IMPLICATIONS OF BIG DATA ANALYTICS AND BUSINESS INTELLIGENCE SYSTEMS ON ORGANIZATION DECISION MAKING PROCESS IN REFERENCE TO INDIAN COMPANIES

भारतीय कंपनियों के संदर्भ में संगठन निर्णय लेने की प्रक्रिया पर बिग डेटा एनालिटिक्स और बिजनेस इंटेलिजेंस सिस्टम के प्रभाव

A

Thesis

Submitted for the Award of the Ph.D. degree of

PACIFIC ACADEMY OF HIGHER EDUCATION AND RESEARCH UNIVERSITY

By

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2023

DECLARATION

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PREFACE

Big Data Analytics (BDA) and Business Intelligence Systems (BIS) are pivotal for modern organizations, fueling data-driven insights that strengthen decision-making, operational efficiency, and strategic planning. These technologies enable businesses to harness vast and varied data sources, optimizing processes and maintaining competitiveness in today's data-centric environment. Their true worth lies in their capacity to transform raw data into actionable intelligence, steering business success. By offering decision-makers comprehensive, real-time insights, BDA and BIS foster informed, strategic choices, identifying market trends, customer preferences, and resource allocation. They streamline operations by automating tasks and enhancing efficiency while supporting long-term strategic planning through data analysis and risk assessment. Moreover, these technologies confer a competitive edge by facilitating personalized customer experiences and targeted marketing efforts. In conclusion, BDA and BIS are indispensable tools that convert data into an asset, empowering organizations to thrive in an increasingly complex and data-rich world. The thesis work is structured into five chapters, each serving a specific purpose in exploring the impact of Big Data Analytics and Business Intelligence Systems on decision-making within organizations:

- Chapter 1: Introduction: In the first chapter, we provide an introduction to the research. This section discusses various Big Data technologies, outlines the functions of Business Intelligence systems, presents an overview of the research workflow, and explores the role of Big Data in Business Intelligence. Additionally, we delve into the diverse applications of Big Data and analytics in different contexts.
- Chapter 2: Review of Literature: Chapter two is dedicated to the review of literature. Here, we comprehensively examine previous research related to Big Data Analytics and Business Intelligence systems. We investigate their impact on administrative effectiveness, decision-making processes, and identify key factors associated with technical, structural, and managerial aspects. This chapter also scrutinizes the influence of Big Data Analytics and Business Intelligence on productivity and overall organizational effectiveness.

- Chapter 3: Research Methodology: In the third chapter, we detail the research methodology employed in this thesis. This includes an explanation of our research design, the sampling technique utilized, the rationale for selecting a specific sample size and population, an analysis of the existing research gaps, the hypotheses tested, and the statistical tools and techniques applied in our study.
- Chapter 4: Interpretation, Results, and Discussion: Chapter four is dedicated to presenting the profile of the respondents, as well as the interpretation of results and subsequent discussions. In this section, we explore the impact of Big Data Analytics and Business Intelligence systems on productivity and overall organizational effectiveness based on the data collected. We analyze the findings and engage in a comprehensive discussion to draw meaningful insights.
- Chapter 5: Findings, Recommendations, Conclusions, and Future Scope: The final chapter, Chapter five, encompasses the key findings from our research, followed by a set of practical recommendations based on those findings. We then draw conclusions based on the study's outcomes and outline potential avenues for future research in this field.

In conclusion, the impact of Big Data Analytics and Business Intelligence Systems on decision-making within Indian companies is substantial, with promising prospects for the future. As technology continues to advance and data becomes more readily available, these tools are poised to play an increasingly central role in shaping the strategies and day-to-day operations of Indian businesses. This contribution is expected to enhance their growth and competitive edge in both domestic and global markets. However, it is crucial for companies to remain adaptable in the face of evolving technologies, adhere to ethical standards in data usage, and navigate the changing landscape of regulatory requirements. By doing so, they can fully leverage the benefits of these technologies while effectively managing the associated challenges.

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List of Abbreviations

1. **AI** - Artificial Intelligence
2. **BA** - Business Analytics
3. **BD** - Big Data
4. **BDA** - Big Data Analytics
5. **BI** - Business Intelligence
6. **BPM** - Business Process Management
7. **CC** - Cloud Computing
8. **CIOs** - Chief Information Officers
9. **CRM** - Customer Relationship Management
10. **ERP** - Enterprise Resource Planning
11. **ETL** - Extract, Transform, Load
12. **GPS** - Global Positioning System
13. **HANA** - High-performance Analytic Appliance
14. **HR** - Human Resource
15. **IEEE** - Institute of Electrical and Electronics Engineers
16. **IoT** - Internet of Things
17. **IS** - Information System
18. **IT** - Information Technology
19. **KPIs** - Key Performance Indicators
20. **MIS** - Management Information System
21. **ODM** - Optimized Data Management
22. **OPM** - Organization Performance Management
23. **OBI** - Operational Business Intelligence

24. **OLAP** - Online Analytical Processing

25. **RFID** - Radio-Frequency Identification

26. **SAP** - System Application Programming

27. **SAS** - Statistical Analysis System

28. **SRM** - Supplier Relationship Management

29. **SIE** - Streaming Information Extraction

CHAPTER – 1

INTRODUCTION

CHAPTER - 1
INTRODUCTION

Data analytics are a key component of the field of business intelligence (BI[1]), which helps users get corporate insights for better decision-making. Numerous businesses are gathering and keeping a vast amount of data about their existing and future clients, vendors, and business partners. The companies are unable to turn the data into meaningful and helpful knowledge since it is difficult to find the hidden information in the data. Big data analytics technologies may be able to assist these businesses in extracting insights from the vast amounts of data. It assists businesses in gaining knowledge in order to automate decision-making for the achievement of their objectives.

Business intelligence solutions provide management and other departments with crucial analytical tools and critical performance indicators. It offers further advantages in terms of data quality, scalability, analytical power, and user-friendly presentation. Big data analytics and business intelligence technologies turn sales and customer data into useful information. To maximize the value of this corporate data, big data strategies work in conjunction with business intelligence technologies. This study offers an analysis of how the big data analytics tool aids in e-commerce business management.

According to Laudon & Laudon (2007), an information system is a group of interconnected components that gathers, processes, stores, organizes, retrieves, manages, and provides information to support business operations, decision-making, and performance inside an organization. It varies from information technology in this sense, which describes the tools, techniques, innovations, and standards used to create information. Information systems are crucial in assisting managers in problem-solving, visualizing difficult concepts, and developing new products (Laudon and Laudon, 2008).

1.1 BIG DATA

Massive data collections are referred to as "big data". It is described as data that, because to its volume, velocity, and variability, surpasses the processing power of typical

[1]Business Intelligence

database management systems. Its size falls between numerous Terabytes to petabytes. There might be a huge amount of data online and in the cloud. This data contains several useful patterns and information that call for more sophisticated analysis methods. Business intelligence combines data from many sources to paint a comprehensive picture of the company's current market, consumers, issues, competitors, and development of new goods and services. It supports the creation of data-driven insights for marketing decision-making. Such a goal may be attained with the use of analytics tools, which can be used to extract or identify patterns in client behavior or massive databases.

Massive, independent sources like decentralized and distributed control systems are combined with big data. These capabilities provide a significant challenge for businesses that handle and store these enormous data collections via the traditional data processing technique. For the analysis and administration of large data, a new model must be established and the current framework must be reexamined. Applications, technologies, and processes for obtaining, reviewing, incorporating, and presenting commercial knowledge are referred to as business intelligence (BI). The main goal of business intelligence is to promote more efficient and effective company decision-making.

In order to allow more effective and reliable action plans, the strategic review of the literature must investigate the elements influencing the adoption of Information Systems (IS[2]) as a well-designed strategic diagnostic tool. By studying the possible applications of Big Data Analytics (BDA[3]) and Business Intelligence, we began by talking about key frameworks necessary for strategic excellence (BI). In the end, we would create an integrated application that serves as a strategic performance management diagnostic tool for a firm.

1.2 BIG DATA FEATURES:

Big data refers to the accumulation of information from diverse sources, characterized by five key aspects: volume, value, variety, velocity, and veracity.

Volume: This pertains to the sheer amount of data that organizations manage and process.

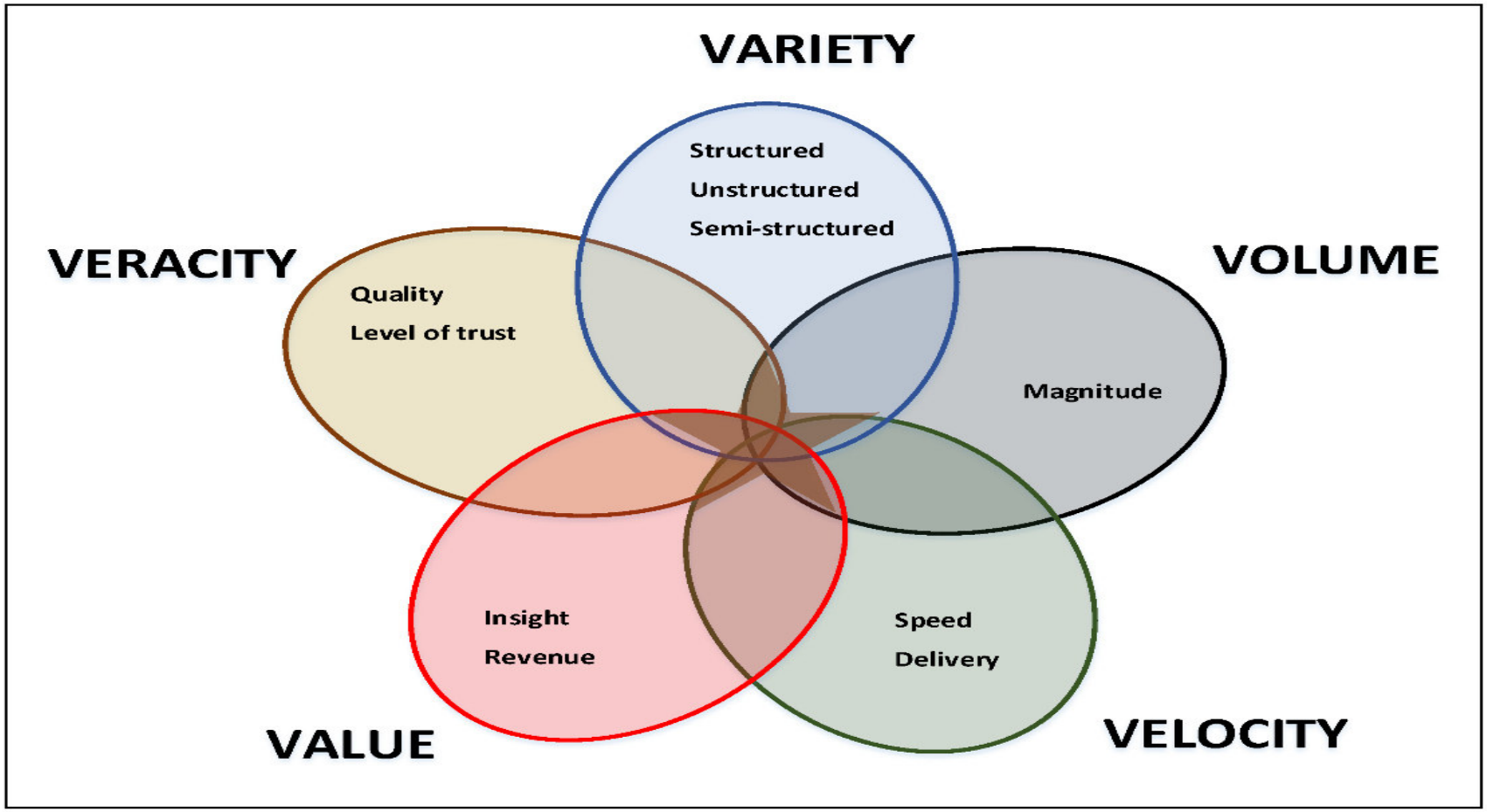
[2]Information System
[3]Big Data Analytics

Value: The significance of big data lies in the insights and patterns it offers, leading to more efficient operations, enhanced customer relationships, and tangible business benefits.

Variety: Big data encompasses a wide array of data types, ranging from raw and semi-structured data to unstructured data.

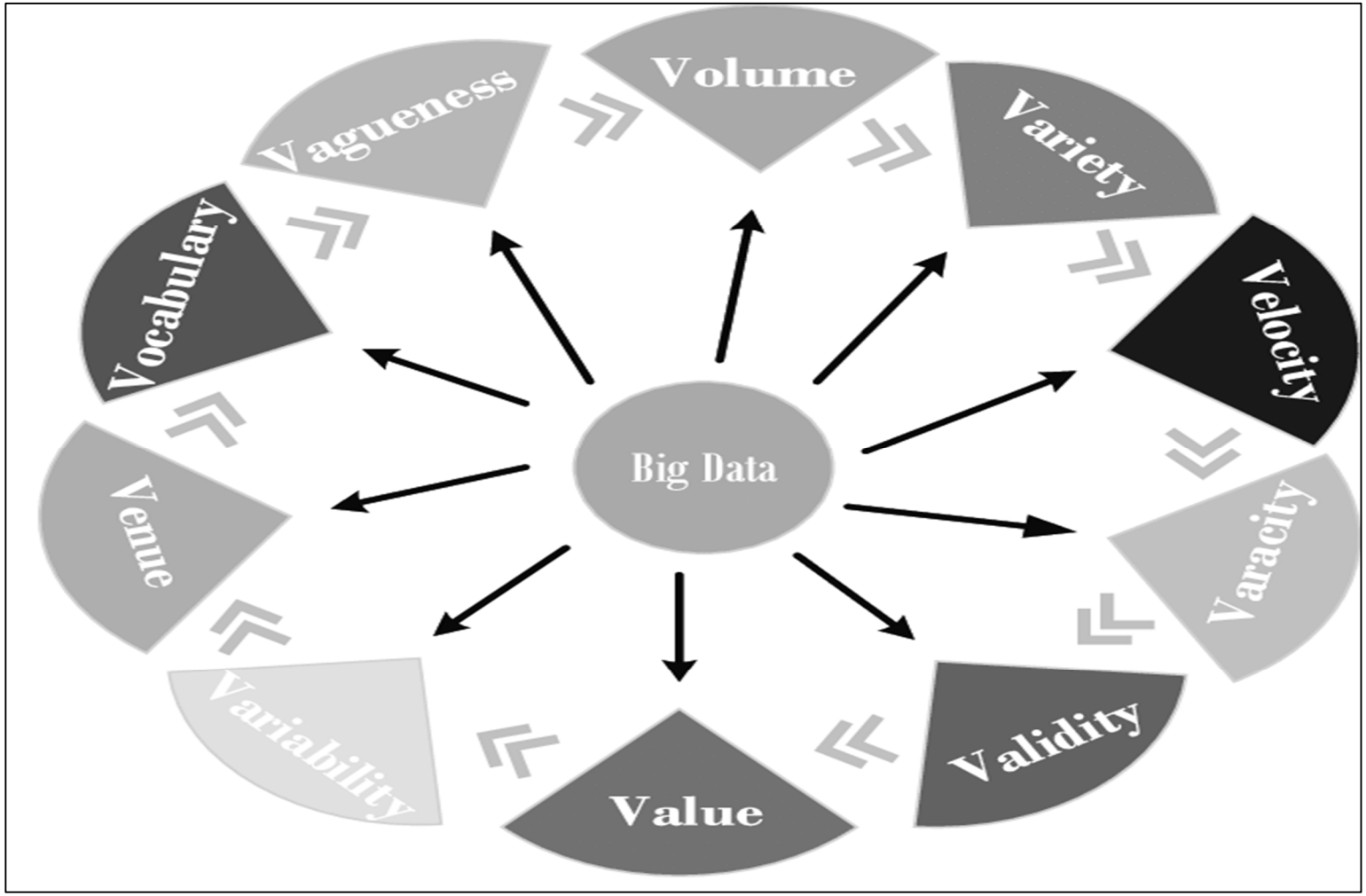
Velocity: This refers to the speed at which businesses gather, store, and handle data, measured by metrics like the quantity of social media posts or search queries within specific time frames.

Veracity: Executive confidence in big data often depends on the accuracy and truthfulness of the data and information assets at hand



(Source: Husamaldin, Laden & Saeed, N., 2019)

Figure 1.1: Big Data 5 V's



(Source: Bhat, Showkat & Huang, Nen-Fu., 2021)

Figure 1.2: Big Data 10 V's

1.3 BIG DATA ANALYTICS:

Analytics is a systemic method of thinking in which subjective, quantitative, and mathematical computer tools and tactics are employed to dissect knowledge, gather data, enlighten, and enhance decision-making. Complicated research may employ a variety of techniques, including as indicative, predictive, prescriptive, and optimization frameworks. Market and data analysis are both relevant research categories. The Market Analytics is a systemic method of thinking in which subjective, numerical, and mathematical computing tools and tactics are utilized to dissect knowledge, gather data, enlighten, and enhance decision-making.

"The information obtained on the occasion of fascination through perception, measurement, or trials" is coordinated by data analysis. The goal of data analysis is to separate out as much data as may be expected to be useful for the relevant topic. Additionally, according on the level of analysis, the entire area of big data analysis has been categorized into three levels: descriptive analysis, predictive analysis, and prescriptive analysis.

Descriptive analysis:

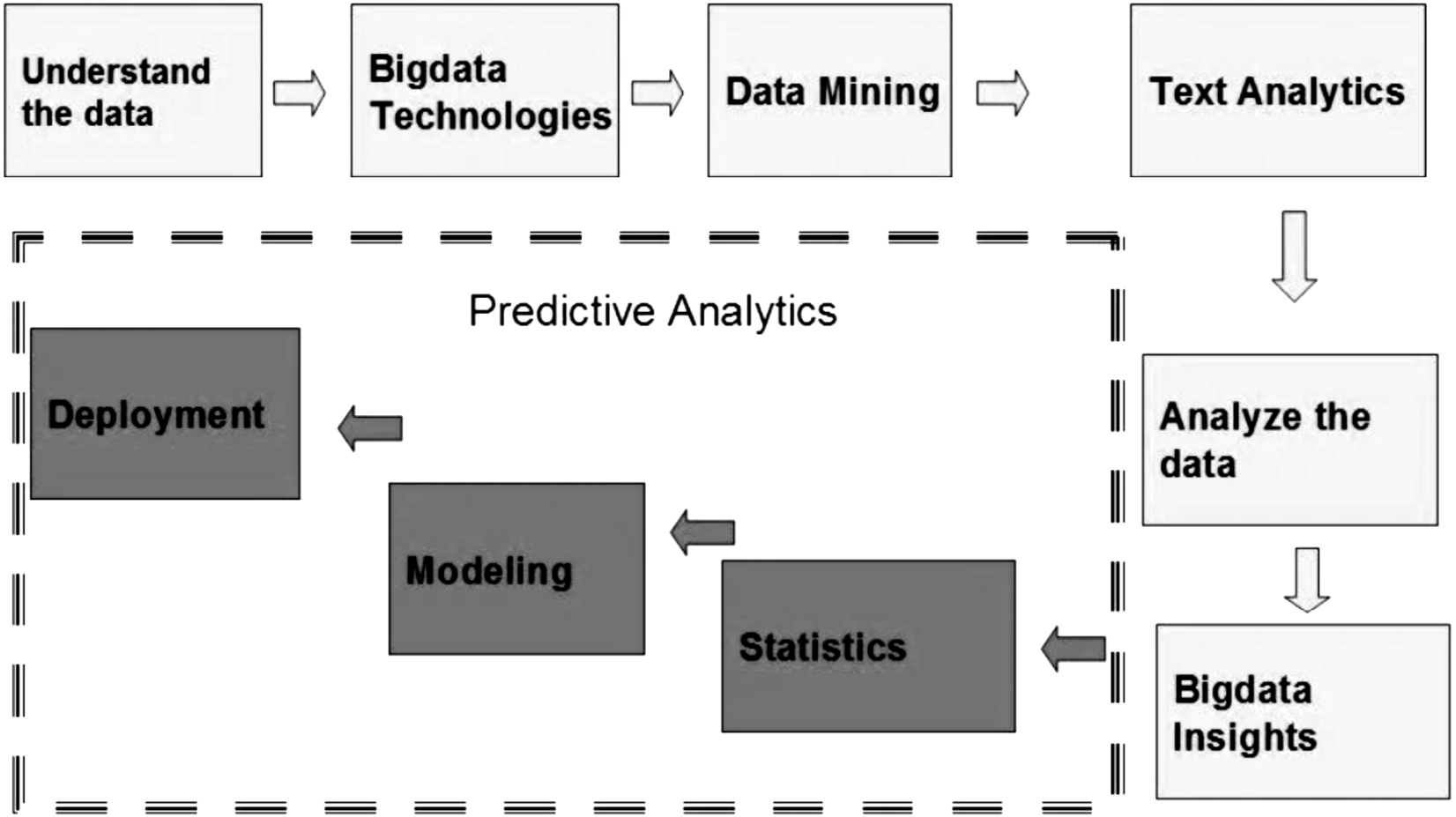
It uses documented evidence to depict what occurred. For example, a relapse may be used to detect simple patterns in databases, while the representation merely introduces the data and the data demonstration is used to record, store, and cut data intelligently.

Predictive analysis:

It focuses on predicting future trends and probability. Predictive displaying, for example, uses factual strategies like straight relapse and coordination's to obtain inclines and estimate future results, whilst data extraction separates models to provide information and expectancies.

Prescriptive analysis:

Integrity and decision-making are covered here. Regeneration, for instance, is used to examine complex systems to learn more about system behaviour and to distinguish between issues, and optimization techniques are used to find the best arrangements based on particular needs.



(Source: https://www.predictiveanalyticstoday.com)

Figure 1.3: Big Data & Predictive Analytics

Big data analytics is the use of sophisticated analytical methods on large data collections. Big data is prepared by advanced analytics so that users may make wise judgments. To help them make better judgments, the analysts compare historical data from the data warehouse. Big data analytics deals with data diversity as well as data volume. The tools for big data analytics include RDBMS, data warehouses, data mining, clustering, association, OLAP[4], BPM[5], ETL[6], regression, classification, analysis, genetic algorithms, multivariate statistical analysis, and heuristic research. Big data offers a significant advantage for making decisions by giving customers useful data, giving business analytics advantages, and giving advantages to certain analytical applications. Despite the advantages, there aren't many obstacles to using big data analytics for decision-making. These obstacles typically include a lack of business support, inadequate employees to handle complex analytics for decision-making, and recurring issues with database software.

Text Analytics:

Document representation, enterprise search systems, and search engines play a crucial role in the digital landscape. User models and the relevance of feedback are essential components in enhancing the efficiency of search processes. For instance, Google processes billions of searches from customers seeking specific products, indicating their intention to purchase. Similarly, websites like Amazon utilize this information to recommend products to customers during their subsequent visits. This strategy significantly improves the likelihood of customers making purchase decisions, a technique also employed by various other e-commerce firms such as Jet Airways.

Audio and Video Analytics:

Audio analytics technology swiftly processes audio data within seconds, primarily for safety applications in various organizations. It effectively monitors a broad spectrum of sounds in the surrounding environment. On the other hand, video analytics is employed

[4]Online Analytical Processing
[5]Business Process Management
[6]Extract Transform Load

across diverse fields and industries to analyse videos. This process aids in extracting pertinent events that are valuable for making operational decisions.

Web Analytics:

Amazon, the online retail giant, employs data mining techniques to extract valuable insights from vast datasets including click streams, web searches, and order histories. This intelligence enables Amazon to make informed decisions about product promotions. By analysing previous purchase patterns, Amazon establishes connections between historical purchases and potential new products. This correlation is then leveraged through digital channels such as emails, Facebook, and notifications on Amazon.com to identify new buyers and market a variety of products to them.

Network Analytics:

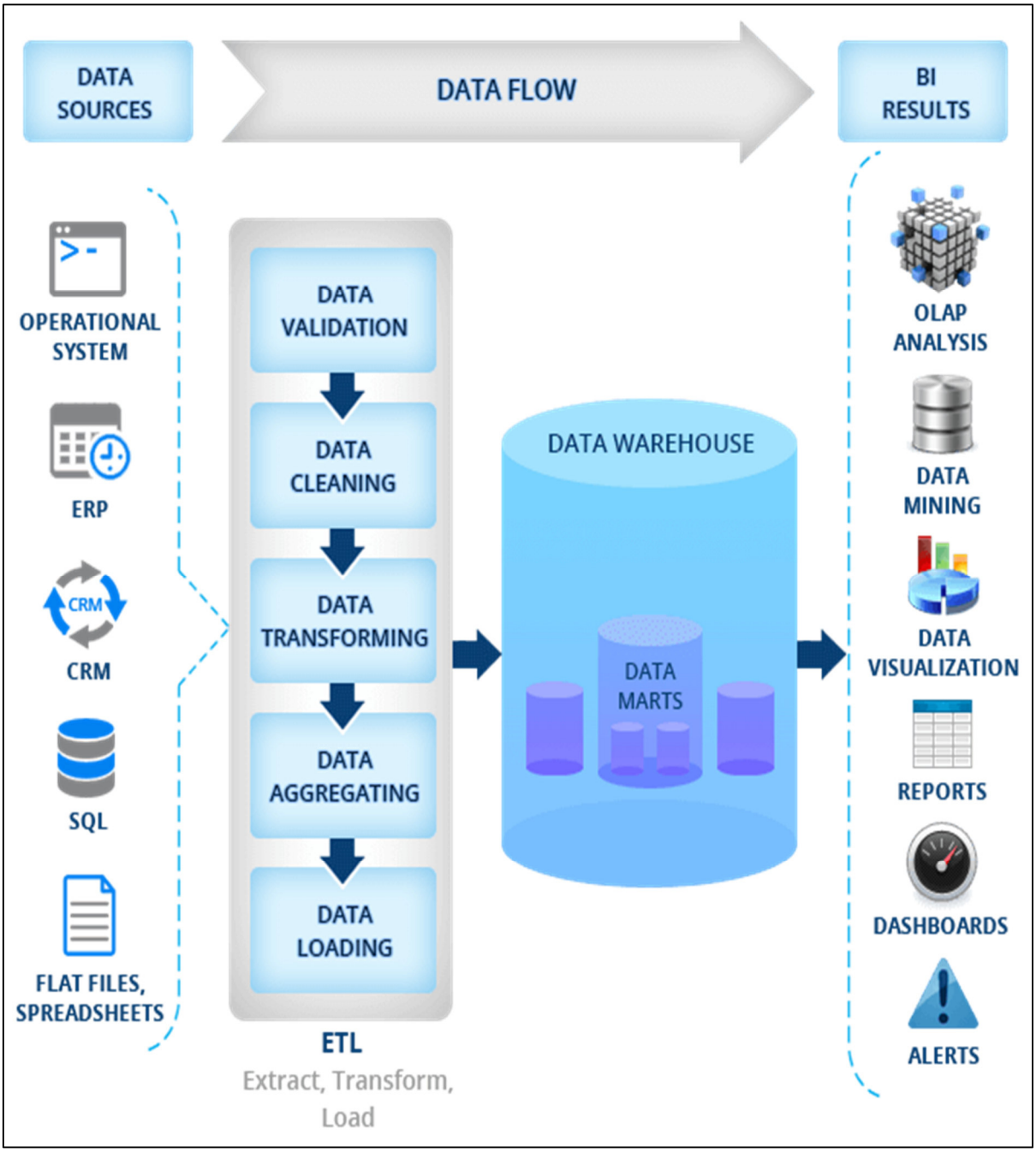
Network analytics gives data on the network-connected devices and their interactions with one another. With the aid of this information, network policies can be created and decisions that can really be implemented to increase productivity and cut costs may be made.

Business intelligence systems integrate operational data with analytical tools to provide intricate and competitive information to decision-makers and planners. The primary objective is to enhance the timeliness and quality of decision-making inputs. Business intelligence is instrumental in understanding a company's capabilities, staying abreast of current trends, and anticipating future developments in markets, technology, and regulatory landscapes. It also offers insights into the competitive field and its implications for competitors. The introduction of data warehouses as robust repositories, advancements in data purification methods, improved hardware and software capabilities, and the evolution of web architecture have collectively ushered in a more sophisticated business intelligence environment than previously achievable.

1.4 BUSINESS INTELLIGENCE AND ANALYTICS

Platforms that provide access to analytics and provide greater business value are disrupting traditional BI market share leaders. BI executives should monitor how

traditionalists turn their investments in futuristic products into a fresh energy and better customer experience.



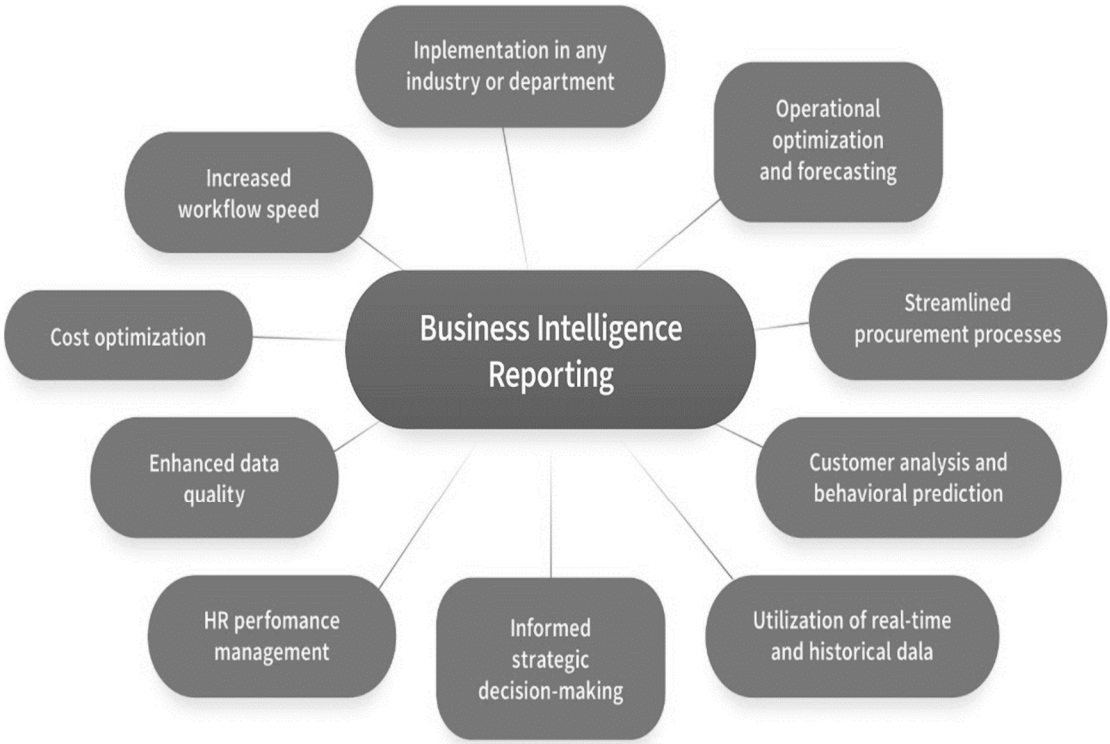
(Source: https://www.ebintl.com)

Figure 1.4: Business Intelligence & Analytics

The BI and analytics platform industry is going through a major transformation. The majority of BI platform expenditures over the past 10 years have gone into IT[7]-led consolidation and standardization initiatives for big systems-of-record reporting. These have a history of being highly regulated and centralized, with production reports written by IT being sent to a wide range of information consumers and analysts. More business customers are now seeking access to interactive analytical methods and insights from advanced analytics, without the need for IT or data science expertise. The IT industry seeks to meet the increased demand from business customers for ubiquitous access to data discovery capabilities without compromising governance.

Business intelligence (BI) is a strategic approach focused on improving business processes and performance by delivering relevant information and decisions to individuals when they require them. It serves as a conceptual framework encompassing different software, data structures, big data concepts, and algorithms. Similar to other data interpretation methods, BI revolves around data as its core element, following standard procedures like data collection, storage, processing, and extraction of valuable insights. Following pre-processing, the data kept or choices made in this manner are displayed in various reports, graphs, summaries, charts, etc. The decisions made by BI have a direct impact on how businesses operate, as well as their working strategies and tactics. Therefore, businesses and organizations alter how they operate and adopt new techniques. Hence, ensuring the decisions are reliable and accurate is crucial, as they shape the fate of the company and empower the management to make informed choices in comparison to their counterparts.

[7]Information Technology



(Source: https://nix-united.com)

Figure 1.5: Business Intelligence Reporting

1.5 ROLE OF BIG DATA IN BUSINESS INTELLIGENCE:

According to Balakrishnan (2018) data is the fundamental component of business intelligence. Big Data refers to the quantity of sources' gathered organized and unstructured data. The amount of data depends on the sources used, the company's position in the market, the short- and long-term objectives it has set for itself, its understanding of client needs, its business strategy, etc. Three simple words—variety, velocity, and amount of data—can easily describe big data. Big data involves four fundamental data-related tasks: data gathering, storage, and integration.

Collection

The methods used by businesses to acquire data have undergone several changes. The feedback method is now a dated strategy. Today, the customer's needs are discovered simply by watching them, without even revealing the process to them. These few methods include deploying very sensitive cameras with precise motion detection, monitoring a user's online shopping behavior, observing online transaction data, etc.

Storage

Expanding the storage facility is imperative due to the increasing volume of gathered data. With the anticipated size of big data ranging from dozens of terabytes to petabytes, the storage area might need to be twice as large as initially projected. Various methods, such as Hadoop and MapReduce (commonly used for analysis with tools like SAS, Splunk, and SAP HANA), Edge Computing (requiring expanding storage for simultaneously generated data), multi-Cloud solutions (offering online computing options via public cloud platforms), and Storage Intelligence (software managing the necessary storage space), are employed to store extensive datasets.

Integration

This process involves connecting closely related processed data based on their relevance. However, several challenges need to be addressed during this stage. Some of these obstacles include poorly managed extracted information, determining appropriate placements for data within big data systems, synchronizing data sources, a shortage of skills in managing data while integrating them into technologies, and other unforeseen miscellaneous challenges.

1.5 METHODOLOGY:

The world has witnessed significant changes since the information revolution, transforming the way businesses operate. Big data plays a crucial role in providing firms with a competitive edge through various analytical techniques. These techniques enable the extraction of insights, patterns, correlations, and associations that were previously inaccessible with traditional small datasets. Big data supports the decision-making process for business executives, utilizing sources such as social media data, competitive intelligence, cost and time reduction strategies, supply chain analytics, and web analytics. Companies that understand the importance of big data and build products around this valuable resource have reaped substantial rewards in recent years. Many organizations now integrate analytics into nearly every aspect of their operations, harnessing the benefits of data-driven decision-making strategies.

The research project aims to explore a conceptual framework for establishing analytics capabilities and assess how this evolving knowledge can empower businesses of varying

sizes small, medium, and large to compete effectively with limited resources. Small adjustments tailored to their specific business domains and models allow these companies to adopt this framework. Additionally, this framework serves as an initial point for further analysis, improvement, and future research prospects. Given the ongoing digitization across society and business sectors, the rapid generation of high-speed, high-volume data is anticipated to persist. This ongoing trend presents a valuable opportunity to leverage analytics for informed decision-making.

Previous researches were restricted to lesser geographical coverage area. There are very few studies which are related with the impact of big data analytics & business intelligent system on decision making in Indian perspective, as the concept of big data analytics is recent in India, to fulfill the gap of limited number of investigations in the area of big data analytics & business intelligent systems in India, the present topic is selected. Very less research work is done related to the design of modern business intelligent system having capabilities of handling big data.

Flow of the Research Work:

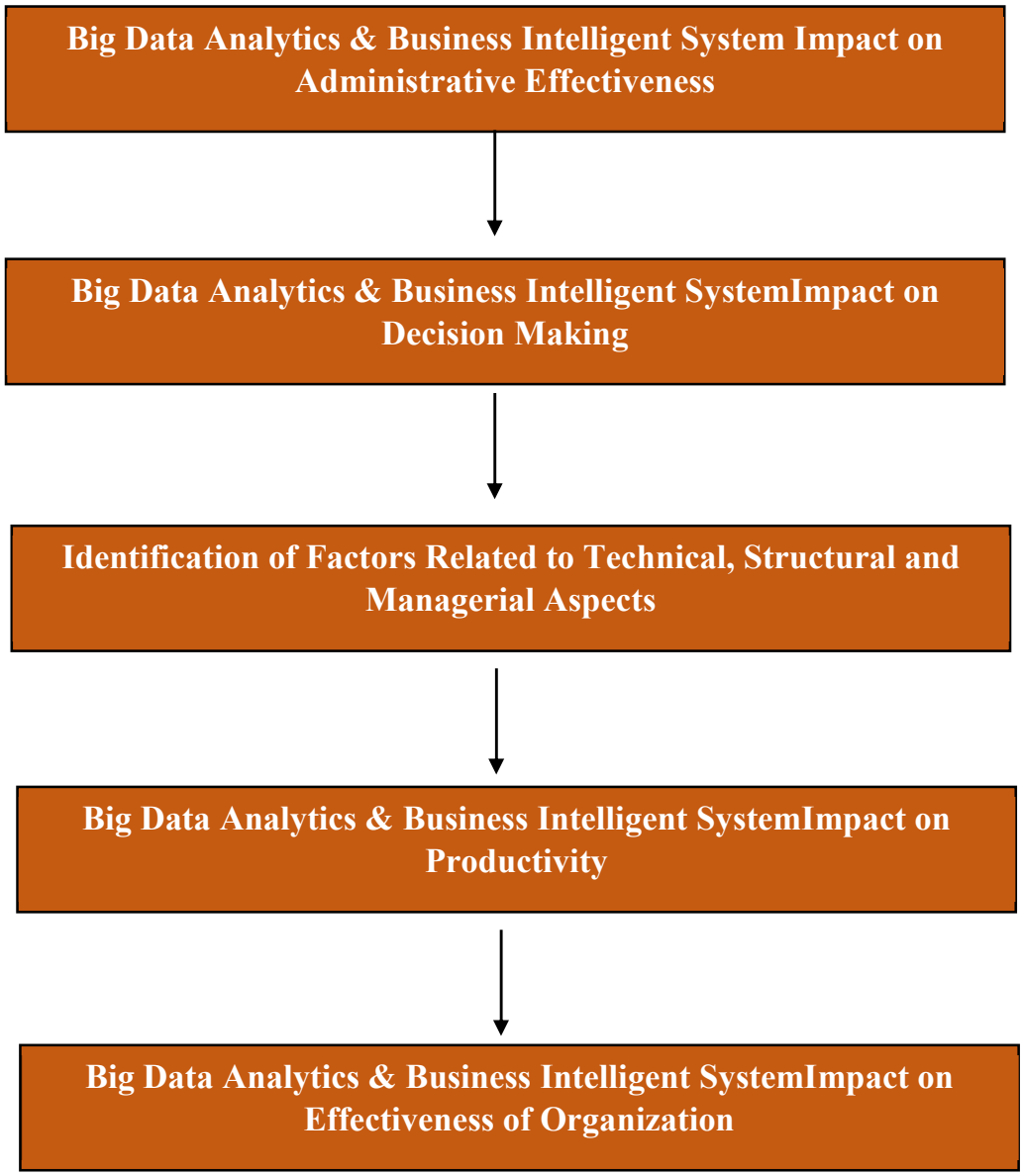


Figure 1.6: Flow Diagram

The proposed model as shown in the figure below tries to find the association between the following:

Big Data Analytics & BI ⟶ Organizational Performance

Big Data Analytics & BI ⟶ Organizational Effectiveness

Big Data Analytics & BI ⟶ Organizational Productivity

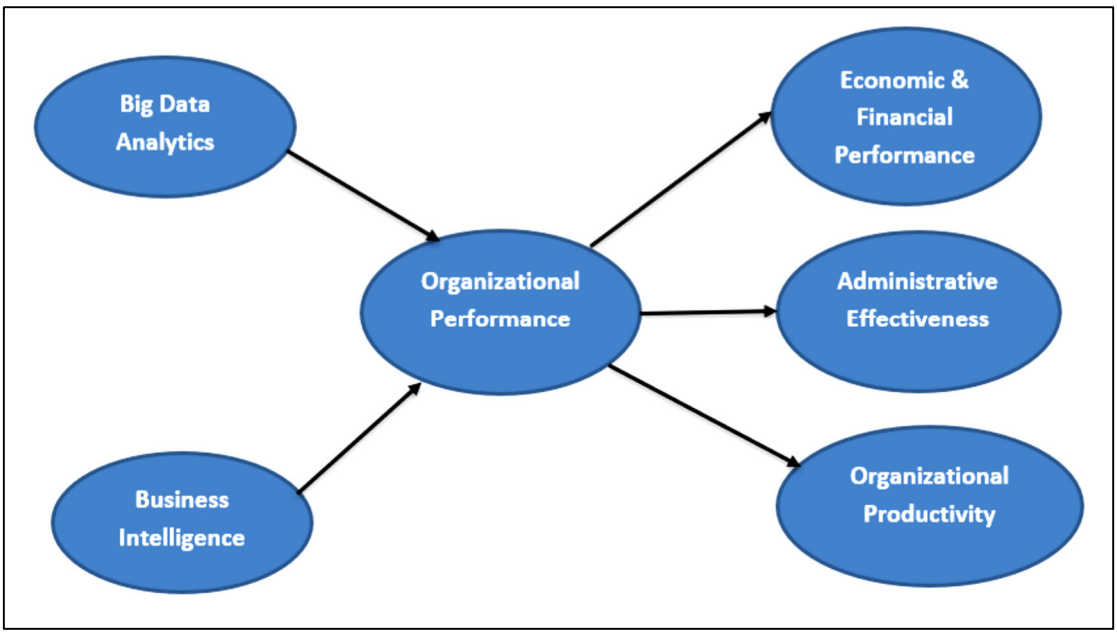


Figure 1.7: Model (Relationship between BDA, BI & Performance)

1.7 APPLICATIONS OF BIG DATA & ANALYTICS:

In the contemporary environment, there is an abundance of data. Major corporations leverage this information to facilitate the expansion of their businesses. Examining this data proves invaluable in making informed decisions in various situations:

"Tracking Customer Shopping Behaviour":

Large retail management teams, exemplified by companies like Amazon, Walmart, and Big Bazar, are tasked with gathering extensive data on customer spending behaviors. This data includes details on the products customers purchase, their preferred brands, and the frequency of their purchases. Additionally, the management teams analyze shopping patterns and identify customers' favorite products to ensure these items are consistently

available in their stores. By closely monitoring which products are being searched for or sold most frequently, these retailers determine manufacturing and inventory rates for those particular products. In the banking sector, consumer spending habits serve as valuable insights. Banks use this information to provide discounts or rewards to customers who use their credit or debit cards to buy specific products they prefer. This personalized approach involves sending tailored offers to individuals at the opportune moment, enhancing customer engagement and satisfaction.

