Exploring business intelligence in the time of big data: Methods, software, and implementations

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Abstract

Access to Big Data has drastically improved the way companies collect and utilize information in the course of the strategic decision-making process within this dynamic business environment. This paper examines the role of Business Intelligence in generating vast amounts of data by focusing on technologies, software, and programs within IT companies. It aims to assess the level of familiarity and interest in BI among employees, identify challenges that hinder effective BI implementation, monitor the reputation of AI technologies, and evaluate the impact of AI on overall operational performance. This research employs both qualitative and quantitative techniques to provide comprehensive insights into the intersection of enterprise intelligence and large-scale data, highlighting the anticipated benefits and potential challenges at this junction. The findings emphasize the critical role of business intelligence in enhancing decision-making, profitability, and operational performance in a digital world.

1. Introduction

Big data is a characteristic of the new business landscape that has revolutionized the way companies collect data and make strategic decisions. Big data consists of large, heterogeneous datasets that are generated daily through digitization, the proliferation of networked tools, and the exponential growth of online platforms characterizing today's organizations. As companies operate in this environment, the ability to harness this vast wealth of data becomes a crucial competitive advantage, providing solutions to complex issues. Business Intelligence (BI) has become an essential tool in exploiting data for strategic decision-making. BI architectures enable companies to transform raw data into relevant insights, facilitating informed actions that improve decision-making strategies and operational efficiencies. The evolution of BI from traditional

reporting to advanced analytics, acquisition tools, and predictive modeling has significantly expanded the arsenal of tools available for deriving insights from data and supporting strategic decisions [1].

The present work, "Business Intelligence in the Time of Big Data: Methods, Software, and Implementations," is aimed at enhancing current understanding of the role that BI can play in the era of big data. It seeks to explore the methods, tools, and applications that support BI and, more importantly, how companies are putting these tools into action against modern complexities. Among the central questions addressed in this study are the following: employee experience with BI, challenges in its implementation, the effect of BI on overall operational performance, and whether BI technology has the potential for expansion from the point of view of IT teams. As such, their interaction is quite complex in terms of BI and big data; hence, integration is key to any organization's drive towards agility in the fast-moving markets. Business leaders can overview the trends in the market, customer behavior, and operational performance through the integration of AI analytics with big data, thereby enhancing flexibility and responsiveness within the organization [2, 3].

Hence, this paper reviews the analytical techniques and competitive advantages related to BI, and their relationship within the area of big data. This research seeks to establish how technologies help in the effective transformation of raw data into useful insights by examining their effectiveness, scalability, and evolution. The study also explores how BI analytics, when integrated with big data analytics, can extend the competitive advantage of enterprises to successfully navigate through all kinds of complexities in their operational environments and achieve enduring success.

1.1. Research Problem

Big data increase is radically changing the way businesses used to work for most companies, with immense opportunities and challenges. IT organizations stand at the very forefront of such sea changes; therefore, Business Intelligence should be instrumental in extracting actionable insights from raw data sets. However, with the turn of events in the big data era, BI goes down as a technique that may not easily be implemented and applied because of challenges related to bad data quality, high integration complexities, high costs, and the need for highly specialized professionals. While there are potential benefits, several limitations restrict BI's power in an organization, therefore defeating its intended purpose in most organizations to Wactlar et al. [4]. This research aims to determine whether the reality of Business Intelligence (BI) aligns with its vision in the era of big data. It examines the methods, software, and implementations used by IT groups to carry out these efforts, along with the key challenges and opportunities associated with them.

1.2. Research Objectives

The main purpose of the study is to investigate the methods, software, and implementations of Business Intelligence in the era of Big Data within IT organizations. Specific objectives:

- To assess the level of understanding and awareness of BI among personnel in IT groups.
- Identify problems impeding the effective implementation of BI in these organizations.
- To examine the role of data collected from the surrounding environment in the implementation of BI.
- To establish how BI impacts the operational performance of IT groups.
- To investigate opportunities for developing and enhancing BI strategies from the perspectives of IT organization personnel.

1.3. Research Questions

The main research question includes the following sub-questions:
1. What are the levels of awareness about business intelligence among employees in an IT company?
2. What problems can possibly become an obstacle to the implementation of Business Intelligence in IT companies?
3. What role does data collected from the surrounding environment play in implementing business intelligence?
4. What are the effects of business intelligence on operational performance for an IT company?
5. What are the opportunities to develop business intelligence strategies from the perspective of employees of IT companies?

