Greater than +1.96
2	Velocity	2.987	.387	5.8901	Greater than +1.96
3	Variety	14.954	.387	34.1038	Greater than +1.96
1	Veracity	4.517	.387	7.8952	Greater than +1.96
2	Value	7.788	.387	18.8576	Greater than +1.96

The values for skewness and kurtosis are shown in Table 6. All of the results in Table 5 exceed +1.96 based on the information given. In hypothesis testing, a commonly used criterion for assessing the normality of data is examining the skewness and kurtosis values. A skewness value greater than +1.96 indicates a significant departure from a normal distribution, while a kurtosis value greater than +1.96 suggests heavy-tailed or peakedness in the distribution. For data normalization, skewness is 0 (see figure 4).

Figure 4: Histogram of Data with a Normal Distribution



6.3. Descriptive Statistics

In the study, the mean ratings of the summary provided by the participants (Executives, Directors, and Managers) are covered in the paper's statistical indicators section. The participants' castoff a 5-point Likert scale to rate their experiences and share their knowledge. The summary highlights the importance of information-driven decisions in the digital age, where the volume, velocity, variety, veracity, and value of data play crucial roles. The summary also

emphasizes that problems can be seen as opportunities, and the ability to convert problems into opportunities is considered an art. However, it acknowledges that even good decision-makers can make significant mistakes when they neglect or lack sufficient knowledge about the background of a problem.

To address these challenges, the study introduces the intervention of Big Data Analytics insights. By leveraging Big Data Analytics, decision-makers can save time and acquire reliable information regarding the contextual settings of problems. As a result, it can be inferred that the study's main objective is to show how applying Big Data Analytics can improve problem-solving outcomes and decision-making processes.

Table 7: The Average Ratings and Classifications Compared

Factors	Executives		Directors		Managers	
	Mean	Classification	Mean	Classification	Mean	Classification
Volume	3.8	A	3.4	A	3.4	A
Velocity	4.3	S.A	4.2	S.A	3.6	A
Variety	4.1	S.A	3.7	A	3.5	A
Veracity	3.1	A	3.6	A	4.7	S.A
Value	4.4	S.A	3.3	A	3.1	A

Table 7 displays the mean evaluations of participants who were executives, directors, and managers on key Big Data Analytics (BDA) topics. The elements include BDA volume, velocity, diversity, authenticity, and value, as well as how these elements affect Pakistani manufacturing industry decision-making. According to the information provided, the values in Table 6 suggest that all participants (Executives, Directors, and Managers) either strongly agreed or agreed that the statements in the questionnaire were true. This suggests that the participants agreed on the value of big data analytics and its beneficial effects on Pakistan's manufacturing sector. As Executives, Directors, and Managers hold key positions in organizations, their unanimous agreement suggests a shared belief in the benefits and resourcefulness of Big Data Analytics insights and usage, despite the potential associated costs. It indicates that Big Data Analytics can serve as a valuable asset for organizations over a longer period. Furthermore, the qualitative expression of the participants' opinion suggests that information-driven decisions supported by Big Data Analytics can have positive implications across various departments within the manufacturing industry. These departments may include operations, manufacturing units, finance, information management, quality control, research and development, among others.

In the manufacturing industry, decision-making processes often differ from those in other service sectors. Manufacturing decisions typically require timeliness, quickness, and effectiveness due to the dynamic nature of production processes. A study conducted by Ara (2019) established that there are distinct differences in the decision characteristics between service and manufacturing industries. Manufacturing decisions often involve more intense and thoughtful consideration in problem-solving attitudes. This could be due to the complex and intricate nature of manufacturing operations, which often require careful planning, resource allocation, and consideration of various factors such as production capacity, supply chain management, quality control, and operational efficiency. In contrast, decision-making in service industries may prioritize factors such as customer satisfaction, service delivery, and responsiveness. The nature of service-based decisions often involves interpersonal interactions, customer expectations, and service customization. By recognizing and understanding the unique decision characteristics of the manufacturing industry, organizations can tailor their decision-making processes and approaches accordingly. This understanding can help in developing effective strategies, optimizing operational efficiency, and improving overall decision outcomes in the manufacturing sector.