"Smart Traffic System":

Information about traffic conditions on different roads is collected through various methods, such as cameras positioned at city entry and exit points, as well as GPS devices installed in vehicles like Ola and Uber cabs. This data undergoes thorough analysis, enabling the identification of routes that are either congestion-free or less prone to jams and can be traversed in less time. Leveraging big data analysis, cities have the opportunity to establish smart traffic systems, optimizing commuting experiences for residents and visitors alike. One significant advantage of implementing such a system is the reduction in fuel consumption. By guiding drivers through efficient, jam-free routes, vehicles spend less time idling in traffic, leading to lower fuel usage and reduced emissions. This not only benefits individual commuters by saving them time but also contributes to environmental conservation by decreasing overall fuel consumption and pollution levels in the city. Additionally, the data-driven approach ensures that traffic flow is managed intelligently, promoting smoother transportation and a more sustainable urban environment.

Secure and Protected Air Traffic System":

Flight systems are equipped with sensors located at different points, including propellers, that capture essential data such as flight speed, humidity, temperature, and environmental conditions. Analysis of this data enables the configuration and adjustment of internal flight parameters. By assessing the data generated by the flying machine, it becomes feasible to predict the duration for which the machine can operate smoothly before it necessitates replacement or repairs.

Big data analysis plays a pivotal role in enabling autonomous vehicle functionality. Sensors are strategically placed at locations where car cameras are utilized, capturing

crucial information like nearby vehicle sizes and distances from obstacles. After collecting this data, complex calculations are performed, determining factors such as the necessary degree of rotation, appropriate speed, and the ideal timing for stopping. These computations facilitate automatic actions, guiding the autonomous vehicle's movements effectively.

"IoT":

Manufacturing companies embed IoT sensors within their equipment to collect operational data. By analysing this data, these companies can predict how long a machine will function normally before requiring maintenance. This proactive approach enables corporations to take necessary measures before the equipment encounters significant issues or stops functioning entirely, potentially eliminating the need to replace the entire system. In the healthcare sector, big data plays a vital role. Patient data is collected to enhance care through big data tools, enabling doctors to provide improved medical services. IoT technology, in particular, can identify early signs of diseases within the body, allowing for timely interventions. Sensors placed near patients or newborn infants continually monitor various health indicators like blood pressure and heartbeat. If any parameter exceeds the safe limit, an alert is sent to the doctor, enabling swift and remote action.

Education Sector:

Providers of online educational courses utilize big data to identify potential candidates interested in their offerings. For instance, if someone searches for a tutorial video on a specific topic on platforms like YouTube, organizations providing online or offline courses related to that topic will send targeted online advertisements to that individual. This approach ensures that the right audience is reached based on their specific interests and needs.

Energy Sector:

Smart electric meters monitor electricity consumption every 15 minutes and transmit the data to a central server for analysis. This data allows for the identification of periods when the city's power demand is at its lowest. Utilizing this information, manufacturing facilities or households can receive recommendations to operate heavy machinery during

off-peak hours, typically at night, when electricity demand is lower. This strategic approach helps in reducing electricity costs effectively.

The media and entertainment industry:

Media and entertainment service providers such as Netflix, Amazon Prime, and Spotify analyse the user data they collect. This data is assessed to shape their upcoming business strategies. They gather and evaluate information regarding the types of videos and music consumers engage with, as well as the duration of their website visits. This analysis aids these companies in making informed decisions about their content offerings and user experiences.

1.8 PROBLEM STATEMENT

The primary focus of this study is to assess the impact of big data analytics and business intelligence systems on the decision-making processes within Indian companies. Specifically, the research aims to understand the influence of these systems on decision making in both private and public sector organizations, examining their roles in strategic, tactical, and operational decisions. Additionally, the study seeks to identify the underlying factors related to the technical, structural, and managerial aspects that affect the implementation of these systems. It also aims to investigate how the utilization of big data analytics and business intelligence systems contributes to improved decision-making by managers. Furthermore, the research explores whether organizations employing these systems demonstrate enhanced economic and financial performance, increased productivity, and overall effectiveness in the Indian context.

1.9 OBJECTIVES:

The primary goals of the intended research are:

1. To find out the effect of big data analytics & business intelligent system on administrative effectiveness of private and public sector organizations in India
2. Identify the role of big data analytics & business intelligent system in making strategic, tactical and operational decisions.
3. Identification of factors related to technical, structural and managerial aspects for implementation of big data analytics and business intelligent system.

4. To examine how big data analytics & business intelligent system led to better decision-making by Managers.

5. To find out that organization which use big data analytics & business intelligent system have better economic and financial performance.

6. Identify that firms which use business analytics & business intelligent system have higher productivity than others.

Determine the impact of business intelligent system on the effectiveness of organizations in Indian perspective.

1.10 RESEARCH GAP:

1. Previous researches were restricted to lesser geographical coverage area.

2. There are very few studies which are related with the impact of big data analytics & business intelligent system on decision making in Indian perspective, as the concept of big data analytics is recent in India, to fulfill the gap of limited number of investigations in the area of big data analytics & business intelligent systems in India, the present topic is selected.

3. Very less research work is done related to the design of modern business intelligent system having capabilities of handling big data.

4. Industry-Specific Investigations: Many studies focus on general applications of big data analytics and business intelligence. There is a need for research that delves into industry-specific use cases and assesses how these technologies can be tailored to meet the unique requirements of different sectors, such as healthcare, finance, manufacturing, and retail.

5. Ethical and Legal Implications: With the increasing use of big data analytics, there's a lack of comprehensive research on the ethical and legal implications of collecting, storing, and analyzing massive amounts of data. Investigating issues related to data privacy, security, and compliance can help organizations navigate potential risks.

6. User Experience and Adoption: While there's a focus on the technical aspects of implementing these systems, research could explore the user experience and adoption challenges. Understanding how users interact with these tools and identifying barriers to adoption can lead to more effective implementations.

7. Real-time Analytics: As businesses increasingly require real-time insights, there's room for research into real-time analytics using big data. This includes investigating technologies, algorithms, and best practices for processing and analyzing data in real-time or near-real-time.

8. Data Quality and Data Preparation: Big data analytics heavily depends on the quality of data. Research on data cleaning, data preparation techniques, and data quality assessment in the context of big data can be valuable for organizations aiming to derive reliable insights.

9. Cost-Benefit Analysis: Assessing the cost-effectiveness of implementing big data analytics and business intelligence systems remains an area with potential research gaps. This includes examining both the direct and indirect costs and the return on investment associated with these technologies.

10. Integration with Emerging Technologies: Exploring how big data analytics and business intelligence systems can be integrated with emerging technologies like artificial intelligence, machine learning, blockchain, and the Internet of Things to create innovative solutions and drive business value.

11. Cross-Cultural and Global Studies: Conducting cross-cultural and global studies to understand how cultural differences and geographic factors impact the adoption and effectiveness of intelligent systems in different regions and industries.

12. Sustainability and Environmental Impact: Investigating the environmental sustainability of data centers and infrastructure used for big data analytics, along with ways to minimize the carbon footprint associated with these technologies.

Human-AI Collaboration: Research on how humans and artificial intelligence can collaborate effectively with big data analytics, addressing issues of trust, decision-making, and transparency.

1.11 BIG DATA ANALYTICS AND BI TOOLS:

Big data analytics and business intelligence (BI) tools are essential for extracting insights, visualizing data, and making informed decisions from vast and complex datasets. The BDA-BI tools were being classified into following categories:

1. Spreadsheet-Based Tools:

- Microsoft Excel with Power Query and Power Pivot
- Google BigQuery with Google Sheets
- Apache Zeppelin
- Jupyter Notebooks
- Databricks Community Edition
- Trifacta
- Dataiku DSS Community Edition

2. BI Planning/Reporting Suites:

- Tableau
- Power BI
- QlikView
- Qlik Sense
- MicroStrategy
- Sisense
- Yellowfin BI
- IBM Cognos Analytics
- SAP BusinessObjects
- Zoho Analytics
- Oracle Analytics Cloud
- Pyramid Analytics
- TIBCO Spotfire

3. Data ETL/Management Solutions:

- Apache NiFi
- Microsoft SQL Server Integration Services (SSIS)

- Apache Kafka
- AWS Glue
- Google Cloud Dataflow
- IBM InfoSphere DataStage
- Oracle Data Integrator (ODI)
- Apache Beam
- Apache Flink
- TIBCO BusinessWorks
- Matillion

4. Data Visualization Tools:

- Tableau
- Power BI
- QlikView
- Qlik Sense
- Looker
- MicroStrategy
- Sisense
- Yellowfin BI
- Google Data Studio
- D3.js
- Plotly
- Highcharts
- Chart.js
- Google Charts
- FusionCharts
- RAWGraphs
- Visme

5. Data Mining Suits:

- IBM SPSS Modeler
- SAS Enterprise Miner

- RapidMiner
- Weka
- Oracle Data Mining
- Knime
- Microsoft SQL Server Analysis Services (SSAS)
- Python
- R- Programming
- MATLAB
- Orange
- Rattle
- ELKI
- Apache Mahout
- BigML
- Rexer Analytics

6. Advance Statistical Suits:

- SAS (Statistical Analysis System)
- SPSS (Statistical Package for the Social Sciences)
- Stata
- Minitab
- R (R Project for Statistical Computing)
- MATLAB Statistics Toolbox
- Statistica
- SYSTAT
- GraphPad Prism
- XLSTAT
- PSPP (Free alternative to SPSS)
- GENSTAT

7. BD /High Performance Computing Tools:

- Apache Hadoop
- Apache Spark

- Apache Flink
- Apache Storm
- Google Bigtable
- Google Cloud Dataflow
- Amazon EMR (Elastic MapReduce)
- Cloudera
- Microsoft Azure HDInsight
- IBM BigInsights
- Apache Drill
- HBase
- Cassandra
- Impala
- Kubernetes

8. AI Enabled BI Tools:

- Einstein Analytics (Salesforce)
- Cognitive BI (Microsoft Power BI)
- IBM Cognos Analytics
- Qlik Sense
- Tableau
- Yellowfin BI
- Domo
- Zoho Analytics
- SAS Visual Analytics
- Looker
- GoodData
- Pyramid Analytics
- SiSense AI

9. Automated system in Organization for data Gathering:

- Zapier
- Microsoft Power Automate

- Integromat
- IFTTT (If This Then That)
- UiPath
- Blue Prism
- Automation Anywhere
- Kofax
- Pega
- WinAutomation
- AutoIt
- VisualCron
- Apache Airflow
- Apache Nifi
- Microsoft Flow (now part of Power Automate)
- WorkFusion
- Matillion ETL
- SnapLogic

1.12 THESIS ORGANIZATION:

The thesis work is being organized into five chapters introduction, review of literature& research methodology, big data analytics and business intelligent system impact on decision making, interpretation, results and discussion and findings, recommendations & conclusions.

In Chapter first "Introduction" various big data technologies were being discussed, business intelligence system functions, flow of research work, role of big data in business intelligence and applications of big data & analytics were being covered.

Chapter second "Review of literature" covers study of various previous research work being done related to big data analytics & business intelligent system impact on administrative effectiveness, decision making, identification of factors related to technical, structural and managerial aspects, big data analytics & business intelligent system impact on productivity and overall organizational effectiveness.

The chapter third discuss the "Research Methodology" being adopted in the thesis which includes research design, sampling technique, sample size, population, research gap, hypotheses and statistical tools & techniques being used.

Chapter fourth covers the respondents' profile, interpretation, results, and discussion related to big data analytics & business intelligent system impact on productivity and overall organizational effectiveness.

Finally, chapter fifth includes findings, recommendations, conclusions and future scope of the study.

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CHAPTER – 2

REVIEW OF LITERATURE

CHAPTER - 2

LITERATURE REVIEW

2.1 BUSINESS INTELLIGENCE SYSTEM & BIG DATA ANALYTICS:

According to Ahmed A.A. Gad-Elrab (2021) in the contemporary business landscape, Business Intelligence (BI) technologies have gained widespread adoption across various industry domains, guiding decision-making processes to create value. BI encompasses the method of extracting, analyzing, and predicting vital business insights from available datasets. Traditional BI primarily focuses on the collection, extraction, and organization of data, enabling proficient query processing to derive insights from historical data. However, with the advent of technologies like big data, the Internet of Things (IoT), artificial intelligence (AI), and cloud computing (CC), BI has evolved into a more crucial and significant process. This evolution has captured the attention of both business professionals and academic researchers, emphasizing the growing importance of BI in the modern business landscape.

Gurcan et al. (2023) study involved an extensive review of research papers pertaining to business intelligence systems (BIS) and their intricate dynamics. Their analysis revealed a rich landscape of research in this field, encompassing various aspects and subtopics. Notably, the study identified 36 distinct topics, each delving into different facets of BIS. These topics included areas such as "Organizational Capability," "AI Applications," "Data Mining," "Big Data Analytics," and "Visualization," among others. Authors provided a comprehensive overview of the multifaceted research landscape surrounding BIS. Their work not only highlighted the diverse areas of investigation but also contributed by synthesizing valuable information on the latest developments and future directions within the realm of business intelligence systems.

Nenonen et al. (2022) underscored the critical role played by Business Intelligence Systems (BIS) within organizations. They emphasized that BIS functions as a foundational element, enabling organizations to efficiently store, manage, analyse, and leverage data. Through these capabilities, organizations can extract valuable insights and utilize them to innovate, develop new products, and deliver enhanced services. Authors perspective accentuates the pivotal position of BIS in modern businesses, where data-driven decision-making is paramount for sustained growth and competitiveness.

A system is made up of a number of connected parts that work in concert to produce certain results (Satzinger et al, 2002). According to Laudon & Laudon (2007) and O'Brien (2003), an IS is a group of interconnected components that gathers, processes, stores, organises, retrieves, manages, and provides information to support business operations, decision-making, and performance inside an organisation. It varies from information technology in this sense, which describes the tools, techniques, innovations, and standards used to create information (Kroenke, 2007). Information systems are crucial in assisting managers in solving problem, difficult concepts visualising, and new product development (Laudon and Laudon, 2008).

According to Yahaya et al. (2016) it is crucial and necessary to use business intelligence (BI) and big data analytics (BDA[1]) to manage organisational performance, particularly in the public sector. A nation and its people might be severely impacted by poor management of the implementation plan and performance. Therefore, BI and BDA integration are essential to help decision-makers improve the efficiency of public services. Inefficient performance in management practise was found to be caused by the inadequate use of BI and business analytics with OPM[2], according to preliminary research. The research proposes integrating business intelligence and big data analytics (BI-BDA) for Operations Performance Management (OPM). This integration is crucial as a substantial volume of data from diverse sources has shifted towards big data analytics. The study aims to identify specific implementation elements and sub-elements focusing on big data analytics within the context of integrated BI-BDA and OPM. The primary outcome of this research is the development of a new integrated framework called BI-BDA for OPM in the public sector. This framework is designed to enhance the dynamism and effectiveness of the OPM system, providing valuable support for stakeholders and practitioners.

Firican (2017) offers the following seven additional characteristics for the current big data scenario:

- Variability is the measure of how many data points are inconsistent due to the abundance of data variables and dimensions originating from several dissimilar data kinds and sources.

[1]Big Data Analytics
[2]Organization Performance Management

- When discussing meaningful analysis, veracity refers to the provenance or dependability of the data source.
- Validity describes how well the data is accurate and suitable for the purpose for which it is being used. & the term "vulnerability" refers to the data source's security issues.
- The standards for data availability and currency are referred to as volatility.
- Visualization refers to the structure and presentation of data analysis findings.
- Value is the significant context that the data source provides.

According to Ayokanmbi, Fola, and Sabri, Mustafa (2021), Embracing Industry 4.0 technology is imperative in fostering a culture grounded in facts and data, leading to exceptional performance. The proliferation of digital devices such as mobile phones, social networks, computers, and wearables generates vast volumes of data. Achieving performance enhancements relies heavily on adept management, efficient utilization, thorough analysis, and meaningful interpretation of this data to bolster strategic operations. Data, essentially raw facts, undergo processing to yield insights and knowledge essential for decision-making. A robust data-driven decision support system necessitates not only copious amounts of data but also effective methodologies for extracting pertinent information. Integrating data science into organizational workflows through digital transformation becomes pivotal for optimizing operations and procedures. Big Data Analytics (BDA) emerges as a powerful tool, enabling the extraction of value from extensive datasets, thereby elevating the standard of decision-making. In the study, the author delved into the impact of big data and advanced analytical techniques on decision-making quality, ultimately enhancing organizational performance towards achieving excellence. Attaining performance excellence involves synergizing big data analytics proficiency with organizational resources and competencies. Efficient methods of extracting meaningful insights from vast data sets empower strategic decision-making, paving the way for both performance excellence and a competitive edge in the evolving business landscape.

According to Dyche (2014), Big data essentially refers to vast volumes of data that technology enables us to process, transforming it into valuable insights for various individuals. Its true essence lies in the effective utilization of data in specific domains through technological means. This concept came to the forefront in the early years of the

21st century and found initial traction among internet-based and emerging businesses. Big data encompasses a diverse range of data types, including speech, text, log files, images, and videos, as highlighted by Davenport and Dyche in 2013. The proper harnessing of this extensive data leads to the creation of numerous applications that significantly contribute to decision-making processes. By extracting meaningful information from large datasets, big data applications empower businesses and individuals alike, shaping a new paradigm for data-driven insights.

Author Yanfang et al. (2021) emphasizes the pivotal role of business intelligence in extracting vital insights from unstructured data, transforming it into actionable knowledge for informed policy decisions and heightened business productivity. Overcoming challenges such as plan failure, lack of preparedness, resource limitations, and risk-taking abilities is imperative for businesses leveraging business intelligence. The author proposes the Optimized Data Management Utilizing Big Data Analytics (ODM-BDA) paradigm as a solution to enhance organizational intelligence and decision-making. This framework incorporates a backtracking mechanism to address plan failures and improve risk-taking capacities. Additionally, the ODM-BDA framework integrates a steep optimized method to refine training plans and optimize expenditure. To validate the efficacy of these models, the study relies on a comprehensive dataset, ensuring the relative efficacy and performance of the proposed framework. The research employs simulation analysis, encompassing true positive analysis, performance evaluation, error assessment, and accuracy analysis, to demonstrate the reliability of the suggested framework. Through this approach, businesses can enhance their decision-making processes, making them more resilient in the face of challenges and better equipped to take calculated risks.

A novel platform was suggested by Castellanos et al. (2021) to alert company managers to circumstances that could have an impact on their operations. SIE[3]-OBI[4] combines the components needed to take advantage of relevant, fast-moving information on the internet. They put up fresh ideas for gathering and connecting data from the web with the previous data kept in the data warehouse to derive position trends. Only two or more separate unstructured data sources—typically one stream of internal slow text and one stream of external rapid text—are used to extract the pertinent data. This platform was created to

[3]Streaming Information Extraction
[4]Operational Business Intelligence

produce slow and rapid data streams that incorporate ordered and unorganised flows and to evaluate them nearly instantly.

The goal of Chapmana and Kihnb's (2008) study was to quantify how the resources and capabilities of information systems affect company performance. The complicated interrelationship between information system integration methodologies has been shown in the literature. In their study, the authors focus on the data architecture component of information system integration, specifically the single database concept. They argue that while this integration aspect should influence the perception of system success, there isn't substantial evidence connecting it to business unit performance due to the varied ways information is utilized in practice. The researchers employed coercive and enabling organization, finding that an enabling management control approach is facilitated by the level of information system integration. They establish a connection between the perceived success of the system and the performance of the business unit.

According to Jehad S. Bani-2009 Hani's research, Jordanian universities with a business college looked at the effects of MIS on firms' performance from an academic standpoint. All deans and department heads for the business faculties at public and private institutions in Jordan made up the study's target group. The targeted universities were divided into a simple random sample of (15) universities, and 120 questionnaires being distributed among eight different universities). Response rate was about 70% and statistical techniques like the Spearman correlation-coefficient and regression being used to test the hypothesis. Additionally, results demonstrated that management information systems had a big influence on how well a business performed. The researchers provide a few intriguing suggestions for the administration of Jordanian institutions in the last section.

Computer hardware, software, data, processes, and people are the five basic elements of an information system. From the simplest to the most complex information systems, all have these five elements. These five elements are balanced. Hardware and people, the final elements, are both actors and have the ability to act. Both the software and procedure components are collections of instructions: the former are meant for humans, while the latter are meant for hardware. Finally, data serves as a link between the computer and human worlds (Kroenke, 2007).

Humans are inherently social beings, reliant on connections with others to fulfill their needs and desires. The idea of self-sufficiency is unrealistic due to the limitations in capacity, time,

strength, and skills that each individual possesses. In this context, an organization can be defined as a gathering of people united by specific goals. This concept isn't recent (Diksha, 2017); organizations have historically formed as collectives driven by continuous pursuit of particular objectives. They provide a structured platform where diverse members collaborate harmoniously, thanks to established boundaries, norms, authority structures, communication networks, and incentive systems. The essence of an organization lies in the process of harmonizing individual or group tasks with the necessary resources. This synchronization ensures tasks are executed efficiently, systematically, constructively, and in a coordinated manner, optimizing the collective effort available (Diksha, 2017). Essentially, organizations serve as platforms that enable individuals with varied skills and expertise to work together effectively towards shared objectives.

The study, which focused on management information systems, sought to determine how these systems had aided in the provision of services in Nigerian universities and the reduction of paperwork at these institutions. A 'sample size' of 332 was being taken from the study's population of 1,928, according to Freund and William's formula. Questionnaires were the primary and secondary data gathering tools. 275 employees completed the questionnaire and returned it. The study used the survey methodology. Chi-square (x2) was employed for the test with the help of three hypotheses. With the use of the Statistical Package for Social Sciences, the Z-test and Chi-square (2) statistical tools were used to examine hypotheses 1, 3, and 4. (SPSS). The results showed that management information systems have greatly aided in service delivery, which led to the calculations 2 (Calculated) (95,n =150) = 0.889,p0.5 and 2 (Tabulated) (95,n =150) = 36.042. Management information systems have also significantly aided in the reduction of paperwork. According to the study's findings, a weak management information system is a barrier to Nigeria's universities being successfully managed. As per the report, it is essential for managers at every hierarchical level to undergo comprehensive orientation, and secretaries should receive continuous in-service training. This ensures the appropriate and effective utilization of Management Information System (MIS) facilities, enabling the production and dissemination of information within institutions. This enhanced knowledge and training are crucial for making informed decisions within the organization (Marire Mary Ijeoma, 2018).

2.2 BDA-BIS & ORGANIZATIONAL PERFORMANCE:

Performance serves as a measure of achievements for individuals, groups, or organizations. When it comes to organizations, performance is a continual, action-driven process aimed at improvement. It centres on benchmarks, standards, evaluations, and feedback, reflecting a constant effort to enhance outcomes. This dynamic approach characterizes organizational performance Ababneh (2008).

An organization's performance is determined by evaluating its tangible results and outcomes in comparison to the intended goals and objectives. Organizations employ performance measurement to enhance accountability, provide valuable operational insights, and facilitate more effective planning, budgeting, and evaluation processes (Ammons, 2001).

According to Hunger et al. (2007) performance is the result of an activity, and performance of organization is the culmination of all work processes & activities that make up the organisation. Managers monitor and regulate organisational performance because doing so improves management evaluations, increases the capacity to deliver value to customers, enhances measures of organisational knowledge, and has an effect on an organization's reputation.

When assessing an organization's performance, it involves analysing past management decisions related to investments, operations, and financing. This evaluation aims to determine the efficient utilization of available resources, whether the business's profitability met or exceeded expectations, and if financial decisions were made prudently (Shaukat et al., 2008). Additionally, decisions regarding the continuation, improvement, expansion, or reduction of a program or initiative rely on analyses of organizational performance (Rossi et al., 1999). Traditionally, performance measurement has relied on productivity indicators such as service inputs and outputs (Holmes et al., 2006). In recent years, many companies have explored the adoption of the balanced scorecard system, which assesses performance across various dimensions, to effectively manage organizational performance.

According to Daft (1983), organisational effectiveness is "the extent to which an organisation fulfilled its aims." Organizational effectiveness, according to Mondy (1990), is "the extent to which an organisation provides the expected result."

According to Walrad and Moss (1993) efficiency is defined as the ability to do a task in less time, for less money, or with fewer resources (or employees). Effectiveness refers to how

successfully one does one's duties. To put it another way, the output (final product) is of a high calibre. It is a rare and wonderful occurrence when a problem-solving approach is both successful and efficient; ordinarily, one must choose which he likes because one typically cannot have both.

Several forward-thinking businesses have created tools for making decisions in real time utilising supply and demand side data. They can make decisions in real time online using data, which traditional business models cannot match. Big data is used by transportation service providers like Uber to route cars in real-time, reducing wait times and improving the rider experience (Woodie, 2015). Both customers and cab drivers benefit from real-time information provided by ride-sharing platforms like Ola and Uber through integrated services such as Google Maps.

Many innovative companies have embraced real-time decision-making using data from both supply and demand sides. Through advanced analytics, these companies have established online decision-making systems that traditional businesses can't match. Ride-sharing services like Uber utilize big data to efficiently route cars, reducing wait times and enhancing the customer experience. Both Uber and Ola provide real-time information to both riders and drivers using Google Maps, utilizing a constant flow of data on cab demand and availability in various areas. By analysing this real-time data, they create effective methods to manage demand. Singapore recently introduced Beeline, a shared private transportation concept driven by data analytics and mobile technology. This system dynamically assigns buses based on demand patterns and uses crowd-sourced travel data to identify optimal routes. This approach reduces commuting time, encouraging people to use shared transportation more often. (Askari, 2015).

Historically, transaction processing systems like ERPs[5] facilitated internal company decisions according to Davenport and Dyché (2013). As technology advanced, the integration of supply and demand side systems such as SRM[6] and CRM,[7] linking internal processes with suppliers (like Ariba) and clients (e.g., Siebel), became prevalent. These systems relied on well-structured relational databases, aiding in various operational choices like product pricing strategies, order status inquiries, inventory planning, cost analysis, and managing outstanding payments. The data derived from these systems significantly

[5] Enterprise Resource Planning
[6] Supplier Relationship Management
[7] Customer Relationship Management

improved the accuracy and speed of internal decisions. Additionally, data warehouses and data mining processes utilized this data for further analysis. By employing techniques like data mining, patterns, correlations, and association rules were discovered from accumulated data, enhancing overall business insights, as highlighted by Han et al (2011).

Enterprises may use business analytics as a tool to increase their business performance in terms of customer service, customer retention, and client acquisition. Using the information that is now accessible, predictive analytics enables us to make predictions about potential outcomes. The ability to prepare ahead is a competitive advantage for a business. Data patterns, correlations, and linkages may be used to segment markets, improve sales performance, and find the ideal clients for a product. Every field where data may be gathered can use analytics. Analytics for supply chains are provided in the following areas: demand forecasting, fleet and route size and optimization, inventory optimization, and procurement planning (Nair, 2012).

Kokila et al. (2017) data analytics are a key component of the field of business intelligence (BI), which helps users get corporate insights for better decision-making. Numerous businesses are gathering and keeping a vast amount of data about their existing and future clients, vendors, and business partners. The companies are unable to turn the data into meaningful and helpful knowledge since it is difficult to find the hidden information in the data. Big data analytics technologies may be able to assist these businesses in extracting insights from the vast amounts of data. It assists businesses in gaining knowledge in order to automate decision-making for the achievement of their objectives. Business intelligence solutions provide management and other departments with crucial analytical tools and critical performance indicators. It offers further advantages in terms of data quality, scalability, analytical power, and user-friendly presentation. Big data analytics and business intelligence technologies turn sales and customer data into useful information. To maximise the value of this corporate data, big data strategies work in conjunction with business intelligence technologies. This study offers an analysis of how the big data analytics tool aids in e-commerce business management.

Arefin, Md. (2015) the goal of the study was to determine how organisational strategy, structure, process, and culture affect organisational success and if business intelligence (BI) systems may play a mediating role in this relationship. Design, technique, and strategy 225 organisational units in Bangladesh provided the sample data for this study, which was then

examined using the partial least squares method, a statistical analytic approach based on structural equation modelling. The research indicated that organizational factors like strategy, structure, processes, and culture positively impacted the effectiveness of both Business Intelligence (BI) systems and the overall efficiency of the company. Moreover, the study revealed that the success of BI systems plays a role in mediating how corporate strategy, structure, processes, and culture influence the overall effectiveness of the organization.BI systems can affect corporate success since they are context-specific. The lack of research on the relationship between organisational factors and BI systems inspires this study to make a contribution to the literature on BI systems by putting forth a theoretical model and looking into how BI systems act as a mediator between different organisational factors and organisational effectiveness.

Anshari et al. (2019) focused that in order to successfully use data to attain performance excellence, the organization's culture must be fundamentally changed, and senior management commitment and support are essential. Achieving performance excellence necessitates a strong commitment from senior management towards leveraging data science. This involves implementing process measurement systems, collecting and analyzing data, and granting employees access to a skilled team of data scientists proficient in diverse data science fields. Consequently, it's crucial for leadership to ensure the integration of digital technology within the company's operations, enabling the comprehensive collection of data. The organization's potential to achieve performance excellence greatly hinges on its capacity to effectively employ data science tools for comprehending and analyzing vast datasets. With the aid of data analytics concepts, tools, and methodologies, data scientists can delve into these datasets, extracting valuable information and insights essential for informed decision-making. This strategic use of data science empowers businesses to enhance their performance significantly.

2.3 BDA-BIS AND DECISION MAKING:

Almeida et al. (2023) have made a noteworthy contribution by shedding light on the far-reaching nature of big data that transcends the capacities of conventional data management approaches. In their work, they delve deeply into the fundamental characteristics that define big data, specifically highlighting three critical aspects: volume, velocity, and variety. These characteristics are pivotal in shaping the decision-making processes within organizations. The "volume" aspect signifies the sheer magnitude of data generated and collected, often

exceeding what traditional systems can handle. "Velocity" pertains to the rapid pace at which data accumulates and evolves, demanding real-time processing and analysis. "Variety" underscores the diverse forms and formats that data can take, including structured and unstructured data from various sources. By identifying and emphasizing these core attributes, Almeida and colleagues offer organizations a valuable framework for comprehending the distinctive nature of big data. This framework not only aids in understanding the challenges posed by big data but also facilitates adaptation and the development of strategies to harness its potential effectively. Their contribution enriches the discourse on big data's impact on decision-making and underscores the importance of recognizing these inherent characteristics when navigating the complexities of the data-driven landscape.

Latif et al. (2023) have addressed the existing gap in understanding the influence of big data analytics (BDA) on decision-making and its subsequent consequences for organizational performance. Their study, rooted in the information processing perspective and survey-based evaluations, establishes a connection between BDA and the efficiency of decision-making, with a specific focus on the textile industry. The primary objective of this research is to explore the relationship between BDA and decision-making within organizations and to gauge the degree to which BDA shapes these decisions. The study collected data from 570 respondents through a questionnaire, and the subsequent statistical analysis demonstrates that BDA has a positive impact on an organization's ability to make effective decisions. Importantly, the research also reveals that there are no significant differences between large corporations and medium-sized businesses in terms of how BDA influences successful decision-making. These findings offer valuable insights for managers aiming to improve their decision-making processes through the utilization of BDA.

Salari, Omid. (2022) due to its direct impact on the growth of enterprises and firms, big data has come under more and more consideration by experts and business owners, boosting the effectiveness of crucial business choices. There is a great amount of information that may be utilized and correctly investigated due to the growth in Internet usage and the development of information storage technologies. Big data is the term used to describe the volume of information that may be utilized to guide crucial business growth choices. While this is going on, a lot of startups and even huge businesses are confused how to exploit big data. This article analyses how to effectively extract information to help decision making in addition to looking at big data and its significance in decision making.

Wiederet al. (2015), over the past decade, business intelligence (BI) systems have remained a primary concern for Chief Information Officers (CIOs). However, there is limited understanding regarding the effective maintenance of these systems beyond their initial adoption phase. Addressing this gap, a study conducted by Wieder et al. (2015) explores the direct and indirect impacts of BI management quality on managerial decision-making quality. This research utilizes Partial Least Squares (PLS) analysis of survey data obtained from senior IT managers in Australia. The study's findings not only validate the overall connection between BI management quality and improved managerial decision-making but also shed light on the mediating roles played by data/information quality and the scope of the BI solution. Specifically, the research emphasizes the significance of active management of BI systems and the breadth of solutions employed. This study provides unprecedented evidence concerning the direct and indirect factors that influence enhancements in managerial decision support related to the comprehensive nature of BI solutions. By uncovering these intricate relationships, this research not only contributes valuable insights to the academic sphere but also offers practical implications for industry professionals. Understanding the nuanced impact of BI management quality, data quality, and the extent of BI solutions is crucial for organizations aiming to enhance their managerial decision-making processes effectively.

As indicated by Ram et al. (2016), the global landscape has witnessed a transformative shift in business operations due to the widespread adoption of social media. This shift has necessitated a change in paradigms, leading to the accumulation of vast datasets from various social media platforms. Recognizing the importance of this data, businesses have increasingly turned to big data analytics for business intelligence purposes. Despite its significance, there remains a gap in research concerning the impact of big data analytics on business intelligence, particularly in the context of data gathered from Chinese social media platforms. To bridge this gap, our study focuses on exploring the role and implications of big data analytics in business intelligence using information sourced from Chinese social media platforms. The research employs a qualitative approach to data collection and analysis, given its exploratory nature. We have meticulously designed a comprehensive semi-structured questionnaire based on an in-depth review of existing literature. The study aims to conduct interviews with 35-40 respondents spanning various industries, including retail and manufacturing. The gathered data will be meticulously analyzed using Nvivo software, allowing us to identify crucial issues related to extracting value from Big Data

analytics for business intelligence objectives. The outcomes of this research are anticipated to significantly influence both theoretical frameworks and practical strategies. By shedding light on effective methods for maximizing the potential of social media channels, the study will contribute to the development of informed plans and strategies, thereby enhancing corporate value in the ever-evolving digital landscape.

Tuncay, Erhun & Belgin, Onder (2010) the analysis of data related to business processes involves specific approaches, with "business intelligence" being a prominent subset among these strategies. Business intelligence primarily revolves around gathering and scrutinizing data concerning an organization, its customers, and competitors. These methods facilitate the collection, storage, analysis, and presentation of intelligent insights from corporate data. The goal is to identify crucial trends or patterns that aid decision-making. Consequently, businesses can make more precise decisions on both tactical and strategic management matters, such as optimizing their supply chain or devising competitive strategies for specific markets. Business intelligence applications include query and reporting, online analytical processing (OLAP), statistical analysis, forecasting, and data mining, which are frequently employed in decision support systems. These programs are often integrated into enterprise resource planning systems and utilize data sourced from data warehouses or data marts. The study delves into the methods utilized for business intelligence activities within organizations, the underlying logic employed by business intelligence tools during the decision-making process, and their role in enhancing organizational efficiency.

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CHAPTER – 3

RESEARCH METHODOLOGY

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Research methodology serves as a clear framework outlining the researcher's intended path in conducting their study. It constitutes a systematic and logical plan designed to tackle a research problem effectively. This methodical approach is essential for ensuring the credibility and validity of the results, aligning with the researcher's goals and objectives. The methodology outlines the researcher's strategy, specifying the data to be collected, its sources, and the methods employed for collection and analysis. In essence, it provides a structured roadmap for conducting research, guaranteeing the reliability and integrity of the outcomes.

3.1 INTRODUCTION

In today's business landscape, organizations aim to align with the principles of the fourth industrial revolution and establish their competitive foundations by offering unique value propositions that cater to customer needs through the utilization of business intelligence. The term "big data" refers to the extensive volume of data, encompassing both structured and unstructured information, that inundates businesses on a daily basis. However, it's not merely the quantity of data that holds significance; rather, it is the actions organizations take with this data that truly count. Big data can be subject to analysis to extract valuable insights, enabling improved decision-making and the formulation of strategic business initiatives.

Many companies use both business analytics and business intelligence (BI) to support their decision-making processes and gain a competitive edge. These two fields complement each other and serve various purposes within organizations. Here's how companies use them:

3.1.1 Business Intelligence (BI) in Companies:

Operational Reporting: Companies use BI tools to generate operational reports that provide insights into daily or periodic activities. These reports help monitor key performance indicators (KPIs[1]), track sales, inventory, and other operational metrics.

Dashboard Visualization: BI dashboards are popular in organizations for providing at-a-glance views of critical data. They help executives and managers quickly understand the state of the business and identify trends or anomalies.

Historical Analysis: BI allows companies to analyze historical data to understand past performance, identify areas for improvement, and make data-driven decisions based on historical trends.

Data Integration: BI tools often integrate data from multiple sources, such as databases, spreadsheets, and third-party applications, providing a consolidated view of business data.

Ad Hoc Reporting: BI tools enable non-technical users to create ad hoc reports and perform basic data exploration, reducing the dependence on IT departments for data queries.

Compliance and Governance: BI solutions help companies ensure data security, compliance with regulations, and governance through features like access controls and audit trails.

3.1.2 Business Analytics in Companies:

Predictive Analytics: Companies use predictive models to forecast future trends, such as customer behavior, demand for products, or equipment maintenance needs. Predictive analytics helps optimize operations and identify growth opportunities.

Prescriptive Analytics: This type of analytics suggests specific actions or strategies to optimize outcomes. For example, it can recommend pricing strategies, supply chain adjustments, or marketing campaigns based on data analysis.

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[1]Key Performance Indicators

Customer Segmentation: Analytics helps companies segment their customer base into groups with similar characteristics or behaviors. This allows for more targeted marketing and personalized customer experiences.

Supply Chain Optimization: Companies employ analytics to enhance various aspects of their supply chain operations such as inventory management, demand forecasting, and logistics. By utilizing analytics, businesses can achieve cost savings and improved efficiency in their supply chain processes.

Risk Management: Analytics can be used to assess and mitigate risks. For instance, financial institutions use analytics to detect fraudulent transactions, and healthcare organizations use it for patient risk assessment.

Product Development: Companies leverage analytics to understand customer feedback, market trends, and competitor data to inform product development and innovation efforts.

Market Research: Analytics is used to analyze market data, competitor performance, and consumer sentiment to make informed decisions about market entry, expansion, or product positioning.

In practice, many organizations integrate BI and business analytics into their decision-making processes. BI provides the foundational data and historical context, while business analytics leverages this data to provide deeper insights, predictions, and recommendations. Together, they empower companies to make data-driven decisions that drive growth, improve efficiency, and enhance customer experiences.

3.1.3 Integrating Business Intelligence (BI) and Business Analytics (BA):

Integrating Business Intelligence (BI) and Business Analytics (BA[2]) into a cohesive model can significantly enhance an organization's ability to extract actionable insights from data and drive informed decision-making. Here's a framework for integrating BI and BA:

[2]Business Analytics

1. Data Integration:

Centralized Data Repository: Create a centralized data repository where all relevant data, both internal and external, is stored and organized. This could include structured data for BI and unstructured data for BA.

Data Quality Assurance: Implement data quality processes to ensure that data is accurate, consistent, and up-to-date.

2. BI Foundation:

Reporting and Dashboards: Build BI reports and dashboards for monitoring historical performance and KPIs. These provide a baseline understanding of your business operations.

Data Visualization: Utilize data visualization techniques to make information more accessible and actionable for users at all levels of the organization.

Self-Service BI: Enable users without technical expertise to generate their own reports and navigate data effortlessly using intuitive Business Intelligence tools.

3. BA Capabilities:

Predictive Analytics: Employ predictive models to forecast future trends and identify potential opportunities or risks.

Prescriptive Analytics: Develop prescriptive models to recommend specific actions based on insights generated from historical and predictive data.

Advanced Statistical Analysis: Utilize statistical methods and machine learning algorithms for in-depth data analysis.

4. Data Exploration:

Data Discovery: Encourage data exploration by BA teams to discover patterns, anomalies, and correlations in the data.

Hypothesis Testing: BA teams can formulate hypotheses and conduct experiments to validate assumptions and uncover insights.

5. Data Governance:

Establish data governance policies and practices to ensure data security, compliance, and privacy, especially when dealing with sensitive data.

Define data ownership and access controls to maintain data integrity.

6. Collaboration and Communication:

Foster collaboration between BI and BA teams to ensure they work together effectively.

Establish clear communication channels for sharing insights and findings with decision-makers.

7. Continuous Improvement:

Implement a feedback loop to continuously improve BI and BA processes and models based on user feedback and changing business needs.

Stay updated with emerging technologies and methodologies in BI and BA.

8. Executive Sponsorship:

Ensure strong executive sponsorship and support for the integration of BI and BA to drive a data-driven culture within the organization.

9. Training and Skill Development:

Provide training and skill development for team members in BI and BA to keep them updated with the newest tools and techniques.

10. Key Performance Indicators (KPIs) and Other Metrices:

Track KPIs related to the effectiveness and impact of BI and BA initiatives, such as improved decision-making, cost savings, or revenue growth.

By integrating BI and BA within this framework, organizations can harness the power of data to gain a competitive edge, adapt to market changes, and make informed decisions that drive business growth and innovation.