1.4. Research Hypothesis

The hypotheses may be framed as follows based on the problem statement and research objectives:

H_1: *Employees in IT companies are highly aware and understand Business Intelligence.*

H_2: *Major difficulties in the practical application of BI within IT companies are problems with data quality, issues in integration, cost, and a lack of professionals.*

H_3: *Successful implementation of BI in IT companies is significantly influenced by data collected from the surrounding.*

H_4: *Implementation of BI significantly influences the operational performance of IT companies.*

H_5: *There are tremendous opportunities to develop and enhance BI strategies based on the views of employees in IT companies.*

2. Research Methodology

This section details the methodology that will be followed for the study: the research approach, the description of the study population and sample, the identification of tools and measures, the methods for verifying their validity and reliability, and the statistical methods used during data processing. In this research, the descriptive-analytical method of

approach is adopted to explain the topic of business intelligence in the big data era: methods, software, and implementations. This approach is based on the collection of data by means of a specially designed tool and on the analysis of results in order to give an accurate description of the phenomenon. The method shall, therefore, be contributing to the understanding of patterns and behaviors related to business intelligence, thus ultimately contributing with recommendations for improving related practices.

2.1. Sample Description

The study population consisted of employees in IT companies in the Jordanian capital, Amman, during the year 2025. The study sample was represented by selecting a convenient random sample of 123 employees based on specific criteria to ensure accurate representation of the target group in line with the study's objectives. The criteria included selecting employees with various years of experience (e.g., beginners, mid-level, experts) to obtain multiple perspectives on methods and applications, employees specializing in business intelligence and data analysis, as well as individuals involved in the development or use of business intelligence programs and tools. Additionally, the selection included IT companies of various sizes (large, medium, small) and fields (technical consulting, software development, cloud service providers). The following Table 1 illustrates the distribution of the sample according to its demographic variables.

Table 1.
Distribution of the sample according to its demographic variables.

Variable	Category	Freq.	Percentage%
Gender	Male	75	61%
	Female	48	39%
Qualifications	BSc.	102	82.9%
	MSc.	15	12.2%
	PhD	6	4.9%
Years of Experience	Less than 5 years	17	13.8%
	5 years- less than 10 year	37	30.1%
	10 years-less than 15 years	42	34.1%
	15 years and more	27	22%

2.2. Research Instrument

The study tool, represented by the questionnaire, was developed to explore business intelligence in the era of big data: methods, software, and implementations from the perspective of IT company employees, drawing on several previous studies. The questionnaire aimed to gather data on employees' knowledge and implementation of business intelligence strategies and tools, using it as a means to gain a deep understanding of this phenomenon and identify associated factors. The initial version of the study tool consisted of 20 items distributed across five dimensions closely related to business intelligence: Knowledge of Business Intelligence, Challenges in Implementing Business Intelligence, Role of Data in Business Intelligence, Impact of Business Intelligence on Operational Performance, and Development of Business Intelligence Strategies.

2.3. Validity and Reliability Analysis

To ensure the tool's content validity, the initial version was presented to a group of experienced faculty members at Jordanian universities specializing in business intelligence. This step aimed to ensure the linguistic and scientific integrity of the tool's paragraphs. Reviewers suggested rephrasing some paragraphs and removing two redundant ones. Amendments were made based on these suggestions, resulting in a final tool comprising 20 paragraphs. To assess the reliability of the study tool, it was distributed to a sample of 20 participants from both within and outside the actual study population. Cronbach's alpha coefficient was computed to measure internal consistency reliability, with a statistically acceptable result typically being greater than 0.60. After calculating the internal consistency coefficient of the study tool, the researcher found it to be 0.881. This indicates that the study tool possesses the necessary reliability to achieve the objectives of the study.

2.4. Statistical Methods

Various statistical methods were employed for analyzing the collected data using SPSS software V24. Initially, reliability analyses were conducted, including the calculation of Cronbach's alpha coefficients. Subsequently, the primary data analysis involved descriptive statistics, such as frequencies and percentages, to summarize categorical data.

2.5. Study Definitions

- Business Intelligence (BI): Business intelligence refers to the strategies, technologies, structures, practices, methodologies, and programs that analyze important business facts to help a company better understand its business and marketplace and make timely business decisions [5].
- Big Data: BI encompasses facts series, facts warehousing, facts evaluation, and facts visualization approaches geared toward reworking raw facts into actionable insights. Massive facts are characterized by high volume, speed, and variety of data that require advanced strategies and technology to enable the capture, storage, distribution, control, and analysis of the data [5].