6.4. Regression Analysis

Linear regression analysis, a widely-used statistical method, is employed to examine the relationship between independent variables and a dependent variable. According to (Hutchinson, Bates, Molnar, Allen, & Makovicky, 2011), the primary objective of linear regression is to investigate the impact of these independent variables on the dependent variable. Through linear regression analysis, results are obtained in the form of an intercept and slope, representing the best-fit line for predicting the dependent variable based on the independent variable(s). The

intercept signifies the value of the dependent variable when all independent variables are zero, while the slope indicates the degree of change in the dependent variable associated with a unit change in the independent variable. In the context of the mentioned study, the independent variables are characterized as Volume, Velocity, Variety, Veracity, and Value of Big Data Analytics. These variables are utilized to predict the dependent variable, which, in this case, is decision-making. The study's objective is to comprehend how these Big Data Analytics characteristics influence the process of decision-making.

Table 8: Summary of Regression Models

MODEL	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.999[a]	.998	.997	.03304

The model, which treats decision-making as the dependent variable and the Big Data Analytics attributes (Volume, Velocity, Variety, Veracity, and Value) as independent variables, is highly predictive with an adjusted R-square value of 0.997. If adjusted R-square value is understood to be 99.7%, then independent variables can be used to account for about 99.7% of variability in dependent variable (decision making) (characteristics of Big Data Analytics). This high percentage suggests that a unit change in any of the Big Data characteristics is associated with a 99% change in decision making.

Furthermore, the high adjusted R-square value indicates that the model has a strong capacity to predict the dependent variable. This indicates a highly reliable and constant connection between the independent factors and decision-making. The study suggests that the corporation's potential for effective and efficient decision-making increases with an adjusted R-square of 99.7%. Within this linear model, information-driven decisions that are influenced by Big Data Analytics' Volume, Velocity, Variety, Veracity, and Value are more successful.

Table 9: Change Statistics of Model

Model	Change Statistics				
	R Square change	F – Change	Df1	Df2	Sig. F Change
1	.997	27778.209	2	137	.000

Data source: survey data dated: October, 2019 @ manufacturing industry, labor zone Karachi industries

Table-9 explains the R-Change statistic, which resembles R-Change statistic shown in summary model (Table 10). Table 10's summary model shows that model is significant, as shown by F-value of 27778.209 with degrees of freedom (2, 137) and corresponding p-value of.000, which is less than 0.05. When the model is significant ($p < .05$), it suggests that the independent variables (Volume, Velocity, Variety, Veracity, and Value) indeed have an impact on the dependent variable (decision-making efficiency) in the context of corporate performance. Consequently, changes in these unrelated factors have the potential to impact how effectively decisions are made, which in turn affects the corporation's overall performance. A linear relationship between the variables is implied by assertion that a % change in independent variables will result in a % change in decision-making efficiency. However, without additional information or specific regression model coefficients, the precise magnitudes of these changes cannot be identified.

Table 10: Analysis of Variance for Manufacturing Industry Decision-Making

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	60.644	2	30.322	27779.207	.012[b]
	Residual	.106	408	.001		
	Total	60.750	410			

In Table 10, an analysis of variance (ANOVA) is conducted to evaluate model's fit and provide an explanation for variation in factors under investigation. The value of (Y1-Y)2 = 60.750 represents mean difference square of predicted value of dependent variable (D.V.) and independent variables (I.V.). According to the ANOVA findings, Model 1 is significantly able to predict values and account for fluctuation in components. The model appears to be statistically significant as indicated by F-value of (2, 137) = 27779.207 and the associated p-value of.012. These results suggest that features of big data analytics (volume, velocity, variety, veracity, and value) would undoubtedly affect Pakistan's manufacturing industry's information-driven decision-making. `The qualitative expression of this variance suggests that these factors play a significant role in influencing decision-making processes within organizations.

Table 11: Regression Analysis

Model		Unstandardized Coefficient		Mean Square	F	Sig.
		B	Std. Error			
1	(Constant)	.111	.044		2.536	.013
	Volume	1.362	.006	1.037	233.516	.000
	Velocity	.403	.010	.172	38.731	.000
	Variety	2.341	.013	.232	56.345	.012
	Veracity	1.123	.002	1.234	32.124	.000
	Value	1.999	.234	2.345	1.223	.234

Based on the information, there seems to have been the development of a linear regression model to forecast the impact of independent variables (Volume, Velocity, Variety, Veracity, and Value) on dependent variable (decision-making effectiveness) in relation to BDA qualities. p-values associated on coefficients of independent variables are reported as .013, .000, .000, .012, and .000. It is stated that all these values are less than .005, indicating statistical significance. As a result, it can be inferred that the independent variables have a considerable impact on the dependent variable and that the model is significant and fit for forecasting the relationship between these variables.