In the current environment, organizations strive to align with the concepts of the fourth industrial revolution, establishing the foundational elements of today's competitive business environment through a unique value proposition centered around fulfilling customer needs using business intelligence. Big data refers to the substantial volume of data – both structured and unstructured – that businesses encounter daily. However, the significance lies not in the sheer volume of data but in how organizations utilize it. Big data can be scrutinized to uncover insights that drive improved decisions and strategic business initiatives.

3.1.4 Five Vs of Big Data:

The five Vs of big data characterize the essential aspects of vast and intricate datasets, offering organizations insights into the specific challenges and possibilities associated with handling such data. These five Vs include:

Volume: Referring to the immense amount of data, often measured in terabytes or petabytes, which has been consistently doubling every forty months.

Velocity: Signifying the rapid pace at which data accumulates in various businesses and organizations, highlighting the need for efficient processing and analysis.

Variety: Encompassing the diverse range of data sources available, including data from enterprise systems, social media, text, video, audio, emails, RFID, web applications, and other digital devices.

Veracity: Emphasizing the crucial aspect of data quality, which is fundamental for accurate decision-making, highlighting the importance of reliable and trustworthy data.

Value: Indicating the potential for economic and social improvements by extracting valuable insights and outcomes from heterogeneous data, emphasizing the practical utility and significance of big data analytics.

Big Data Analytics:

Big data analytics involves employing advanced analytical techniques to process large and diverse datasets, enabling better decision-making by analyzing historical data stored in data warehouses. This comprehensive approach considers not only data quantity but

also its various types and sources, including structured and unstructured data. Tools and methods encompass data warehousing, RDBMS, clustering, classification, association analysis, OLAP, ETL, BPM, both simple and multiple regression, genetic algorithms, and heuristic research. The benefits of big data analytics include delivering valuable insights to customers, enhancing corporate analytics capabilities, and improving specialized analytical applications. However, challenges like staffing issues, insufficient business support, and database software problems can impede its implementation.

Text Analytics:

In online user experiences, the significance of enterprise search systems, document representation and search engines cannot be overstated. These elements are crucial for comprehending user behavior and preferences, thereby assisting businesses in tailoring their recommendations effectively. Valuable insights into customer intentions to make a purchase emerge from the analysis of billions of searches on major platforms such as Google and Amazon. E-commerce giants like Amazon and Jet Airways utilize this valuable information to elevate user engagement. These platforms proactively suggest products or flights by anticipating customer preferences based on their search history. This personalized approach significantly heightens the probability of customers making a purchase during their subsequent visits, thereby enhancing their overall shopping or travel experience.

Audio and Video Analytics:

Audio analytics technology processes audio quickly, typically within a few seconds, primarily for safety reasons in various companies. Its primary purpose is to monitor a variety of sounds in their natural settings. Similarly, video analytics is employed to process and analyze videos from diverse sectors and companies. This aids in identifying relevant events that are valuable for making operational decisions.

Web Analytics:

Amazon, the online retail giant, employs advanced data mining techniques to sift through vast amounts of data, including click streams, web searches, order history, and online activities, among other sources, to extract valuable insights. This data-driven intelligence is instrumental in guiding decisions related to product promotions. Amazon, along with

other businesses, has found this approach highly effective. By analyzing the correlation between previous purchase history and the likelihood of making similar purchases, patterns emerge. These patterns help identify potential customers who might be interested in analogous products based on their past buying behavior. Leveraging this correlation, Amazon and similar platforms can target specific clientele. These potential customers are then reached through digital channels like emails, Facebook, or targeted messages on Amazon.com, effectively promoting various products tailored to their preferences.

Network Analytics:

"Network analytics" encompasses the systematic collection of data concerning interconnected devices within a network and their communication patterns. This valuable information is instrumental in crafting effective network policies and making strategic decisions that drive actionable outcomes. By leveraging network analytics, companies can enhance their overall performance while simultaneously reducing costs. The insights derived from analyzing device interactions empower organizations to make informed choices, ensuring optimal network functionality and efficiency. This proactive approach not only improves operational decisions but also significantly contributes to the company's growth and financial stability.

Business intelligence systems integrate data from operational sources with analytical tools to provide complex and competitive information to planners and decision-makers. Enhancing the timeliness and quality of data inputs is crucial to achieve this objective. Business intelligence aids in understanding an organization's capabilities, the prevailing industry standards, market trends, technological advancements, and regulatory landscapes. It also enables insights into competitors' actions and their implications. The evolution of data warehousing, improvements in data cleansing techniques, advancements in hardware and software capabilities, and the introduction of web-based architectures collectively create a more robust environment for business intelligence, surpassing the accessibility of the past.

The investigation that has been proposed helps to understand the conceptual framework of BDA and BIS, the influence of BDA and BIS on the administrative effectiveness of organizations, the basic role of BDA and BIS in decision making at different levels of

the organization such as top level: strategic, middle level: tactical, and also lower level: operational, and the identification of factors related to technical, structural, and managerial aspects for the implementation of BDA. determine the influence that business intelligent systems have on the efficiency of organizations in the Indian context, identify that BDA and BIS have better economic and financial performance, determine that firms that use business analytics and business intelligent systems have higher productivity than others, and determine the impact that business intelligent systems have on the effectiveness of organizations.

3.2 HYPOTHESES:

1. Big data analytics and business intelligence system have a significant impact on organizations performance.
2. Big data analytics & business intelligent system have better economic and financial performance.
3. There is no significant difference between the impact of big data analytics & business intelligence system on decision making in both type of organizations (Private and Public).
4. There is a significant relationship between big data & business intelligence system success factors and type of organizations.
5. There is no significant impact of big data analytics & business intelligent system on administrative effectiveness of private and public sector organizations in India.
6. There is no impact of business intelligent system on the effectiveness of organizations in Indian perspective.

3.3 RESEARCH DESIGN:

There are three fundamental research types: quantitative, qualitative, and mixed research, which involves a combination of quantitative and qualitative methods. Research methodologies typically encompass five steps. The first step in the research process is to define the research type, either qualitative or quantitative. Following this, the second step

involves identifying a research paradigm that guides the entire study. After determining the paradigm, the research methodology is developed to align with it. The last two steps include choosing appropriate data collection methods from a range of sources and conducting thorough data analysis.

Big data has become instrumental in providing companies with a competitive edge through the application of various analytics techniques. These methods offer insights, patterns, correlations, and associations that were previously inaccessible with traditional small data approaches. This invaluable information aids business executives in decision-making processes by utilizing data from social media, competitive intelligence, cost and time reduction strategies, supply chain analytics, and web analytics. Firms acknowledging the significance of big data and shaping their products around data have experienced significant gains in recent years. Many companies now integrate analytics into various aspects of their operations, benefiting from data-driven decision-making. The proposed research delves into the conceptual framework for building analytics capabilities and explores how this emerging knowledge can empower businesses of all sizes – small, medium, and large – to compete effectively using limited resources. This framework is adaptable, allowing companies to tailor it according to their specific industry and business model. It serves as a foundational point for further analysis, refinement, and future research opportunities. Considering the ongoing digitization in both society and business, the continuous generation of high-speed, high-volume data presents a substantial opportunity for leveraging analytics in decision-making processes.

The proposed study identifies influence of big data analytics & business intelligent system on the decision-making process.

Study Design: Quantitative Research

Study Area: India (Major States)

Sample Design:

1. Sample Size: 200 which includes organizations from private and public sector in India. The organizations included were being classified zone wise as follows:

North Zone:

- Hero MotoCorp
- Fortis Healthcare
- JK Cement
- Infosys Limited
- Bharat Sanchar Nigam Limited (BSNL)

South Zone:

- Infosys Limited
- Wipro Limited
- Tata Consultancy Services (TCS)
- Apollo Hospitals

East Zone:

- Coal India Limited
- Exide Industries
- OIL India Limited
- IDBI Bank

West Zone:

- ICICI Bank
- Yes Bank
- Ambuja Cements Limited
- Life Insurance Corporation of India (LIC)

Central Zone:

- State Bank of India (SBI)

2. Sampling techniques: non-probability-based convenience sampling technique.

The gathered data was being edited then coded, and further tabulated for the purpose of analysis. Various statistical techniques such as percentages, averages, and ratios were applied. After data analysis techniques were employed, further interpretation was done in alignment with the research objectives.

Instrument Development

The questionnaire is structured to gather information on demographic factors and aspects concerning big data analytics and business intelligence systems. It is divided into two distinct sections, Section A and Section B. Section A focuses on capturing the demographic details of the respondents, whereas Section B consists of questions related to the influence of big data analytics and business intelligence systems on decision-making processes. To ensure the reliability and validity of the instrument, evaluations are conducted using methods such as Cronbach's Alpha value and correlation analysis.

Sources of Information:

The proposed study intended to comprehensively delve into various dimensions concerning the conceptual framework of big data analytics and business intelligence systems. Its focus was on evaluating how these systems enhance organizational efficiency, exploring their influence on decision-making across different organizational levels—strategic, tactical, and operational. Furthermore, the research aimed to identify the key factors related to technical, structural, and managerial aspects crucial for the successful implementation of big data analytics and business intelligence systems. Additionally, the study sought to determine whether the adoption of these systems improved managerial decision-making and positively impacted the economic and financial performance of organizations. Another aspect of the investigation was to determine whether firms that embraced business analytics and business intelligence systems exhibited higher productivity compared to their counterparts that did not leverage such technologies. The study was specifically focused on understanding the impact of business intelligence systems in the context of organizations within India. In essence, this investigation aimed to shed light on the multifaceted role of big data analytics and business intelligence systems in organizational effectiveness, decision-making, financial performance, and productivity, with a particular emphasis on the Indian business landscape.

Primary and Secondary Sources:

Gathering Primary Data: The primary data was acquired through a meticulously crafted questionnaire distributed to entrepreneurs, top-level management executives, technical experts, and managers within Indian organizations.

Gathering Secondary Data: To establish a foundation for the current study, the researcher explored a range of sources for secondary data, shaping the conceptual framework. Various search engines like Google and Yahoo were utilized to find relevant articles on the topic. Additionally, the researcher sought guidance from scholars and professionals in the field. Newspapers, magazines, and internal reports from companies also served as valuable secondary sources for this study.

- Secondary information for the research was sourced from various reputable publishers, including Elsevier, Wiley, IEEE[3], Springer, and Saga, through research papers.
- These research papers covered a wide range of topics related to big data and information security and privacy.
- Government websites were utilized to access secondary data, including historical data and statistics, enhancing the research's data sources.
- The research incorporated insights from specialized journals focused on security and privacy issues related to big data and information.
- Books within the fields of computer science and engineering, machine learning, big data management, and data quality were consulted to provide background knowledge and relevant information.
- The study also made extensive use of digital resources, including websites, blogs, and online portals, to gather valuable information and insights from the broader digital landscape.

[3]Institute of Electrical and Electronics Engineers

- This comprehensive approach to secondary data collection aimed to establish a well-rounded foundation for the research.

3.4 TOOLS OF DATA COLLECTION

A well-structured instrument the questionnaire with two components being employed. Part A asks questions about respondents' profiles or demographic characteristics, including inquiries about respondents' ages, genders, designation, educational backgrounds, experience, type of organization and other characteristics. The questions linked to the particular study objectives are included in the second part-B such as questions related to data quality, reports being generated, security aspects, effective decision making, web interfaces, big data management, predictive, descriptive analytics etc.

Structure of Questionnaire:

Mainly the questionnaire includes the questions related to:

- Storing of big data
- Automated System
- Statistical Analysis
- Machine Learning Capabilities
- Data Quality
- Data Velocity
- User satisfaction
- Managerial Decision Making
- Security aspects
- Implementation Aspects

3.5 TOOLS & TECHNIQUES:

Various statistical techniques such as: Principal Component Analysis, Partial Least Square method, Mean Rating, Multiple Regression, Factor analysis, Chi-Square-Test,

ANOVA, Variance & Standard deviation were being used for identification of factors related to technical, structural, and managerial aspects for implementation of big data analytics and business intelligent system.

Software tools such as Excel & SPSS were being used for the data analysis.

SPSS:

SPSS, which stands for Statistical Package for the Social Sciences, is a powerful statistical software package used for data analysis and decision-making in various fields of research. Developed by IBM, SPSS provides advanced statistical analysis, data management, and data documentation features. Below is a detailed description of SPSS and its key features:

- Data Management: Import data from various sources, clean, transform, and handle missing values.
- Statistical Analysis: Calculate descriptive statistics, perform inferential tests, and advanced analytics like predictive modeling.
- Non-Parametric Tests: Support non-parametric tests for specific data distributions.
- Data Visualization: Create diverse charts and interactive graphics for dynamic exploration.
- Output and Reporting: Generate detailed output reports, exportable to various formats.
- Syntax and Automation: Use command syntax for automation and reproducibility, write scripts for integration.
- Data Mining and Machine Learning: Utilize machine learning algorithms for predictive analytics and text analytics for unstructured data.
- Data Security: Implement data encryption and user authentication features for enhanced security.
- Collaboration: Facilitate collaborative data analysis and results sharing among team members.

3.6 RELIABILITY AND VALIDITY:

Reliability, in the context of research, is a critical concept that pertains to the consistency and repeatability of research results. It signifies the degree to which the same results can be consistently produced when the same research methods are applied repeatedly. Put simply, if a study is highly reliable, it means that other researchers should be able to replicate the findings using the same research methodology under similar conditions. High reliability instills confidence in the credibility of research outcomes.

Research validity, on the other hand, addresses the degree to which a study adheres to established scientific study techniques while generating research findings. It essentially assesses whether the study accurately measures what it intends to measure. Validity ensures that the research methods and instruments used are appropriate for the research objectives, and that the findings can be reasonably generalized to the broader population or context of interest.

In this particular research context, internal consistency, often referred to as dependability, is a key aspect of reliability assessment. The Cronbach's alpha approach is a widely adopted method for measuring this internal consistency, especially when dealing with Likert scale items in a questionnaire. Cronbach's alpha offers a numerical measure indicating the extent to which items within a scale are interrelated. A high Cronbach's alpha value signifies a robust level of internal consistency among the items in the questionnaire. This suggests that these items effectively gauge the same underlying construct or concept, emphasizing the reliability of the scale.

Reliability ensures that research results can be consistently reproduced, validity ensures that the research adheres to sound scientific practices, internal consistency, evaluated by methods such as Cronbach's Alpha, assesses how well particular research instrument measures the intended constructs.

Reliability Statistics	
Cronbach's Alpha	No. of Items
0.88	38

The scale under evaluation exhibited a high level of internal consistency, as shown by Cronbach's alpha, which was found to be 0.88.

3.7 SUMMARY:

The purpose of the study was to find the effect of big data analytics & business intelligent system on administrative effectiveness of private & public sector business units in India, identify the role of big data analytics & business intelligent system in making strategic, tactical and operational decisions, identification of factors related to technical, structural and managerial aspects for implementation of big data analytics and business intelligent system, examine how big data analytics & business intelligent system led to better decision-making by managers, determine the impact of business intelligent system on the effectiveness of organizations in Indian perspective. Accordingly, survey method was being adopted in which questions related to above aspects were being asked to the respondents as executives and users of BI and BA technologies. To assess the reliability and validity of the questionnaire, the Cronbach's alpha method was employed. The results indicated a high level of internal consistency among the questionnaire items.

CHAPTER – 4

INTERPRETATION, RESULTS AND DISCUSSION

CHAPTER - 4

INTERPRETATION, RESULTS AND DISCUSSION

4.1 RESPONDENTS DEMOGRAPHIC ASPECTS:

4.1.1. Gender Wise Classification:

Table 4.1: Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	100	50.0	50.0	50.0
	Male	100	50.0	50.0	100.0
	Total	**200**	**100.0**	**100.0**	

About 50% respondents as Big Data Analytics and Business Intelligence Systems users either senior officials, managers or executives were male and 50% respondents as Big Data Analytics and Business Intelligence Systems users either senior officials, managers or executives were female. Which account for 100 respondents each from overall sample size of 200 respondents.

4.1.2 Classification Age Wise:

Table 4.2: Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	21-30 Years	62	31.0	31.0	31.0
	31- 40 Years	102	51.0	51.0	82.0
	41 – 50 Years	36	18.0	18.0	100.0
	Total	**200**	**100.0**	**100.0**	

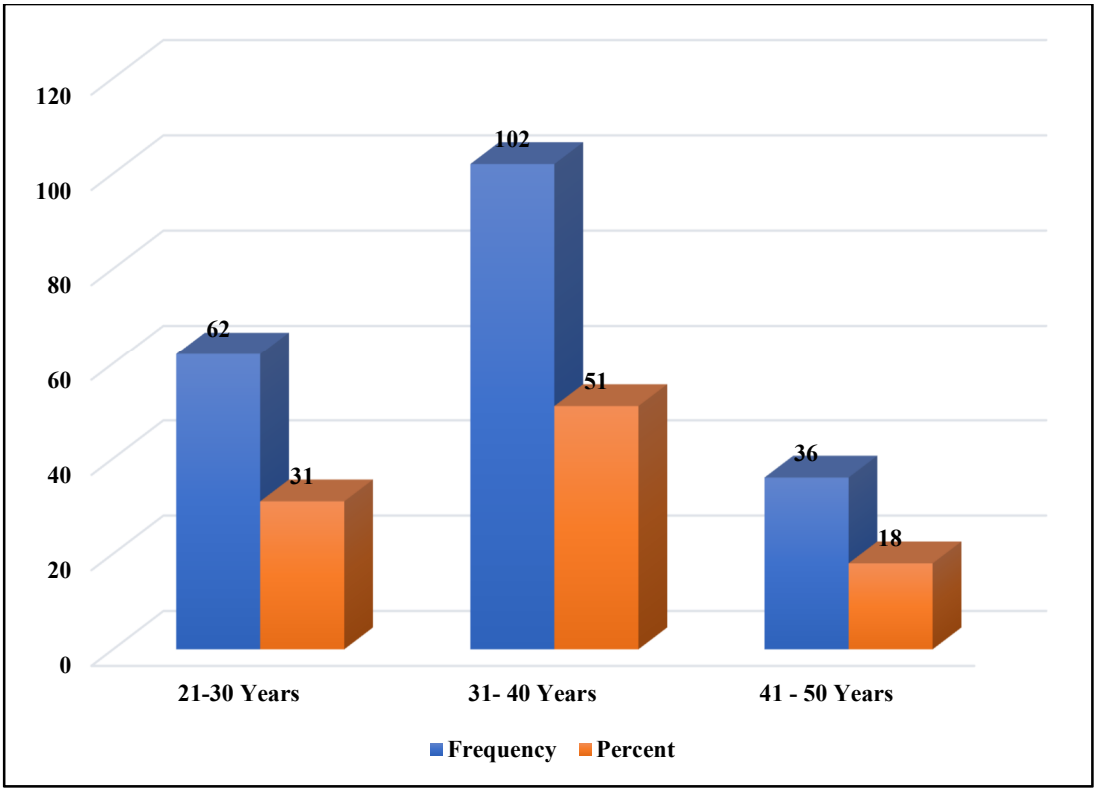

Figure 4.1: Age

Majority of respondents about 51% were between the age group 31- 40 years of age, about 31% respondents were between the age group between 21-30 years and 18% were from the age group between 41-50 years.

4.1.3 Year of Experience:

Table 4.3: Year of Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1 - 3 years	86	43.0	43.0	43.0
	4 - 6 years	40	20.0	20.0	63.0
	Less than a year	34	17.0	17.0	80.0
	More than six years	40	20.0	20.0	100.0
	Total	**200**	**100.0**	**100.0**	

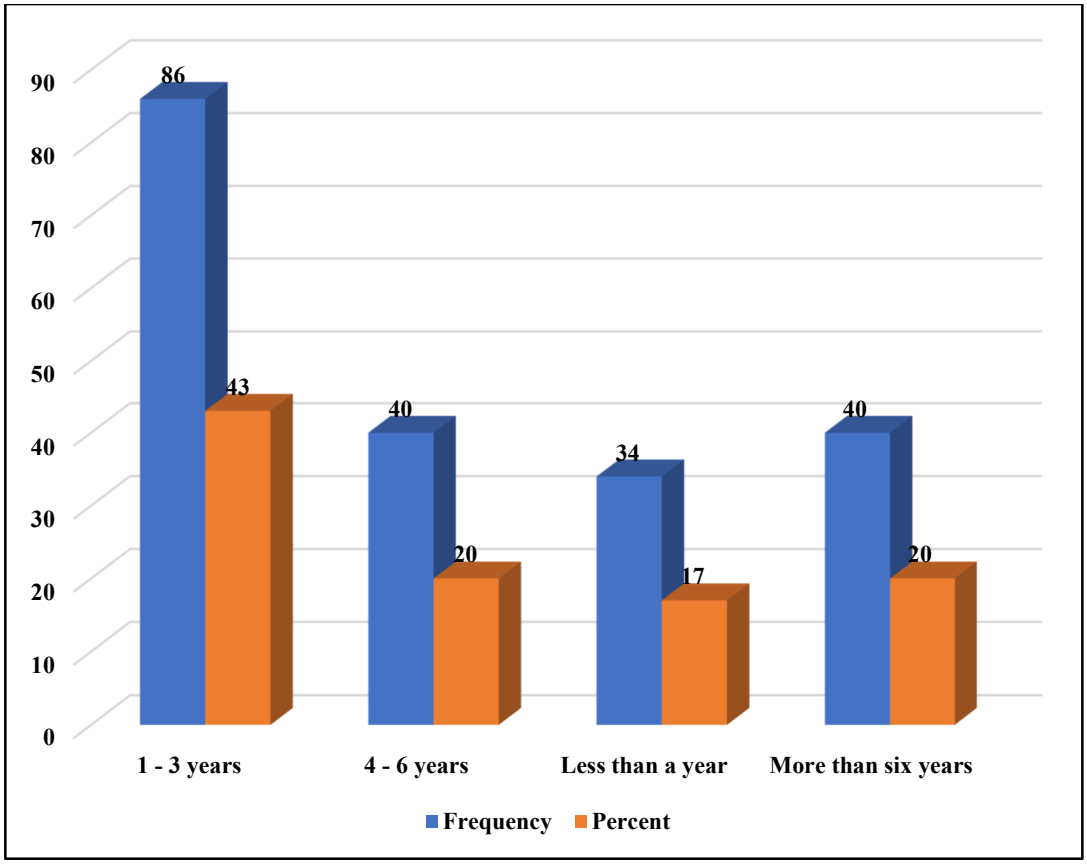

Figure 4.2: Year of Experience

Majority of respondents about 43% were having total experience between 1-3 years which accounts for about 86 respondents whereas about 20% respondents were having experience between 4 – 6 years, about 17% were having experience less than one year also about 20% users of BDA & BIS were having more than 6 years of experience.

4.1.4 Education Qualification:

Table 4.4: Educational Qualification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Doctorate	22	11.0	11.0	11.0
	Graduate	155	77.5	77.5	88.5
	PG	23	11.5	11.5	100.0
	Total	**200**	**100.0**	**100.0**	

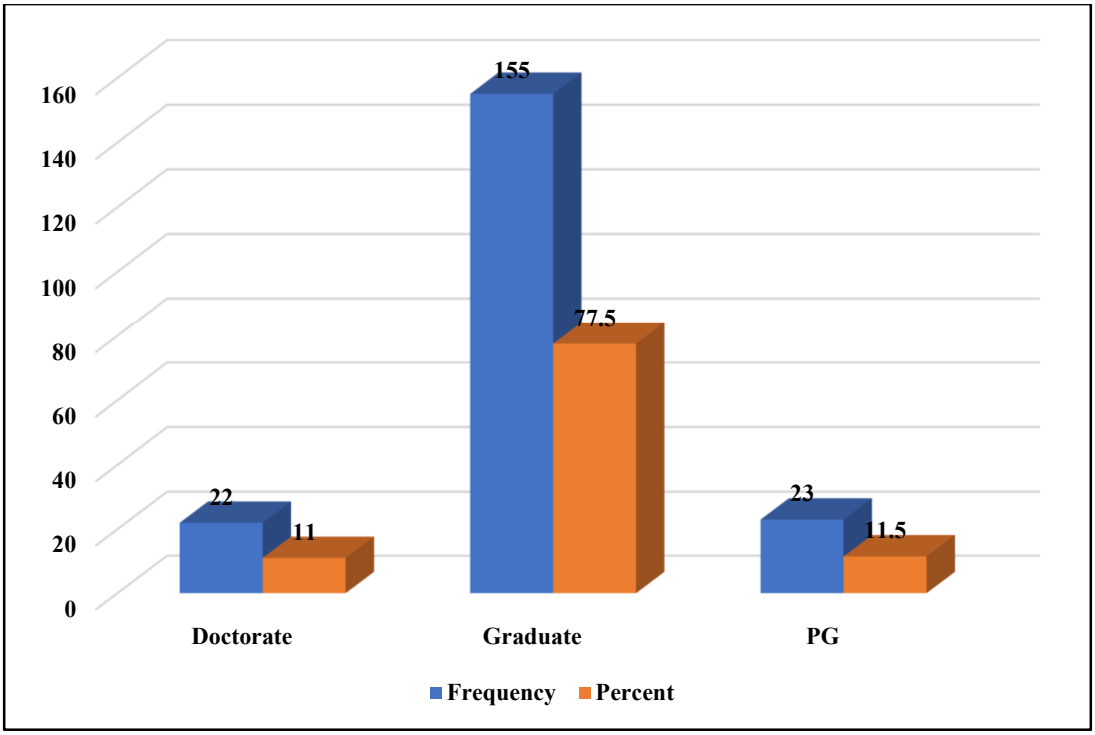

Figure 4.3: Educational Qualification

About 77.5% users as respondents were having the educational qualification as graduate, 11% were having doctorate degree whereas about 11.5% were having post-graduation qualification.

Table 4.5: Type of Organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Private	100	50.0	50.0	50.0
	Public	100	50.0	50.0	100.0
	Total	**200**	**100.0**	**100.0**	

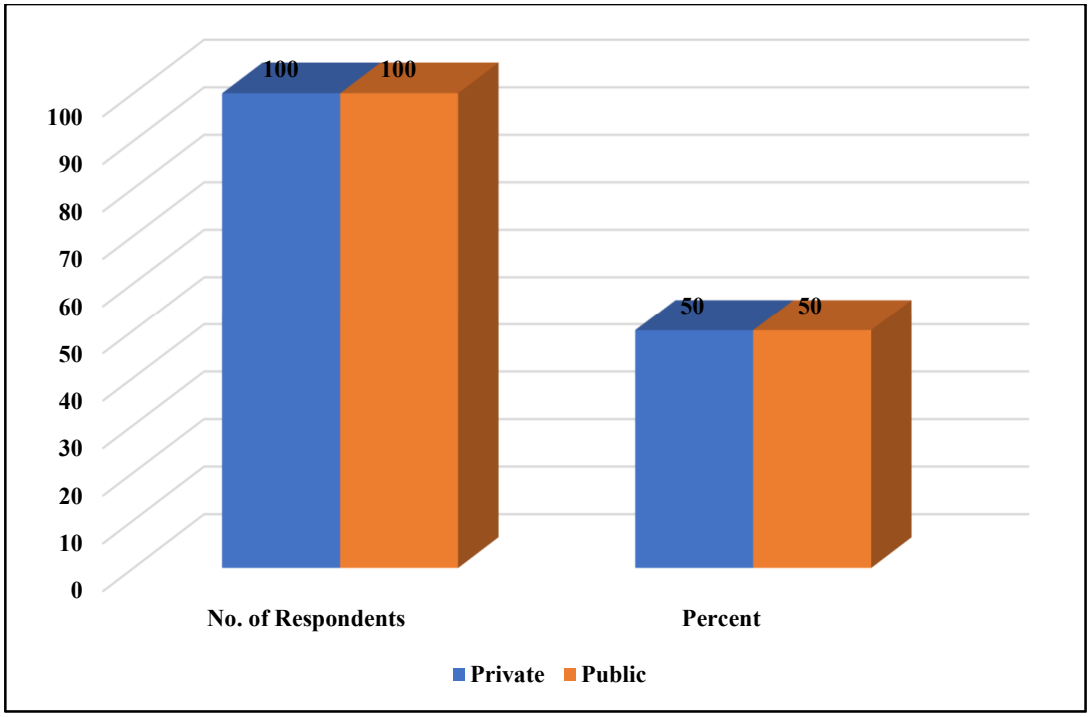

Figure 4.4: Type of Organization

Based on type of organization the respondents can be categorized into private and public organizations employees. About 50% respondents were from public organizations and 50% were from private organizations.

4.1.5 Department Wise:

Table 4.6: Department

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Finance	14	7	7	7
	HR[1]	5	2.5	2.5	9.5
	Marketing	101	50.5	50.5	60
	IT	50	25	25	85
	Production	30	15	15	100
	Total	**200**	**100.0**	**100.0**	

[1]Human Resource

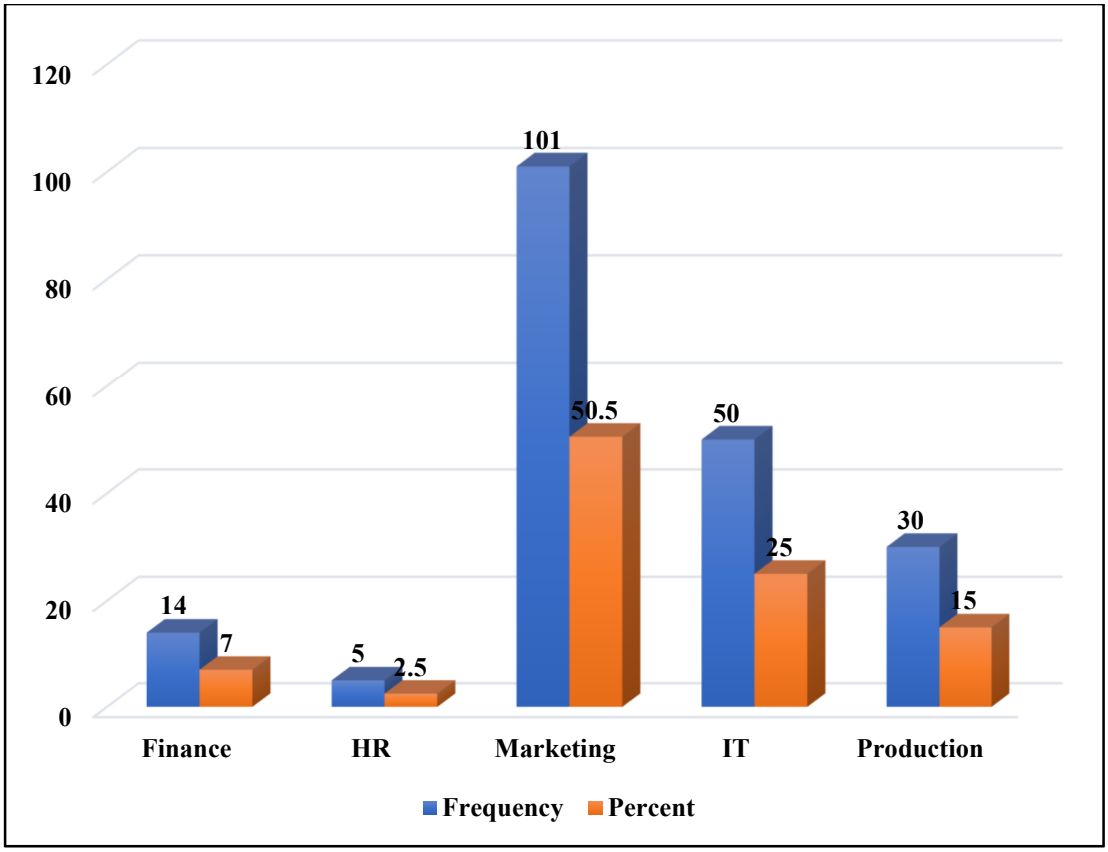

Figure 4.5: Department Wise Classification

About 50.5% respondents were from the marketing department, 25% were from IT, about 15% respondents were from the production department whereas only 7% and 2.5% were form the finance and HR department.

4.1.6 Region Wise Classification:

Table 4.7: Region

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Rural	100	50.0	50.0	50.0
	Urban	100	50.0	50.0	100.0
	Total	**200**	**100.0**	**100.0**	

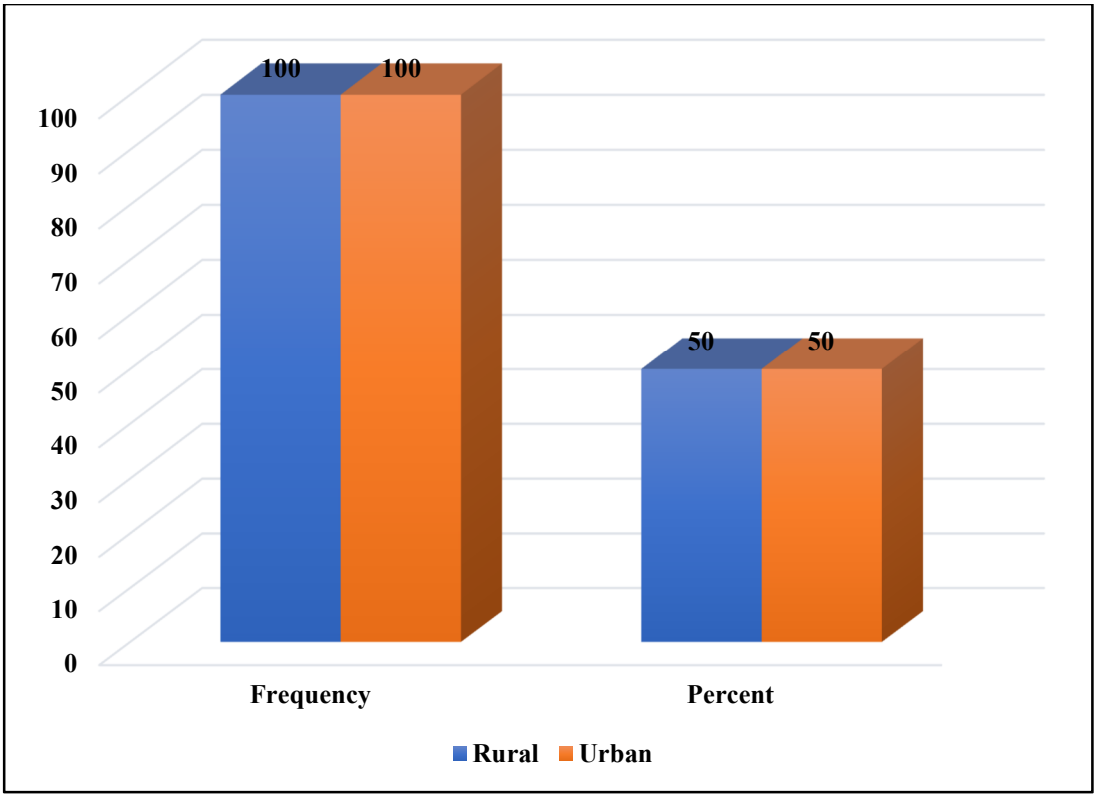

Figure 4.6: Region Wise Classification

The study considered two regions rural and urban, about 50% were from the rural region and 50% were from urban area.

4.1.7 Position Wise Respondents:

Table 4.8: Position in organization

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BI Executive	98	49.0	49.0	49.0
	Top officials	102	51.0	51.0	100.0
	Total	**200**	**100.0**	**100.0**	

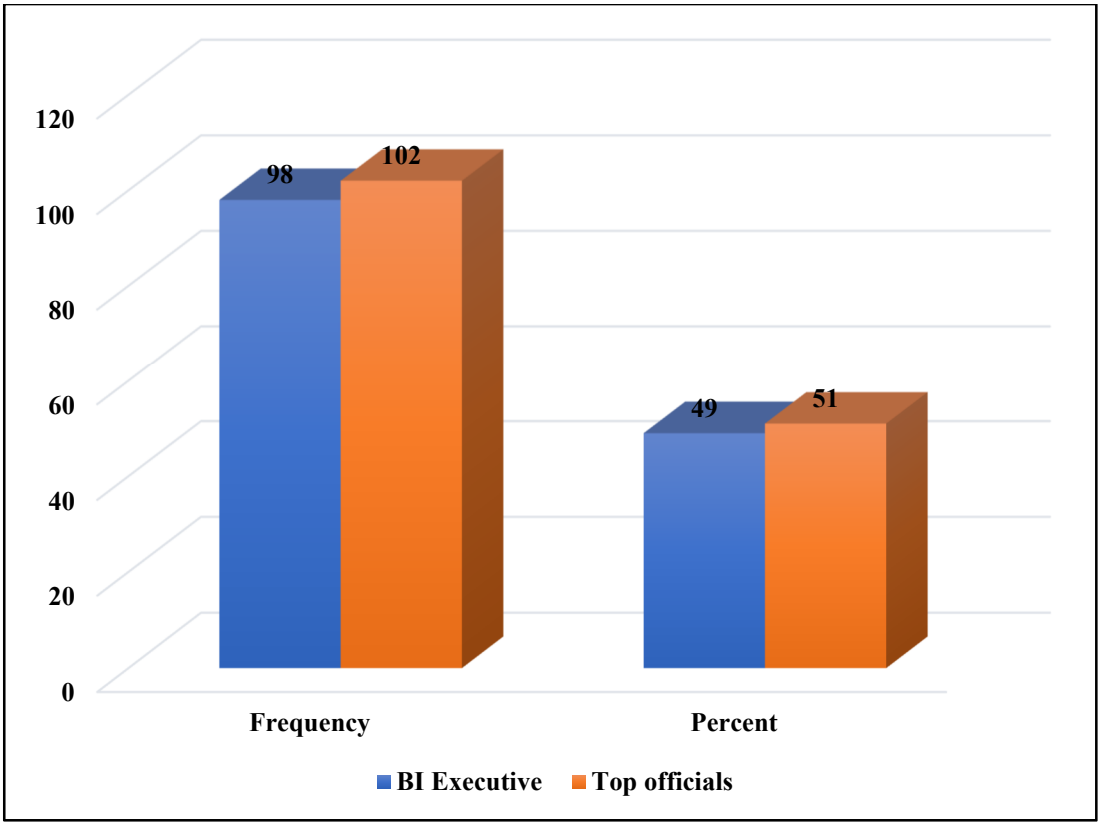

Figure 4.7: Position in Organization

Classification based on position it was found that about 49% respondents were BI executives and 51% respondents were from top official positions.

4.2 ANALYSIS OF BIG DATA ANALYTICS & BIS TOOLS & TECHNIQUES:

4.2.1 Spreadsheet Use:

Table 4.9: Spreadsheet Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low Usage	13	6.5	6.5	6.5
	Low Usage	18	9.0	9.0	15.5
	Medium Usage	13	6.5	6.5	22.0
	High Usage	45	22.5	22.5	44.5
	Very High Usage	111	55.5	55.5	100.0
	Total	**200**	**100.0**	**100.0**	

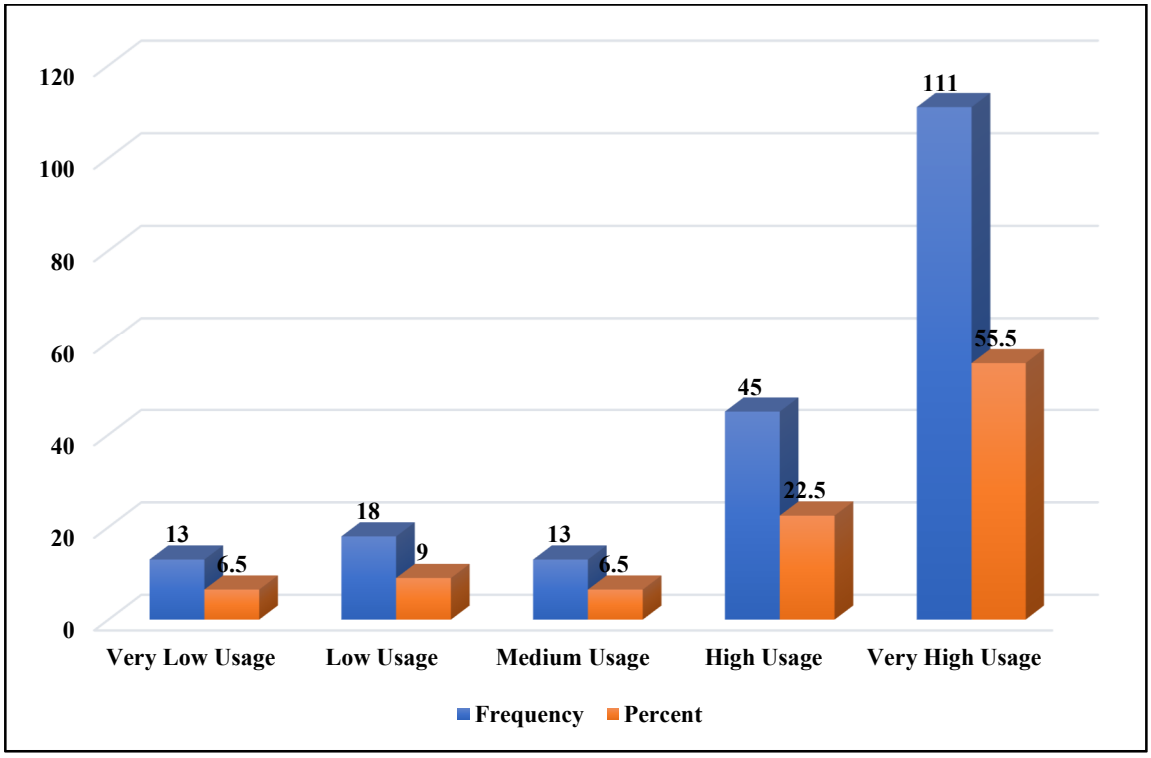

Figure 4.8: Spreadsheet Use

Big Data Analytics & BIS users as respondents confirmed that about 6.5% use spreadsheets very less while handling the data, about 9% respondents have confirmed less usage of spreadsheets whereas about 55.5% confirmed very high usage, 22.5% confirmed high usage of spreadsheets for big data handling also 6.5% confirmed medium usage.