- Predictive Analytics: Predictive Analytics entails the usage of ancient statistics, statistical algorithms, and machine learning strategies to identify the likelihood of destiny consequences based on ancient statistics. It is a key aspect of advanced Business Intelligence systems [5].
- Operational Efficiency: Operational efficiency in the context of BI refers to the potential of an organization to supply products or services in the most cost-effective way without compromising quality. It entails optimizing processes and resources via the effective use of BI tools and insights [6].
- Competitive advantage: Competitive advantage is the ability of an organization to perform in a way that competitors cannot imitate or surpass without challenges. In business intelligence, competitive advantage is gained from comprehensive insights, strategic decisions, and up-to-date analytics [5].
- Machine Learning: Machine learning is a subset of artificial intelligence that entails the development of algorithms that allow computer systems to learn from data and make predictions based entirely on statistics. It performs a critical role in advanced business intelligence with the help of enabling advanced statistical assessment and predictive modeling [7].

2.6. Research Significance

It is critical for businesses seeking to stay competitive and attain operational excellence to comprehend the convergence of business intelligence and big data [8]. There are multiple reasons why this research is noteworthy:

- Strategic Decision-Making: This study addresses how business intelligence (BI) tools can improve decision-making procedures, offering valuable perspectives on how to enhance operational and strategic choices based on data intelligence.
- Operational Efficiency: The study looks for methods that BI can help IT companies run more efficiently, cut costs, and increase overall productivity.
- Competitive Advantage: The study assists organizations in creating strategies to obtain a competitive edge in a data-driven market by highlighting the advantages and difficulties of implementing BI.
- Knowledge Enhancement: By adding to the body of knowledge already available on business intelligence (BI) and big data, the findings will benefit scholars, practitioners, and legislators alike.

3. Literature Review and Previous Studies

3.1. Theoretical Framework

The theoretical framework for this research explores the position and effect of business intelligence (BI) in the generation of massive data, focusing on its techniques, software, and implementations within IT organizations. The framework draws upon several theories that explain how BI can enhance decision-making, operational efficiency, and overall business performance.

3.2. Business Intelligence (BI) Framework

Enterprise intelligence frameworks are critical in leveraging information for strategic decision-making and operational performance within massive IT. In line with [9] the BI framework integrates various components that allow companies to collect, market, examine, and provide actionable insights. This full-fledged technology enhances the ability of decision-makers to face challenges and develop the potential of the enterprise [9].

3.3. Components of the BI Framework

1. Data Gathering and Storage: Statistics, amassing, and garage: Enterprise Intelligence (BI) architectures combine operational records with analytical tools to deliver complex and competitive insights. Statistics series technology gathers records from diverse internal and external sources, which are then stored in statistics warehouses. These warehouses serve as repositories for structured and semi-structured data, facilitating the integration and cleansing of disparate statistics sources [10].
2. Data Types and Sources: Negash and Gray[9] highlights the importance of managing both structured and semi-structured data. Structured statistics are usually stored in databases, even as semi-structured statistics consist of emails, reviews, and web pages. Negash's framework ensures treasured insights can be extracted from these diverse data types via refinement and evaluation methods [9].
3. Analytical Tools and Processes: The analytical component of the BI framework involves various equipment along with data mining, online analytical processing (OLAP), and machine learning algorithms. That equipment is important for converting uncooked data into meaningful insights. As an example, data mining strategies can perceive patterns and relationships inside massive datasets, while OLAP equipment facilitate multidimensional analysis of data, permitting customers to drill down into particular areas of interest [11]
4. Data Visualization and Delivery: Powerful data visualization is critical for making complex statistics comprehensible and actionable. BI structures employ diverse visualization techniques, which include dashboards and geographic information systems (GIS), to present statistics in intuitive formats. These visualizations enable decision-makers to understand trends, anomalies, and key performance indicators quickly, facilitating more informed decision-making [12].

5. Proactive BI Components: Proactive BI entails real-time information warehousing, computerized anomaly detection, proactive alerting, and seamless workflow integration. These components ensure that BI structures are not simply reactive but also predictive, permitting organizations to anticipate and mitigate capacity troubles earlier than they occur [9].
6. BI for the Masses: The concept of "BI for the Masses" refers back to the democratization of BI tools, making them accessible to a broader range of users within a company. This approach ensures that insights derived from BI are not limited to senior management but are available to all relevant stakeholders, thereby improving overall organizational responsiveness and agility [9].

