Tech-Business Analytics – a Review-based New Model to Improve the Performances of Various Industry Sectors

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ABSTRACT

Purpose: *Integration of ICCT underlying technologies and big data technology to develop a new kind of Business analytics that can be used to solve semi-structured and unstructured problems of various industry sectors i.e., primary, secondary, tertiary, and quaternary industry sectors. The new study is known as Tech-business analytics (TBA). The goal of this study is to better understand the idea of TBA and how it influences a company's innovation outcomes.*

Design/Methodology/Approach: *The originality of business analytics products/services in many industries is based on how business analytics is directly influenced by data-driven culture, but product/service importance is influenced indirectly by environmental scanning, which is further influenced by the usage of ICCT underlying technologies. Through a comprehensive review, analysis of the existing state, anticipating ideal/desired status, identifying research gaps, and analysing of research objectives in business analytics, this have developed a new concept of Tech-Business Analytics in this work. The paper also examines the importance of Business Analytics (BA) and how to predict the importance and applications of projected business analytics in future business sectors using the ABCD analytical framework.*

Findings/Result: *This review based a new concept of integrated technology that combines ICCT underlying technologies with big data leads to a new model of tech-business analytics for improving the performance of different industry sectors. With all the resources, templates, technologies, opportunities, and capabilities of integrating Data science with other ICCT underlying technologies, Tech-business analytics will a paradigm shifter with a lot of potentials in solving industrial problems.*

Originality/Value: *The new model of tech-business analytics is developed which is a review-based new concept opportunity for improving Industry Performance in Various Industries. A generic architecture is also developed, which looks at Tech Business Analytics in Primary, Secondary, Tertiary, and Quaternary industry sectors and is useful for research for technical efficiency improvement purposes.*

Paper Type: *Exploratory research.*

Keywords: Business Analytics (BA), ICCT underlying technologies, Tech-Business Analytics, TBA, Industry Performance, Data Science, Big Data Analytics, Research gap in Business Analytics, ABCD Listing

1. INTRODUCTION :

The term "business analytics" refers to a combination of several research disciplines and software tools, including quantitative data analysis, statistical analysis, management science methodologies, and procedures, computer science, and information communication technology (ICT) tools. Although

all these disciplines contribute to the advancement of the business analytics idea, it is not overstated to say that dynamic changes in the ICT domain have the most impact on business analytics [1-2]. The Analytics 1.0 era encompasses the time when all traditional analytical tools were employed. From the mid-nineteenth century to 2005, this time was covered [3-4]. The use of descriptive statistical methodologies, optimization, and simulation approaches, traditional reporting capabilities, and visual data presentations were all important aspects of this BA concept. Various methodologies from the statistical realm and other quantitative disciplines, as well as management science, have been actively investigated for the goal of business analytics over this long time. The ultimate purpose of TBA utilization was to support business decision-making, and the persons involved in this process were divided into two groups: data analysts on one side and business decision-makers on the other. At the turn of the preceding decade, there was a significant shift. The birth of the Big Data phenomenon and the change in analytics toward Big Data analytics as a distinct independent entity characterize the era from 2005 to 2012 [5-6]. This is known as Analytics 2.0, and it pertains to the rise of Big Data. Google, Yahoo, Microsoft, eBay, Facebook, LinkedIn, and other pioneering proponents of the BA era had, and still have, business models built on data gathering, manipulation, and analysis. Data products and services are their major offerings. Much of the analytics effort in the recent few years (from 2012 to now) has been focused on combining the previous two analytical skills, which have been labelled Analytics 3.0. This era is frequently described as a mix of "big and small data": huge companies are dealing with big data, while small businesses have a lot of potential with traditional - small data analytics [7-8]. Firms' goals in this period are to use BA not only to aid decision-making but also to develop new products and services. The final era of Analytics 4.0 is just getting started. When compared to the previous three eras, this one has a few differences: while the involvement of the human analyst was critical from Analytics1.0 to Analytics 3.0, Analytics 4.0 is more self-contained. Despite the need for specific experts such as quantitative analysts and data scientists, who were the workhorses of the previous three analytics eras, Analytics 4.0 is primarily focused on democratizing analytics professions. Citizen data scientists and business translators are two examples of new professional positions that are emerging [9-10].