4.2.2 BI Planning/Reporting Suites:

Table 4.10: BI Planning/Reporting Suites

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low Usage	32	16.0	16.0	16.0
	Low Usage	11	5.5	5.5	21.5
	Medium Usage	28	14.0	14.0	35.5
	High Usage	72	36.0	36.0	71.5
	Very High Usage	57	28.5	28.5	100.0
	Total	**200**	**100.0**	**100.0**	

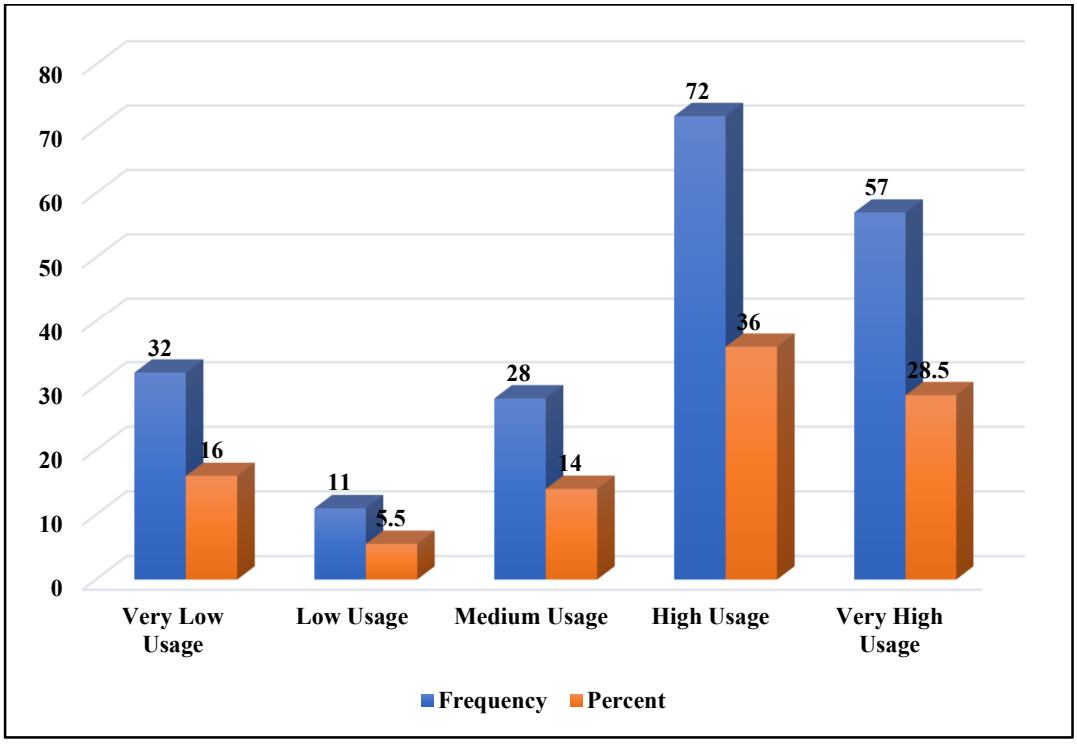

Figure 4.9: BI Planning/Reporting Suites

Majority of respondents about 36% were with the opinion that there is high use of BI planning / reporting suites in the companies of India in order to handle the big data and apply analytics for business solutions, also about 28.5% were in favour of the opinion whereas 16% were consider very low usage of BI planning/reporting suites.

4.2.3 Data ETL/Management Solutions:

Table 4.11: Data ETL/Management Solutions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low Usage	2	1.0	1.0	1.0
	Low Usage	20	10.0	10.0	11.0
	Medium Usage	27	13.5	13.5	24.5
	High Usage	133	66.5	66.5	91.0
	Very High Usage	18	9.0	9.0	100.0
	Total	**200**	**100.0**	**100.0**	

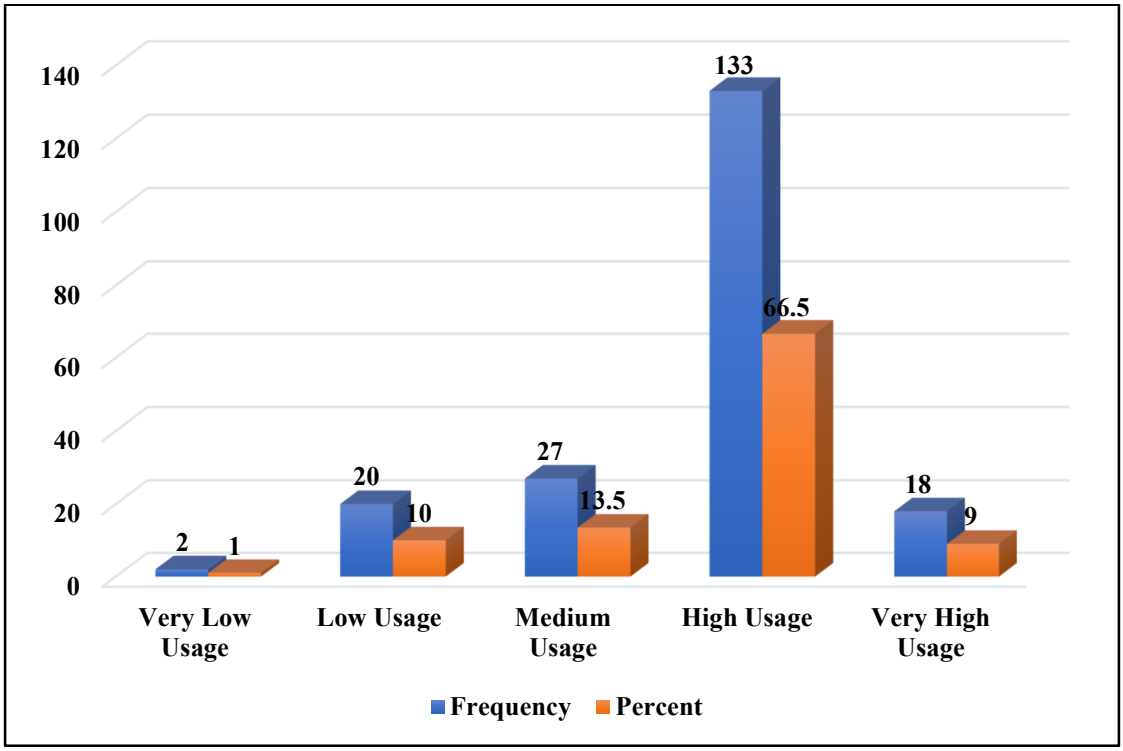

Figure 4.10: Data ETL/Management Solutions

The data represents the frequency distribution of usage levels for Data ETL/Management Solutions among a sample of 200 respondents. The majority of respondents fall into the "High Usage" category, accounting for 66.5% of the sample, indicating that a significant portion of users extensively utilize these solutions. "Medium Usage" is the next most common category, with 13.5% of respondents falling into this group. In contrast, only a small proportion of respondents reported "Very Low Usage" (1%) and "Low Usage" (10%), suggesting that a relatively small number of users rarely utilize these solutions. Lastly, "Very High Usage" represents 9% of the sample, signifying a noteworthy but smaller proportion of users who make extensive use of these solutions. Overall, these findings highlight a wide range of usage levels for Data ETL/Management Solutions, with a substantial portion of the sample heavily relying on them.

4.2.4 Data Visualization Tools:

Table 4.12: Data Visualization Tools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low Usage	20	10.0	10.0	10.0
	Low Usage	16	8.0	8.0	18.0
	Medium Usage	64	32.0	32.0	50.0
	High Usage	56	28.0	28.0	78.0
	Very High Usage	44	22.0	22.0	100.0
	Total	**200**	**100.0**	**100.0**	

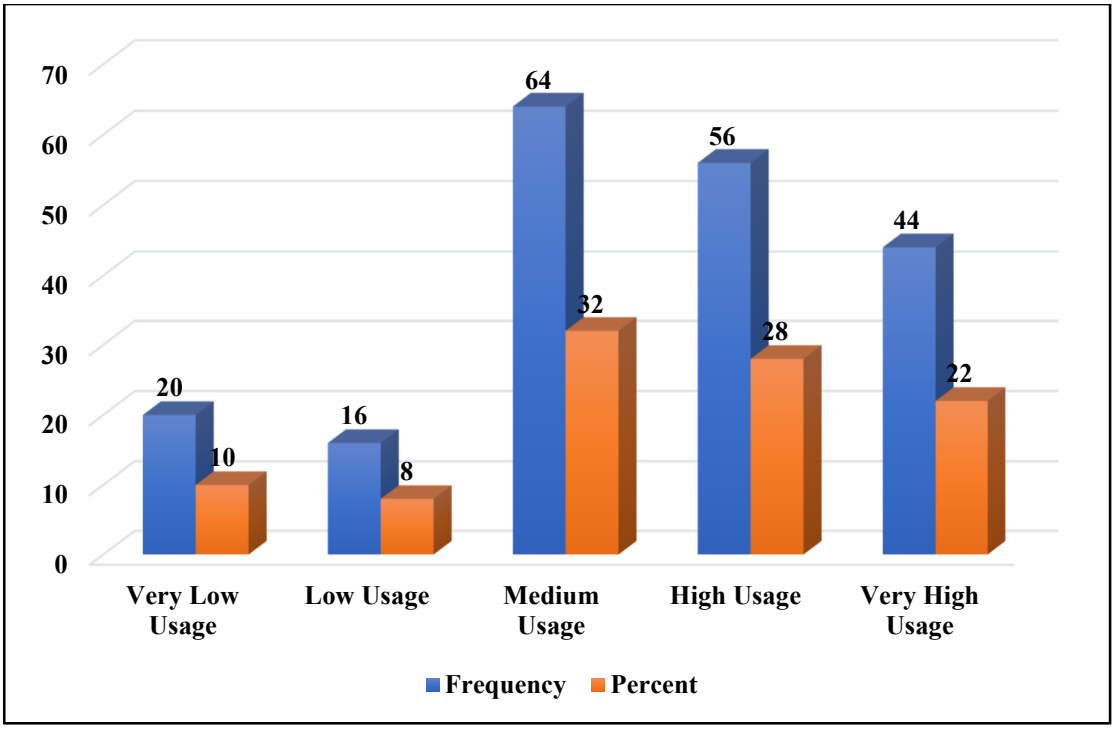

Figure 4.11: Data Visualization Tools

About 22% respondents confirmed that business analytics and business intelligence systems are very highly used in data visualization tasks in the organization both public and private, also about 28% confirmed that these systems have high usage whereas 18% in total were against the above-mentioned view point.

4.2.5 Data Mining Suits:

Table 4.13: Data Mining Suits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low Usage	24	12.0	12.0	12.0
	Low Usage	107	53.5	53.5	65.5
	Medium Usage	37	18.5	18.5	84.0
	High Usage	16	8.0	8.0	92.0
	Very High Usage	16	8.0	8.0	100.0
	Total	**200**	**100.0**	**100.0**	

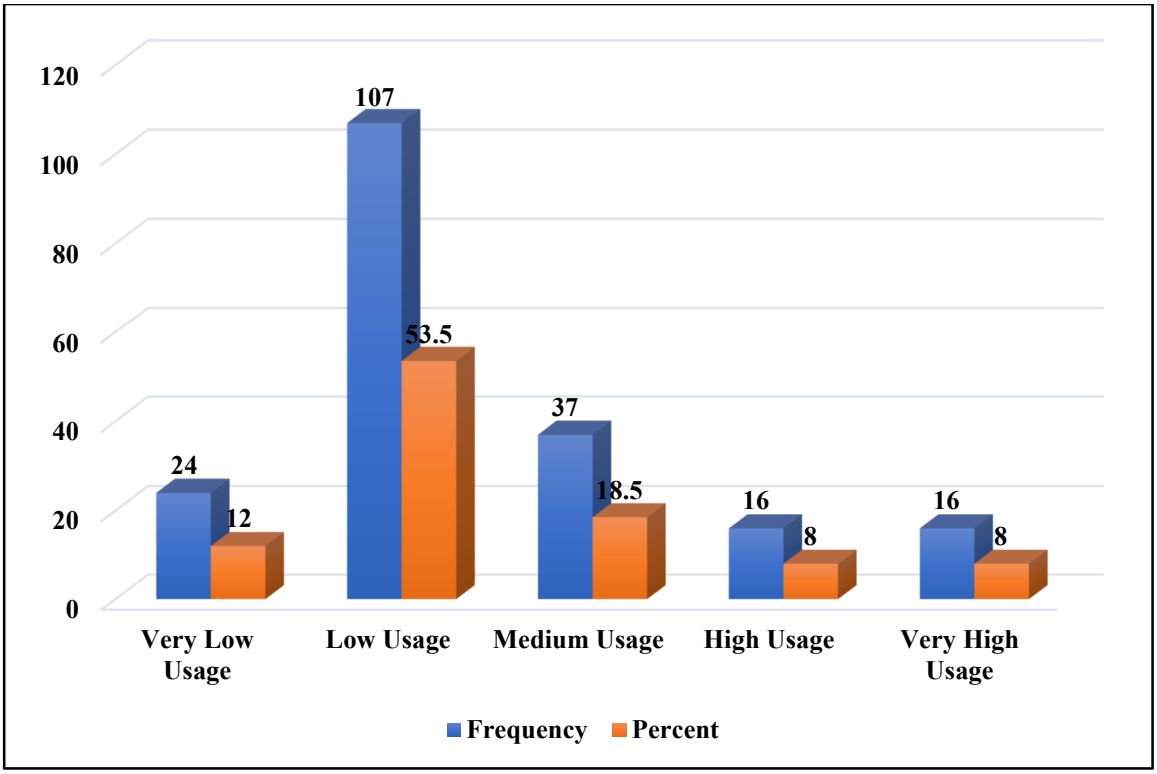

Figure 4.12: Data Mining Suits

Big Data Analytics & BIS users as respondents confirmed that about 12% use data mining suits very less while doing the tasks related to classification and clustering, about 53.5% respondents have confirmed less usage of data mining suits whereas about 8% confirmed very high usage, 8% confirmed high usage of data mining suits and about 18.5% confirmed medium usage.

4.2.6 Advance Statistical Suits:

Table 4.14: Advance Statistical Suits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low	21	10.5	10.5	10.5
	Low	94	47.0	47.0	57.5
	Medium	56	28.0	28.0	85.5
	High	20	10.0	10.0	95.5
	Very High	9	4.5	4.5	100.0
	Total	**200**	**100.0**	**100.0**	

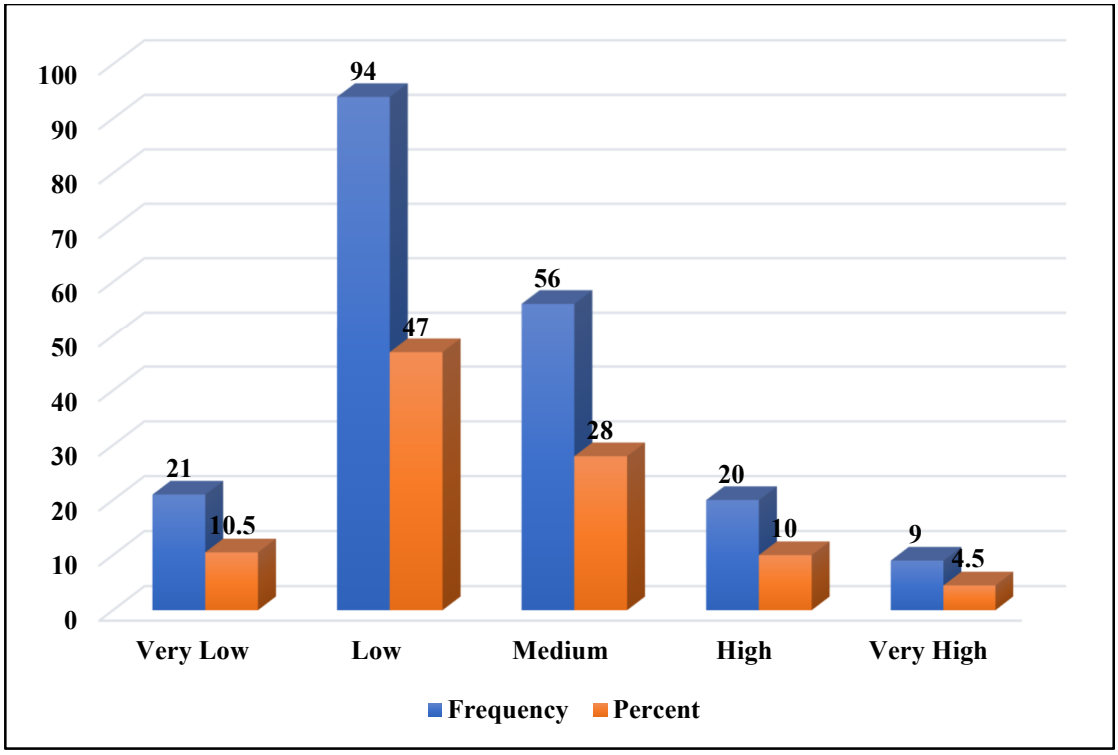

Figure 4.13: Advance Statistical Suits

Among 200 respondents, 47% use advanced statistical software to some extent ("Low" usage), with 28% falling into the "Medium" usage category. Smaller proportions of respondents are distributed across "Very Low," "High," and "Very High" usage levels, indicating varying levels of engagement with these advanced statistical tools.

4.2.7 BD[2]/High Performance Computing Tools:

Table 4.15: BD/High Performance Computing Tools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low	21	10.5	10.5	10.5
	Low	98	49.0	49.0	59.5
	Medium	45	22.5	22.5	82.0
	High	32	16.0	16.0	98.0
	Very High	4	2.0	2.0	100.0
	Total	**200**	**100.0**	**100.0**	

[2]Big Data

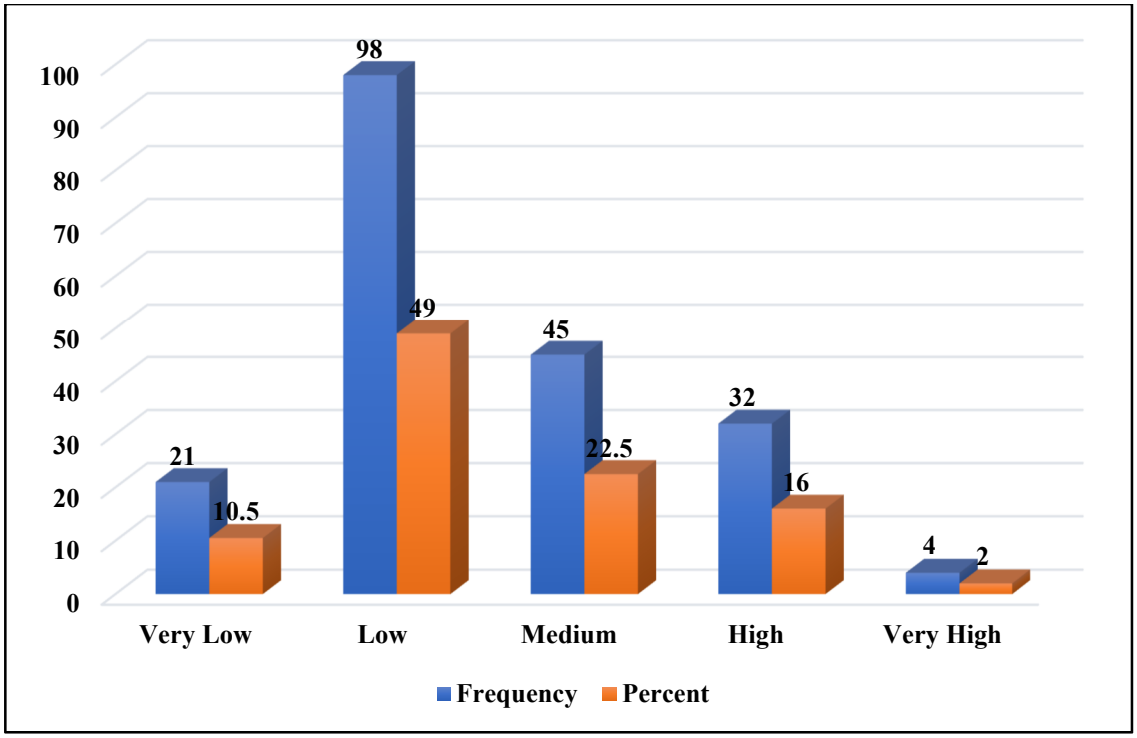

Figure 4.14: BD/High Performance Computing Tools

Only 2% respondents confirmed that business analytics and business intelligence systems are very highly used in BD/High Performance Computing also about 16% confirmed that these systems have high usage in BD/High Performance Computing whereas approx. 59.5% in total were against the above-mentioned view point.

4.2.8 AI Enabled BI Tools:

Table 4.16: AI Enabled BI Tools

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low	39	19.5	19.5	19.5
	Low	69	34.5	34.5	54.0
	Medium	46	23.0	23.0	77.0
	High	38	19.0	19.0	96.0
	Very High	8	4.0	4.0	100.0
	Total	**200**	**100.0**	**100.0**	

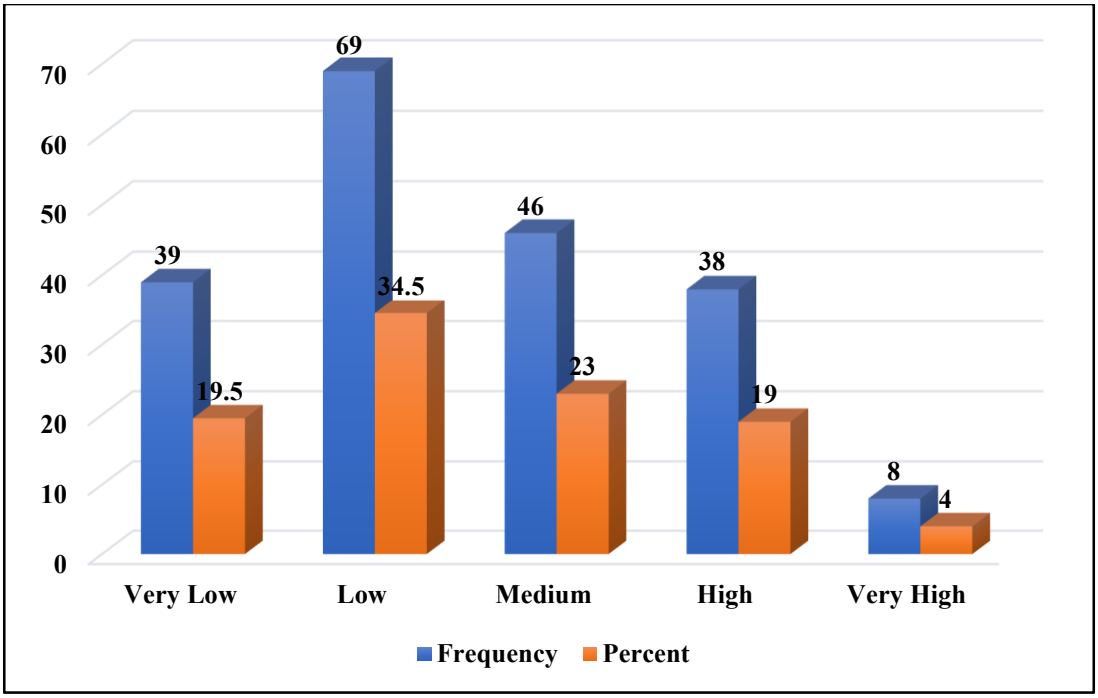

Figure 4.15: AI Enabled BI Tools

About 23% respondents in all were with the opinion that AI enabled BI tools are basically used by the companies for predictive modelling whereas about 54% were against the opinion and about 23% were not sure about it.

4.2.9: Automated System in Organization for Data Gathering:

Table 4.17: Automated system in Organization for data Gathering

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Low	57	28.5	28.5	28.5
	Low	31	15.5	15.5	44.0
	Medium	97	48.5	48.5	92.5
	High	15	7.5	7.5	100.0
	Total	**200**	**100.0**	**100.0**	

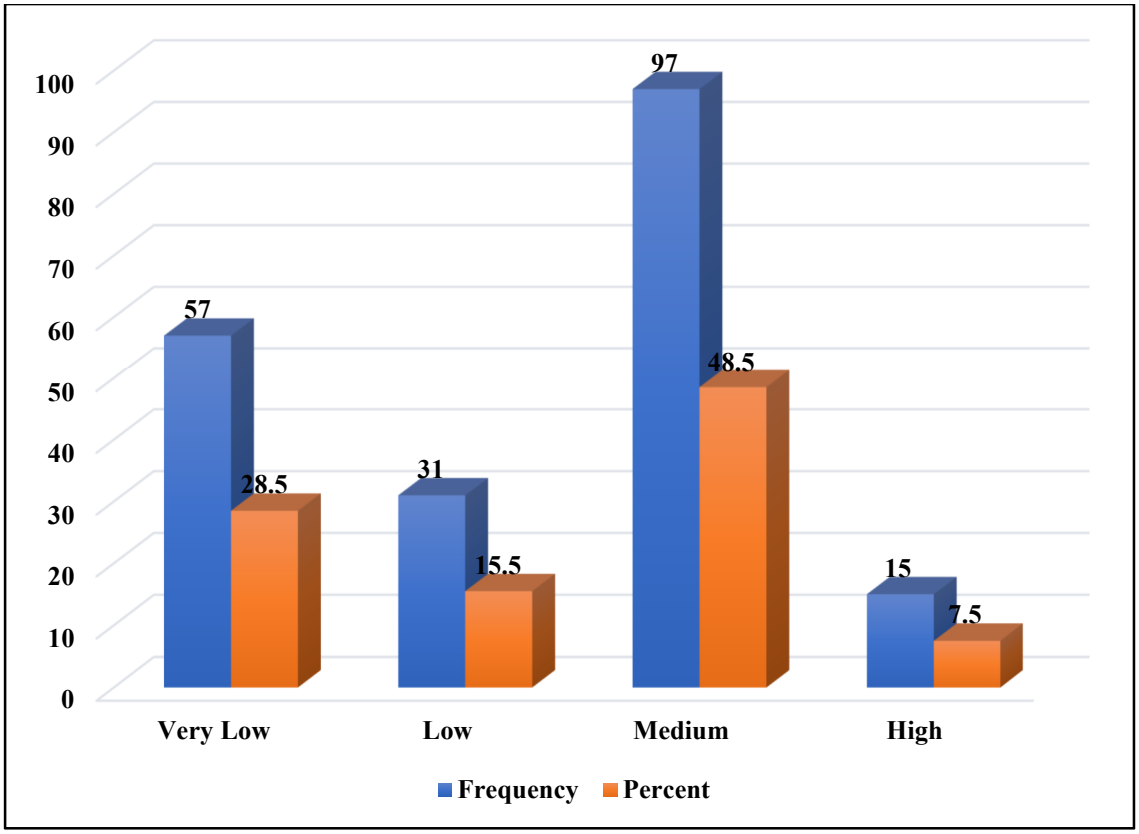

Figure 4.16: Automated system in Organization for data Gathering

Only 7.5% respondents in all were with the opinion that automated system in organization are being used for data gathering by the organizations whereas about 44% were against the opinion and majority about 48.5% were not sure about it.

4.3: BA & BIS USE:

Table 4.18: BA & BI for strategic reporting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	0	0.0	0.0	0.0
	Disagree	40	20.0	20.0	20.0
	Not Sure	58	29.0	29.0	49.0
	Agree	70	35.0	35.0	84.0
	Strongly Agree	32	16.0	16.0	100.0
	Total	**200**	**100.0**	**100.0**	

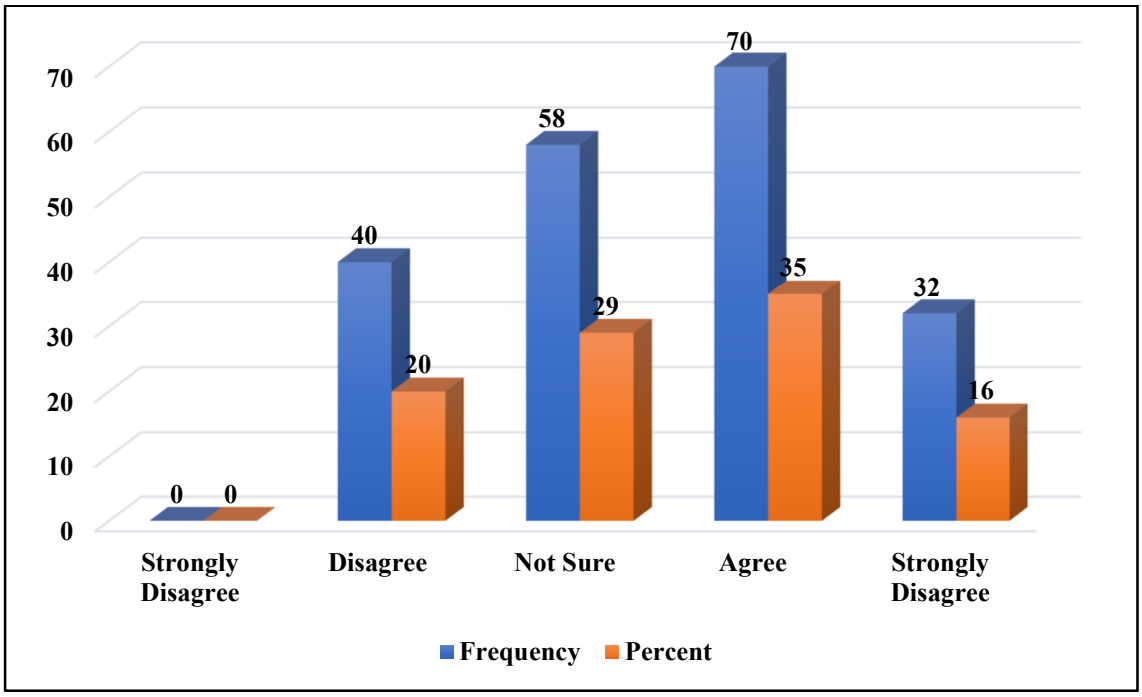

Figure 4.17: BA & BI for Strategic Reporting

Among the respondents, 20% "Disagree" with using these tools, while 29% are "Not Sure." On the positive side, 35% "Agree" and 16% "Strongly Agree" with using BA and BI for strategic reporting. This suggests that a significant portion of respondents are open to or supportive of using these tools for strategic reporting, with a combined 51% showing agreement, but there is also a notable contingent (29%) that remains uncertain about their utility, and a minority (20%) that disagrees with their use.

Table 4.19: Tactical reporting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	24	12.0	12.0	12.0
	Disagree	83	41.5	41.5	53.5
	Not Sure	41	20.5	20.5	74.0
	Agree	21	10.5	10.5	84.5
	Strongly Agree	31	15.5	15.5	100.0
	Total	**200**	**100.0**	**100.0**	

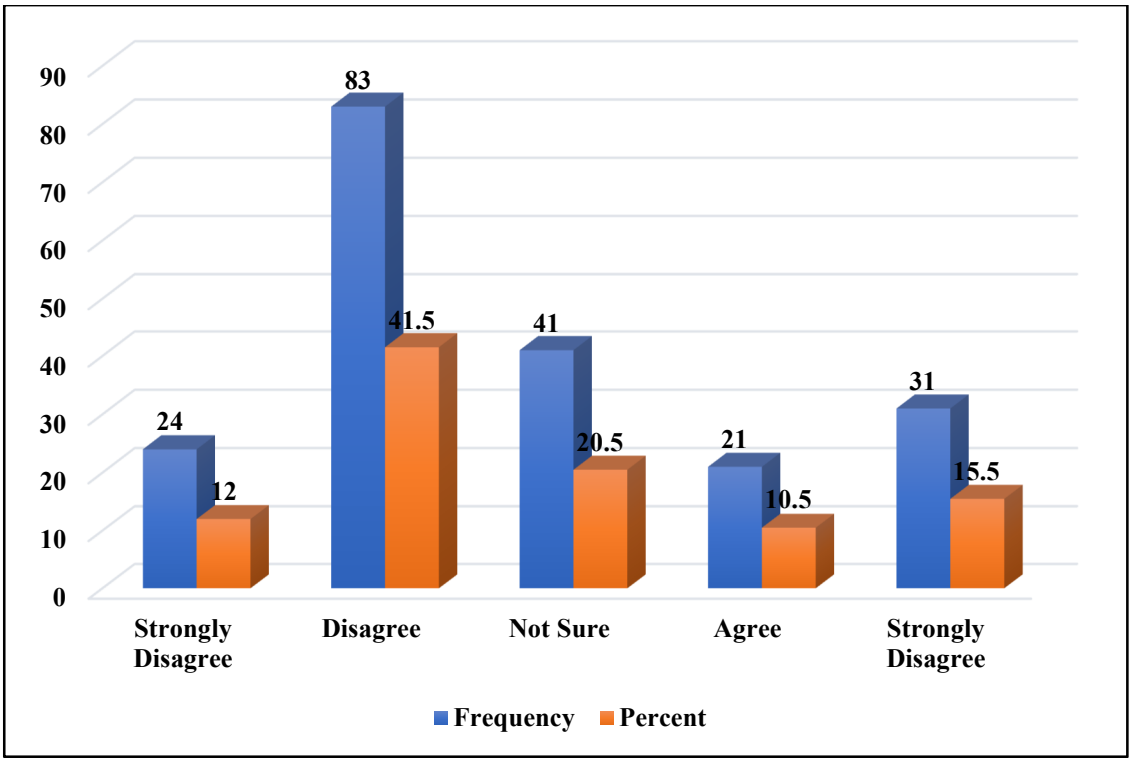

Figure 4.18: Tactical Reporting

About 15.5% respondents were strongly in favour of the statement that BA and BIS are used for tactical reporting also 10.5% agreed that business analytics and intelligent systems are being used for tactical reporting whereas in all about 53.5% were against of the above-mentioned view point.

Table 4.20: Operational reporting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	8	4.0	4.0	4.0
	Disagree	105	52.5	52.5	56.5
	Not Sure	42	21.0	21.0	77.5
	Agree	27	13.5	13.5	91.0
	Strongly Agree	18	9.0	9.0	100.0
	Total	**200**	**100.0**	**100.0**	

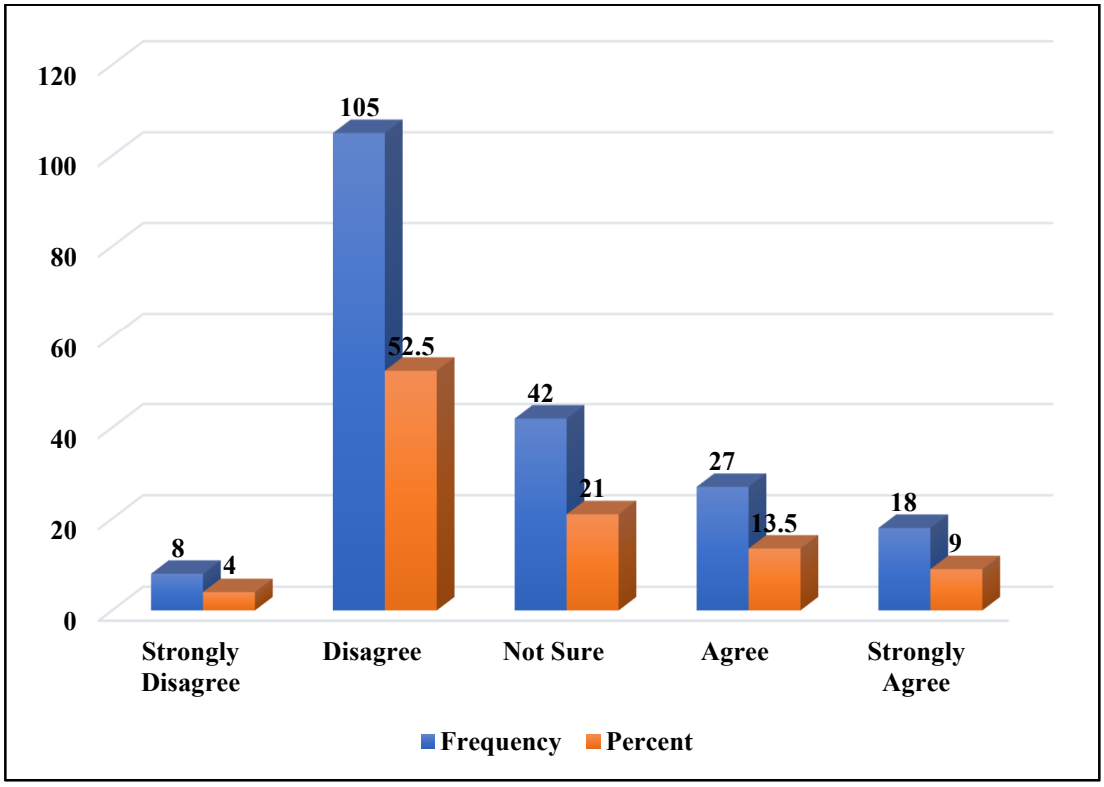

Figure 4.19: Operational Reporting

Nearly about 9% of the respondents were strongly in favour of the statement that BA and BIS are used for operational reporting also 13.5% agreed that business analytics and intelligent systems are being used for operational reporting whereas in all about 56.5% were against of the above-mentioned view point.

Table 4.21: BA-BIS helpful to derive insightful conclusion from data

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	0	0.0	0.0	0.0
	Disagree	67	33.5	33.5	33.5
	Not Sure	112	56.0	56.0	89.5
	Agree	12	6.0	6.0	95.5
	Strongly Agree	9	4.5	4.5	100.0
	Total	**200**	**100.0**	**100.0**	

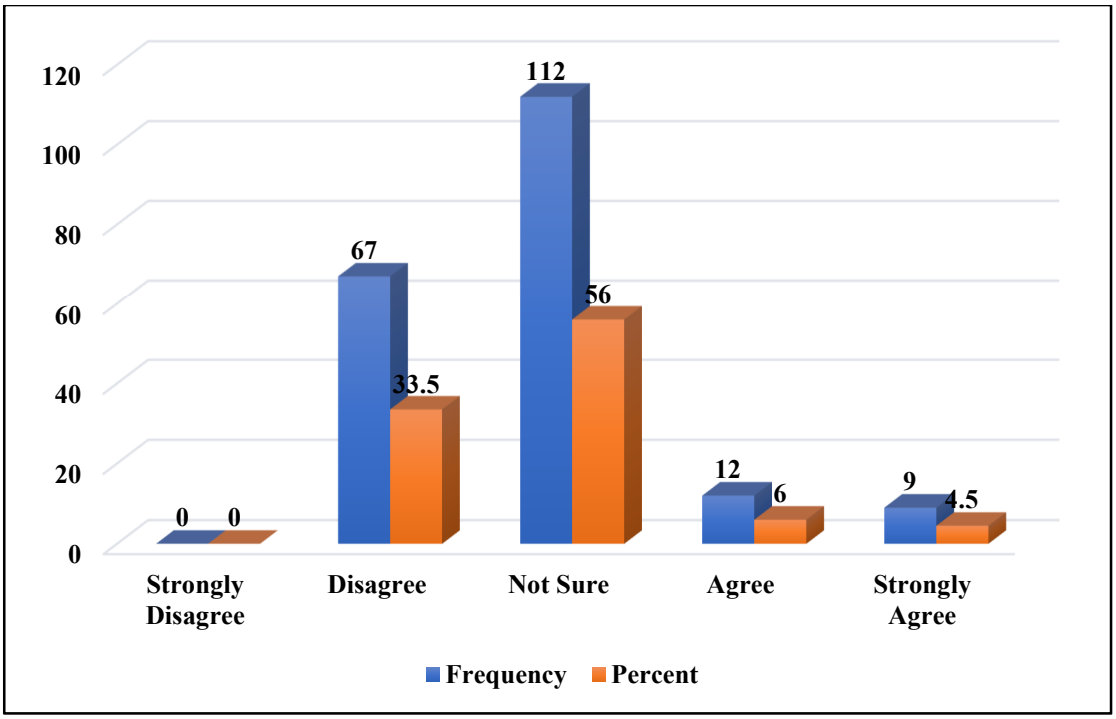

Figure 4.20: BA-BIS Helpful to Derive Insightful Conclusion from Data

Only 4.5 % respondents were strongly in favour of the statement that BA-BIS helpful to derive insightful conclusion from data also 6% agreed that business analytics and intelligent systems are being used to derive insightful conclusion from data whereas in all about 33% were against of the above-mentioned view point and majority of respondents about 56% were not sure about it.

Table 4.22: BA-BIS helpful to provide comparison in current and past data

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	15	7.5	7.5	7.5
	Not Sure	61	30.5	30.5	38.0
	Agree	88	44.0	44.0	82.0
	Strongly Agree	36	18.0	18.0	100.0
	Total	**200**	**100.0**	**100.0**	

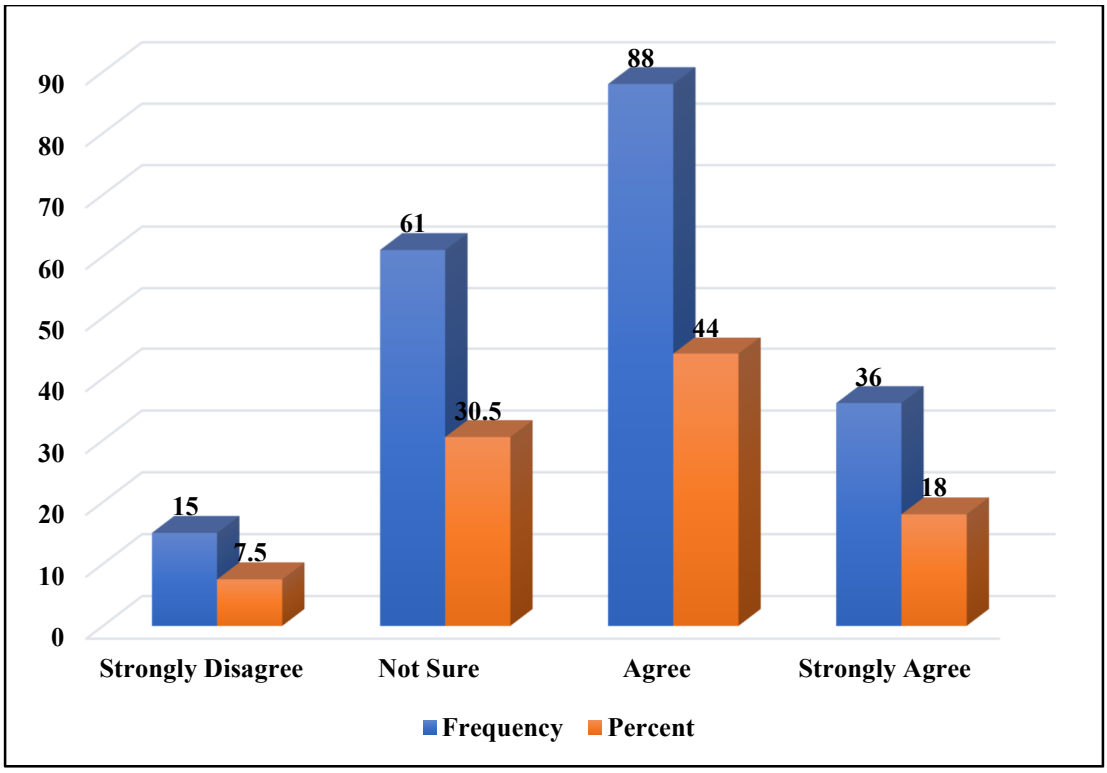

Figure 4.21: BA-BIS Helpful to Provide Comparison in Current and Past Data

Nearly about 18% of the respondents were strongly in favour of the statement that BA-BIS helpful to provide comparison in current and past data also 44% agreed that BA-BIS helpful to provide comparison in current and past data whereas in all about 7.5% were against of the above-mentioned view point.