3.4. Integration with Other Information Systems

BI frameworks regularly combine with other fact structures along with organization resource planning (ERP), Customer Relationship Management (CRM), and Decision Support Systems (DSS). These integrations enable an unbroken flow of facts across numerous practical regions, enhancing the overall effectiveness of BI tasks [10].

4. Related Theories

4.1. Information Systems Success Model (DeLone and McLean)

The information systems success model, proposed by DeLone and McLean [13] provides a complete framework for evaluating the achievement of Information Systems. This widely adopted and verified model identifies six interrelated dimensions of the achievement of Information Systems: system quality, information quality, use, user satisfaction, individual impact, and organizational impact. These dimensions determine the effectiveness and efficiency of fact structures within the organization [14]. ISSM is closely related to BI, and both aim to enhance the use and impact of business enterprise architectures. The quality and accuracy of business intelligence models, along with their relevance and timeliness, are critical to consumer satisfaction and organizational effectiveness. ISSM provides a powerful means of evaluating the effectiveness of business intelligence, linking information quality with consumer interactions, decision-making, and organizational performance [15].

4.2. Technology Acceptance Model (TAM)

The technology acceptance model (TAM), introduced by Davis [16] is a theoretical framework used to understand consumer acceptance of Information Systems. TAM assumes that tangible utility (PU) and tangible ease of use (PEOU) are the primary determinants of customer acceptance and usage behavior. PU indicates the extent to which the client believes that the use of the device will enhance the overall performance of their activity, while PEOU indicates the advantage of using the device. These factors influence customers' attitudes towards the machine, which in turn affect their behavioral goal of its application and ultimately its actual use [16, 17]. In the context of business intelligence, TAM provides an explanation of the factors that influence the acceptance and effective use of a business intelligence tool. For business intelligence structures to be widely adopted, they must be percesived as useful and easy to implement, emphasizing the importance of user-friendly equipment design to enhance decision-making methods [18].

4.3. Application of Theories to Business Intelligence

The ISSM provides a multidimensional framework for evaluating BI systems based on the accuracy of tools, good records, and people's satisfaction, among various metrics, and supporting organizations in measuring the effectiveness of BI programs and their impact on decision-making and organizational performance [13, 15]. Incorporating these theoretical models into BI tests underscores the importance of person-centered planning and comprehensive assessment metrics in achieving successful BI outcomes.

4.4. Previous studies

The study, *"Business Intelligence and Analytics: From Big Data to Big Impact,"* by Chen et al. [5] delves into the practical components of enterprise intelligence in the context of massive statistics. It addresses the diverse methods and software tools used in enterprise intelligence, with a focus on their implementation in IT groups. The look at highlights how these tools can enhance statistics collection, storage, analysis, and visualization, supplying groups with the ability to extract beneficial insights from their data. The authors discuss the importance of integrating modern enterprise intelligence tools with existing systems to improve data-driven decision-making processes. It also addresses the challenges groups face in adopting enterprise intelligence technologies, such as high costs and complexity of implementation, and presents strategies to overcome these obstacles. This looks at underscores the transformative capacity of enterprise intelligence in enhancing operational efficiency and gaining competitive advantage in a data-driven enterprise environment.

The study *"Modern Business Intelligence-The Road to Big Data Analytics"*, conducted by Deloitte [19] focused on the development of business intelligence in modern work environments, and talked about the growing demand for analysis according to predictive analytics, and the possibility of dealing with different types of data. According to the study, business intelligence in its traditional form faces many challenges in meeting advanced requirements, while modern business intelligence provides a high ability to prepare periodic reports, store initial data until needed, which provides repositories for various data and explore them more widely and comprehensively. The study put forward proposals to integrate modern intelligence tools with traditional systems to develop the ability to make evidence-based decisions within organizations.

In*" Data Systems and Business Intelligence to Achieve a Competitive Advantage: Prospects, Challenges and Real-World Applications"*, Djerdjouri [20] explores the key role of business intelligence systems in the development of

organizational competitiveness within SMEs. The study highlights the importance of business intelligence technologies in facilitating decision-making processes and enhancing operational efficiencies through the application of real-world models of business intelligence in many sectors. The results emphasize the need to improve business intelligence applications to meet various challenges, such as user satisfaction and data quality.