Additionally, provided coefficients of 1.362, 0.430, 2.341, 1.123, and 1.999 show how much dependent variable changes when each corresponding independent variable changes by one unit. Amount and direction of each independent variable's influence on effectiveness of decision-making are shown by these coefficients. The statement that the research hypotheses are true and that the characteristics of Big Data Analytics significantly affect the capacity of information-driven decision making in corporations suggests that the findings of the linear regression model support the initial hypotheses and demonstrate the importance of these characteristics in decision-making processes. It's important to note that a comprehensive interpretation of the findings would also consider the context of the study, the reliability of the data, and potential limitations or assumptions made in the regression model.

$$Dc\_mkg = \alpha + \beta\,(V1) + \beta\,(V2) + \beta\,(V3) + \beta\,(V4) + \beta\,(V5) + e \qquad (1)$$

Given that decision-making is a linear function, there is steady change in decision-making ability and effectiveness of.111. Depending on the coefficients of the independent variables, this change may be positive or negative (Volume, Velocity, Variety, Veracity, and Value) in the model. Simon (1977) argued that decision-making is a behavioral and intuitive process. In the manufacturing industry, decision makers, who are managers trained for proactive cognition, are responsible for making decisions. A decision-making model that incorporates knowledge-based and practical methods. Simon's three phases of decision making (Intelligence, Design, and Choice) are mentioned. These phases entail knowledge-driven tasks that necessitate a significant amount of data to comprehend issue, design potential solutions, and make best choices with adequate resources for implementation and control. The statement emphasizes the importance of well-controlled decisions for corporations. If decisions are not effectively controlled, they may result in failure or suboptimal outcomes. It's important to consider the specific context and any supporting evidence or findings from the original research conducted by Simon (1977) when interpreting and applying these statements to real-world decision-making scenarios.

6.5. Correlation Analysis

The degree and direction of association between two variables are both expressed in correlation coefficient, which is a numerical measure. The linear function and Big Data Analytics traits are intimately associated in the context of decision-making (Volume, Velocity, Variety, Veracity, and Value). It is believed that there is a substantial connection between these traits and decision-making, and that this connection affects how well an organization performs in the manufacturing and services sectors. Business intelligence is the collection of data from digital sources or Big Data Analytics. High data volume, rapid data processing, a wide range of data types, high veracity or trustworthiness of the data, and high value in terms of the insights and information it offers are foundations of this intelligence. All of these Big Data Analytics' "5Vs" are linked together and have a direct impact on how organizations make decisions.

The characteristics of Big Data Analytics are the independent variables, and decision making is the dependent variable. Executives, directors, and managers, who are primarily in

charge of making decisions in operational and marketing activities, use the nominal relationships between the independent variables and decision making to control and direct their decision-making processes. It's crucial to keep in mind that correlations do not always imply causality, even though they can show the strength and direction of associations. To demonstrate causal links and comprehend the precise mechanisms through which the characteristics of Big Data Analytics influence organizational decision making, additional study and analysis are required.

To obtain the desired results, decisions must be well-executed after a problem-solving approach has been selected and designed. Making decisions based on information can have a good effect on organizational performance, especially when Big Data analytics are used and business intelligence insights are developed. When managers make informed decisions based on information insights provided by Big Data analytics, it can lead to more efficient and effective allocation of resources, improved operational processes, and enhanced employee performance. This can result in higher productivity and output from individuals, contributing to overall organizational performance.

The application of Big Data analytics or the information insights produced by business intelligence can also have an impact on relationship between performance of businesses in manufacturing sector and decision-making. Businesses may learn a lot about customer preferences, market trends, and operational efficiencies by utilizing the power of data and analytics. These understandings can aid in decision-making and ultimately result in better performance. It is important for organizations to effectively utilize the information generated by Big Data analytics and business intelligence to inform decision making and drive performance improvements.