Table 4.23: BIS helpful for statistical analysis

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	16	8.0	8.0	8.0
	Not Sure	49	24.5	24.5	32.5
	Agree	52	26.0	26.0	58.5
	Strongly Agree	83	41.5	41.5	100.0
	Total	**200**	**100.0**	**100.0**	

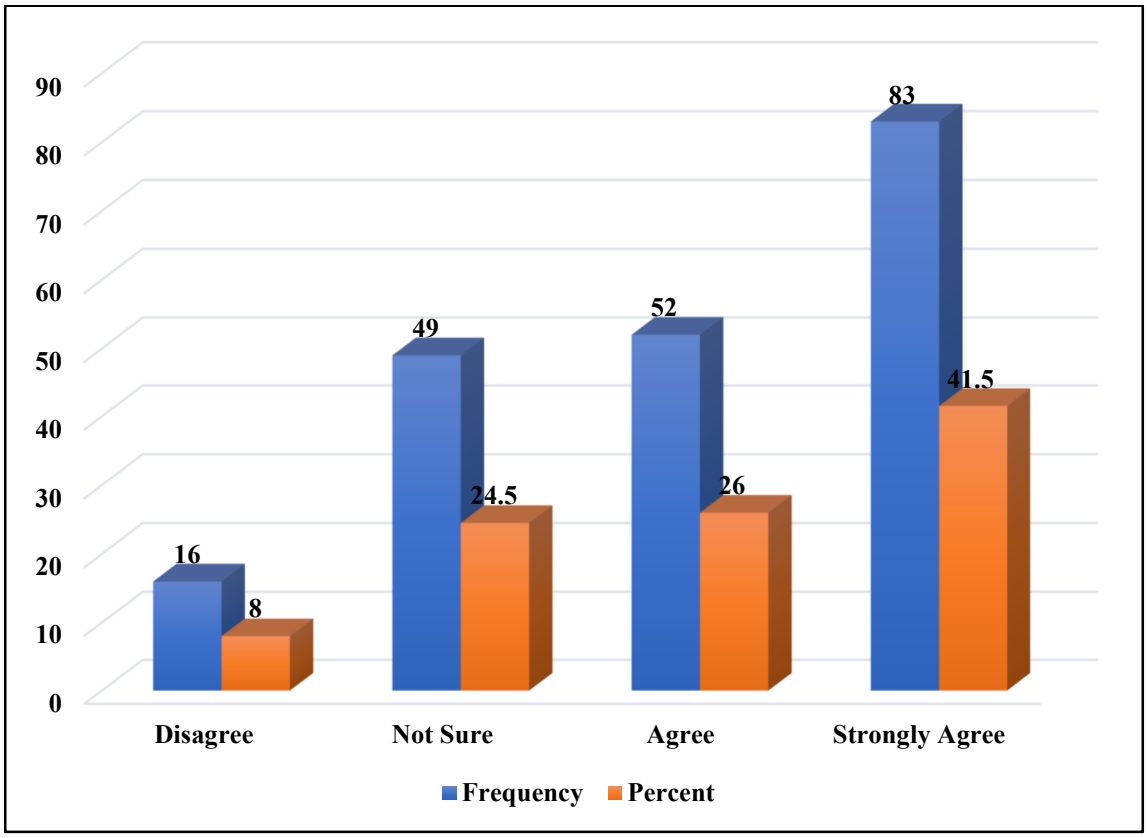

Figure 4.22: BIS Helpful for Statistical Analysis

About 41.5% of the respondents were strongly in favour of the statement that BIS helpful for statistical analysis, 26% agreed that BA-BIS used for doing statistical analysis data whereas in all about 8% were against of the above-mentioned view point.

Table 4.24: Effective data storage system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	5	2.5	2.5	2.5
	Disagree	57	28.5	28.5	31.0
	Not Sure	32	16.0	16.0	47.0
	Agree	81	40.5	40.5	87.5
	Strongly Agree	25	12.5	12.5	100.0
	Total	**200**	**100.0**	**100.0**	

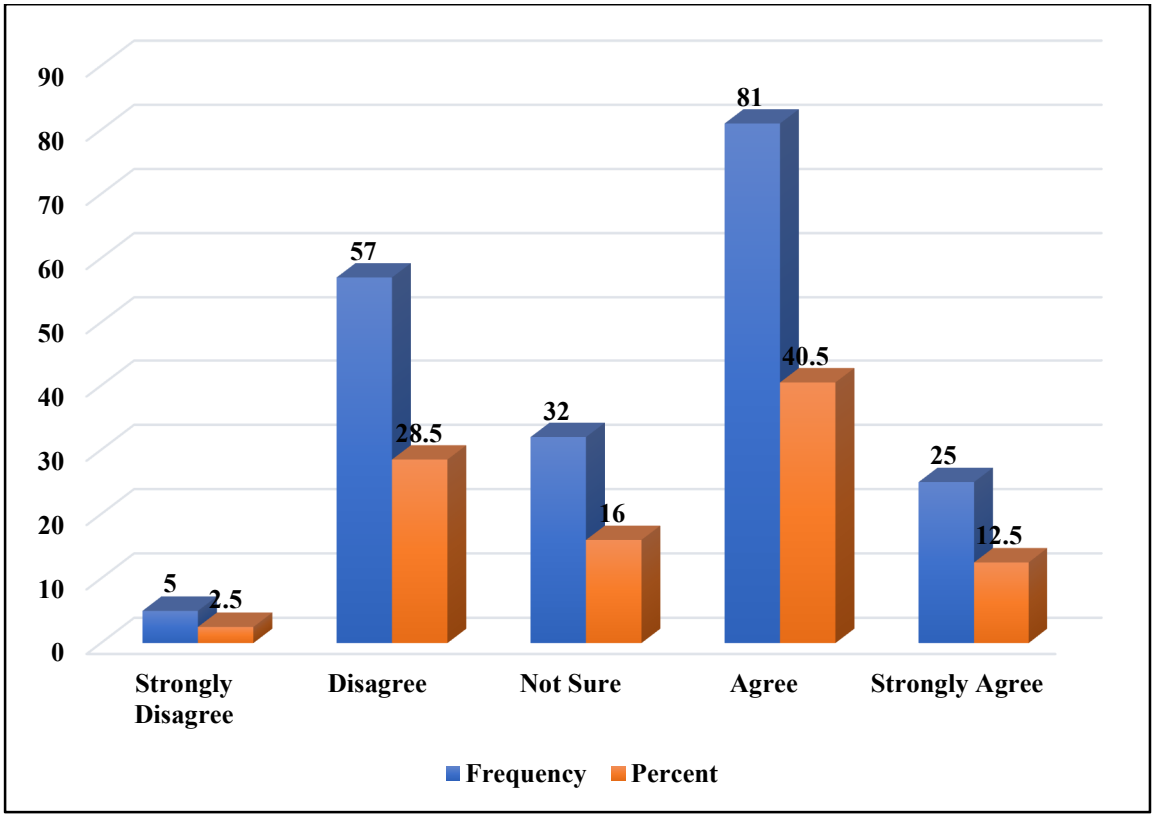

Figure 4.23: Effective Data Storage System

Approximately about 12.5% respondents strongly agreed that BA-BIS are used for effective data storage, 40.5% were also in agreement, around 16% respondents as BA-BIS users were not sure about it whereas about 28.5% disagreed with the statement and 2.5% were strongly against the view point.

Table 4.25: Effective data transformation process

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	13	6.5	6.5	6.5
	Disagree	21	10.5	10.5	17.0
	Not Sure	42	21.0	21.0	38.0
	Agree	52	26.0	26.0	64.0
	Strongly Agree	72	36.0	36.0	100.0
	Total	**200**	**100.0**	**100.0**	

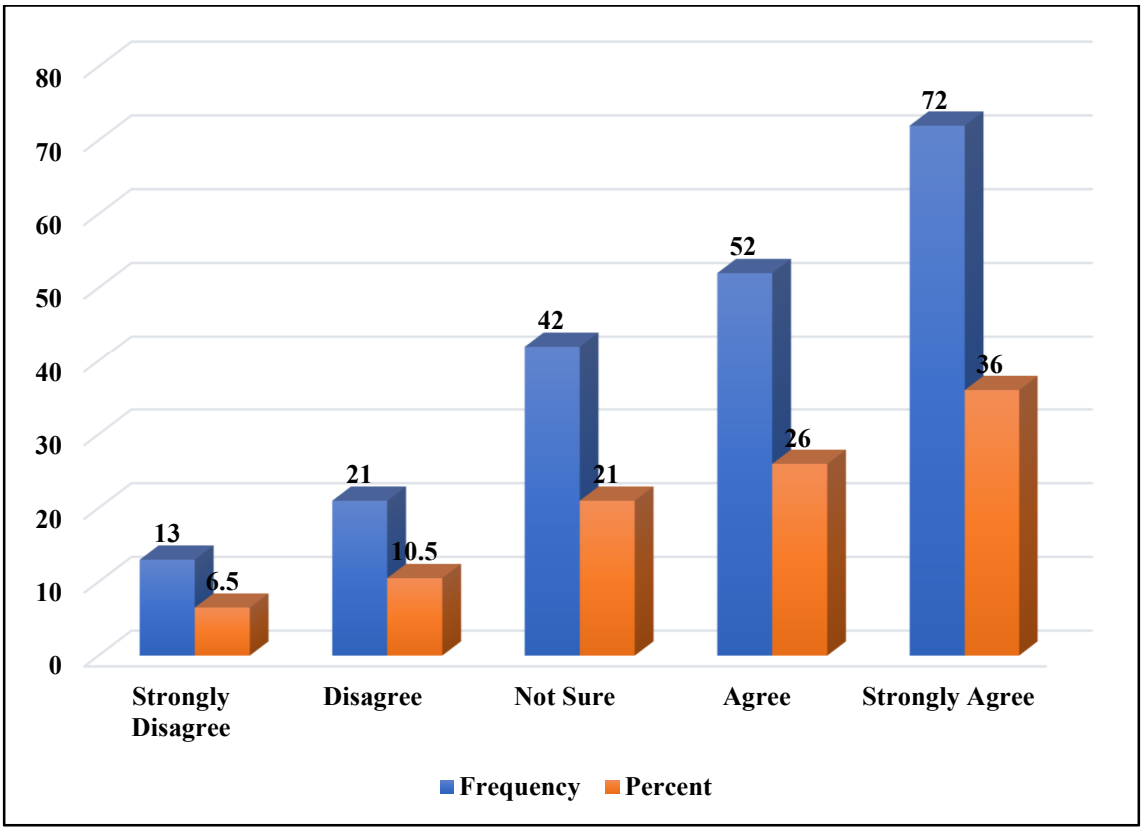

Figure 4.24: Effective Data Transformation Process

About 36% respondents strongly agreed that BA-BIS are used for effective data transformation process, 26% were also in agreement, around 21% respondents as BA-BIS users were not sure about it whereas about 10.5% disagreed with the statement and 6.5% were strongly against the view point.

Table 4.26: Capability of monitoring important sources of information

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	45	22.5	22.5	22.5
	Disagree	33	16.5	16.5	39.0
	Not Sure	28	14.0	14.0	53.0
	Agree	90	45.0	45.0	98.0
	Strongly Agree	4	2.0	2.0	100.0
	Total	**200**	**100.0**	**100.0**	

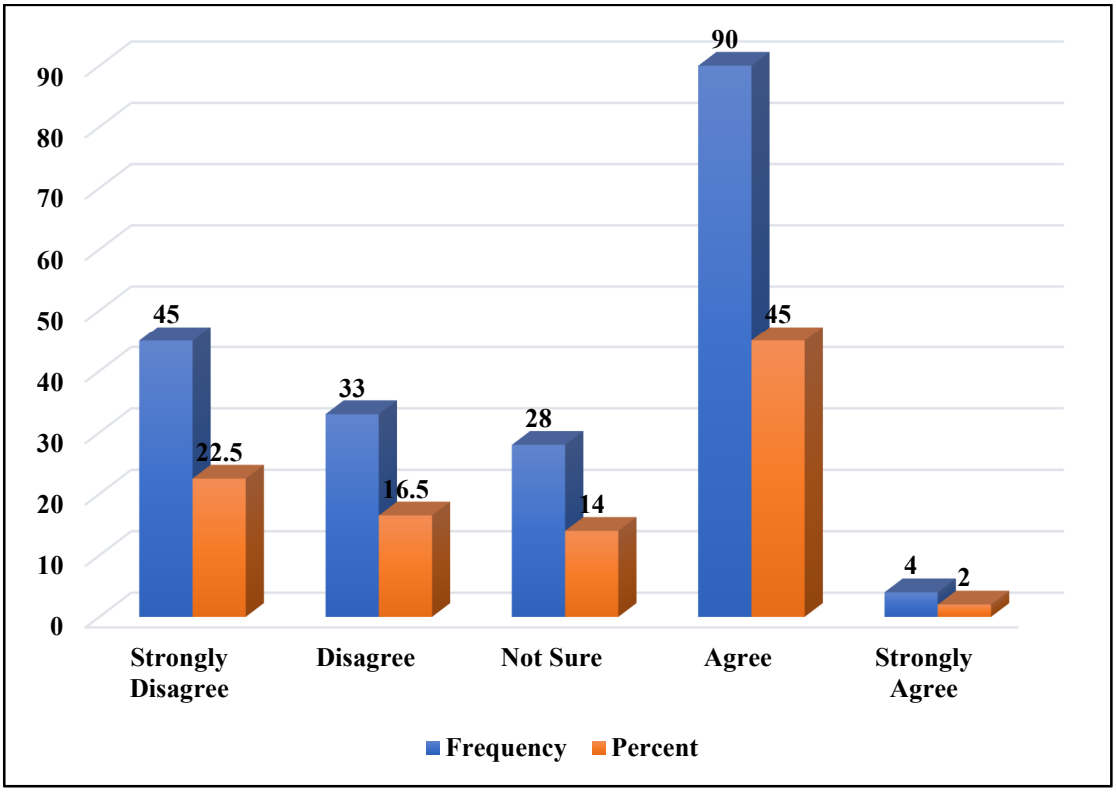

Figure 4.25: Capability of Monitoring Important Sources of Information

Approximately about 2% respondents strongly agreed that BA-BIS have the capability of monitoring important sources of information, 45% were also in agreement, around 14% respondents as BA-BIS users were not sure about it whereas about 16.5% disagreed with the statement and 22.5% were strongly against the view point.

4.4 BA-BIS AND DATA QUALITY:

Table 4.27: Data Quality: Data volume adequacy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	7	3.5	3.5	3.5
	Not Sure	33	16.5	16.5	20.0
	Agree	155	77.5	77.5	97.5
	Strongly Agree	5	2.5	2.5	100.0
	Total	**200**	**100.0**	**100.0**	

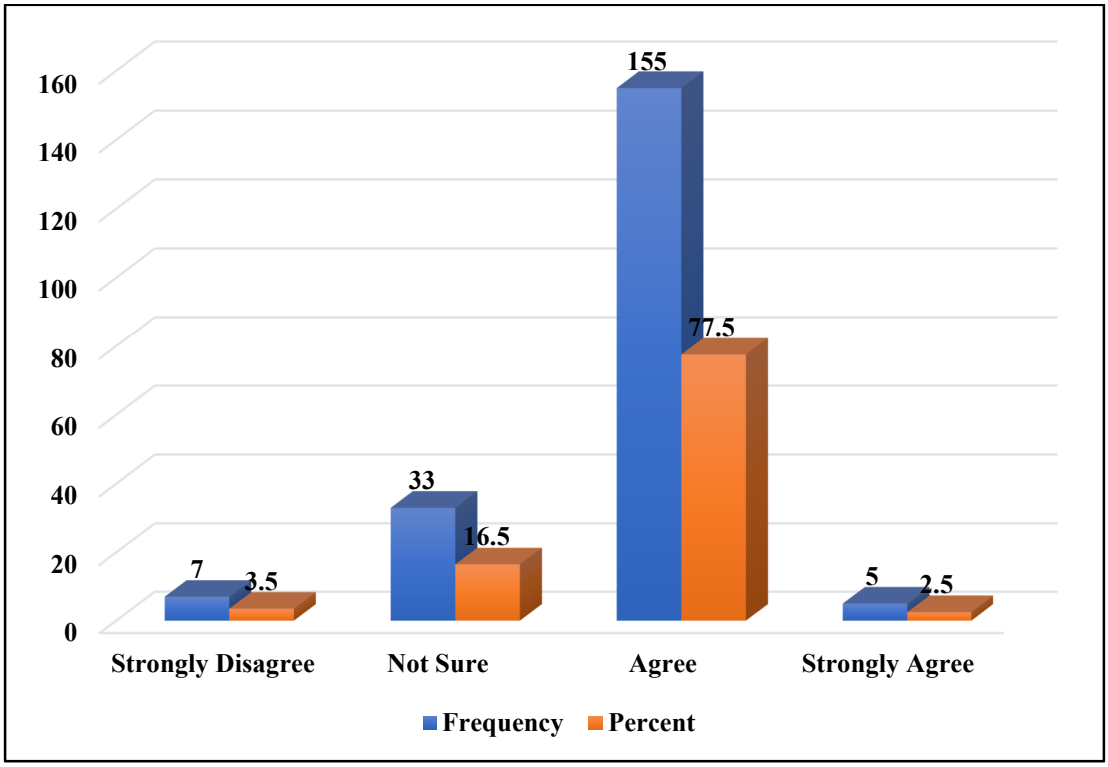

Figure 4.26: Data Quality: Data Volume Adequacy

About 2.5% respondents strongly agreed that BA-BIS are used for data quality: data volume adequacy, 77.5% were also in agreement, around 16.5% respondents as BA-BIS users were not sure about it whereas about 3.5% disagreed with the statement and none were strongly in disagreement with view point.

Table 4.28: Data Quality: Access

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	46	23.0	23.0	23.0
	Not Sure	28	14.0	14.0	37.0
	Agree	45	22.5	22.5	59.5
	Strongly Agree	81	40.5	40.5	100.0
	Total	**200**	**100.0**	**100.0**	

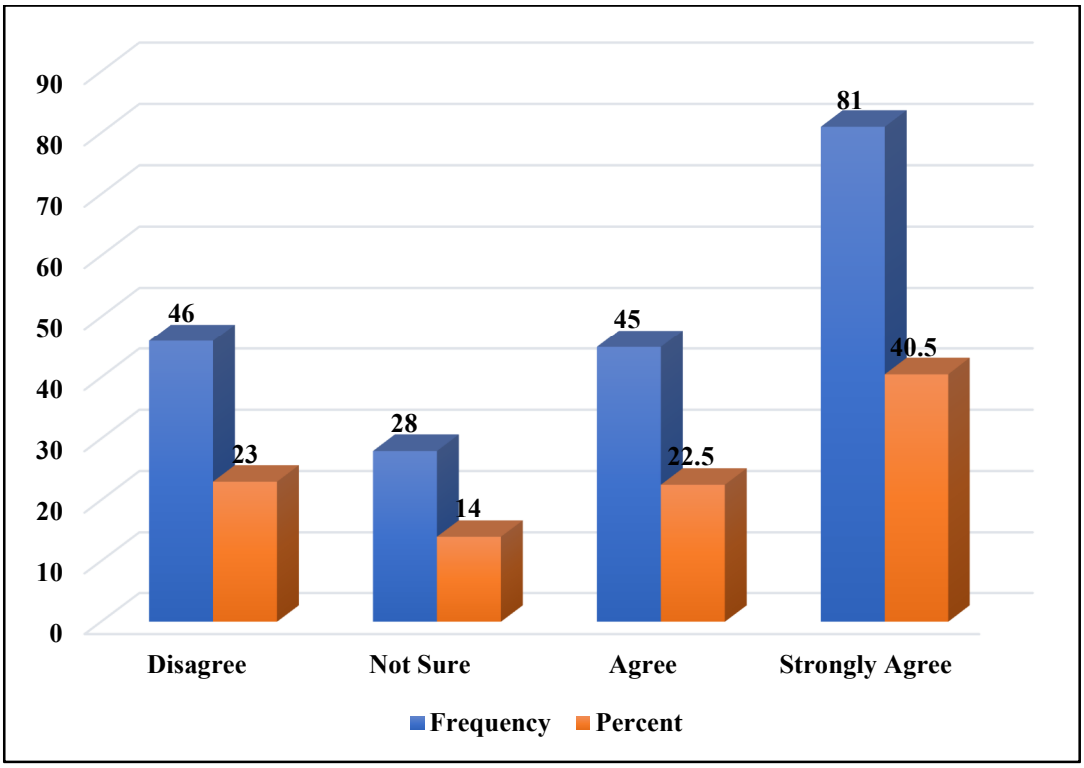

Figure 4.27: Data Quality: Access

Accordingly, about 40.5% respondents strongly agreed that BA-BIS are used for data quality: Access, 22.5% were also in agreement, around 14% respondents as BA-BIS users were not sure about it whereas about 23% disagreed with the statement and none were strongly in disagreement with view point.

Table 4.29: Data Quality: Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	26	13.0	13.0	13.0
	Disagree	4	2.0	2.0	15.0
	Not Sure	27	13.5	13.5	28.5
	Agree	84	42.0	42.0	70.5
	Strongly Agree	59	29.5	29.5	100.0
	Total	**200**	**100.0**	**100.0**	

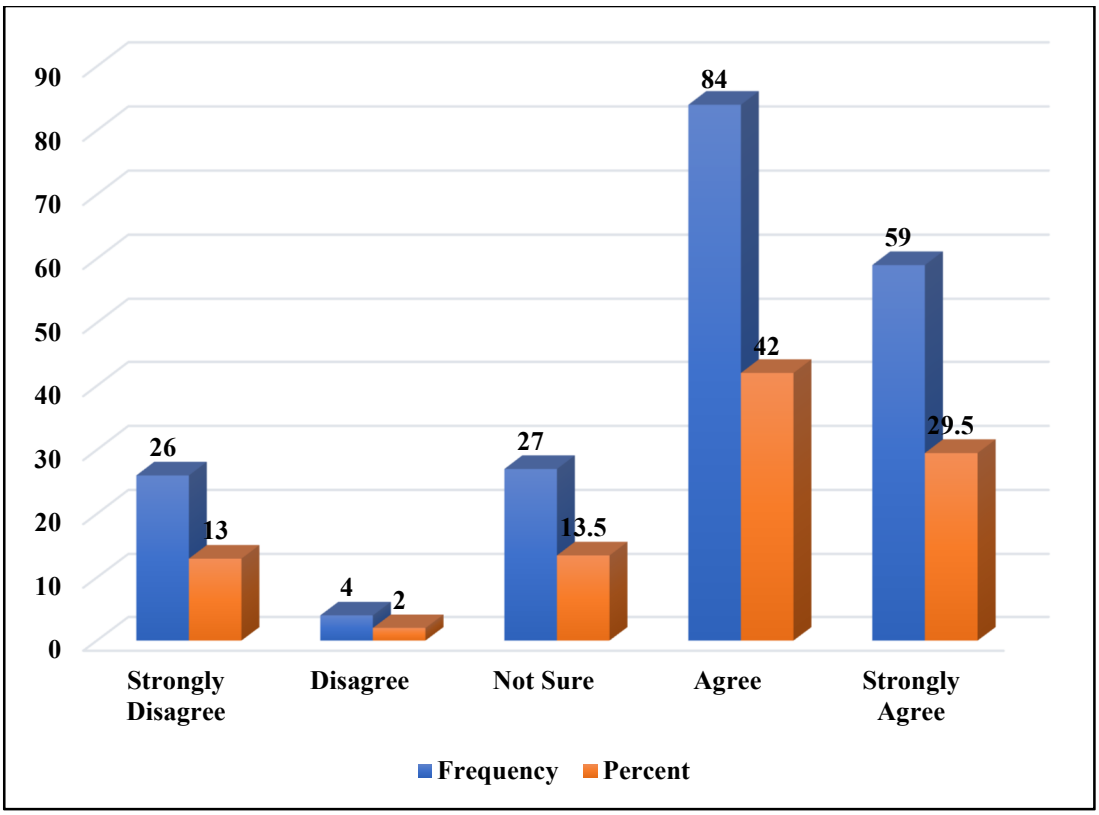

Figure 4.28: Data Quality: Use

About 29.5% respondents strongly agreed that BA-BIS are used for data quality: use, 42% were also in agreement, around 13.5% respondents as BA-BIS users were not sure about it whereas about 2% disagreed with the statement and 13% were strongly in disagreement with view point.

Table 4.30: Data Variety : Diversity of Unstructured Data – Access

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	24	12.0	12.0	12.0
	Disagree	6	3.0	3.0	15.0
	Not Sure	65	32.5	32.5	47.5
	Agree	101	50.5	50.5	98.0
	Strongly Agree	4	2.0	2.0	100.0
	Total	**200**	**100.0**	**100.0**	

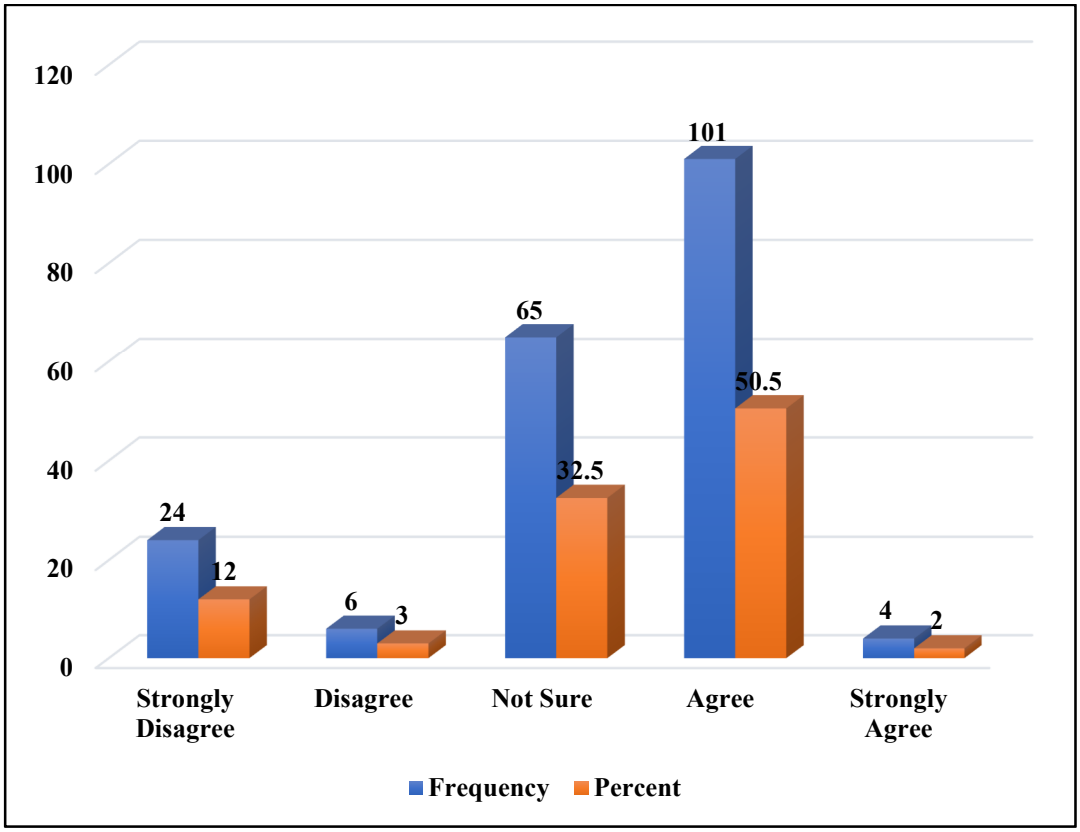

Figure 4.29: Data Variety: Diversity of Unstructured Data – Access

About 2% respondents strongly agreed that BA-BIS are used for data variety: diversity of unstructured data – access, 50.2% were also in agreement, around 32.5% respondents as BA-BIS users were not sure about it whereas about 3% disagreed with the statement and 12% were strongly in disagreement with view point.

Table 4.31: Data Variety: Diversity of Unstructured Data – Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	2	1.0	1.0	1.0
	Disagree	29	14.5	14.5	15.5
	Not Sure	47	23.5	23.5	39.0
	Agree	76	38.0	38.0	77.0
	Strongly Agree	46	23.0	23.0	100.0
	Total	**200**	**100.0**	**100.0**	

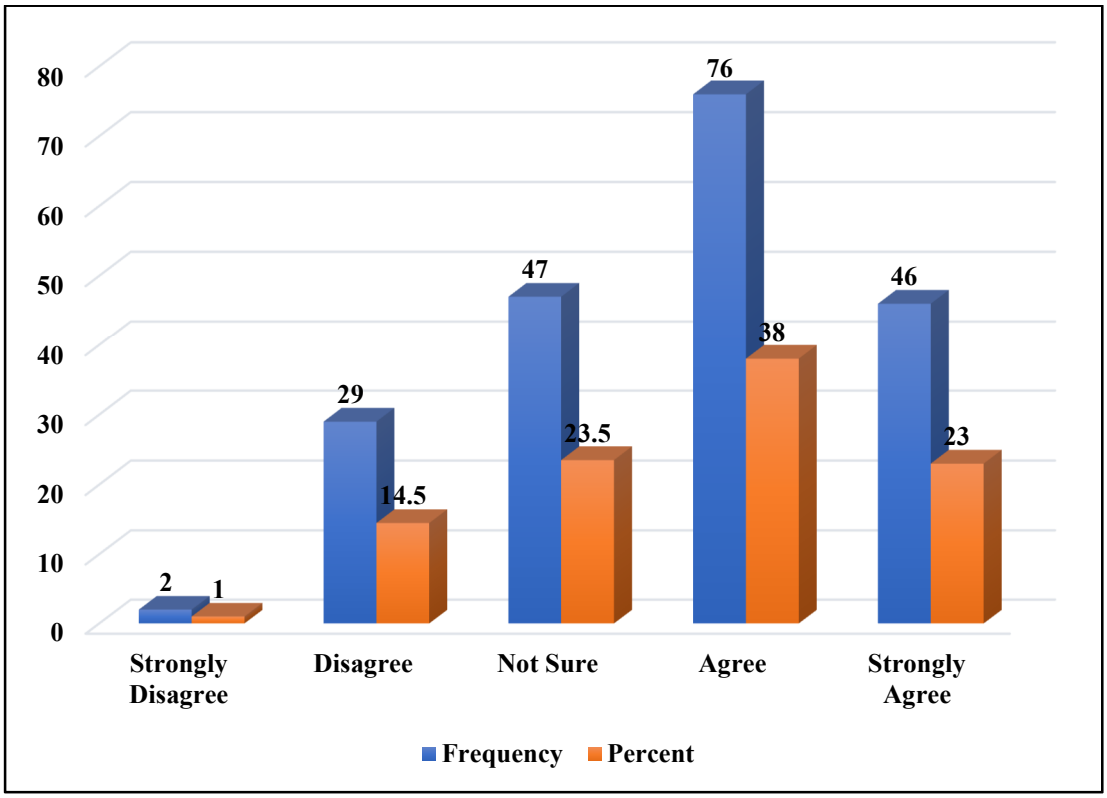

Figure 4.30: Data Variety: Diversity of Unstructured Data – Use

23% respondents strongly agreed that BA-BIS are used for data variety: diversity of unstructured data – use, 38% were also in agreement, around 23.5% respondents as BA-BIS users were not sure about it whereas about 14.5% disagreed with the statement and 1% were strongly in disagreement with view point.

Table 4.32: Data Velocity: Rate of Change of Data – Access

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	7	3.5	3.5	3.5
	Disagree	83	41.5	41.5	45.0
	Not Sure	80	40.0	40.0	85.0
	Agree	2	1.0	1.0	86.0
	Strongly Agree	28	14.0	14.0	100.0
	Total	**200**	**100.0**	**100.0**	

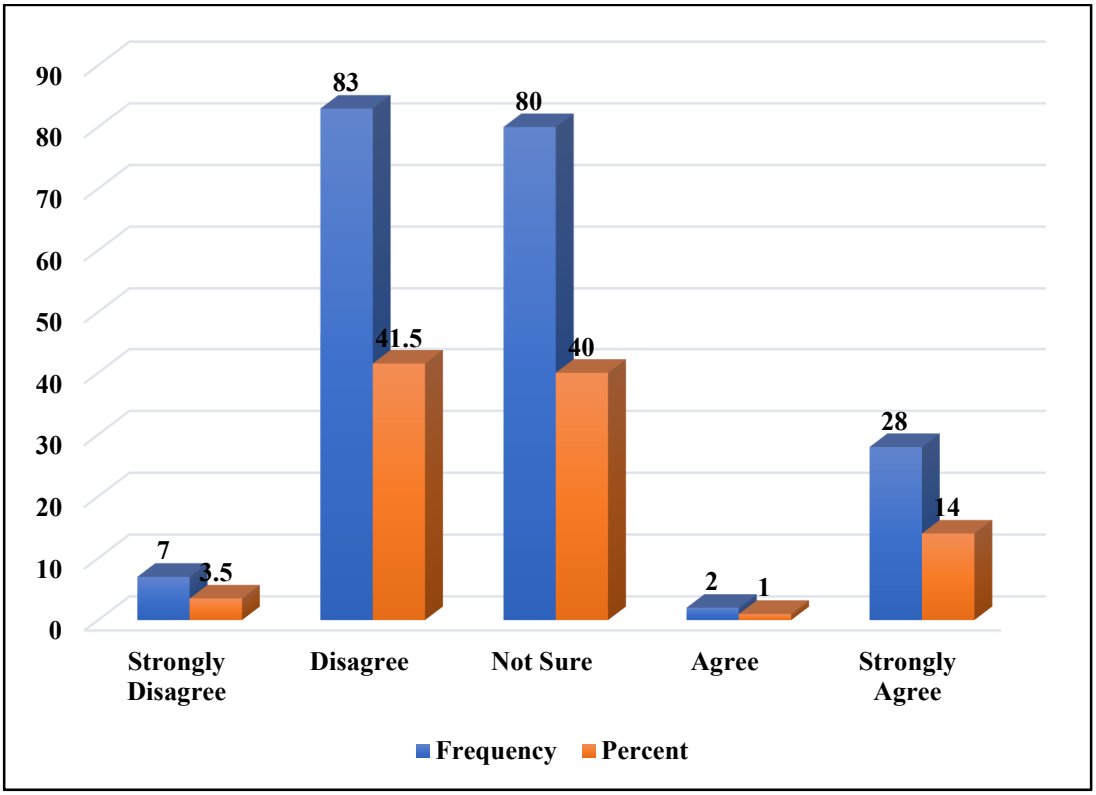

Figure 4.31: Data Velocity: Rate of Change of Data – Access

About 14% respondents strongly agreed that BA-BIS are used for data velocity: rate of change of data – access, 1% were also in agreement, around 40% respondents as BA-BIS users were not sure about it whereas about 41.5% disagreed with the statement and 3.5% were strongly in disagreement with view point.

Table 4.33: Data Velocity: Rate of Change of Data – Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	8	4.0	4.0	4.0
	Disagree	18	9.0	9.0	13.0
	Not Sure	117	58.5	58.5	71.5
	Agree	57	28.5	28.5	100.0
	Total	**200**	**100.0**	**100.0**	

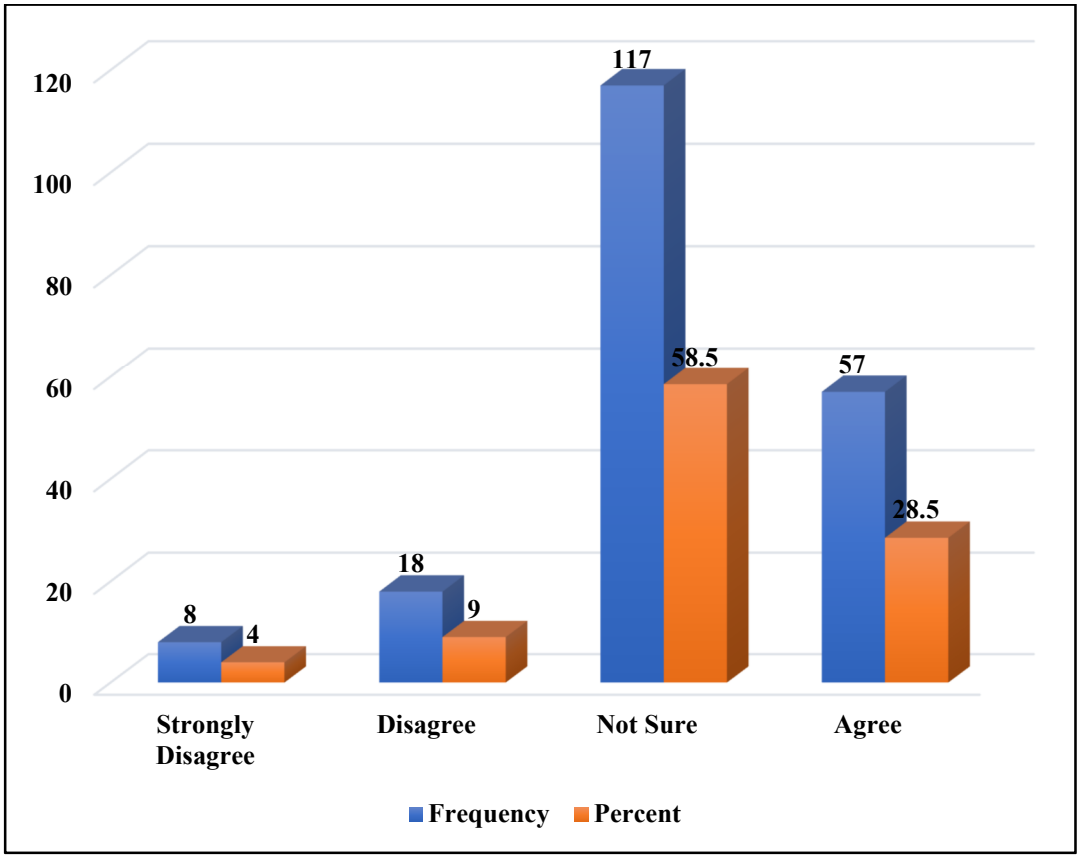

Figure 4.32: Data Velocity: Rate of Change of Data – Use

28.5% respondents strongly agreed that BA-BIS are used for data velocity: rate of change of data – use, around 58.5% respondents as BA-BIS users were not sure about it whereas about 9% disagreed with the statement and 4% were strongly in disagreement with view point.

4.5 BA-BIS AND LEVEL OF USER SATISFACTION:

Table 4.34: User Satisfaction: Effectiveness & efficiency of BI system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	18	9.0	9.0	9.0
	Disagree	15	7.5	7.5	16.5
	Not Sure	37	18.5	18.5	35.0
	Agree	88	44.0	44.0	79.0
	Strongly Agree	42	21.0	21.0	100.0
	Total	**200**	**100.0**	**100.0**	

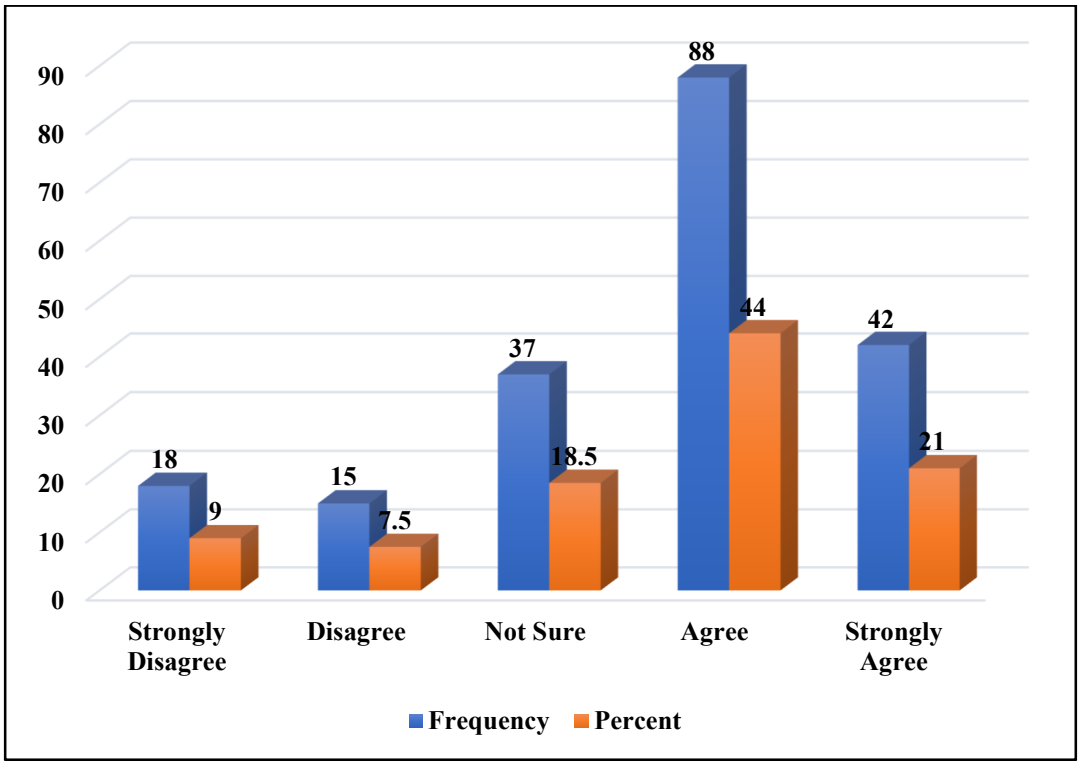

Figure 4.33: User Satisfaction: Effectiveness & efficiency of BI system

About 21% respondents strongly agreed that BA-BIS are used for user satisfaction: effectiveness & efficiency of BI system, 44% were also in agreement, whereas about 7.5% disagreed with the statement and 9% were strongly in disagreement with view point.