The study *"The Impact of Business Intelligence in The Era of Big Data on Business Data Analysis,"* by Du [21] explores the evolving role of Business Intelligence (BI) and its integration with Big Data Analytics, which enables organizations to analyze events very well and increases their ability to predict future trends. The study dealt with the methods and techniques of transition from traditional data storage systems to modern means of business intelligence, which combines structured and unstructured data to develop the ability to make decisions within organizations to enhance overall business strategies. The results of the study confirm that business intelligence enhances the ability to comprehensively analyze data, leading to better strategic planning.

The study *"Business Intelligence in The Era of Big Data: A Review of Analytical Tools and Competitive Advantage"* by Adewusi et al. [2] used various investigative research methods and analytical tools, including traditional approaches such as paper reports and modern technologies like machine learning. The researchers provided a comprehensive review of the development of business intelligence tools in the digital age. They highlight the importance of having personnel with extensive experience in using business intelligence technologies, which leads to enhanced productivity and improved decision-making capabilities. Additionally, the study offers an overall perspective on the challenges associated with implementing business intelligence technologies in the era of big data. It emphasizes the necessity for organizations to adopt modern tools that enhance their comprehensive understanding of the market, consumers, and services provided.

5. Research Results

5.1. Data Analysis and Research Findings

The initial stage of data analysis involved descriptive statistics, specifically calculating frequencies and percentages.

5.2. Knowledge of BI

To understand how BI is perceived, used, and impacted within the organizational context of the respondent, frequencies and percentages of respondents' responses to the items in this dimension were extracted.

Table 2.
Frequencies and percentages of respondents' responses about Knowledge of BI (N=123).

Items		Freq.	Percentage%
How familiar are you with the concept of BI	Very familiar	46	37.4%
	Familiar	32	26%
	Neutral	30	24.4%
	Unfamiliar	6	4.9%
	Very unfamiliar	9	7.3%
What BI methods does your organization use?	Predictive Analysis	20	16.3%
	Data Mining	27	22%
	Data Visualization	35	28.5%
	Big Data Analytics	33	26.8%
	Other	8	6.5%
Which software do you currently use for BI purposes?	Microsoft Power BI	41	33.3%
	Tableau	24	19.5%
	Qlik	17	13.8%
	SAS	20	16.3%
	Other	21	17.1%
How has the implementation of BI affected your decision-making process?	Significantly improved	39	31.7%
	Improved	52	42.3%
	Neutral	17	13.8%
	Deteriorated	12	9.8%
	Significantly deteriorated	3	2.4%
What types of data do you analyze using BI tools?	Sales Data	21	17.1%
	Customer Data	32	26%
	Financial Data	37	30.1%
	Operational Data	28	22.8%
	Other	5	4.1%

The results reveal a mixed familiarity with Business Intelligence (BI) concepts among respondents, with a notable 63.4% indicating varying levels of familiarity (Very familiar: 37.4%, Familiar: 26%). Data visualization emerges as the most utilized BI method (28.5%), followed closely by Big Data Analytics (26.8%) and Data Mining (22%). Microsoft Power BI is the most commonly used BI software (33.3%), with Tableau (19.5%) and SAS (16.3%) also being prominent choices. Implementation of BI has generally had a positive impact on decision-making, with 74% reporting improvements

(Significantly improved: 31.7%, Improved: 42.3%). Financial data (30.1%) and customer data (26%) are prioritized for analysis, indicating a strategic focus on financial analytics and customer insights.

5.3. Challenges in Implementing BI

To identify the challenges facing IT companies in implementing BI within the organizational context of the respondent, the frequencies and percentages of the respondents' responses to the items in this dimension were extracted.

Table 3.
Frequencies and percentages of respondents' responses about Challenges in Implementing BI (N=123).