Table 12: Organizational Performance and Decision Making: A Pearson Correlation

Items	Description	Information driven Decision Making	Organizational Performance
Information driven Decision Making	Correlation Coefficient	1	.987**
	Sig. (2-tailed)		.000
	N	410	100
Organizational Performance	Correlation Coefficient	.987**	1
	Sig. (2-tailed)	.000	
	N	410	100

The Pearson correlation coefficient between information-driven decision making and organizational performance is displayed in (Table 12) based on information supplied. Reported correlation coefficient of 0.987 indicates a strong positive correlation between these two variables. With a sample size (N) of 410, this association implies that information-driven decision making and organizational performance in the manufacturing sector are strongly and significantly related. The strong positive correlation implies that as information-driven decision making increases, organizational performance also tends to increase. This suggests that the effective usage and improvement in information-driven decision making can positively impact performance individuals and overall organization. By making decisions based on accurate and timely information, organizations can enhance their efficiency and effectiveness in achieving their goals. It's crucial take into account study's setting, how variables were measured, and any additional pertinent elements that might have an impact on connection. Further investigation would be required to determine direction and underlying processes of association between information-driven decision making and organizational performance because correlation does not indicate causality.

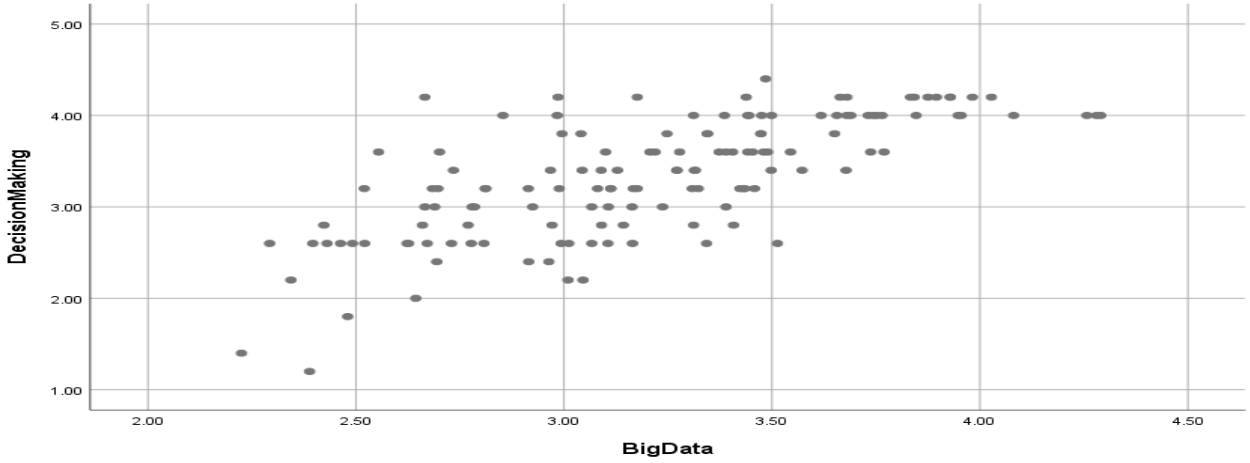
7. Analysis of Results

According to data available, it appears that the study's conclusions point to a substantial connection between decision-making in the industrial sector and the features of big data analytics (volume, velocity, variety, truthfulness, and value). The null hypotheses have been rejected, indicating support for the study hypotheses. It is indicated that the t-values for volume, velocity, variety, truthfulness, and value are higher than the essential t-table values, showing that these variables have a considerable influence on corporate decision-making. This implies that changes in these Big Data Analytics qualities are connected to adjustments in the effectiveness of decision-making.

The data appears to be regularly distributed based on values for skewness and kurtosis shown in Table 6, which supports the rejection of null hypotheses. This shows that data gathered for study are trustworthy and can be analyzed. According to Table 7, which shows the descriptive statistics of the study, Pakistan's manufacturing industry's information-driven decision making is highly influenced by the mean ratings of Big Data Analytics' characteristics. As evidenced by the p-values being less than 0.50 in the regression analysis and change statistics, the model built is likely to be useful for making predictions and to be significantly different from chance. According to this, "5Vs" of Big Data Analytics can be used to forecast changes in decision making efficiency using linear function of decision making.

Figure 5's scatter plot illustrates the data set from decision-making and big data, demonstrating that the ratings of the data set are mostly in agreement with the study's hypotheses. Further insights into the connections between these factors are provided by study's examination of relationship between organizational performance and decision-making in industrial sector. It's critical to take into account the study's particulars, including its methodology, sample size, and any constraints or underlying presumptions. These results provide credence to the idea that information-driven decision making and its effects on organizational performance in the manufacturing sector are significantly influenced by the characteristics of big data analytics.