Table 4.35: User Satisfaction: Suitability/task relevance of BI info.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	31	15.5	15.5	15.5
	Agree	79	39.5	39.5	55.0
	Strongly Agree	90	45.0	45.0	100.0
	Total	**200**	**100.0**	**100.0**	

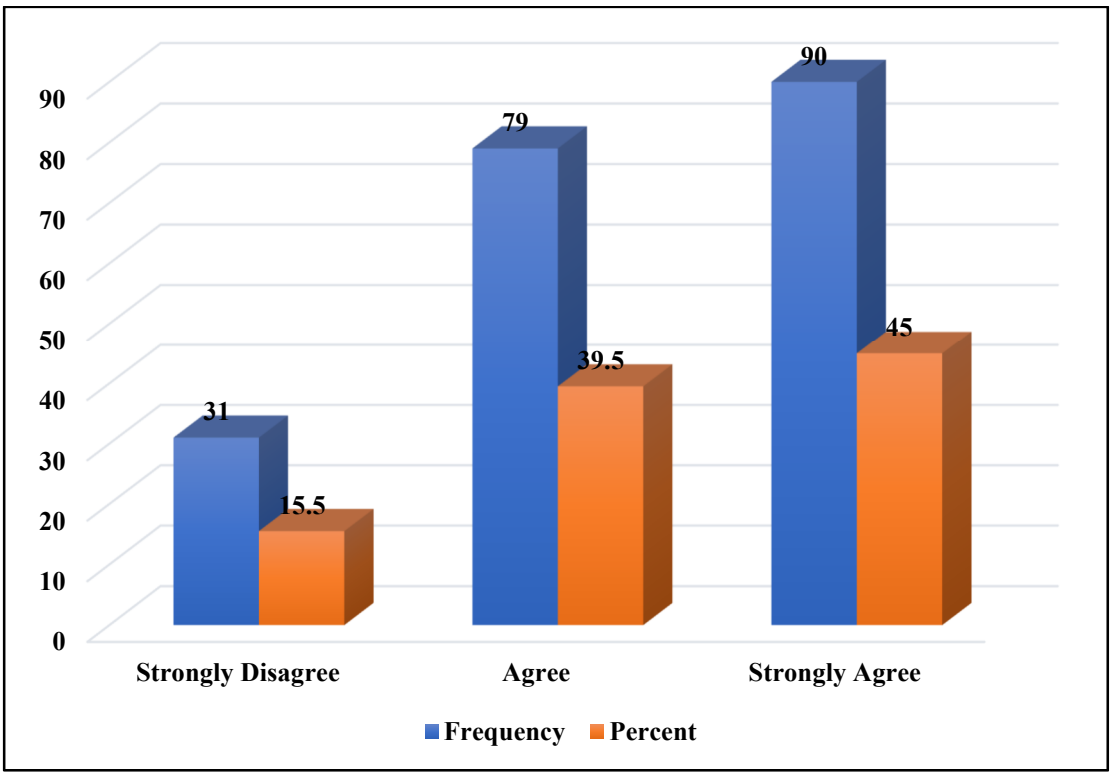

Figure 4.34: User Satisfaction: Suitability/task relevance of BI info.

About 45% respondents strongly agreed that BA-BIS are used for user satisfaction: suitability/task relevance of BI information, 39.5% were also in agreement, whereas about none disagreed with the statement and 15.5% were strongly in disagreement with view point.

Table 4.36: User Satisfaction: BI system meeting user requirements

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	12	6.0	6.0	6.0
	Disagree	41	20.5	20.5	26.5
	Not Sure	45	22.5	22.5	49.0
	Agree	91	45.5	45.5	94.5
	Strongly Agree	11	5.5	5.5	100.0
	Total	**200**	**100.0**	**100.0**	

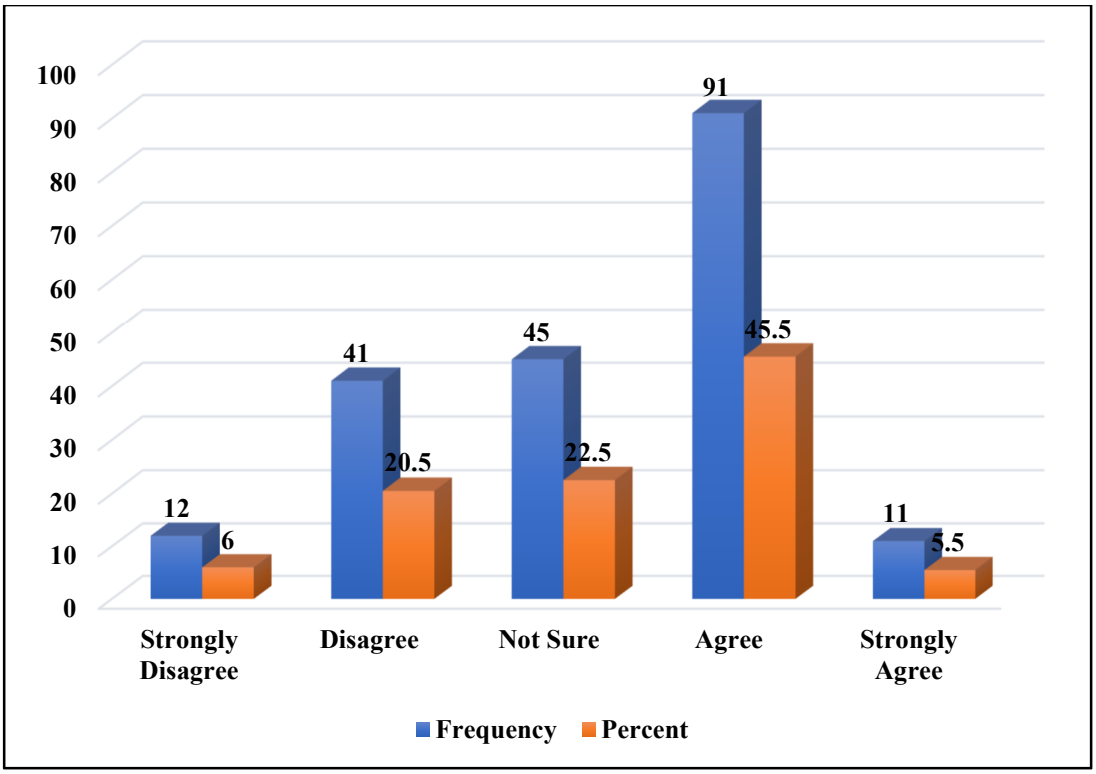

Figure 4.35: User Satisfaction: BI System Meeting User Requirements

5.5% respondents strongly agreed that BA-BIS system meeting user requirements, 45.5% were also in agreement, around 22.5% respondents as BA-BIS users were not sure about it whereas about 20.5% disagreed with the statement and 6% were strongly in disagreement with view point.

Table 4.37: User Satisfaction: General end-user satisfaction with BI system

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	12	6.0	6.0	6.0
	Disagree	7	3.5	3.5	9.5
	Agree	90	45.0	45.0	54.5
	Strongly Agree	91	45.5	45.5	100.0
	Total	**200**	**100.0**	**100.0**	

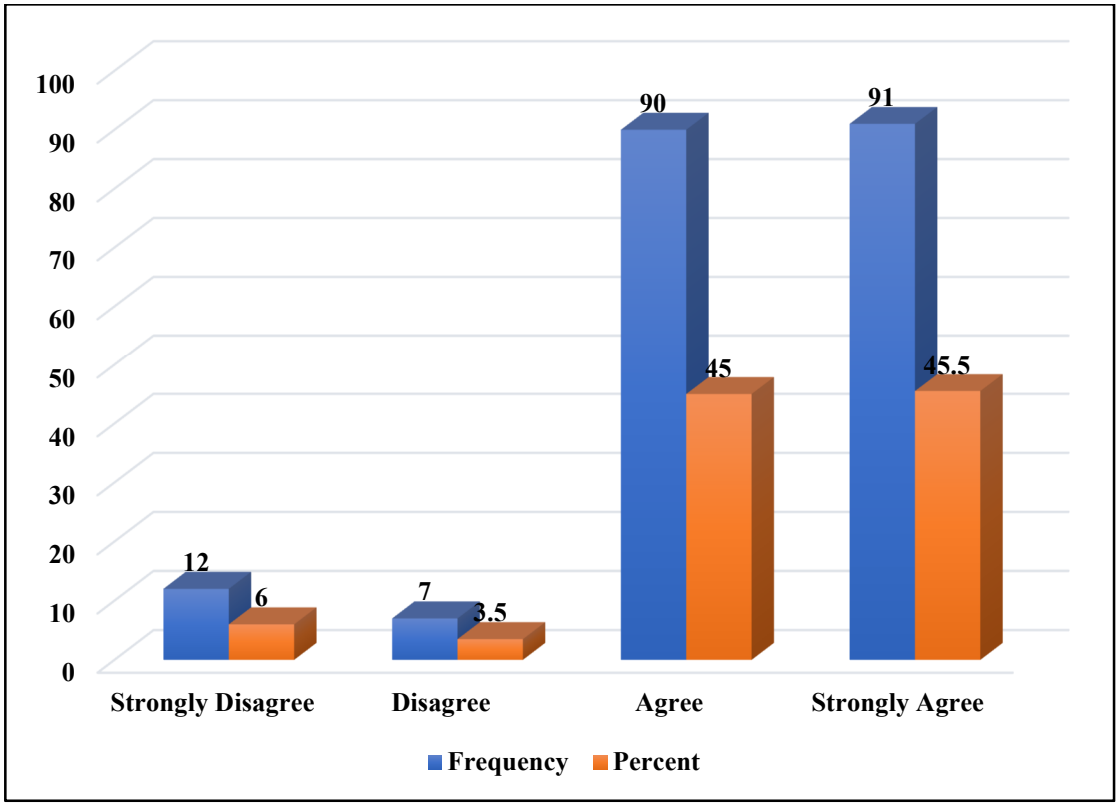

Figure 4.36: User Satisfaction: General End-User Satisfaction with BI System

About 45.5% respondents strongly agreed that they find general end-user satisfaction with BI system, 45% were also in agreement whereas about 3.5% disagreed with the statement and 6% were strongly in disagreement with view point.

4.6 BA-BIS AND MANAGERIAL DECISION MAKING:

Table 4.38: Managerial Decision Making: Decision effectiveness

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	7	3.5	3.5	3.5
	Disagree	46	23.0	23.0	26.5
	Not Sure	19	9.5	9.5	36.0
	Agree	128	64.0	64.0	100.0
	Total	**200**	**100.0**	**100.0**	

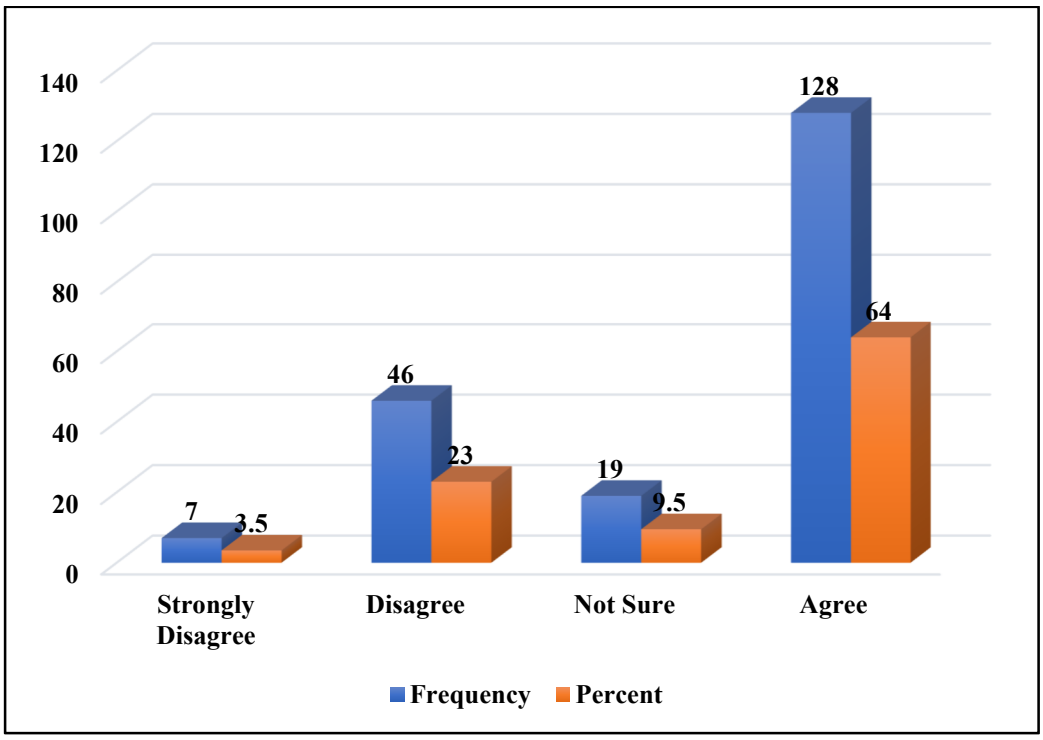

Figure 4.37: Managerial Decision Making: Decision Effectiveness

About 64% respondents strongly agreed that BA-BIS are used for effective decision making, 9.5% respondents as BA-BIS users were not sure about it whereas about 23% disagreed with the statement and 3.5% were strongly in disagreement with view point.

Table 4.39: Managerial Decision Making: Accuracy/correctness of decision making

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	38	19.0	19.0	19.0
	Disagree	7	3.5	3.5	22.5
	Not Sure	5	2.5	2.5	25.0
	Agree	117	58.5	58.5	83.5
	Strongly Agree	33	16.5	16.5	100.0
	Total	**200**	**100.0**	**100.0**	

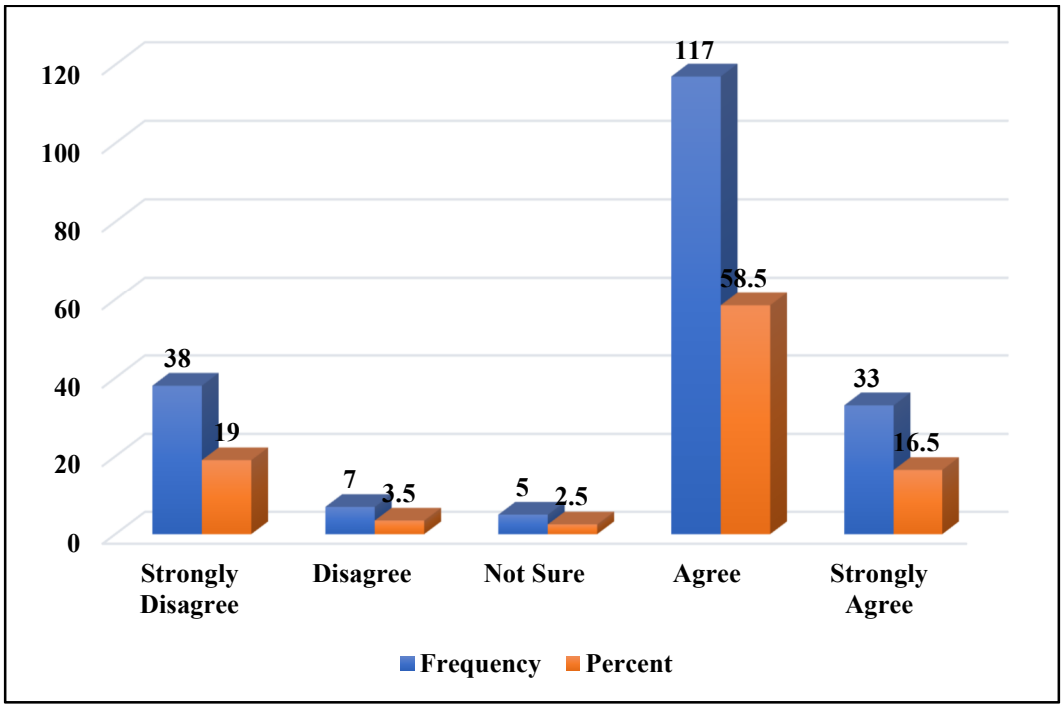

Figure 4.38: Managerial Decision Making: Accuracy/Correctness of Decision Making

About 16.5% respondents strongly agreed that BA-BIS are used for accuracy/correctness of decision making, 58.5% were also in agreement, around 2.5% respondents as BA-BIS users were not sure about it whereas about 3.5% disagreed with the statement and 19% were strongly in disagreement with view point.

Table 4.40: Managerial Decision Making: Timeliness/speed of decision making

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	4	2.0	2.0	2.0
	Disagree	14	7.0	7.0	9.0
	Not Sure	18	9.0	9.0	18.0
	Agree	68	34.0	34.0	52.0
	Strongly Agree	96	48.0	48.0	100.0
	Total	**200**	**100.0**	**100.0**	

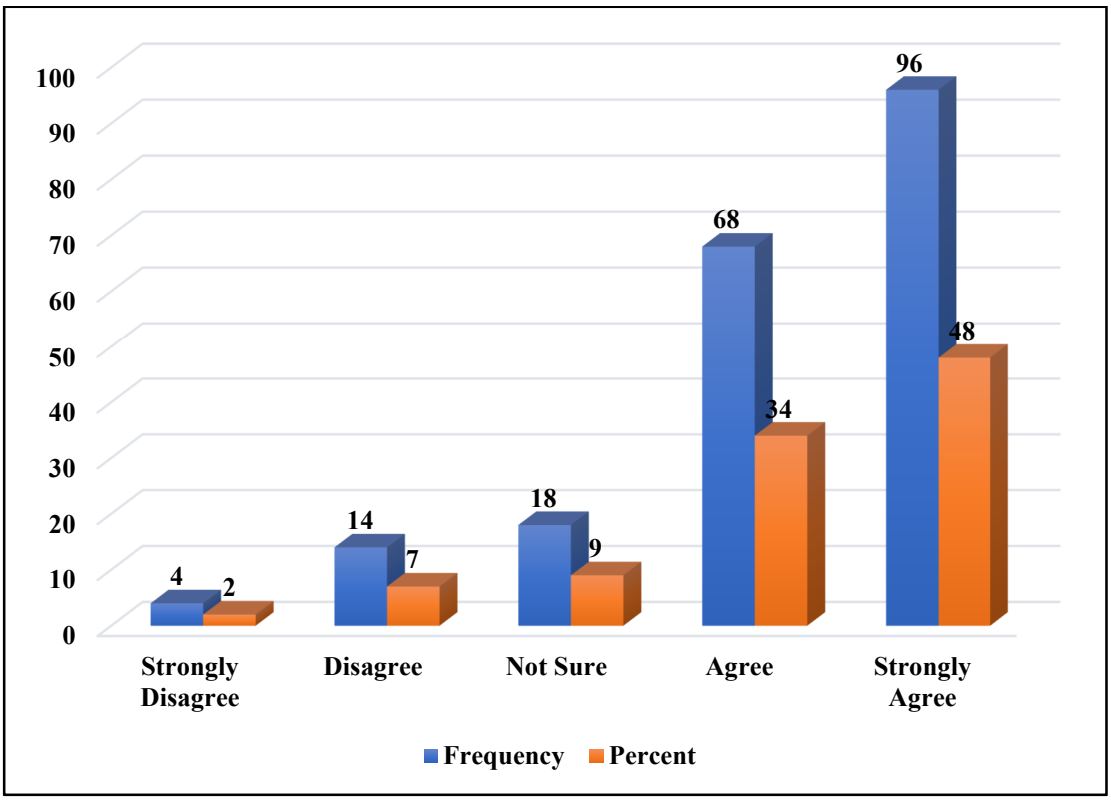

Figure 4.39: Managerial Decision Making: Timeliness/Speed of Decision Making

48% respondents strongly agreed that BA-BIS are used for Timeliness/speed of decision making, 34% were also in agreement, around 9% respondents as BA-BIS users were not sure about it whereas about 7% disagreed with the statement and 2% were strongly in disagreement with view point.

Table 4.41: Managerial Decision Making: rationale/informed decisions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	.5	.5	.5
	Not Sure	32	16.0	16.0	16.5
	Agree	80	40.0	40.0	56.5
	Strongly Agree	87	43.5	43.5	100.0
	Total	**200**	**100.0**	**100.0**	

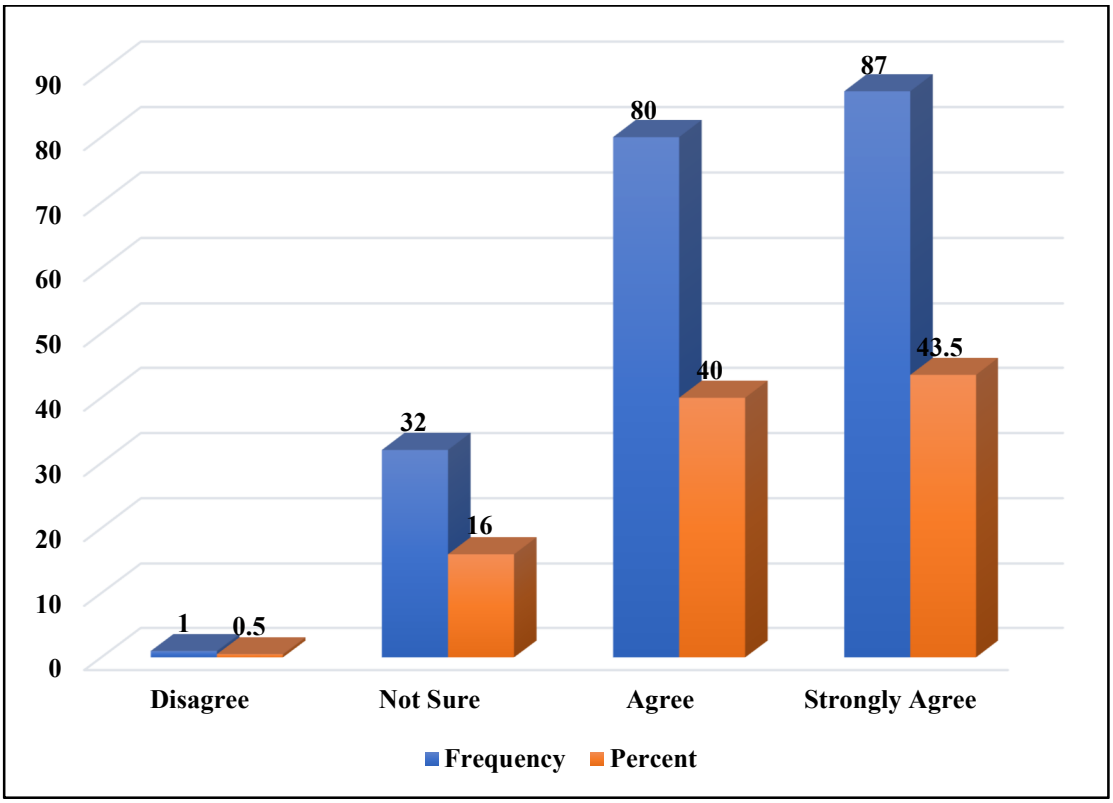

Figure 4.40: Managerial Decision Making: Rationale/Informed Decisions

43.5% respondents strongly agreed that BA-BIS are used for rationale/informed decision making, 40% were also in agreement, around 16% respondents as BA-BIS users were not sure about it whereas about 0.5% disagreed with the statement.

Table 4.42: Managerial Decision Making: Timeliness/speed of decision making

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	11	5.5	5.5	5.5
	Disagree	14	7.0	7.0	12.5
	Not Sure	59	29.5	29.5	42.0
	Agree	30	15.0	15.0	57.0
	Strongly Agree	86	43.0	43.0	100.0
	Total	**200**	**100.0**	**100.0**	

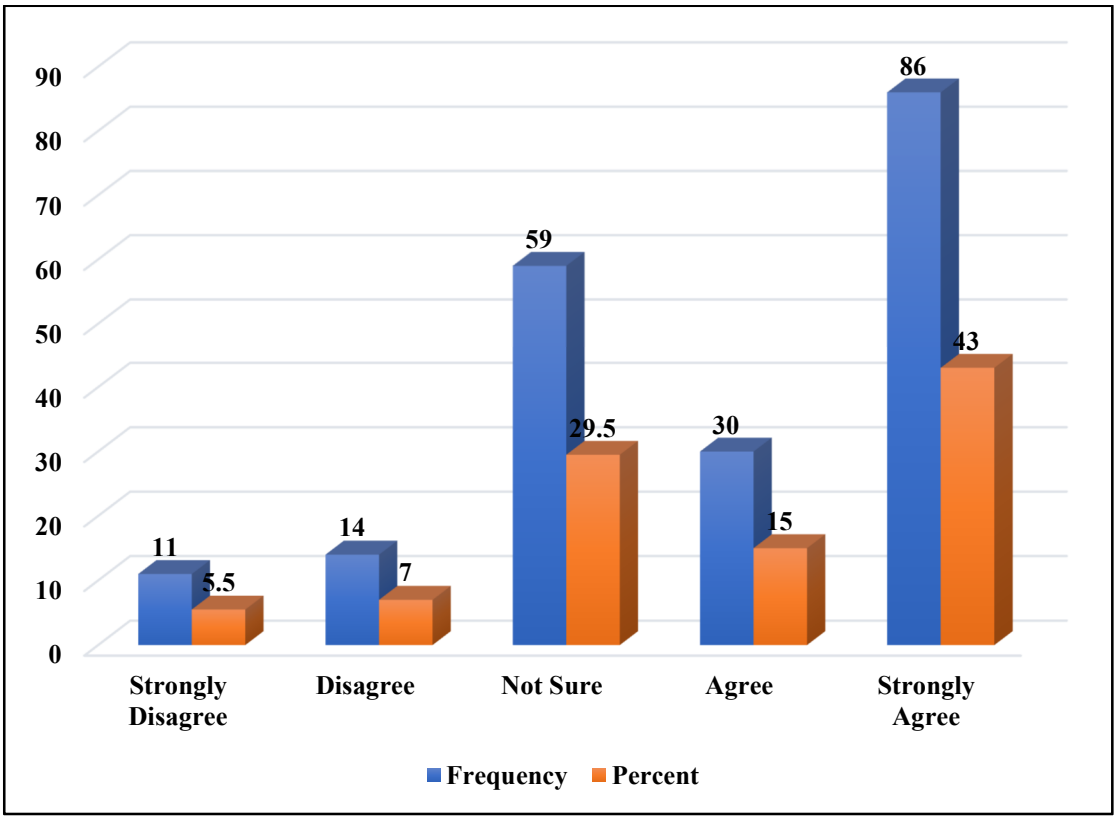

Figure 4.41: Managerial Decision Making: Timeliness/Speed of Decision Making

Majority of respondents about 43% strongly agreed that Business analytics and intelligent systems are basically used for timeliness/speedy decision making, 15% also agreed whereas about 12.5% disagreed and about 5.5% strongly disagreed with the above-mentioned view point.

Table 4.43: Decisions about New Products/Services/Market

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	20	10.0	10.0	10.0
	Disagree	14	7.0	7.0	17.0
	Not Sure	35	17.5	17.5	34.5
	Agree	99	49.5	49.5	84.0
	Strongly Agree	32	16.0	16.0	100.0
	Total	**200**	**100.0**	**100.0**	

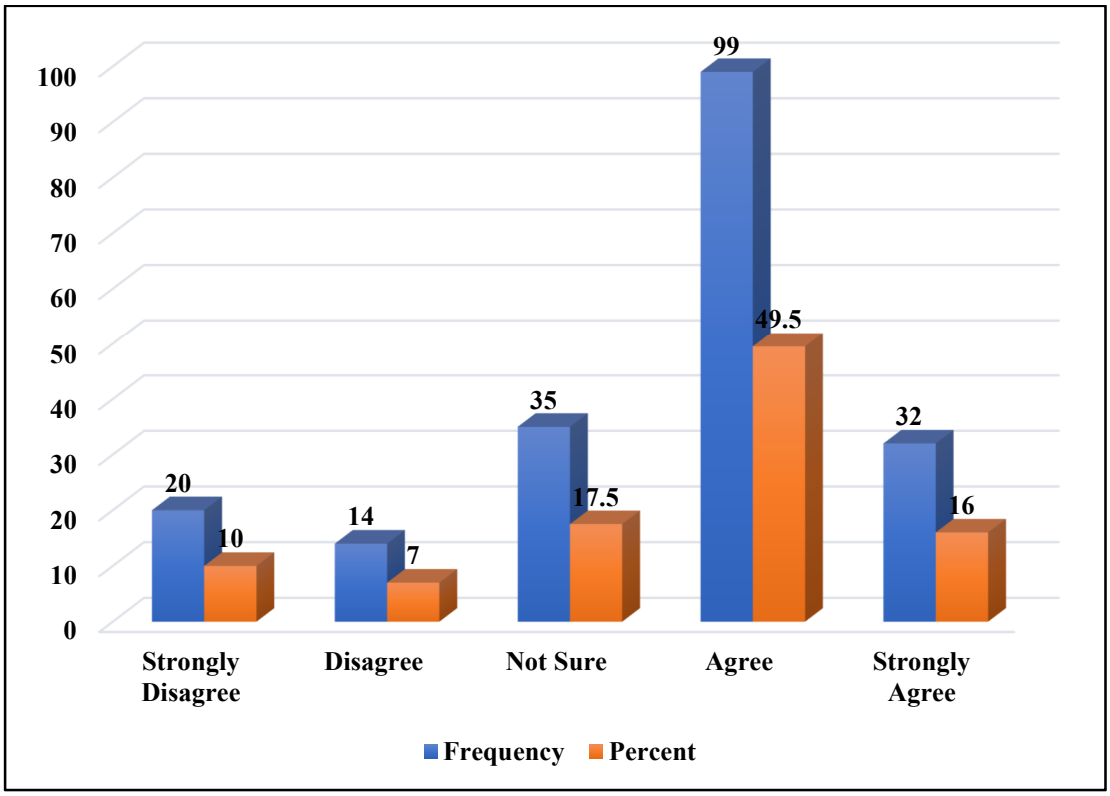

Figure 4.42: Decisions about New Products/Services/Market

16% respondents strongly that BA-BIS are used for decisions about new products /services /market, 49.5% were also in agreement, around 17.5% respondents as BA-BIS users were not sure about it whereas about 7% disagreed with the statement and 10% were strongly in disagreement with view point.

Table 4.44: Decisions about Strategic/Key Suppliers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	8	4.0	4.0	4.0
	Disagree	34	17.0	17.0	21.0
	Not Sure	59	29.5	29.5	50.5
	Agree	67	33.5	33.5	84.0
	Strongly Agree	32	16.0	16.0	100.0
	Total	**200**	**100.0**	**100.0**	

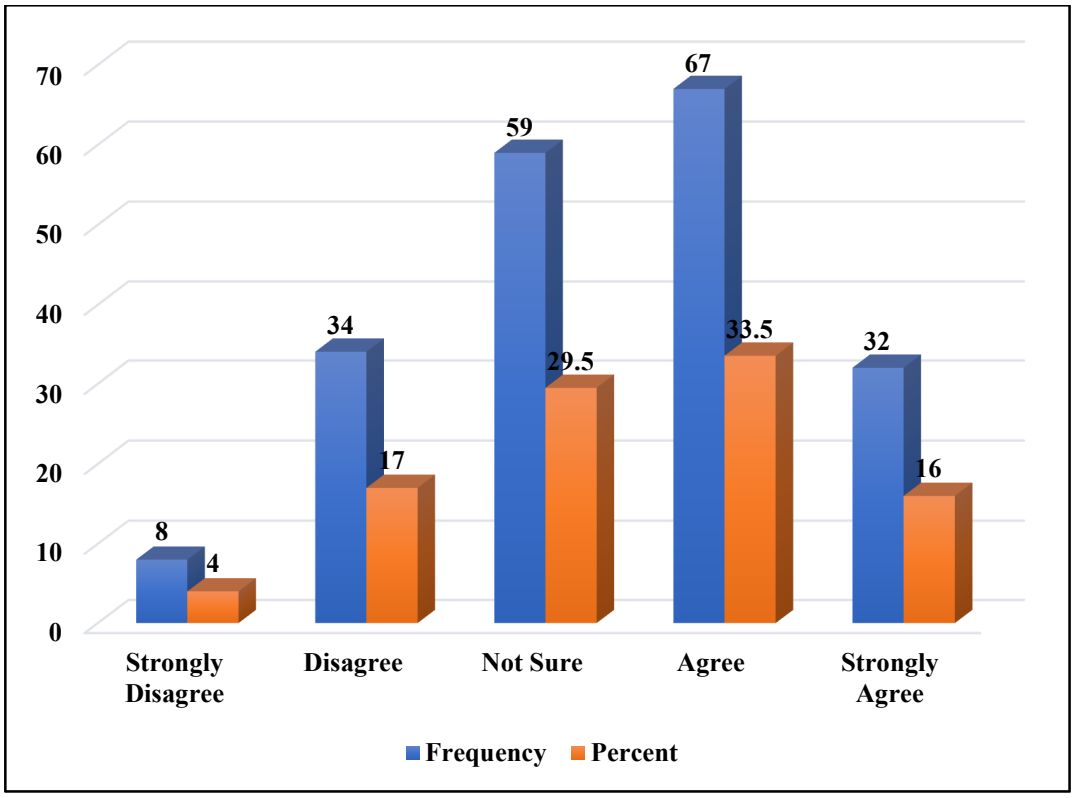

Figure 4.43: Decisions about Strategic/Key Suppliers

Majority of respondents about 33.5% agreed that Business analytics and intelligent systems are being used for decisions about strategic/key suppliers, 16% strongly agreed whereas about 17% disagreed and about 4% strongly disagreed with the above-mentioned view point.

Table 4.45: Decisions about Outsourcing/BPM

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	35	17.5	17.5	17.5
	Disagree	43	21.5	21.5	39.0
	Not Sure	46	23.0	23.0	62.0
	Agree	45	22.5	22.5	84.5
	Strongly Agree	31	15.5	15.5	100.0
	Total	**200**	**100.0**	**100.0**	

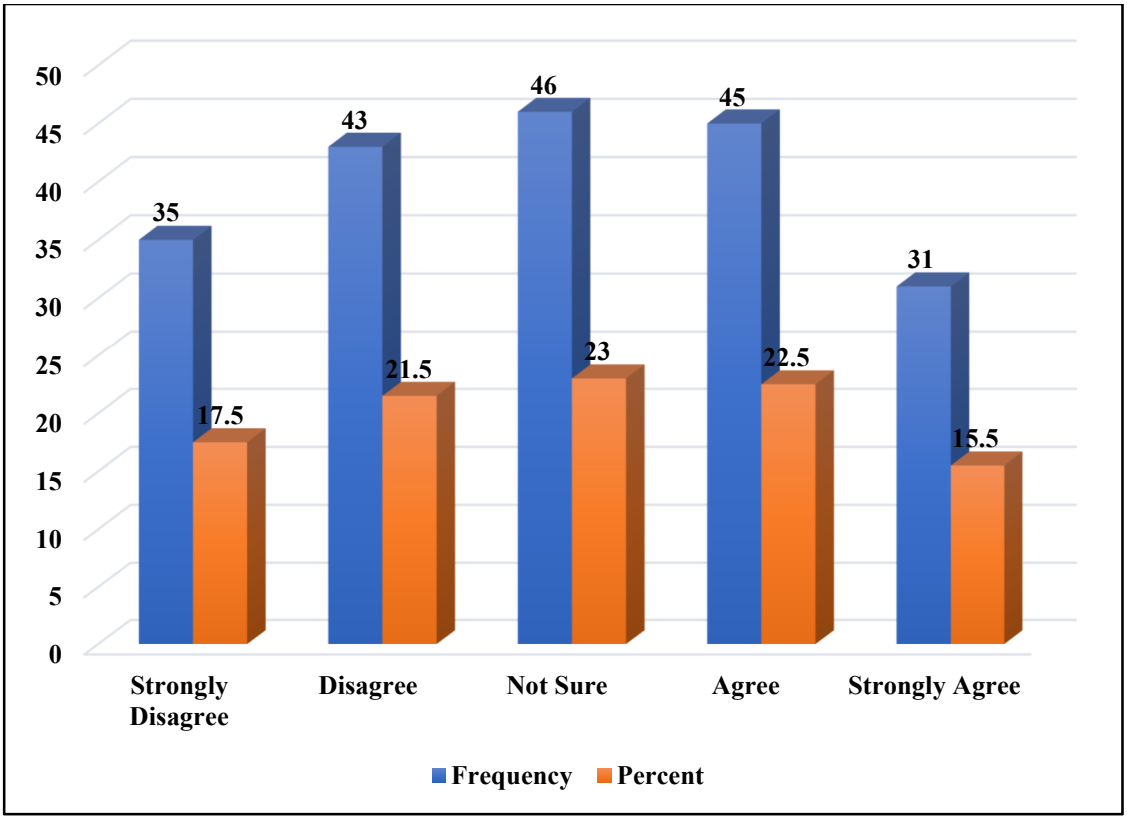

Figure 4.44: Decisions about Outsourcing/BPM

15.5% respondents strongly agreed that BA-BIS are used for decisions about outsourcing / BPM, 22.5% were also in agreement, around 23% respondents as BA-BIS users were not sure about it whereas about 21.5% disagreed with the statement and 17.5% were strongly in disagreement with view point.

Table 4.46: Decisions about Sales and Marketing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	27	13.5	13.5	13.5
	Disagree	18	9.0	9.0	22.5
	Not Sure	27	13.5	13.5	36.0
	Agree	56	28.0	28.0	64.0
	Strongly Agree	72	36.0	36.0	100.0
	Total	**200**	**100.0**	**100.0**	

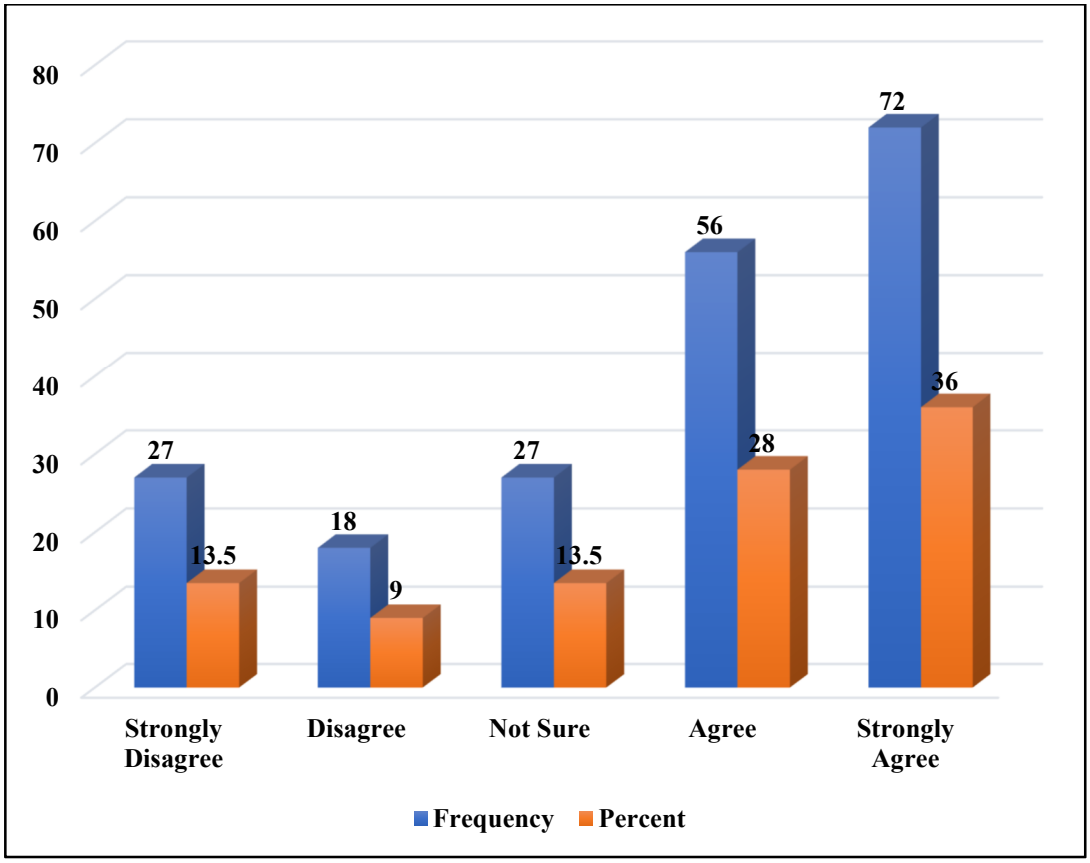

Figure 4.45: Decisions about Sales and Marketing

Majority of respondents about 36% strongly agreed that Business analytics and intelligent systems are being used for decision making in sales and marketing whereas about 13.5% strongly disagreed with the above-mentioned view point.