Items		Freq.	Percentage%
What are the main challenges you face in implementing BI solutions?	Data Quality	33	26.8%
	Data Integration	23	18.7%
	Cost	46	37.4%
	User Adoption	17	13.85
	Other	4	3.3%
How do you ensure data quality in your BI operations?	Regular Data Cleaning	25	20.3%
	Automated Data Quality Tools	54	43.9%
	Manual Verification	30	24.4%
	Other	14	11.4%
How often do you update your BI software?	Weekly	8	6.5%
	Monthly	33	26.8%
	Quarterly	37	30.1%
	Annually	41	33.3%
	Less frequently	4	3.3%
How do you measure the success of your BI initiatives?	Improved Decision-Making	42	34.1%
	Increased Efficiency	26	21.1%
	Cost Savings	27	22.0%
	Revenue Growth	23	18.7%
	Other	5	4.1%

The results highlight significant challenges in BI implementation, with cost identified as the primary obstacle (37.4%), underscoring financial constraints in adopting BI solutions. Data quality (26.8%) and integration issues (18.7%) also pose substantial hurdles, emphasizing the critical need for effective data management strategies. Automated data quality tools (43.9%) and regular data cleaning practices (20.3%) are widely employed to maintain data accuracy. BI software updates predominantly occur annually (33.3%), balancing technological advancements with operational stability. Success metrics focus on improved decision-making (34.1%) and efficiency gains (21.1%), reflecting strategic goals in leveraging BI for operational and strategic improvements.

5.4. Role of Data in BI

To perceive the position of data in BI within IT groups in the organizational context of the respondent, frequencies and probabilities of respondents' responses to the gadgets on this dimension have been extracted.

The have a look at consequences indicate that records visualization performs a crucial role in business intelligence activities, with an majority of respondents (sixty five. eight%) thinking about it both " critical" or " crucial." This emphasis highlights its pivotal function in simplifying complicated datasets into easily understandable insights that facilitate informed decision-making. Concerning privacy and security, businesses typically rely on encryption (35.8%) and access controls (31.7%) to protect sensitive data, supplemented by regular audits (26%) and other measures (6.5%). The study also found that the impact of big data on business intelligence is significant, with seventy-four point eight percent of participants noting its slight to large impact, underscoring its transformative role in expanding data analytics capabilities and enhancing strategic insights across various organizational domains.

Table 4.
Frequencies and probabilities of respondents' responses approximately the position of data in BI (N=123).

Items		Freq.	Percentage%
What role does data visualization play in your BI activities?	Critical	34	27.6%
	Important	47	38.2%
	Neutral	19	15.4%
	Unimportant	16	13%
	Not Used	7	5.7%
How do you handle data privacy and security in your BI operations?	Encryption	44	35.8%
	Access Controls	39	31.7%
	Regular Audits	32	26%
	Other	8	6.5%
How has Big Data influenced your approach to BI?	Significantly	40	32.5%
	Moderately	52	42.3%
	Slightly	26	21.15
	Not at all	5	4.1%

5.5. Impact of BI on Operational Performance

To perceive the effect of BI on overall operational performance in IT groups within the organizational context of the respondent, frequencies and probabilities of respondents' responses to the objects in this dimension have been extracted.

Table 5.
Frequencies and percentages of respondents' responses about the impact of BI on operational performance (N=123).

Items		Freq.	percentage%
How has the implementation of BI impacted operational performance in your organization?	Improved Decision-Making	45	36.6%
	Operational Efficiency	26	21.1%
	Better Customer Insights	24	19.5%
	Cost Savings	22	17.9%
	Other	6	4.9%
How do you integrate BI with other business systems?	API Integrations	48	39%
	Custom Solutions	29	23.6%
	Data Warehouses	40	32.5%
	Other	6	4.9%

Based on the study findings, the implementation of Business Intelligence (BI) has had a profound impact on operational performance within organizations. A significant 36.6% of respondents reported that BI implementation has notably improved decision-making processes, emphasizing its role in enhancing the accuracy and timeliness of strategic decisions. Additionally, BI has positively influenced operational efficiency (21.1%) by streamlining processes and providing better customer insights (19.5%) through an improved understanding of customer behaviors and preferences. Cost savings (17.9%) have also been realized, demonstrating BI's ability to optimize resource allocation and operational expenditures. Integration of BI with other business systems primarily occurs through API integrations (39%) and data warehouses (32.5%), enabling comprehensive data aggregation and analysis across various sources, while custom solutions (23.6%) further tailor BI implementations to specific organizational needs, ensuring flexibility and alignment with strategic goals.

5.6. Development of BI Strategies

To identify the development of BI strategies in IT companies within the organizational context of the respondent, frequencies and percentages of respondents' responses to the items in this dimension were extracted.

Table 6.
Frequencies and percentages of respondents' responses about development of BI strategies (N=123).