Figure 5: Scatter Plot for Linear Function of Decision Making



8. Discussions and Result

The trends we identified underlined three crucial business characteristics: innovation, commercial validity, and big data-related decision-making. Numerous cases showed how these themes had positive effects. However, in order to fully realize the big data value proposition outlined in the introduction section, business transformation and new business models are required. In the papers, we only came across one case of a big data-based business model. As part of its business operations, Netflix provides customers with tailored, data-driven recommendations in an effort to boost sales (Amatriain, 2013). (Prescott, 2014) detailed a firm revolution strategy in one of his case studies, which resulted in the restoration of competitive advantage. A company-wide data-driven strategy was also applied in one case (Dutta & Bose, 2015). In one instance, a sizable steel production altered its practices to take advantage of data, which increased the company's bottom line. However, they also had to deal with obstacles including organizational opposition to the move. The other examples involved more specialized efforts that benefited certain businesses, such as marketing- or social media-related experiments. In some situations, including (Crampton et al., 2013), social media data has been analyzed to seek for signs or suggestions of, for instance, emerging trends or other new behaviors. For further information on the Internet of Signs, see (O'Leary, 2013). One aspect of data-driven innovation is secondary use, or exploiting data for goals other than those for which it was originally acquired. Many works, like Mayer-Schönberger and Cukier (2013), assert that secondary data utilization has enormous potential (Mayer-Schönberger & Cukier, 2013).

We found one instance (Bettencourt-Silva et al., 2015) where this type of data exploitation was fully understood and applied. These findings must undoubtedly be connected to the fact that the majority of the businesses were only starting to use big data. Vendors of technology and

software frequently emphasize the commercial elements, particularly their benefits. Our analysis somewhat validates the uproar because all the statistics point in the same direction. The problems associated with the decision-making theme suggest that the excitement frequently overlooks the impact that moving an organization to be more data-driven will have on administrative culture and decision-making processes. Mechanical trials have been mentioned in many research, especially given the volume of data. The results of our investigation are shown in Table 2 below. Examples of articles that address the subject are provided in the examples section. The value of big data was demonstrated through the case studies. But rather than being a technical challenge, attaining the advantage is more of a company transformation endeavor. Companies must properly account for these issues in their big data analysis.

9. Conclusion

According to study's findings, Big Data Analytics (BDA) is a competitive technology in era of digital business that is especially well-suited for gathering a significant amount of knowledge. Although BDA may have a greater implementation cost, according to researchers, the advantages and prospects it offers surpass this expense. Decision-makers in Pakistan's industrial sector, including executives, directors, and managers, are under a lot of pressure to make important choices, particularly in difficult and urgent situations. These choices include a range of topics, including operations, strategy, R&D, marketing, and even downsizing. The study emphasizes that in order to make informed decisions, decision makers require background information and insights into the problems and opportunities they face. Big Data Analytics, with its high volume of information from reliable sources, provides decision makers with a valuable and reliable asset. The five BDA characteristics—Volume, Velocity, Variety, Veracity, and Value—are positively connected to one another and to the several decision-making processes described by Simon (1966): Knowledge, Design, and Option.

Overall, the study highlights the significance of BDA in supporting decision makers and improving the efficiency of the decision-making process. It underscores the interconnectedness of the different characteristics of BDA and their relevance to decision making in the manufacturing industry. By leveraging BDA, decision makers can access a wealth of information and insights to inform their decision-making strategies and enhance organizational performance. Below Eq.1 shows Big Data characteristics have a direct impact on how a linear model makes decisions:

$$Dc\_mkg = \alpha + \beta\,(V1) + \beta\,(V2) + \beta\,(V3) + \beta\,(V4) + \beta\,(V5) + e \qquad (2)$$

The research not only reveals a causal link between decision-making and organizational performance in the manufacturing sector, but also suggests that this link can be extended to other industries like services and finance. Improved decision making has the potential to positively impact employee performance and overall corporate performance, leading to increased output and efficiency. In the current era of data-driven disruption, business managers are faced with the challenge of simultaneously identifying high-risk and rewarding opportunities while integrating analytics into core decision-making processes. They need to have a dual focus on exploring new markets and business models, as well as incorporating data analytics into their overall strategy.