Table 4.47: Overall, Organisation Acts on Insights

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly Disagree	30	15.0	15.0	15.0
	Disagree	24	12.0	12.0	27.0
	Not Sure	18	9.0	9.0	36.0
	Agree	96	48.0	48.0	84.0
	Strongly Agree	32	16.0	16.0	100.0
	Total	**200**	**100.0**	**100.0**	

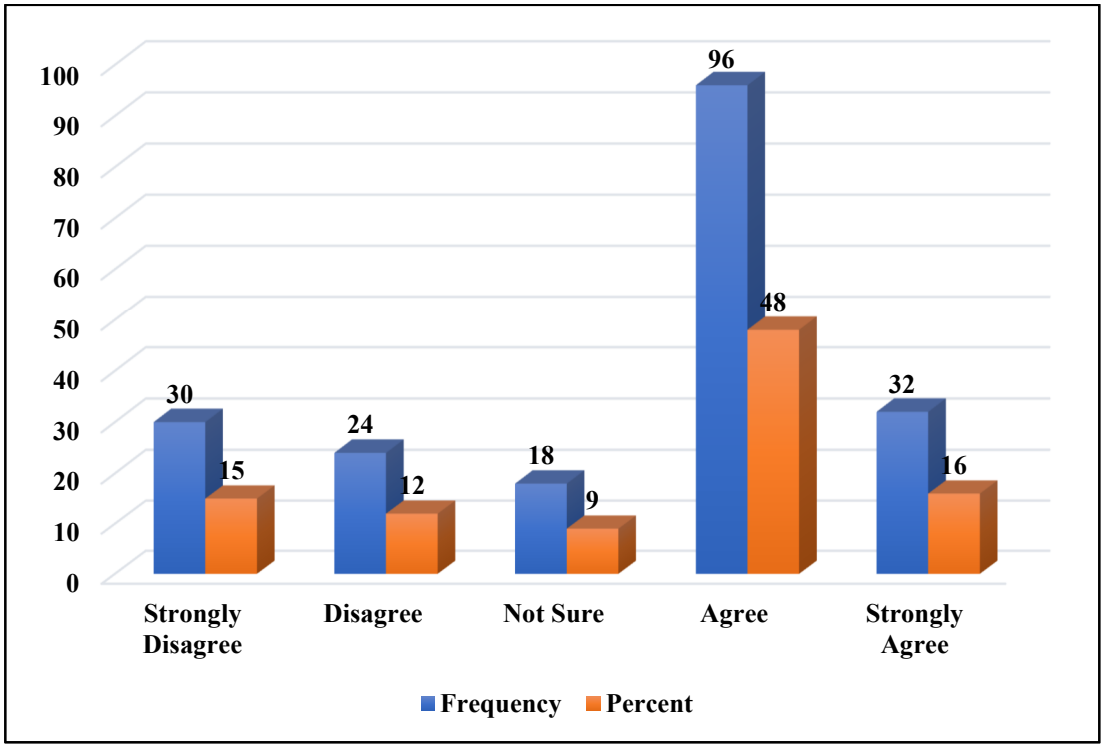

Figure 4.46: Overall, Organisation Acts on Insights

16% respondents strongly agreed that overall, organisation acts on insights, 48% were also in agreement, around 9% respondents as BA-BIS users were not sure about it whereas about 12% disagreed with the statement and 15% were strongly in disagreement with view point.

4.7 BIG DATA ANALYTICS & BUSINESS INTELLIGENCE SYSTEM AND ORGANIZATIONS PERFORMANCE:

H_01 : Big data analytics and business intelligence system do not have a significant impact on organizations performance.

H_a1 : Big data analytics and business intelligence system have a significant impact on organizations performance.

The null hypothesis was being divided various sub hypotheses (shown in the form models) in order to identify the impact of big data analytics and business intelligence system on organization performance. The significant impact being measured through the correlation, ANOVA, and regression techniques.

Model 1: Association between organization performance measure sales growth (P1) and overall use of BABIS.

$H_01.1$: There is no association between organization performance measure sales growth (P1) and overall use of BABIS

Performance: Sales Growth (P1) ⟶ Overall Use of BABIS

Table 4.48: Model: 1 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.905[a]	.819	.818	.25215
a. Predictors: (Constant), Overall Use of BABIS				

The table shows the model 1 summary which includes the correlation and error values. R-value of 0.905 shows strong positive correlation between organization performance measure sales growth (P1) and overall use of BABIS also the R Square value of 0.819 support the results.

Table 4.49: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	56.991	1	56.991	896.374	.000[b]
	Residual	12.589	198	.064		
	Total	**69.580**	**199**			
a. Dependent Variable: Performance: Sales Growth (P1)						
b. Predictors: (Constant), Overall Use of BABIS						

The ANOVA test results with F-statistic value of 896.374 and the corresponding p-value of 0.00 confirms that the model is significant enough as the p-value is found to be lesser than the standard alpha value of 0.05. This concludes that there is significant association between "Overall Use of BABIS" and "Performance: Sales Growth (P1)" further it can be interpreted that overall use of BABIS is very important factor or aspect while explaining the variability in sales growth performance.

Table 4.50: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.249	.130		1.910	.058
	Overall Use of BABIS	.934	.031	.905	29.940	.000
a. Dependent Variable: Performance: Sales Growth (P1)						

The regression equation showing the relationship between "Overall Use of BABIS" and "Performance: Sales Growth (P1)" can be represented as:

Performance: Sales Growth (P1) = 0.943 (Overall Use of BABIS) + 0.249

Model 2: Association Between organization performance measure market share (P2) and overall use of BABIS.

Performance: Market Share (P2) ⟶ Overall Use of BABIS

Table 4.51: Model: 2 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
2	.765[a]	.585	.582	.40641
a. Predictors: (Constant), Overall Use of BABIS				

The table shows the model 2 summary which includes the correlation and error values. R-value of 0.765 shows strong positive correlation between organization performance measure market share (P2) and overall use of BABIS also the R Square value of 0.585 support the results.

Table 4.52: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	46.017	1	46.017	278.606	.000[b]
	Residual	32.703	198	.165		
	Total	**78.720**	**199**			
a. Dependent Variable: Performance: Market share (P2)						
b. Predictors: (Constant), Overall Use of BABIS						

The ANOVA test results with F-statistic value of 278.606 and the corresponding p-value of 0.00 confirms that the model is significant enough as the p-value is found to be lesser than the standard alpha value of 0.05. This concludes that there is significant association between "Overall Use of BABIS" and "Performance: Market share (P2)" further it can be interpreted that overall use of BABIS is very important factor or aspect while explaining the variability in market share (P2).

Table 4.53: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	.610	.210		2.908	.004
	Overall Use of BABIS	.839	.050	.765	16.691	.000
a. Dependent Variable: Performance : Market share (P2)						

The regression equation showing the relationship between "Overall Use of BABIS" and "Performance: Market share (P2)" can be represented as:

Performance: Market Share (P2) = 0.839 (Overall Use of BABIS) + 0.610

So, in summary, the equation tells that there is a positive relationship between "Overall Use of BABIS" and "Performance: Market Share (P2)." As the use of BABIS increases, market share is expected to increase, based on the coefficients provided in the equation.

Model 3: Association Between organization performance measure cost reductions (P3) and overall use of BABIS.

Performance: Cost Reductions (P3) ⟶ Overall Use of BABIS

Table 4.54: Model : 3 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
3	.864[a]	.746	.744	.27087
a. Predictors: (Constant), Overall Use of BABIS				

The table shows the model 3 summary which includes the correlation and error values. R-value of 0.864 shows strong positive correlation between organization performance measure cost reductions (P3) and overall use of BABIS also the R Square value of 0.746 support the results.

Table 4.55: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
3	Regression	42.592	1	42.592	580.494	.000[b]
	Residual	14.528	198	.073		
	Total	**57.120**	**199**			
a. Dependent Variable: Performance: Cost Reductions (P3)						
b. Predictors: (Constant), Overall Use of BABIS						

The ANOVA test results with F-statistic value of 580.494 and the corresponding p-value of 0.00 confirms that the model is significant enough as the p-value is found to be lesser than the standard alpha value of 0.05. This concludes that there is significant association between "Overall Use of BABIS" and "Performance: Cost Reductions (P3)" further it can be interpreted that overall use of BABIS is very important factor or aspect while explaining the variability in cost reductions (P3).

Table 4.56: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
3	(Constant)	.782	.140		5.590	.000
	Overall Use of BABIS	.807	.034	.864	24.093	.000
a. Dependent Variable: Performance : Cost Reductions (P3)						

The regression equation showing the relationship between "Overall Use of BABIS" and "Performance: Cost Reductions (P3) can be represented as:

Performance: Cost Reductions (P3) = 0.807 (Overall Use of BABIS) + 0.782

So, in summary, the equation tells that there is a positive relationship between "Overall Use of BABIS" and "Performance: Cost Reductions (P3)." This suggests that the use of BABIS is associated with better cost reduction.

Model 4: Association between organization performance measure profitability (P4) and overall use of BABIS.

Performance: Profitability (P4) ⟶ Overall Use of BABIS

Table 4.57: Model : 4 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
4	.900[a]	.810	.809	.26340
a. Predictors: (Constant), Overall Use of BABIS				

The table shows the model 4 summary which includes the correlation and error values. R-value of 0.900 shows strong positive correlation between organization performance measure profitability (P4) and overall use of BABIS also the R Square value of 0.810 support the results.

Table 4.58: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
4	Regression	58.618	1	58.618	844.912	.000[b]
	Residual	13.737	198	.069		
	Total	**72.355**	**199**			
a. Dependent Variable: Performance : Profitability (P4)						
b. Predictors: (Constant), Overall Use of BABIS						

The ANOVA test results with F-statistic value of 58.618 and the corresponding p-value of 0.00 confirms that the model is significant enough as the p-value is found to be lesser than the standard alpha value of 0.05. This concludes that there is significant association between "Overall Use of BABIS" and "Performance: Profitability (P4)" further it can be interpreted that overall use of BABIS is very important factor or aspect while explaining the variability in profitability (P4).

Table 4.59: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
4	(Constant)	.199	.136		1.463	.145
	Overall Use of BABIS	.947	.033	.900	29.067	.000
a. Dependent Variable: Performance: Profitability (P4)						

The regression equation showing the relationship between "Overall Use of BABIS" and "Performance: Profitability (P4)" can be represented as:

Performance: Profitability (P4) = 0.947 (Overall Use of BABIS) + 0.199

So, in summary, the equation tells that there is a positive relationship between "Overall Use of BABIS" and "Performance: Profitability (P4)." As the use of BABIS increases, the performance metric related to profitability (P4) is expected to improve or increase, based on the coefficient provided in the equation. This suggests that the use of BABIS is associated with higher profitability.

Model 5: Association between organization performance measure customer loyalty (P5) and overall use of BABIS.

Performance: Customer loyalty (P5) ⟶ Overall Use of BABIS

Table 4.60: Model : 5 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
5	.821[a]	.674	.672	.40973
a. Predictors: (Constant), Overall Use of BABIS				

The table shows the model 5 summary which includes the correlation and error values. R-value of 0.821 shows strong positive correlation between organization performance measure customer loyalty (P5) and overall use of BABIS also the R Square value of 0.674 support the results.

Table 4.61: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
5	Regression	68.635	1	68.635	408.839	.000[b]
	Residual	33.240	198	.168		
	Total	**101.875**	**199**			
a. Dependent Variable: Performance : Customer loyalty (P5)						
b. Predictors: (Constant), Overall Use of BABIS						

The ANOVA test results with F-statistic value of 408.839 and the corresponding p-value of 0.00 confirms that the model is significant enough as the p-value is found to be lesser than the standard alpha value of 0.05. This concludes that there is significant association between "Overall Use of BABIS" and "Performance: Customer loyalty (P5)" further it can be interpreted that overall use of BABIS is very important factor or aspect while explaining the variability in customer loyalty (P5).

Table 4.62: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
5	(Constant)	-.162	.212		-.768	.443
	Overall Use of BABIS	1.025	.051	.821	20.220	.000
a. Dependent Variable: Performance : Customer loyalty (P5)						

The regression equation showing the relationship between "Overall Use of BABIS" and "Performance: Customer loyalty (P5)" can be represented as:

Performance: Customer loyalty (P5) = 1.025 (Overall Use of BABIS) – 0.162

So, in summary, the equation tells that there is a positive relationship between "Overall Use of BABIS" and "Performance: Customer Loyalty (P5)." As the use of BABIS increases, customer loyalty is expected to increase, based on the coefficient provided in the equation. However, it's important to note that the intercept term is negative, which implies that very low or no use of BABIS might have a negative impact on customer loyalty.

4.8 BIG DATA ANALYTICS & BUSINESS INTELLIGENT SYSTEM AND ECONOMIC / FINANCIAL PERFORMANCE:

H_02 : Big data analytics & business intelligent system do not have better economic and financial performance.

H_a2 : Big data analytics & business intelligent system have better economic and financial performance.

Model 6: Association between big data analytics & business intelligent system economic and financial performance.

Economic and Financial Performance ⟶ Overall Use of BABIS

Table 4.63: Model : 6 Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
6	.730[a]	.533	.531	.47771
a. Predictors: (Constant), Overall Use of BABIS				

The table shows the model 5 summary which includes the correlation and error values. R-value of 0.730 shows strong positive correlation between Economic / Financial Performance and overall use of BABIS also the R Square value of 0.533 support the results.

Table 4.64: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
6	Regression	51.570	1	51.570	225.983	.000[b]
	Residual	45.185	198	.228		
	Total	**96.755**	**199**			
a. Dependent Variable: Economic & Financial Performance						
b. Predictors: (Constant), Overall Use of BABIS						

The ANOVA test results with F-statistic value of 225.983 and the corresponding p-value of 0.00 confirms that the model is significant enough as the p-value is found to be lesser than the standard alpha value of 0.05. This concludes that there is significant association between "Overall Use of BABIS" and "Performance: Economic & Financial" further it can be interpreted that overall use of BABIS is very important factor or aspect while explaining the variability in Economic / Financial performance.

Table 4.65: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
6	(Constant)	.362	.247		1.467	.144
	Overall Use of BABIS	.888	.059	.730	15.033	.000
a. Dependent Variable: Economic & Financial Performance						

The regression equation showing the relationship between "Overall Use of BABIS" and " Economic & Financial Performance" can be represented as:

Economic & Financial Performance = 0.888 (Overall Use of BABIS) + 0.362

So, in summary, the equation tells that there is a positive relationship between "Overall Use of BABIS" and "Economic & Financial Performance". As the use of BABIS increases, Economic & Financial Performance is expected to increase, based on the coefficient provided in the equation.

4.9 IMPACT OF BABIS SYSTEM ON DECISION MAKING:

H_03 : There is no significant difference between the impact of big data analytics & business intelligence system on decision making in both type of organizations (Private and Public).

H_a3 : There is significant difference between the impact of big data analytics & business intelligence system on decision making in both type of organizations (Private and Public).

Type of Organization and Decision effectiveness:

$H_03.1$: There is no significant difference between the impact of big data analytics & business intelligence system on decision effectiveness in both type of organizations (Private and Public).

The table below shows the cross tabulation between type of organization and decision effectiveness in order to find dependency between them.

Table 4.66: Crosstabulation: Decision effectiveness and Type of Organization

		Managerial Decision Making: Decision effectiveness				**Total**
		Very Low	**Low**	**Medium**	**High**	
Type of Org.	Private	7	34	19	40	100
	Public	0	12	0	88	100
Total		**7**	**46**	**19**	**128**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and "Managerial Decision Making: Decision effectiveness." Accordingly, the Chi-Square test results are shown below in the table:

Table 4.67: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	54.522[a]	3	.000
Likelihood Ratio	65.456	3	.000
N of Valid Cases	200		
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 3.50.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis $H_0$3.1 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant difference between the impact of big data analytics & business intelligence system on decision effectiveness in both type of organizations (Private and Public).

Type of Organization and Accuracy/correctness of decision making:

$H_0$3.2 : There is no significant difference between the impact of big data analytics & business intelligence system on accuracy/correctness of decision making in both type of organizations (Private and Public).

The table below shows the cross tabulation between type of organization and accuracy/correctness of decision making in order to find dependency between them.

Table 4.68: Crosstabulation: Accuracy/correctness of decision making and Type of Organization

		Accuracy/correctness of decision making and Type of Organization					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	31	7	0	50	12	100
	Public	7	0	5	67	21	100
Total		**38**	**7**	**5**	**117**	**33**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and "Managerial Decision Making: accuracy/correctness of decision making" Accordingly, the Chi-Square test results are shown below in the table:

Table 4.69: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	32.083[a]	4	.000
Likelihood Ratio	37.973	4	.000
N of Valid Cases	200		
a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 2.50.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis $H_0$3.2 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant difference between the impact of big data analytics & business intelligence system on accuracy/correctness of decision making in both type of organizations (Private and Public).

Type of Organization and Timeliness/speed of decision making:

$H_0$3.3 : There is no significant difference between the impact of big data analytics & business intelligence system on timeliness/speed of decision making in both type of organizations (Private and Public).

The table below shows the cross tabulation between type of organization and timeliness/speed of decision making in order to find dependency between them.

Table 4.70: Crosstabulation: Timeliness/speed of decision making and Type of Organization

		Timeliness/speed of decision making and Type of Organization					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	1	0	18	40	41	100
	Public	3	14	0	28	55	100
Total		**4**	**14**	**18**	**68**	**96**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and "Managerial Decision Making: timeliness/speed of decision making" Accordingly, the Chi-Square test results are shown below in the table:

Table 4.71: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	37.159[a]	4	.000
Likelihood Ratio	49.586	4	.000
N of Valid Cases	200		
a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 2.00.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis $H_0$3.3 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant difference between the impact of big data analytics & business intelligence system on timeliness/speed of decision making in both type of organizations (Private and Public).

Type of Organization and Managerial Decision Making- rationale/informed decisions:

$H_0$3.4 : There is no significant difference between the impact of big data analytics & business intelligence system on rationale/informed decisions in both type of organizations (Private and Public).

The table below shows the cross tabulation between type of organization and rationale/informed decisions in order to find dependency between them.

Table 4.72: Crosstabulation: Rationale/Informed Decisions and Type of Organization

		Rationale/Informed decisions				Total
		Low	Medium	High	Very High	
Type of Org.	Private	0	13	26	61	100
	Public	1	19	54	26	100
Total		**1**	**32**	**80**	**87**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and "Managerial Decision Making: rationale/informed decisions" Accordingly, the Chi-Square test results are shown below in the table:

Table 4.73: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	26.005[a]	3	.000
Likelihood Ratio	27.016	3	.000
N of Valid Cases	200		
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is .50.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis $H_0$3.4 is being rejected, indicating strong evidence against the null hypothesis further it can be

concluded that there is significant difference between the impact of big data analytics & business intelligence system on rationale/informed decisions in both type of organizations (Private and Public).

Type of Organization and Decision Making Related to Key Indicators:

$H_0$3.5 : There is no significant difference between the impact of big data analytics & business intelligence system on decision making related to key indicators in both type of organizations (Private and Public).

The table below shows the cross tabulation between type of organization and decision making related to key indicators in order to find dependency between them.

Table 4.74: Crosstabulation: Decision Making Related to Key Indicators and Type of Organization

		Managerial Decision Making: Decision Making Related to Key Indicators					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	11	11	25	4	49	100
	Public	0	3	34	26	37	100
Total		**11**	**14**	**59**	**30**	**86**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and "Managerial Decision Making: decision making related to key indicators" Accordingly, the Chi-Square test results are shown below in the table:

Table 4.75: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	34.752[a]	4	.000
Likelihood Ratio	41.196	4	.000
N of Valid Cases	200		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.50.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis $H_0 3.5$ is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant difference between the impact of big data analytics & business intelligence system on decision making related to key indicators in both type of organizations (Private and Public).

4.10 BABIS SUCCESS FACTORS AND TYPE OF ORGANIZATION:

$H_0 4$: There is no significant relationship between big data & business intelligence system success factors and type of organizations.

$H_0 4$: There is significant relationship between big data & business intelligence system success factors and type of organizations.

Type of Organization and Data volume adequacy:

$H_0 4.1$: There is no significant relationship between big data & business intelligence system success factor: data volume adequacy and type of organizations.

The table below shows the cross tabulation between type of organization and Data Quality: Data volume adequacy in order to find dependency between them.

Table 4.76: Crosstabulation: Data Volume Adequacy and Type of Organization

		Data Quality: Data volume adequacy				Total
		Very Low	Medium	High	Very High	
Type of Org.	Private	0	33	62	5	100
	Public	7	0	93	0	100
Total		**7**	**33**	**155**	**5**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, “Type of Organization” and “Data Quality: Data volume adequacy”. Accordingly, the Chi-Square test results are shown below in the table:

Table 4.77: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	51.200[a]	3	.000
Likelihood Ratio	68.625	3	.000
N of Valid Cases	200		
a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 2.50.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 4.1 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is a significant relationship between big data & business intelligence system success factor: data volume adequacy and type of organizations (Private and Public).

Type of Organization and Data Access:

H_0 4.2 **:** There is no significant relationship between big data & business intelligence system success factor: data Access and type of organizations.

The table below shows the cross tabulation between type of organization and data access in order to find dependency between them.

Table 4.78: Crosstabulation: Data Quality: Access and Type of Organization

		Data Quality: Access				Total
		Low	Medium	High	Very High	
Type of Org.	Private	46	4	19	31	100
	Public	0	24	26	50	100
Total		**46**	**28**	**45**	**81**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and “data access”. Accordingly, the Chi-Square test results are shown below in the table:

Table 4.79: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	65.831[a]	3	.000
Likelihood Ratio	85.211	3	.000
N of Valid Cases	200		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 14.00.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 4.2 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is a significant relationship between big data & business intelligence system success factor: data access and type of organizations (Private and Public).

Type of Organization and Data Quality: Use:

H_0 4.3 **:** There is no significant relationship between big data & business intelligence system success factor data quality: use and type of organizations.

The table below shows the cross tabulation between type of organization and data quality: use in order to find dependency between them.

Table 4.80: Crosstabulation: Data Quality: Use and Type of Organization

		Data Quality: Use					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	26	4	0	34	36	100
	Public	0	0	27	50	23	100
Total		**26**	**4**	**27**	**84**	**59**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and “Data Quality: Use”. Accordingly, the Chi-Square test results are shown below in the table:

Table 4.81: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	62.912[a]	4	.000
Likelihood Ratio	84.973	4	.000
N of Valid Cases	200		
a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 2.00.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 4.3 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant relationship between big data & business intelligence system success factor: data quality: use and type of organizations (Private and Public).

Type of Organization and Data Variety: Diversity of Unstructured Data – Access:

H_0 4.4 : There is no significant relationship between big data & business intelligence system success factor diversity of unstructured data: access and type of organizations.

The table below shows the cross tabulation between type of organization and diversity of unstructured data: access in order to find dependency between them.

Table 4.82: Crosstabulation: Diversity of Unstructured Data – Access and Type of Organization

		Data Variety: Diversity of Unstructured Data – Access					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	24	6	15	51	4	100
	Public	0	0	50	50	0	100
Total		**24**	**6**	**65**	**101**	**4**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and " Data Variety: Diversity of Unstructured Data – Access". Accordingly, the Chi-Square test results are shown below in the table:

Table 4.83: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	52.856[a]	4	.000
Likelihood Ratio	67.027	4	.000
N of Valid Cases	200		
a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 2.00.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 4.4 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant relationship between big data & business intelligence system success factor diversity of unstructured data: access and type of organizations

Type of Organization and Data Variety: Diversity of Unstructured Data – Use:

H_0 4.5 : There is no significant relationship between big data & business intelligence system success factor diversity of unstructured data - use and type of organizations.

The table below shows the cross tabulation between type of organization and diversity of unstructured data - use in order to find dependency between them.

Table 4.84: Crosstabulation: Diversity of Unstructured Data (Use) and Type of Orgabization

		Data Variety: Diversity of Unstructured Data – Use					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	2	12	16	26	44	100
	Public	0	17	31	50	2	100
Total		**2**	**29**	**47**	**76**	**46**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and "Data Variety: Diversity of Unstructured Data – Use". Accordingly, the Chi-Square test results are shown below in the table:

Table 4.85: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	53.576[a]	4	.000
Likelihood Ratio	63.537	4	.000
N of Valid Cases	200		
a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 1.00.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 4.5 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant relationship between big data & business intelligence system success factor diversity of unstructured data - use and type of organizations.

Type of Organization and Data Velocity: Rate of Change of Data – Access:

H_0 4.6 **:** There is no significant relationship between big data & business intelligence system success factor rate of change of data – access and type of organizations.

The table below shows the cross tabulation between type of organization and rate of change of data – access in order to find dependency between them.

Table 4.86: Crosstabulation: Rate of Change of Data – Access and Type of Organization

Count							
		Data Velocity: Rate of Change of Data - Access					**Total**
		Very Low	**Low**	**Medium**	**High**	**Very High**	
Type of Org.	Private	7	33	32	0	28	100
	Public	0	50	48	2	0	100
Total		**7**	**83**	**80**	**2**	**28**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, “Type of Organization” and “Data Velocity: Rate of Change of Data – Access”. Accordingly, the Chi-Square test results are shown below in the table:

Table 4.87: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	43.682[a]	4	.000
Likelihood Ratio	58.021	4	.000
N of Valid Cases	200		
a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 1.00.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 4.6 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant relationship between big data & business intelligence system success factor rate of change of data – access and type of organizations.

Type of Organization and Data Velocity: Rate of Change of Data-Use:

H_0 4.7 **:** There is no significant relationship between big data & business intelligence system success factor rate of change of data-use and type of organizations.

The table below shows the cross tabulation between type of organization and rate of change of data-use in order to find dependency between them.

Table 4.88: Crosstabulation: Rate of Change of Data (Use) and Type of Organization

		Data Velocity: Rate of Change of Data : Use				Total
		Very Low	Low	Medium	High	
Type of Org.	Private	8	18	55	19	100
	Public	0	0	62	38	100
Total		**8**	**18**	**117**	**57**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, “Type of Organization” and “Data Velocity: Rate of Change of Data-Use” Accordingly, the Chi-Square test results are shown below in the table:

Table 4.89: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	32.752[a]	3	.000
Likelihood Ratio	42.919	3	.000
N of Valid Cases	200		
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 4.00.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 4.7 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant relationship between big data & business intelligence system success factor rate of change of data-use and type of organizations.

Type of Organization and User Satisfaction: Effectiveness & efficiency of BI system:

H_0 4.8 **:** There is no significant relationship between big data & business intelligence system success factor user satisfaction: effectiveness & efficiency of BI system and type of organizations.

The table below shows the cross tabulation between type of organization and user satisfaction: effectiveness & efficiency of BI system in order to find dependency between them.

Table 4.90: Crosstabulation: User Satisfaction: Effectiveness & Efficiency of BI System and Type of Organization

		User Satisfaction: Effectiveness & Efficiency of BI System					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	18	15	12	38	17	100
	Public	0	0	25	50	25	100
Total		**18**	**15**	**37**	**88**	**42**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and "User Satisfaction: Effectiveness & Efficiency of BI System". Accordingly, the Chi-Square test results are shown below in the table:

Table 4.91: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	40.728[a]	4	.000
Likelihood Ratio	53.589	4	.000
N of Valid Cases	200		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.50.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 4.8 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant relationship between big data & business intelligence system success factor user satisfaction: effectiveness & efficiency of BI system and type of organizations.

Type of Organization and User Satisfaction: Suitability/task relevance of BI information:

H_0 4.9 **:** There is no significant relationship between big data & business intelligence system success factor user satisfaction: suitability/task relevance of BI information and type of organizations.

The table below shows the cross tabulation between type of organization and user satisfaction: suitability/task relevance of BI information in order to find dependency between them.

Table 4.92: Crosstabulation: User Satisfaction: Suitability/Task Relevance of BI information and Type of Organization

		User Satisfaction: Suitability/Task Relevance of BI info.			Total
		Very Low	High	Very High	
Type of Org.	Private	31	29	40	100
	Public	0	50	50	100
Total		**31**	**79**	**90**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and "User Satisfaction: Suitability/task relevance of BI information". Accordingly, the Chi-Square test results are shown below in the table:

Table 4.93: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	37.693[a]	2	.000
Likelihood Ratio	49.738	2	.000
N of Valid Cases	200		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.50.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 4.9 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant relationship between big data & business intelligence system success factor user satisfaction: suitability/task relevance of BI information and type of organizations.

Type of Organization and User Satisfaction: BI system meeting user requirements:

H_0 4.10 : There is no significant relationship between big data & business intelligence system success factor user satisfaction: BI system meeting user requirements and type of organizations.

The table below shows the cross tabulation between type of organization and user satisfaction: BI system meeting user requirements in order to find dependency between them.

Table 4.94: Crosstabulation: User Satisfaction: BI System Meeting User Requirements and Type of Organization

		User Satisfaction: BI system meeting user requirements					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	12	21	28	39	0	100
	Public	0	20	17	52	11	100
Total		**12**	**41**	**45**	**91**	**11**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and "User Satisfaction: BI system meeting user requirements". Accordingly, the Chi-Square test results are shown below in the table:

Table 4.95: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	27.570[a]	4	.000
Likelihood Ratio	36.489	4	.000
N of Valid Cases	200		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.50.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 4.10 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant relationship between big data & business intelligence system success factor user satisfaction: BI system meeting user requirements and type of organizations.

Type of Organization and User Satisfaction: General end-user satisfaction with BI system:

H_0 4.11 : There is no significant relationship between big data & business intelligence system success user satisfaction: general end-user satisfaction with BI system and type of organizations.

The table below shows the cross tabulation between type of organization and user satisfaction: general end-user satisfaction with bi system in order to find dependency between them.

Table 4.96: Crosstabulation: User Satisfaction: General End-User Satisfaction with BI System and Type of Organization

		User Satisfaction: General end-user satisfaction with BI system				Total
		Very Low	Low	High	Very High	
Type of Org.	Private	12	7	40	41	100
	Public	0	0	50	50	100
Total		**12**	**7**	**90**	**91**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and "User Satisfaction: General End-User Satisfaction with BI System". Accordingly, the Chi-Square test results are shown below in the table:

Table 4.97: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	21.001[a]	3	.000
Likelihood Ratio	28.345	3	.000
N of Valid Cases	200		
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 3.50.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 4.11 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant relationship between big data & business intelligence

system success User Satisfaction: general end-user satisfaction with BI system and type of organizations.

Type of Organization and Decisions about New Products/Services/Market:

H_0 4.12 : There is no significant relationship between big data & business intelligence system success factor decisions about new products/services/market and type of organizations.

The table below shows the cross tabulation between type of organization and decisions about new products/services/market in order to find dependency between them.

Table 4.98: Crosstabulation: Decisions about New Products/Services/Market and Type of Organization

		Decisions about New Products/Services/Market					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	3	0	13	72	12	100
	Public	17	14	22	27	20	100
Total		**20**	**14**	**35**	**99**	**32**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and "Decisions about New Products/Services/Market ". Accordingly, the Chi-Square test results are shown below in the table:

Table 4.99: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	48.569[a]	4	.000
Likelihood Ratio	55.812	4	.000
N of Valid Cases	200		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.00.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 4.12 is being rejected, indicating strong evidence against the null hypothesis further it can be

concluded that there is significant relationship between big data & business intelligence system success factor decisions about new products/services/market and type of organizations.

Type of Organization and Decisions about Strategic/Key Suppliers:

H_0 4.13 : There is no significant relationship between big data & business intelligence system success factor decisions about strategic/key suppliers and type of organizations.

The table below shows the cross tabulation between type of organization and decisions about strategic/key suppliers in order to find dependency between them.

Table 4.100: Crosstabulation: Type of Organization and Decisions about Strategic/Key Suppliers

		Decisions about Strategic/Key Suppliers					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	8	17	28	29	18	100
	Public	0	17	31	38	14	100
Total		**8**	**34**	**59**	**67**	**32**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and "Decisions about Strategic/Key Suppliers ". Accordingly, the Chi-Square test results are shown below in the table:

Table 4.101: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.861[a]	4	.043
Likelihood Ratio	12.957	4	.011
N of Valid Cases	200		
a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 4.00.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 4.13 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant relationship between big data & business intelligence system success factor decisions about strategic/key suppliers and type of organizations.

Type of Organization and Decisions about Outsourcing/BPM:

H_0 4.14 : There is no significant relationship between big data & business intelligence system success factor decisions about outsourcing/BPM and type of organizations.

The table below shows the cross tabulation between type of organization and decisions about outsourcing/BPM in order to find dependency between them.

Table 4.102: Crosstabulation: Decisions about Outsourcing/BPM and Type of Organization

		Decisions about Outsourcing/BPM					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	12	26	9	37	16	100
	Public	23	17	37	8	15	100
Total		**35**	**43**	**46**	**45**	**31**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and "Decisions about Outsourcing/BPM". Accordingly, the Chi-Square test results are shown below in the table:

Table 4.103: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	41.105[a]	4	.000
Likelihood Ratio	44.002	4	.000
N of Valid Cases	200		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 15.50.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 4.14 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant relationship between big data & business intelligence system success factor decisions about outsourcing/BPM and type of organizations.

Type of Organization and Decisions about Sales and Marketing:

H_0 4.15 : There is no significant relationship between big data & business intelligence system success factor decisions about sales and marketing and type of organizations.

The table below shows the cross tabulation between type of organization and decisions about sales and marketing in order to find dependency between them.

Table 4.104: Crosstabulation: Decisions about Sales and Marketing & Type of Organization

		Decisions about Sales and Marketing					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	12	10	13	36	29	100
	Public	15	8	14	20	43	100
Total		**27**	**18**	**27**	**56**	**72**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, "Type of Organization" and "Decisions about Sales and Marketing". Accordingly, the Chi-Square test results are shown below in the table:

Table 4.105: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	7.886[a]	4	.096
Likelihood Ratio	7.969	4	.093
N of Valid Cases	200		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.00.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is 0.096 and 0.093 respectively. This p-value is greater than the standard alpha value of 0.05. So, the null hypothesis H_0 4.15 is being accepted, indicating strong evidence in favour of the null hypothesis further it can be concluded that there is no significant relationship between big data & business intelligence system success factor decisions about sales and marketing and type of organizations.

4.11 IMPACT OF BIG DATA ANALYTICS & BUSINESS INTELLIGENT SYSTEM ON ADMINISTRATIVE EFFECTIVENESS:

H_05 : There is no significant impact of big data analytics & business intelligent system on administrative effectiveness of private and public sector organizations in India.

H_a5 : There is significant impact of big data analytics & business intelligent system on administrative effectiveness of private and public sector organizations in India.

The table below shows the cross tabulation between type of organization and administrative effectiveness in order to find dependency between them.

Table 4.106: Type of Organization and Administrative Effectiveness: Crosstabulation

		Administrative Effectiveness					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	2	5	8	26	59	100
	Public	0	0	15	47	38	100
Total		**2**	**5**	**23**	**73**	**97**	**200**

The Chi-Square Test is used to determine whether there is a statistically significant association between the two categorical variables, “Type of Organization” and “Administrative Effectiveness”. Accordingly, the Chi-Square test results are shown below in the table:

Table 4.107: Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	19.718[a]	4	.001
Likelihood Ratio	22.579	4	.000
N of Valid Cases	200		
a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 1.00.			

The p-value for both the Pearson Chi-Square Test and the Likelihood Ratio Test is .001. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 5 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is significant impact of big data analytics & business intelligent system on administrative effectiveness of private and public sector organizations in India.

$H_0$6 : There is no impact of big data analytics & business intelligent system on the effectiveness of organizations in Indian perspective.

H_a6 : There is impact of big data analytics & business intelligent system on the effectiveness of organizations in Indian perspective.

The table below shows the one sample statistics for user satisfaction: effectiveness & efficiency of BABIS system which includes mean, standard deviation and standard error mean with values 3.6050, 1.16437 and 0.08233 respectively.

Table 4.108: One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
User Satisfaction: Effectiveness & efficiency of BABIS system	200	3.6050	1.16437	.08233

The T-Test is being used to determine whether there is a statistically significant association between big data analytics & business intelligent system and effectiveness of organizations. Accordingly, the one sample T-Test results are shown below in the table:

Table 4.109: One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Effectiveness & efficiency of BABIS system	43.785	199	.000	3.60500	3.4426	3.7674

The p-value for both the one sample T- Test is .000. This p-value is lesser than the standard alpha value of 0.05. So, the null hypothesis H_0 6 is being rejected, indicating strong evidence against the null hypothesis further it can be concluded that there is impact of big data analytics & business intelligent system on the effectiveness of organizations in Indian perspective.

CHAPTER – 5

FINDINGS, RECOMMENDATIONS & CONCLUSIONS

CHAPTER - 5

FINDINGS, RECOMMENDATIONS & CONCLUSIONS

5.1 MAJOR FINDINGS:

Big Data Analytics (BDA) and Business Intelligence Systems (BIS) play a pivotal role in modern organizations by providing data-driven insights that enhance decision-making, operational efficiency, and strategic planning. They enable businesses to harness valuable information, optimize processes, and remain competitive in a data-centric environment. Their importance lies in their ability to turn raw data into actionable intelligence, driving business success.

- A significant majority of respondents, approximately 36%, held the view that there is a high utilization of BI planning/reporting suites in Indian companies for managing big data and implementing analytics for business solutions. Additionally, about 28.5% of respondents expressed agreement with this perspective, while 16% indicated a belief in very low usage of such suites in this context.

- 22% respondents confirmed that business analytics and business intelligence systems are very highly used in data visualization tasks in the organization both public and private, also about 28% confirmed that these systems have high usage whereas 18% in total were against the above-mentioned view point.

- In total, approximately 23% of the respondents believed that AI-enabled BI tools primarily serve the purpose of predictive modelling within companies, while around 54% of respondents disagreed with this viewpoint. Additionally, 23% of respondents remained unsure about the role of AI-enabled BI tools in this context.

- Among the respondents, approximately 41.5% strongly supported the idea that Business Intelligence Systems (BIS) are beneficial for statistical analysis, while 26% agreed that Business Analytics and BIS are employed for statistical data analysis. Conversely, about 8% of respondents held a contrary perspective on this matter.

- 2.5% respondents strongly agreed that BA-BIS are used for data quality: data volume adequacy, 77.5% were also in agreement, around 16.5% respondents as BA-BIS users were not sure about it whereas about 3.5% disagreed with the statement and none were strongly in disagreement with view point.

- The majority of respondents, comprising 64%, strongly supported the notion that Business Analytics (BA) and Business Intelligence Systems (BIS) are instrumental in facilitating effective decision-making within organizations. However, around 9.5% of BA-BIS users remained uncertain about this aspect, while approximately 23% disagreed with the statement to varying degrees. A smaller percentage, approximately 3.5%, held a strong disagreement with this viewpoint, indicating a diverse range of perspectives within the respondent group.

- Majority of respondents about 36% strongly agreed that Business analytics and intelligent systems are being used for decision making in sales and marketing whereas about 13.5% strongly disagreed with the above-mentioned view point.

5.2 HYPOTHESES TESTING RESULTS:

The incorporation of Big Data Analytics and Business Intelligence Systems has the potential to substantially boost organizational performance. These tools enable data-driven decision-making, enhance operational efficiency, and foster innovation. However, their success hinges on strategic implementation, skilled personnel, data security measures, and a commitment to data quality and continuous improvement. When wielded effectively, they can be a pivotal asset in achieving and maintaining competitiveness in today's data-centric business landscape.

5.2.1 Big Data Analytics and Business Intelligence Systems and Organizational Performance:

$H_0$1: Big data analytics and business intelligence system do not have a significant impact on organizations performance.

H_a1: Big data analytics and business intelligence system have a significant impact on organizations performance.

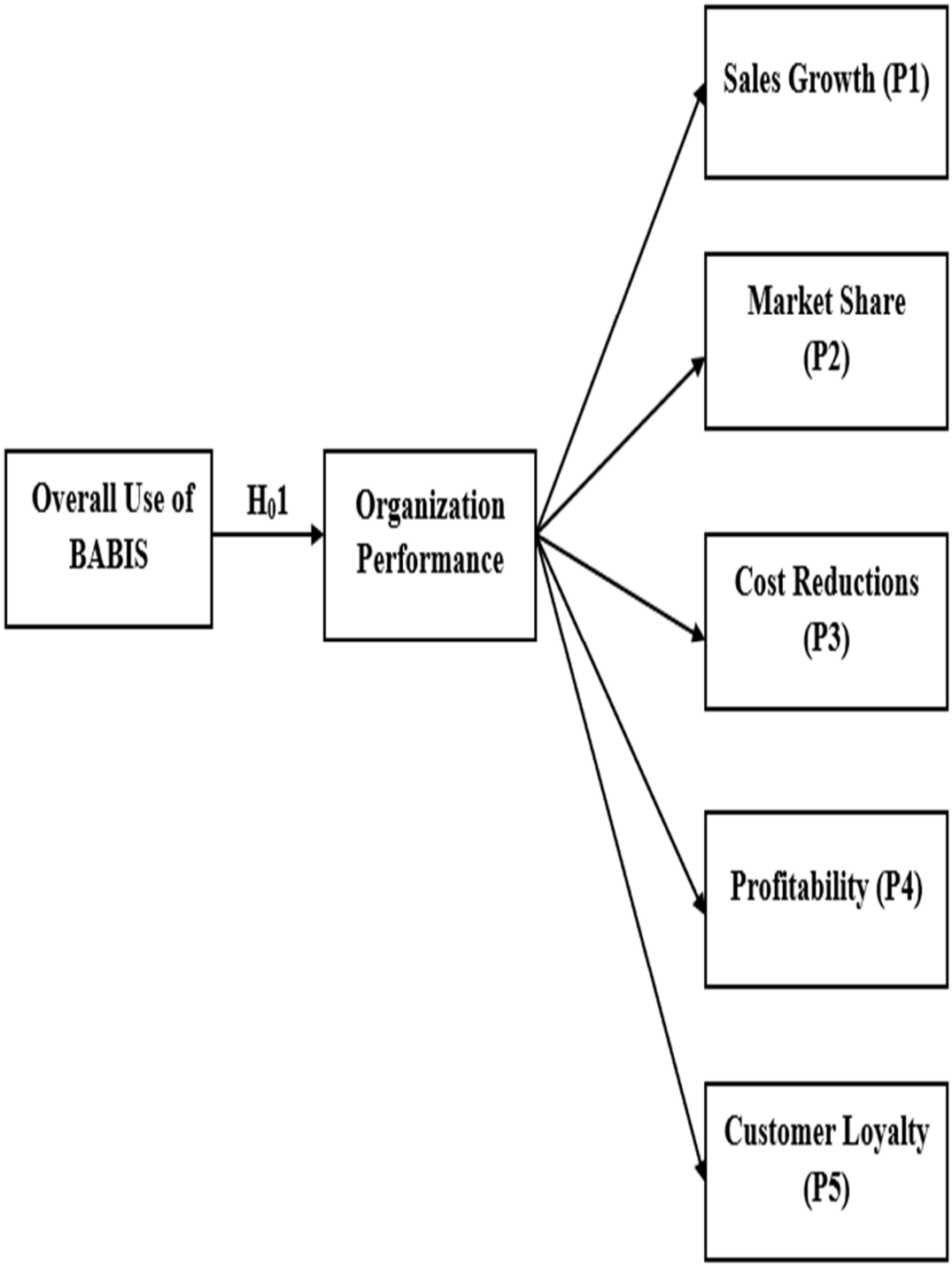

Figure 5.1: Relationship between Overall Use of BABIS & Organization Performance

Sales Growth and Overall Use of BABIS:

$H_0$1.1: There is no association between organization performance measure sales growth (P1) and overall use of BABIS.