Items		Freq.	Percentage%
How do you predict the future development of BI in your organization?	Increased Adoption	49	39.8
	More Advanced Tools	29	23.6
	Integration with AI	42	34.1
	Other	3	2.4
How does BI help you understand customer behavior?	Predictive Analysis	44	35.8
	Customer Segmentation	32	26.0
	Trend Analysis	41	33.3
	Other	6	4.9
What training or resources are available for employees to learn BI tools and techniques?	Internal Training Programs	38	30.9
	Online Courses	42	34.1
	Workshops	37	30.1
	None	0	0
	Other	6	4.9
How do you integrate BI with other business systems?	API Integrations	36	29.3
	Custom Solutions	45	36.6
	Data Warehouses	33	26.8
	Other	9	7.3
How important is real-time data in your BI strategy?	Critical	53	43.1
	Important	65	52.8
	Neutral	5	4.1
	Unimportant	0	0
	Not Used	0	0
What recommendations do you offer to other organizations beginning their journey into Business Intelligence?	Invest in Training	63	51.2
	Ensure Data Quality	45	36.6
	Start Small	12	9.8
	Other	3	2.4

The study results indicate that the future development of Business Intelligence (BI) within organizations is generally positive. 39.8% of respondents expect an increase in the adoption of this technology, and 34.1% believe that integration with artificial intelligence will play a significant role. In terms of understanding customer behavior, 35.8% of respondents rely on predictive analysis and 33.3% on trend analysis, highlighting the importance of advanced analytical techniques in gaining deep insights. For employee training on BI tools and techniques, various resources are available, such as online courses (34.1%), internal training programs (30.9%), and workshops (30.1%), ensuring employees are well-equipped with the necessary skills. In the integration of BI with other business systems, organizations mainly rely on custom solutions (36.6%) and API integrations (29.3%), reflecting the need for flexible and seamless data connectivity. Actual-time records are considered extremely vital in BI techniques, with 95.9% of respondents viewing them as "essential" or "vital," emphasizing the need for immediate insights to aid decision-making. Ultimately, the recommendations for agencies beginning with BI include investing in training (51.2%), ensuring records are accurate (36.6%), and starting with small projects (9.8%) to facilitate editing and implementation.

6. Discussion

The difference in the degree of familiarity with the concepts of business intelligence among workers in IT companies explicitly explains the need for tailored educational programs: although a large percentage of participants has a good understanding of BI models, some still require further recognition and education. Data visualization is the key front-end tool in a business intelligence process; hence, it will require those tools that can transform complex data into understandable insights with actionable values. The high usage of big data analytics and data mining reflects the sophisticated technical requirements of companies in analyzing these large data sets to extract patterns. Additionally, companies are more interested in Microsoft Power BI because of its properties of integration and ease of use, which indicates that selecting tools with flexible and user-friendly functionality is important. Others use applications like Tableau and SAS, demonstrating the varied technical needs and capabilities of companies. In this way, the high positive impact of BI on the decision-making process underscores the importance of these technologies in improving operational and strategic performance. The overall enhancement in decision-making reflects the ability to utilize data effectively to gain a competitive advantage. The focus on financial and customer data makes these areas highly relevant for business strategies and necessitates valid and reliable analyses to guide decisions regarding investments and customer relationships.

Some key factors underline the challenges companies face when trying to implement BI architectures. Annual business intelligence software updates bring about stability through the house of technological advancements and sustain operational stability, eventually contributing to some metrics related to success, like improved decision-making and increased

efficiency. These metrics, therefore, reflect strategic goals that can be leveraged using AI investments as a way of enhancing operational and strategic developments within companies. It identifies high costs as the leading barrier, pointing to tight budgets and tough economic times as the main factors against uptake for innovative business intelligence technologies. In general, the findings show that data quality and integrity issues pose major challenges, stressing the critical need for effective data management strategies, such as using automated data quality tools and implementing regular data validation.

The research findings underscore the essential aspects of business intelligence and analytics within organizations. Most significantly, it demonstrates that data visualization is paramount in interpreting and analyzing intricate datasets for more informed decision-making. Companies need to depend on encryption, access controls, and frequent audits to ensure sensitive data is secure. These steps are very crucial in protecting data from unwanted eyes, and sometimes, audits make it extra safe from unauthorized access. With big data, most of the influences are overwhelming, given the fact that moreover, one can enhance the analytical capability and strategic insight in a company or an organization. Enterprises that invest in big data analytics enable themselves with strategic advantages, increasing the overall performance and innovating the same.