Business managers may improve internal operations, spot new consumer trends, keep an eye on dangers, and set up systems for ongoing feedback and development by integrating data analytics into their fundamental decision-making processes. Companies can acquire a competitive edge and stay at the forefront of digital disruption by driving analytical transformations within the organization. Study highlights the importance of embracing data analytics as a strategic tool for decision making in order to adapt to the volatile business environment and seize opportunities for growth and innovation. By adopting a data-driven approach, businesses can enhance their decision-making capabilities and achieve a sustainable competitive advantage in the digital age. Recommendations of organization performance and big data analytics for decision making are given as under:

While the study looks at a variety of big data-related subjects, including the four big data components (volatility, variety, variability, and validity), it also offers five important recommendations for companies wishing to progress their big data strategy and make the most of their business data. Those five suggestions are:

- Initiate with client results.
- Create a strategy for the whole business.
- Begin with the data that is currently available in the business.
- Generate company goals and develop the strategy on them.
- Establish a business case based on quantifiable results.

These future study directions can contribute to advancing the theoretical perspective of decision making in the manufacturing industry of Pakistan and provide valuable insights for practitioners, policymakers, and researchers in understanding the role and impact of BDA in complex and challenging environments.

9.1. Innovations of the Study

The study contributes to the theoretical perspective of decision making in the manufacturing industry of Pakistan by highlighting the importance of utilizing Big Data Analytics (BDA) frameworks. The study mentioned has several theoretical implications for decision making in the manufacturing industry of Pakistan. Here are some of the key implications:

- Importance of Big Data Analytics (BDA) frameworks: The study emphasizes the significance of utilizing BDA frameworks in decision making. This implies that traditional decision-making approaches may not be sufficient in addressing the complex challenges faced by the manufacturing industry in Pakistan. By incorporating BDA, organizations can leverage the power of data analytics to gain insights, identify patterns, and make informed decisions.

- Challenging environment and decision making: The study acknowledges the challenging environment in Pakistan, including political instability and terrorism threats, which have negatively impacted the manufacturing and services sectors. The implication here is that decision making in such an environment requires careful consideration and strategic planning. By highlighting the importance of strict decision-making processes, the study suggests that organizations need to establish robust mechanisms to navigate through uncertain and volatile situations.

- Internationalization and decision making: The study emphasizes the need for internationalization in the manufacturing industry of Pakistan. This implies that decision making should not be limited to local perspectives but should incorporate global trends, market dynamics, and best practices. By considering international factors in decision making, organizations can enhance their competitiveness and explore new opportunities beyond domestic boundaries.

- Role of Board of Directors, executives, and managers: The study underscores the role of key decision makers, including the Board of Directors, executives, and managers, in implementing effective decision-making processes. This implies that decision making should be a collaborative effort involving top-level management. By involving decision makers at various levels, organizations can ensure better alignment, shared vision, and effective implementation of decisions.

- Significance of BDA in decision making: The study highlights the importance of employing BDA specifically in the manufacturing sector of Pakistan. This implies that organizations can leverage BDA techniques such as data mining, predictive modeling, and machine learning to analyze large datasets and derive valuable insights. By integrating BDA into decision-making processes, organizations can make data-driven decisions, improve operational efficiency, and gain a competitive advantage.

- Raising awareness and leveraging BDA: The study aims to raise awareness among business professionals in Pakistan about the importance of leveraging BDA in decision making and implementation. This implies that there may be a need for education and training initiatives to equip professionals with the necessary skills and knowledge to effectively utilize BDA. By promoting awareness and providing resources, organizations can foster a culture of data-driven decision making and encourage the adoption of BDA frameworks.

Overall, the theoretical implications of this study suggest that decision making in the manufacturing industry of Pakistan can benefit from the incorporation of BDA frameworks, international perspectives, and strict decision-making processes. By embracing these concepts, organizations can navigate the challenges of the local environment, enhance competitiveness, and make more informed and effective decisions. This study will provide the foundation for future studies. Future studies may be conducted by using large sample size with including all textile manufacturing industries in Pakistan. The paper investigates the specific needs of BDA in the manufacturing sectors of Pakistan through a survey of decision makers. By gathering first-hand insights from these individuals, the study provides valuable information on their demand for supportive information in decision making processes. Overall, the study serves as a valuable resource for Pakistani business professionals, shedding light on the potential benefits of incorporating BDA into decision making practices and addressing the challenges faced by the manufacturing industry in Pakistan. It offers a theoretical framework and practical insights to enhance decision making efficiency and contribute to the revival and growth of the sector.

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