H_a1.1: There is association between organization performance measure sales growth (P1) and overall use of BABIS

Performance: Sales Growth (P1) $\xrightarrow{\mathbf{H_0 1.1}}$ Overall Use of BABIS

Results: The null hypothesis was being rejected as p-value was found to be lower than the standard alpha value of 0.05 which suggest that the alternate hypothesis is found to be significant enough and it can be concluded that there is association between organization performance measure sales growth (P1) and overall use of BABIS.

The relationship between organization performance measure sales growth (P1) and overall use of BABIS can be represented in form as shown below:

Performance: Sales Growth (P1) = 0.943 (Overall Use of BABIS) + 0.249

Market Share and Overall Use of BABIS:

$H_0$1.2: There is no association between organization performance measure market share (P2) and overall use of BABIS.

H_a1.2: There is association between organization performance measure market share (P2) and overall use of BABIS.

Performance: Market Share (P2) $\xrightarrow{\mathbf{H_0 1.2}}$ Overall Use of BABIS

Results: The null hypothesis was being rejected as p-value was found to be lower than the standard alpha value of 0.05 which suggest that the alternate hypothesis is being accepted and finally it can be concluded that there is association between organization performance measure market share (P2) and overall use of BABIS.

The relationship between organization performance measure market share (P2) and overall use of BABIS can be represented in form of model as shown below:

Performance: Market Share (P2) = 0.839 (Overall Use of BABIS) + 0.610

Cost Reductions and Overall Use of BABIS:

$H_0$1.3: There is no association between organization performance measure cost reductions (P3) and overall use of BABIS.

H_a1.3: There is association between organization performance measure cost reductions (P3) and overall use of BABIS.

Performance: Cost Reductions (P3) $\xrightarrow{\mathbf{H_0 1.3}}$ Overall Use of BABIS

Results: The null hypothesis was being rejected as p-value was found to be lower than the standard alpha value of 0.05 which suggest that the alternate hypothesis is being accepted and finally it can be concluded that there is association between organization performance measure cost reductions (P3) and overall use of BABIS.

The relationship between organization performance measure cost reductions (P3) and overall use of BABIS can be represented in form of model as shown below:

Performance: Cost Reductions (P3) = 0.807 (Overall Use of BABIS) + 0.782

Profitability and Overall Use of BABIS:

$H_0$1.4: There is no association between organization performance measure profitability (P4) and overall use of BABIS.

H_a1.4: There is association between organization performance measure profitability (P4) and overall use of BABIS.

Performance: Profitability (P4) $\xrightarrow{\mathbf{H_0 1.4}}$ Overall Use of BABIS

Results: The null hypothesis was being rejected as p-value was found to be lower than the standard alpha value of 0.05 which suggest that the alternate hypothesis is being accepted and finally it can be concluded that there is association between organization performance measure profitability (P4) and overall use of BABIS.

The relationship between organization performance measure profitability (P4) and overall use of BABIS can be represented in form of model as shown below:

Performance: Profitability (P4) = 0.947 (Overall Use of BABIS) + 0.199

Customer Loyalty and Overall Use of BABIS:

$H_0$1.5: There is no association between organization performance measure customer loyalty (P5) and overall use of BABIS.

H_a1.5: There is association between organization performance measure customer loyalty (P5) and overall use of BABIS.

Performance: Customer Loyalty (P5) $\xrightarrow{\mathbf{H_0 1.5}}$ Overall Use of BABIS

Results: The null hypothesis was being rejected as p-value was found to be lower than the standard alpha value of 0.05 which suggest that the alternate hypothesis is being accepted and finally it can be concluded that there is association between organization performance measure customer loyalty (P5) and overall use of BABIS.

The relationship between organization performance measure customer loyalty (P5) and overall use of BABIS can be represented in form of model as shown below:

Performance: Customer loyalty (P5) = 1.025 (Overall Use of BABIS) – 0.162

It was found that majority of the sub hypotheses were being rejected which concludes that the null $H_0$1: "Big data analytics and business intelligence system do not have a significant impact on organizations performance" is being rejected. The research findings indicate that there is indeed a significant impact of big data analytics and business intelligence systems on organizational performance. This suggests that these technologies play a substantial and positive role in influencing how organizations operate and perform, aligning with the hypothesis that their implementation can yield tangible benefits and improvements in various aspects of organizational functioning.

5.2.2 BA & BIS and Economic/Financial Performance:

$H_0$2: Big data analytics & business intelligent system do not have better economic and financial performance.

H_a2: Big data analytics & business intelligent system have better economic and financial performance.

Economic and Financial Performance $\xrightarrow{\mathbf{H_0 2}}$ Overall Use of BABIS

Results: The null hypothesis was being rejected as p-value was found to be lesser than the standard alpha value of 0.05 which suggest that the alternate hypothesis is being accepted and finally it can be concluded that big data analytics & business intelligent system have better economic and financial performance.

The relationship between economic and financial performance and overall use of BABIS can be represented in form of model as shown below:

Economic & Financial Performance = 0.888 (Overall Use of BABIS) + 0.362

5.2.3 BABIS System and Decision Making:

$H_0$3: There is no significant difference between the impact of big data analytics & business intelligence system on decision making in both type of organizations (Private and Public).

H_a3: There is significant difference between the impact of big data analytics & business intelligence system on decision making in both type of organizations (Private and Public).

The null hypothesis $H_0$3 was being divided into sub hypotheses as shown below in the table with hypothesis testing results.

Table 5.1: $H_0$3 Sub-Hypotheses Testing Results

Hypothesis	Statement	Test Statistics	Result
$H_0$3.1	There is no significant difference between the impact of big data analytics & business intelligence system on decision effectiveness in both type of organizations (Private and Public).	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$3.2	There is no significant difference between the impact of big data analytics & business intelligence system on accuracy/correctness of decision making in both type of organizations (Private and Public).	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$3.3	There is no significant difference between the impact of big data analytics & business intelligence system on timeliness/speed of decision making in both type of organizations (Private and Public).	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$3.4	There is no significant difference between the impact of big data analytics & business intelligence system on rationale/informed decisions in both type of organizations (Private and Public).	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$3.5	There is no significant difference between the impact of big data analytics & business intelligence system on decision making related to key indicators in both type of organizations (Private and Public).	Chi-Square Test P-Value (0.00) < 0.05	Rejected

Finally, it can be concluded that all the sub hypotheses were being rejected confirming that the alternate hypothesis is being accepted and there is significant difference between the impact of big data analytics & business intelligence system on decision making in both type of organizations (Private and Public).

5.2.4 Success Factors and Organization Type:

H_0 4: There is no significant relationship between big data & business intelligence system success factors and type of organizations.

H_0 4: There is significant relationship between big data & business intelligence system success factors and type of organizations.

Table 5.2: $H_0$4 Sub-Hypotheses Testing Results

Hypothesis	Statement	Test Statistics	Result
$H_0$4.1	There is no significant relationship between big data & business intelligence system success factor: data volume adequacy and type of organizations.	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$4.2	There is no significant relationship between big data & business intelligence system success factor: data Access and type of organizations.	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$4.3	There is no significant relationship between big data & business intelligence system success factor data quality: use and type of organizations.	Chi-Square Test P-Value (0.00) < 0.05	Rejected

$H_0$4.4	There is no significant relationship between big data & business intelligence system success factor diversity of unstructured data: access and type of organizations.	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$4.5	There is no significant relationship between big data & business intelligence system success factor diversity of unstructured data - use and type of organizations.	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$4.6	There is no significant relationship between big data & business intelligence system success factor rate of change of data – access and type of organizations.	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$4.7	There is no significant relationship between big data & business intelligence system success factor rate of change of data-use and type of organizations.	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$4.8	There is no significant relationship between big data & business intelligence system success factor user satisfaction: effectiveness & efficiency of BI system and type of organizations.	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$4.9	There is no significant relationship between big data & business intelligence system success factor user satisfaction: suitability/task relevance of BI information and type of organizations.	Chi-Square Test P-Value (0.00) < 0.05	Rejected

$H_0$4.10	There is no significant relationship between big data & business intelligence system success factor user satisfaction: BI system meeting user requirements and type of organizations.	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$4.11	There is no significant relationship between big data & business intelligence system success user satisfaction: general end-user satisfaction with BI system and type of organizations.	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$4.12	There is no significant relationship between big data & business intelligence system success factor decisions about new products/services/market and type of organizations.	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$4.13	There is no significant relationship between big data & business intelligence system success factor decisions about strategic/key suppliers and type of organizations.	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$4.14	There is no significant relationship between big data & business intelligence system success factor decisions about outsourcing/BPM and type of organizations.	Chi-Square Test P-Value (0.00) < 0.05	Rejected
$H_0$4.15	There is no significant relationship between big data & business intelligence system success factor decisions about sales and marketing and type of organizations.	Chi-Square Test P-Value (0.09) > 0.05	Accepted

The results conclude that majority of null hypotheses are being rejected as p-value is lesser than the standard alpha value of 0.05 except sub hypothesis $H_0$4.15. So, it is interpreted that the null hypothesis $H_0$4 is being rejected and there is significant relationship between big data & business intelligence system success factors and type of organizations.

5.2.5 BABIS and Administrative Effectiveness:

$H_0$5: There is no significant impact of big data analytics & business intelligent system on administrative effectiveness of private and public sector organizations in India.

Result: The obtained p-value of .001 for both the Pearson Chi-Square Test and the Likelihood Ratio Test indicates that the probability of observing the results by chance is extremely low. This p-value is well below the commonly accepted significance level of 0.05, which suggests strong statistical evidence against the null hypothesis (H0 5). Consequently, the rejection of the null hypothesis is justified. This means that there is a significant and positive impact of implementing big data analytics and business intelligence systems on the administrative effectiveness of both private and public sector organizations in India. These systems are evidently associated with improvements in administrative processes, decision-making, and overall efficiency, reinforcing their value as transformative tools in enhancing organizational performance and effectiveness.

5.2.6 BABIS and Effectiveness of Organization:

$H_0$6: There is no impact of big data analytics & business intelligent system on the effectiveness of organizations in Indian perspective.

Result: According to T-Test outcome it can be concluded that the null hypothesis is being rejected as p-value < 0.05 (standard alpha value) which confirms that there is significant impact of big data analytics & business intelligent system on the effectiveness of organizations in Indian perspective.

5.3 FUTURE SCOPE:

The integration of Big Data Analytics (BDA) and Business Intelligence Systems (BIS) has substantial implications for decision-making processes within Indian companies and offers promising future prospects. These systems enhance decision accuracy, enable real-time decision-making, and improve customer understanding, while also optimizing costs and aiding in strategic planning and risk management. Additionally, they assist in ensuring regulatory compliance and require investments in talent development and cybersecurity. Ethical considerations related to data privacy and transparency are increasingly crucial. As technology advances, Indian companies must adapt to evolving tools, standards, and regulations to fully capitalize on these capabilities, contributing to their growth and competitiveness in the domestic and global markets.

Enhanced Decision Accuracy: BDA and BIS provide Indian companies with the tools to collect, process, and analyse vast amounts of data. This enables organizations to make data-driven decisions, reducing guesswork and increasing decision accuracy. Future scope lies in improving these systems to provide even more accurate insights.

Real-time Decision Making: BDA and BIS empower companies to access real-time data, which is crucial in today's fast-paced business environment. Organizations can respond promptly to market changes, customer preferences, and emerging trends. As technology advances, real-time capabilities will become even more sophisticated.

Improved Customer Understanding: Indian companies can leverage BDA and BIS to gain a deeper understanding of their customers. By analyzing customer data, organizations can personalize products, services, and marketing efforts, leading to improved customer satisfaction and loyalty. Future developments may include more advanced customer profiling and predictive analytics.

Cost Optimization: These systems enable organizations to identify cost-saving opportunities and optimize operations. This is particularly important in a competitive market like India. The future scope involves more advanced cost modelling and optimization algorithms.

Strategic Planning: BDA and BIS provide valuable insights for long-term strategic planning. Indian companies can use historical data and predictive analytics to plan for

expansion, new product launches, and market entry. The future may see the integration of AI and machine learning for more sophisticated strategic planning.

Risk Management: BDA and BIS help identify potential risks and vulnerabilities. Indian companies can better manage risks by monitoring data for anomalies and trends. Future scope includes improving risk prediction models.

Regulatory Compliance: As regulations evolve, BDA and BIS can assist Indian companies in ensuring compliance. Automation and data analytics can help in reporting and adhering to complex regulatory requirements.

Talent Development: To harness the full potential of BDA and BIS, Indian companies need skilled professionals. The future scope involves investing in workforce training and development in data analytics and business intelligence.

Cybersecurity: With the increasing reliance on data, cybersecurity becomes crucial. Indian companies need to invest in robust cybersecurity measures to protect sensitive data. The future scope includes advancements in cybersecurity technologies to combat evolving threats.

Ethical Considerations: As data collection and analysis become more pervasive, ethical considerations such as data privacy and transparency become critical. Indian companies should stay attuned to ethical concerns and adopt best practices in data handling.

5.4 LIMITATIONS:

The research limitations identified after analysing the impact of Big Data Analytics and Business Intelligence Systems (BIS) on decision-making and organizational performance in both type of organizations (Private or Public) are as follows:

Data Quality and Availability: The process of analysing start after data collection so availability and quality of data plays very important role as it can affect the final output. The availability and quality of data can vary widely, which might affect the accuracy and reliability of the study's findings.

Sample Size and Representativeness: Limited access to organizations or a small sample size can restrict the generalizability of the findings. It's important to ensure that the sample represents a diverse range of public and private organizations to draw meaningful conclusions.

Measurement and Metrics: Defining and measuring the impact of Big Data Analytics and BIS on decision-making and organizational performance can be challenging. Researchers need to establish clear and consistent metrics to assess these impacts accurately.

Resource Constraints: The implementation of Big Data Analytics and BIS can be resource-intensive. Smaller organizations, whether public or private, might face limitations in adopting and maintaining these systems, potentially affecting the study's scope.

Timeframe: The study's timeframe might not capture the long-term effects of implementing Big Data Analytics and BIS. The impacts on decision-making and performance could evolve over time, and a shorter study duration might miss these trends.

Context Specificity: The impact of these technologies can vary depending on the specific industry, sector, or region. The study's findings might not be universally applicable and could be context-specific.

Technological Advancements: The rapidly evolving nature of technology means that the capabilities and features of Big Data Analytics and BIS might change during the study, potentially impacting the relevance of the findings.

In summary, the implications of Big Data Analytics and Business Intelligence Systems on decision-making in Indian companies are significant and offer promising future scope. As technology continues to advance and data availability grows, these tools will play an increasingly pivotal role in shaping the strategies and operations of Indian businesses, contributing to their growth and competitiveness in both domestic and global markets. However, companies must adapt to evolving technologies, ethical standards, and regulatory requirements to fully harness the benefits while managing associated challenges.

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APPENDIX

LIST OF PUBLICATIONS

Indian Institution of Industrial Engineering

BOMBAY

CERTIFICATE OF PUBLICATION

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BIG DATA ANALYTICS & BUSINESS INTELLIGENT SYSTEMS IMPACT ON DECISION MAKING IN PUBLIC AND PRIVATE ORGANIZATIONS

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BIG DATA ANALYTICS & BUSINESS INTELLIGENT SYSTEMS IMPACT ON DECISION MAKING IN PUBLIC AND PRIVATE ORGANIZATIONS

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Abstract
Big Data Analytics and Business Intelligence systems have significantly reshaped decision-making processes in both public and private organizations. By harnessing the power of data analysis, these technologies enhance decision-making accuracy, provide real-time insights, optimize resource allocation, and enable proactive risk management. The data analysis results provide strong and persuasive evidence. Both hypotheses, H1 and H2, have been rejected as the p-value is found to be lower than standard alpha value. These outcomes confirm the substantial influence arising from the application of big data analytics and business intelligence systems on crucial performance metrics. This implies that organizations, regardless of whether they are in the private or public sector, can anticipate significant enhancements in their decision-making procedures and, consequently, overall performance by adopting these advanced analytical solutions.

Keywords: Big Data Analytics, Business Intelligence systems, Decision Making

1. Introduction

The traditional approaches are not sufficient to handle the big data. In order to handle big data advance tools and techniques are being used which further includes the integration of Big Data Analytics and Business Intelligence (BI). Big Data Analytics and Business Intelligence (BI) have a profound impact on decision-making within organizations:

Informed Decision-Making: The integration of Big Data Analytics and BI tools helps the organizations to analyse and access the large amount of big data from different sources. Accordingly, the data driven techniques help the decision makers in identifying more accurately the business problems. These tools allow the officials to find patterns and insights based on real time data.

Predictive Analytics: These technologies offer predictive analytics capabilities, which enable organizations to anticipate future trends, customer behaviour, and market shifts. By leveraging predictive models, decision-makers can proactively plan and strategize for various scenarios, reducing risks and maximizing opportunities.

Operational Efficiency: BI systems streamline the decision-making process by providing dashboards and reports that present key performance indicators (KPIs) and metrics in a visually accessible manner. This allows decision-makers to quickly assess the health of the organization, identify bottlenecks, and pinpoint areas that require attention, ultimately leading to more efficient operations.

Personalization and Customer Experience: By analysing customer data, organizations can personalize their offerings and tailor their strategies to individual customer preferences. This enhances the overall customer experience and drives customer loyalty and satisfaction.

Competitive Advantage: Organizations that effectively leverage Big Data Analytics and BI gain a competitive edge. They can adapt quickly to market changes, identify emerging opportunities, and respond to challenges more effectively than competitors who rely on traditional decision-making methods.

Risk Management: These technologies aid in risk assessment and management by identifying potential risks and vulnerabilities early. Decision-makers can use this information to implement proactive measures to mitigate risks and safeguard the organization's interests.

2. Review of Literature

According to author **Torre et al. (2022)** the use of big data analytics is increasing in business environment as it having positive impact on effective decision-making. There were two main objectives of the research work firstly to find the use of big data analytics in the business units and its impact on corporate decision making. Second, it presents evidence to assess how big data facilitates advanced decision-making models and identifies key factors that support corporate decision processes, potentially proposing a corporate governance model. The theoretical framework draws from big data management studies, particularly emphasizing the implications demonstrating how big data shapes decision-making dynamics in organizations. This research work contributes both theoretically and managerially to the big data and decision-making literature while outlining future research directions in this field.

Latif et al. (2023) discussed that limited knowledge exists regarding the impact of big data analytics on decision-making and its subsequent influence on organizational performance. This study, grounded in the information processing perspective and survey-based assessments, establishes a linkage between big data analytics (BDA) and the effectiveness of decision-making, particularly textile industry. The research aims to investigate the connection between BDA and organizational decision-making and assess the extent to which BDA shapes decision-making. Data gathered from 570 respondents through a questionnaire were subjected to statistical analysis, revealing that BDA positively affects an organization's decision-making capacity and effectiveness. Additionally, the study finds no significant disparities between large enterprises and medium-sized businesses concerning the impact of BDA on successful decision-making, offering valuable insights for managers seeking to enhance decision-making processes through BDA.

Russom et al. (2011) in the research work discussed that managing increasing data is tough task. Big data includes various characteristics not only large volume of data but also variability, velocity, vagueness, value etc. So, it creates many challenges in front of the database administrators and conventional database management systems. Author focuses on the use of big data analytics and business intelligent systems for handling such complex datasets.

Almeida et al. (2023) make a significant contribution by emphasizing that big data extends beyond the capabilities of existing data management methods. They delve into the core characteristics of big data, notably its volume, velocity, and variety, which are pivotal factors influencing decision-making within organizations. By identifying these attributes, they provide a framework for organizations to understand and adapt to the unique nature of big data.

Alshawabkeh et al. (2022) expands on the fundamental attributes of big data. They underline that big data is characterized by its substantial volume, the speed at which it accumulates (velocity), and the diverse formats and types of data it encompasses (variety). These characteristics underscore the complexity of big data and emphasize the need for specialized approaches in managing and leveraging it.

Jagadish (2015) introduces a crucial dimension to the big data discourse by introducing the concept of "Veracity" as the fourth V. This addition highlights the importance of data accuracy, trustworthiness, and reliability in the context of big data. Veracity emphasizes the need to ensure that the data being analysed is dependable and free from errors or biases, which is critical for making sound decisions based on big data insights.

Visvizi et al. (2023) contribution is noteworthy as they propose that the significance of data itself, often referred to as the "fifth V," should be considered in the decision-making process. They argue that beyond volume, velocity, variety, and veracity, the intrinsic value of the data being analysed plays a pivotal role in shaping organizational decisions. This perspective broadens the understanding of big data's impact on decision-making.

3. Applied Methodology

Both descriptive and inferential analysis is being used in this research work. The sample size of 200 respondents is being considered. The respondents are executives, managers, technical experts and

senior official using big data analytics or business intelligence systems in different organizations either public or private in India.

3.1 Objectives:

The main research objectives are as follows:

1. Measure the impact of big data analytics & business intelligence system on decision making in both public and private sector organizations.
2. To find the association between use of big data analytics & business intelligence system and decision effectiveness.
3. To identify impact of big data analytics & business intelligence system on key performance indicators.

3.2 Hypotheses:

Hypothesis 1: There is no significant impact of big data analytics & business intelligence system on decision making in both type of organizations.

Hypothesis 2: There is no significant impact of big data analytics & business intelligence system on key performance indicators.

4. Data Analysis and Interpretation

4.1 Respondent Profile:

Gender wise classification:

The total sample size consists of 200 respondents, the sample size was selected based on the sampling technique convenience sampling. About 50% respondents being considered were male and 50% were female from different organization either private or public organizations.

Classification based on type of organization:

The table presented below displays the categorization of survey participants according to their organizational affiliation, distinguishing between public and private sectors.

Table 4.1: Type of Organization

Type of Organization					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Private	100	50.0	50.0	50.0
	Public	100	50.0	50.0	100.0
	Total	200	100.0	100.0	

The respondents being considered were having representation from both private and public organizations. In total about 100 respondents which accounts for about 50% were from the private organization and similarly about 100 respondents were form public sector organization accounting for 50%. The respondents being selected were executives, managers, technical experts and senior officials for different organizations of both private and public units.

4.2 Decision making and BDA-BIS:

In order to measure the impact of big data analytics & business intelligence system on decision making in both public and private sector organizations following hypothesis is being framed:

$H_0$1: "There is no significant impact of big data analytics & business intelligence system on decision making in both type of organizations".

H_a1: "There is significant impact of big data analytics & business intelligence system on decision making in both type of organizations".

Further the above-mentioned hypothesis was being divided into sub hypotheses $H_0$1.1, $H_0$1.2 and $H_0$1.3.

Firstly, the impact of big data analytics & business intelligence system on decision effectiveness is being measured, the sub hypothesis being framed is as follows:

$H_0$1.1: "There is no significant impact of big data analytics & business intelligence system on decision effectiveness in both type of organizations".
H_a1.1: "There is significant impact of big data analytics & business intelligence system on decision effectiveness in both type of organizations".
Cross tabulation between the type of the organization and decision effectiveness is shown below in the table.

Table 4.2: Decision Effectiveness and Type of Organization

Crosstabulation: Decision effectiveness and Type of Organization						
		Decision effectiveness				Total
		Very Low	Low	Medium	High	
Type of Org.	Private	7	34	19	40	100
	Public	0	12	0	88	100
Total		7	46	19	128	200

In order to test the null hypothesis $H_0$1.1 the Chi-Square test is being used. The two categorical variables being considered are "Type of Organization" and "Managerial Decision Making: Decision Effectiveness". The outcomes of the Chi-Square test are shown in the table below.

Table 4.3: Chi-Square Test

Chi-Square Test			
	Value	Degree of Freedom	Asymptotic Significance (2-sided)
Pearson Chi-Square	54.522[a]	3	.000
Likelihood Ratio	65.456	3	.000
N of Valid Cases	200		
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 3.50.			

Accordingly, the calculated Pearson Chi-Square is found to be 54.522, Likelihood Ratio value found to be 65.456 at degree of freedom 3 and the corresponding p-value for both is 0.000 further as the p-value of 0.000 is lower than the standard alpha value of 0.05 which concludes that the null hypothesis $H_0$1.1 is being rejected and the alternate is true which interprets that there is significant impact of big data analytics & business intelligence system on decision effectiveness in both type of organizations either private or public.

Accuracy and Type of Organization:
$H_0$1.2: "There is no significant difference between the impact of big data analytics & business intelligence system on accuracy of decision making in both type of organizations (Private and Public)".
Cross tabulation between the type of the organization and accuracy of decision making is shown below in the table.

Table 4.4: Accuracy of decision making and Type of Organization

Crosstabulation: Accuracy of decision making and Type of Organization							
		Accuracy of decision making					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	31	7	0	50	12	100
	Public	7	0	5	67	21	100
Total		38	7	5	117	33	200

To test the null hypothesis $H_0$1.2 the Chi-Square test is being used. The two categorical variables being considered are "Type of Organization" and "Managerial Decision Making: Accuracy". The outcomes of the Chi-Square test are shown in the table below.

Table 4.5: Chi-Square Test

Chi-Square Test			
	Value	Degree of Freedom	Asymptotic Significance (2-sided)
Pearson Chi-Square	32.083[a]	4	.000
Likelihood Ratio	37.973	4	.000
N of Valid Cases	200		
a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 2.50.			

The calculated Pearson Chi-Square statistic was determined to be 32.083, while the Likelihood Ratio value was found to be 37.973, both with 4 degrees of freedom. The corresponding p-values for both tests were calculated to be 0.000. Since these p-values are less than the standard alpha value of 0.05, we can confidently reject the null hypothesis $H_0$1.2. This leads us to accept the alternative hypothesis, indicating a significant difference in the impact of big data analytics and business intelligence systems on the accuracy of decision-making between two types of organizations: Private and Public.

Timeliness/Speed of Decision Making and Type of Organization:

$H_0$1.3: "There is no significant difference between the impact of big data analytics & business intelligence system on timeliness/speed of decision making in both type of organizations (Private and Public)".

Cross tabulation between the type of the organization and timeliness/speed of decision making is shown below in the table.

Table 4.6: Timeliness/Speed of Decision Making and Type of Organization

Crosstabulation: Timeliness/speed of decision making and Type of Organization							
		Timeliness/speed of decision making					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	1	0	18	40	41	100
	Public	3	14	0	28	55	100
Total		4	14	18	68	96	200

To test the null hypothesis $H_0$1.3 the Chi-Square test is being used. The two categorical variables being considered are "Type of Organization" and " Timeliness/Speed of Decision Making ". The outcomes of the Chi-Square test are shown in the table below.

Table 4.7: Chi-Square Test

Chi-Square Test			
	Value	Degree of Freedom	Asymptotic Significance (2-sided)
Pearson Chi-Square	37.159[a]	4	.000
Likelihood Ratio	49.586	4	.000
N of Valid Cases	200		
a. 2 cells (20.0%) have expected count less than 5. The minimum expected count is 2.00.			

Accordingly, the calculated Pearson Chi-Square is found to be 37.159, Likelihood Ratio value found to be 49.586 at degree of freedom 4 and the corresponding p-value for both is 0.000 further as the p-value of 0.000 is lower than the standard alpha value of 0.05 which concludes that the null hypothesis $H_0$1.3 is being rejected and the alternate is true which interprets that there is significant difference between the impact of big data analytics & business intelligence system on timeliness/speed of decision making based on type of organizations (Private and Public)".

4.3 Key Performance Indicators and Type of Organization:

$H_0$2: "There is no significant difference between the impact of big data analytics & business intelligence system on decision making related to key indicators in both type of organizations (Private and Public)".

Cross tabulation between the type of the organization and key performance indicators is shown below in the table.

Table 4.8: Key Performance Indicators and Type of Organization

Crosstabulation: Key Performance Indicators and Type of Organization							
		Key Performance Indicators					Total
		Very Low	Low	Medium	High	Very High	
Type of Org.	Private	11	11	25	4	49	100
	Public	0	3	34	26	37	100
Total		11	14	59	30	86	200

To test the null hypothesis $H_0$2 the Chi-Square test is being used. The two categorical variables being considered are "Type of Organization" and "Key Performance Indicators ". The outcomes of the Chi-Square test are shown in the table below.

Table 4.9: Chi-Square Test

Chi-Square Test			
	Value	Degree of Freedom	Asymptotic Significance (2-sided)
Pearson Chi-Square	34.752[a]	4	.000
Likelihood Ratio	41.196	4	.000
N of Valid Cases	200		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.50.			

Accordingly, the calculated Pearson Chi-Square is found to be 34.752, Likelihood Ratio value found to be 41.196 at degree of freedom 4 and the corresponding p-value for both is 0.000 further as the p-value of 0.000 is lower than the standard alpha value of 0.05 which concludes that the null

hypothesis H_02 is being rejected and the alternate is true which interprets that there is significant difference between the impact of big data analytics & business intelligence system on decision making related to key performance indicators in both type of organizations (Private and Public).

5. Conclusion

The main purpose of the study was to evaluate the impact of big data analytics & business intelligence system on decision making, find the association between use of big data analytics & business intelligence system and decision effectiveness and to identify impact of big data analytics & business intelligence system on key performance indicators. Based on research objectives two main hypotheses were being framed H1 and H2. To test the hypotheses at 5% level of significance Chi-Square test was being used and the results confirm that as all the sub hypotheses related to decision making and type of organization were being rejected so it can be concluded the hypothesis H1 was also being rejected interpretating that there is significant impact of big data analytics & business intelligence system on decision making in both type of organizations, similarly the hypothesis H2 was also being rejected confirming that there is significant impact of big data analytics & business intelligence system on key performance indicators. The statistical analysis has yielded compelling evidence. Both hypotheses, H1 and H2, have been convincingly rejected. These findings affirm the existence of a significant impact stemming from the utilization of big data analytics and business intelligence systems on key performance indicators. This suggests that organizations, whether private or public, can expect meaningful improvements in their decision-making processes and, consequently, in their overall performance by embracing these advanced analytical tools

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Impact of Big Data Analytics &Business Intelligent System on Organization Performance of Private and Public Sector Organizations in India

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Abstract

Big Data Analytics and Business Intelligence Systems have a significant impact on organizational performance by providing data-driven insights, improving decision-making processes, and enhancing operational efficiency. These technologies empower organizations to adapt swiftly to market changes, optimize resource allocation, and gain a competitive edge in today's data-driven business landscape. Ultimately, their adoption leads to improved performance and sustainable growth.

Keywords: ***Big Data Analytics, Business Intelligent System, Organizational Performance***
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1. Introduction

Today with the generation of digital data the organizations across the world are moving towards advance data analytics or big data analytics and business intelligence systems in order to get new insights and patterns which are valuable for decision making and strategy formulation. Collectively the terms are known as BDA-BI (Big Data Analytics and Business Intelligence). The BDA-BI system helps the organizations to make data-driven decisions with operational excellence and competitiveness which ultimately impact the overall performance or organizations. The main purpose of the study is to assess the extent of adoption and utilization of big data analytics and business intelligence systems in private and public sector organizations in India and to identify the effect of big data analytics & business intelligent system on organizational performance of private and public sector organizations in India.

2. Review of Literature

Gurcan et al. (2023) studied various research papers related to business intelligence systems and its dynamics. It was found that many research has been done related to various aspects of the concern field. The modelling topic when research reflected 36 distinct topics which further included sub topics like "Organizational Capability," "AI Applications," "Data Mining," "Big Data Analytics," and "Visualization". Author provides valuable information related to different latest development and future directions in the field of business intelligence.

Nenonen et al. (2022)suggested that Business Intelligence Systems (BIS) play a pivotal role in an organization's ability to store, manage, analyse, and leverage data to gain insights and create innovative products and services.

Popovic et al. (2018)investigates the impact of Big Data Analytics (BDA) on operations management within the manufacturing sector, an

underexplored context. Using a qualitative approach and comparative case studies of three manufacturing companies with varying BDA usage levels, the research reveals that BDA capability and organizational readiness and design factors play pivotal roles in enhancing decision-making and high-value business performance. Additionally, the study emphasizes BDA's potential to empower employees and enhance management capabilities without replacing them. These findings contribute valuable insights for both academics and practitioners, shedding light on the tangible business benefits of BDA in manufacturing and its potential for positive societal impact.

Raffoni et al. (2018)emphasize that organizations face challenges in owning and managing big data, particularly concerning the volume, quality, accuracy, and validity of the data. These challenges highlight the need for effective data management strategies.

Nambisan et al. (2017)discuss how a well-developed business intelligence strategy can be a valuable asset for organizations. They suggest that such strategies can help organizations gain a competitive edge by extracting new value from data.

Wamba et al. (2017)in the study explored the correlation between big data analytics and firm performance, with a particular focus on the role of dynamic capabilities. Their empirical findings highlighted a positive and significant relationship between the use of big data analytics and overall firm performance. Furthermore, the study emphasized that dynamic capabilities within organizations mediate this connection, suggesting that companies with strong adaptive and innovative capacities are better equipped to leverage big data analytics for enhanced performance. These findings underscore the strategic significance of both adopting big data analytics and cultivating dynamic capabilities for modern businesses navigating the data-driven landscape.

According to**Jiwat Ram et al. (2016)** the study acknowledges the transformative impact of social media on global business operations, particularly in terms of collecting vast datasets. These data stores, primarily from various social media platforms, present a compelling case for leveraging Big Data analytics for business intelligence. However, a noticeable research gap exists in understanding the implications of this integration. Therefore, this research focuses on examining the role and consequences of Big Data analytics in the context of business intelligence, specifically with data collected from Chinese social media channels. Employing a qualitative approach, the study plans to conduct 35-40 interviews across diverse industries, including retail and manufacturing, involving stakeholders such as IT managers and senior business managers. The data collected will be analyzed using Nvivo to identify critical issues that can unlock value through Big Data analytics for business intelligence purposes. The study's outcomes hold significant potential to inform both theoretical understanding and practical strategies for optimizing the benefits of social media channels for business value.

Author**McAfee A. et al. (2012)**delved into the transformative impact of big data on management practices. It probably introduced the concept of big data, emphasizing its potential to revolutionize decision-making and operational optimization within organizations. The paper might have underscored the importance of advanced analytics and data mining techniques in extracting valuable insights from vast and complex datasets. It might have discussed the challenges and opportunities associated with big data management, showcasing real-world examples of successful implementation. Furthermore, the paper likely speculated on the long-term implications of the big data revolution for various industries and sectors, highlighting its significance in the evolving business landscape. For specific details or quotes from the paper, referring to the original source through academic databases or the Harvard Business Review's official website is recommended.

3. Research Methodology

Research methodology refers to the systematic approach and techniques employed to conduct research, guiding the selection of data collection methods, data analysis, and interpretation of results. It serves as the framework that ensures the rigor, validity, and reliability of the research process, allowing for the generation of meaningful and credible findings.

3.1 Objectives:

Following are the research objectives:

1. To assess the extent of adoption and utilization of big data analytics and business intelligence systems in private and public sector organizations in India.
2. To find out the effect of big data analytics & business intelligent system on organizational performance of private and public sector organizations in India

3.2 Hypotheses:

Hypothesis 1: There is no significant difference between adoption and utilization of big data analytics and business intelligence systems in private and public sector organizations in India.

Hypothesis 2: The implementation of big data analytics and business intelligence systems significantly enhances the organizational performance of both private and public sector organizations in India.

4. Data Analysis and Interpretation

4.1 Respondent Profile:

Gender wise classification:

Based on gender wise classification it was found that about 100 respondents were male and 100 respondents were female from total sample size of 200. The respondents were basically users of Big Data Analytics and Business Intelligence Systems having positions as managers, senior officials, executives etc from both public and private sector.

Classification based on type of organization:

The table below shows the classification of respondents based on type of organization either public or private.

Table 4.1: Type of Organization

Type of Organization			
	Number of Respondents	Percentage (%)	Cumulative Percent
Private	100	50.0	50.0
Public	100	50.0	100.0
Total	200	100.0	

From the total respondents about 50% were from the private organization which accounts for 100 respondents and about 50% respondents were form public organization working at different managerial, executive, and senior positions.

4.2 Results of Hypothesis Testing:

In order to find the association between adoption,utilization of big data analytics & business intelligence systems and type of organization the hypothesis H1 was being framed and being tested using the Chi-Square test. The null and alternate hypothesis of H1 is shown below.

$H_0$1:There is no significant difference between adoption and utilization of big data analytics and business intelligence systems in private and public sector organizations in India.

H_a1:There is significant difference between adoption and utilization of big data analytics and business intelligence systems in private and public sector organizations in India.

Table 4.2: Cross-tabulation: Adoption, Utilization and Type of Organization

Cross Tabulation						
		Adoption, Utilization of Big Data Analytics and Business Intelligence Systems				Total
		Very Low	Low	High	Very High	
Type of Org.	Private	12	7	40	41	100
	Public	0	0	50	50	100
Total		12	7	90	91	200

According the Chi-Square test determines that if there is statistically significant association between the categorical variables' adoption, utilization, and type of organization. The Chi-Square test results which includes Pearson Chi-Square, Likelihood Ratio and No. of Valid Cases as shown below in the table: "Chi-Square Tests Results."

Table 4.3: Chi-Square Test

Chi-Square Test			
	Value	Degree of Freedom	Asymptotic Significance (2-sided)
Pearson Chi-Square	21.001[a]	3	.000
Likelihood Ratio	28.345	3	.000
N of Valid Cases	200		
a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is 3.50.			

The calculated Pearson Chi-Square is found to be 21.001 at degree of freedom 3,Likelihood Ratio is found to be 28.345 ad degree of freedom 3 also the corresponding p-value (Asymptotic Significance)for both is 0.00 which quite lesser than the standard alpha value of 0.05. So, it can be interpreted that as the p-value (0.00) < 0.05 suggesting that the null hypothesis $H_0$1 is being rejected and finally it can be said that there is significant difference between adoption and utilization of big data analytics and business intelligence systems in private and public sector organizations in India. The level of utilization andadoption of big data analytics and business intelligence vary based on type of organization either private or public.

4.3 BDA-BIS and Organizational Performance:

In order to find the association between big data analytics& business intelligence systems and organizational performance in both public and private organization one sample T-Test was being applied. The null and alternate hypothesis of H2 is shown below:

$H_0$2: The implementation of big data analytics and business intelligence systems significantly doesn't enhance the organizational performance of both private and public sector organizations in India.

H_a2: The implementation of big data analytics and business intelligence systems significantly enhances the organizational performance of both private and public sector organizations in India.

According to the table shown below the one sample statistics results of BDA-BIS and organizational performancehaving mean value of 3.6050,standard deviation of 1.16437 and standard error mean value of 0.08233.

Table 4.4: One-Sample Statistics

One-Sample Statistics				
	N	Mean	Std. Deviation	Std. Error Mean
BDA-BIS and Organizational Performance	200	3.6050	1.16437	.08233

The statistical test T-test is being applied to find that there is statically significant relationship between big data analytics & business intelligent system and organizational performance. The T-Test results are shown below in the table: "One-Sample Test".

Table 4.5: One-Sample Test

One-Sample Test						
	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	Degree of Freedom	Sig. (2-tailed)	Mean Difference	Lower	Upper
BDA-BIS and Organizational Performance	43.785	199	.000	3.60500	3.4426	3.7674

The calculated T-test value is found to be 43.785 at degree of freedom 199, the mean difference value is found to be 3.60500, 95% confidence interval of the difference includes the lower value 3.4426 and upper value 3.7674 and the corresponding p-value is found to be 0.00 which is lower than the standard alpha value of 0.05 which further confirms that the null hypothesis $H_0$2 is being rejected and the alternate hypothesis in being accepted at 5% level of significance.The rejection of $H_0$2 indicates strong evidence against the null hypothesis suggesting that the implementation of big data analytics and business intelligence systems significantly enhances the organizational performance of both private and public sector organizations in India.This interpretation suggests that when organizations in India adopt and effectively utilize these technologies, they are likely to experience improvements in various aspects of their performance. This could encompass increased efficiency, better decision-making, enhanced resource allocation, and potentially a competitive advantage in their respective sectors.

5. Conclusion

The two main objectives of study were to assess the extent of adoption and utilization of big data analytics and business intelligence systems in private and public sector organizations in India and to find out the effect of big data analytics & business intelligent system on organizational performance of private and public sector organizations in India. Based on above mentioned objectives hypotheses H1 and H2 were being framed and were test using the Chi-Square test and T test. The results confirm that the rejection of $H_0$1 indicates a significant difference in the adoption and utilization of big data analytics and business intelligence systems between private and public sector organizations in India. This variation underscores distinct levels of implementation based on organizational type. Similarly, the hypothesis $H_0$2 was being rejected suggesting that adoption of big data analytics and business intelligence systems in India

organizations significantly improves the organizational performance of both private and public sector entities.

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by Priyanka Sharma

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