It discusses a number of benefits, such as improved overall operational performance and cost savings, which help to prove that business intelligence works best in terms of optimizing resource use while at the same time lowering operational costs. This way, companies can have more sustainable general operational performance and greater flexibility with regard to resources and day-to-day operations management. Business intelligence, in this sense, shows the ability to offer a fully analytical environment through its heavy usage of API integrations and data warehouses. This capability assists organizations in using data in an integrated manner for strategic decision-making. Integration makes operations efficient, reduces data silos, and improves an organization's ability to act promptly upon market opportunities or threats. Regarding business intelligence technologies, a focus on their growing adoption and integration with AI foreshadows the increasing pressure to leverage BI technology to improve analytics and operational strategies within organizations. As such, employee training remains a commitment by organizations to enhance their workforce with improved skills and to equip them with the competencies necessary for using business intelligence tools, making them more adaptable to the changing business environment and enabling the achievement of positive results efficiently and effectively.

Thus, this study supports the findings of earlier studies related to the transformative power or subject matter of business intelligence (BI) in a big data era. The research confirms previous studies showing a significant contribution of BI to the enhancement of decision-making processes and operational efficiencies of IT organizations, since a large percentage indicated that decision-making and operational performance have improved with the implementation of BI. This current research, just like [16] emphasizes that BI is a shift in storing data from traditional storage systems toward more advanced and sophisticated ones that can perform structured and unstructured data analysis in a single analytic environment. Both studies underline the role of data visualization and predictive analytics in making complex datasets more amenable to strategic decision-making. Furthermore, data quality and data integration challenges pertain to some of the problems noted by Deloitte [19], who argues that robust data management strategies are required to transcend such limitations.

The findings of Adewusi et al. [2] extend the belief that business intelligence tools, properly integrated with big data analytics, provide competitive advantages by offering insights into market trends and customer behaviors, as well as operational performance in general. The strong positive impacts on decision-making, operational performance, and customer insights also corroborate the conclusions of Adewusi et al. [2] which show that BI facilitates an all-rounded view by organizations of their operational environment. Both studies emphasize the high requirement for skilled professionals and robust data management frameworks to maximize the benefits of business intelligence technologies. In addition, the fact that real-time data integration was emphasized and advanced analytical tools were assigned strategic roles in both studies reflects a common prior knowledge of the evolution of requirements for sustaining competitive advantage in the modern, increasingly data-driven business environment. Therefore, convergence of the findings from these two studies firmly positions BI at the core as an enabler of navigation through the complexities of today's business environments toward sustainable success.

7. Conclusion

This paper provides an in-depth review of business intelligence in IT organizations based in Amman, Jordan, in the year 2025. BI has the potential to transform decision-making processes, enhance operational efficiencies, and improve customer insights, which is especially important given the competitive pressures and dynamic conditions within organizations today. However, the study highlights some common challenges encountered in implementing BI: financial constraints, poor data quality, and difficulties in integrating different data sources. Addressing these issues requires robust data management strategies, including the use of automated tools to ensure data quality and regular maintenance practices. The study also presents an optimistic outlook, with many respondents anticipating increased adoption and integration of artificial intelligence within BI systems. This trend aligns with the growing recognition of BI's potential to leverage advanced analytics and predictive capabilities for deeper insights into market trends and customer behaviors. As BI continues to evolve alongside technological advancements and organizational needs, embracing real-time data integration and agile decision-making processes will be crucial for organizations aiming to remain competitive, agile, and on a sustainable growth trajectory in a data-driven business environment.

8. Recommendations

The following recommendations are proposed to maximize the benefit of business intelligence within organizations:

- Any organization should invest in regular training of its employees in using Business Intelligence tools and techniques. This forms a very important basis for enhancing their understanding of analytical insights and how they can be effectively used in strategic decision-making.

- Key amongst these organizational challenges is the adoption and implementation of strict data quality standards; this is important from the period of collection to analysis. The study recommends starting with small, well-planned projects in business intelligence implementation. These projects facilitate ease into using the technology and learning from challenges in bits; hence, making the organization's shift towards the broader and deeper usage of business intelligence easier.

- It also suggests that real-time data integration in business processes needs to be implemented by organizations because real-time data makes insights available immediately, error-free, with a view to helping organizations support effective decisions as rapidly as possible to become competitive in the marketplace.

- Predictive analytics in understanding customer behaviors and market trends empowers an organization to drive strategic decisions with dependable data and accurate forecasts, thus enhancing the efficacy of business intelligence in achieving business goals.

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