1.1 Analysing the importance of Business Analytics (BA) in future business decisions in various Industries:

Companies throughout the world, according to a recent report by Micro Strategy, are using data to:
(1) Increase the efficiency of your processes and save money.
(2) Lead change and strategy.
(3) Keep a close eye on financial results and adjust as needed.
(4) More Informed Decision-Making when approaching a crucial strategic decision, business analytics can be a helpful tool.
(5) Increasing Revenue Businesses that adopt data and analytics projects may see huge financial gains.
(6) Greater Efficiency of Operations Analytics can be applied to improve business operations and procedures outside of financial gains.
(7) Qualifications for Business Analysts More than just data crunching skills are necessary for success as a business analyst.
(8) Increasing your proficiency in business analytics
(9) As businesses develop their analytics to maximize the value of intricate and rapidly expanding data sets.
(10) There will be an increase in the need for business analytics managers who have the knowledge and abilities to steer data-based initiatives.
(11) Enhance procedures, spot possibilities, and deal with tricky problems [11].

1.2 Summary of ICCT underlying technologies affecting Future Business:

Information, Communication, and Computation Technology (ICCT), also known as Digital Technology, is regarded as a general-purpose, universal technology because of its capacity to address a wide range of issues in human society pertaining to fundamental requirements, innovative desires, and aspirational desires. In the beginning of this chapter, we listed several quality characteristics of digital services as well as several notable published works in the field of digital service innovation. The significant supporting ICCT technologies that are emerging as 21st century technologies, such as

artificial intelligence and robotics, big data and business analytics, cloud computing and storage, digital marketing, 3D printing, the Internet of Things, online ubiquitous education, quantum computing, information storage technology, and virtual and augmented reality, are considered for potential innovations in these fields.

Table 1: ICCT Underlying Technologies and their Importance

S. No.	ICCT Underlying Technology	Importance	Applications
1	Technology in Artificial Intelligence and Robotics	Performing better than humans in terms of thinking behaviour.	The ultimate artificial brain would be one that connects brains with computers. Artificial intelligence is used in tourism, telecommunications, citizen services, banking for loan decisions, retail, and other service industries [4].
2	Technology for Big Data and Business Intelligence (Business Analytics)	Creating meaningful data by merging hidden patterns, undiscovered connections, market trends, and consumer preferences to help companies make better business decisions.	Supply chain management may be found in industries such as banking, tourism, health, finance & insurance, and fashion. Ideal business forecast [5].
3	Blockchain is a distributed ledger technology.	The blockchain facilitates the verification and traceability of multistep transactions that require it. It can protect transactions, reduce compliance costs, and speed up data transfer processes. Contract administration and product audits can be aided by blockchain technology.	Blockchain technology has applications in financial services, healthcare, government, travel & hospitality, retail, and consumer packaged products. Financial Services: Blockchain technology is already being employed in the financial services industry in several novel ways [6].
4	Cloud Computing is a type of computing that uses the internet to	Using the most cost-effective and efficient computing infrastructure from any location	Financial services are provided by industries such as finance, education, security, brokerage services, healthcare, gambling, supply chain, and telecommunications. Computer with the best performance [7].
5	Forensic Technology & Cyber Security	Criminal investigations and law enforcement require forensics. In some circumstances, such as hacking and denial of service (DOS) assaults, the computer system becomes the crime scene. The proof of the crime will be stored on the computer system.	Data theft, network breaches, and unauthorised online transactions are just a few of the crimes that may be investigated with the use of digital evidence. Businesses also employ computer forensics to seek out and punish cyber offenders by tracing information linked to a system or network intrusion [8].

6	Technology for Digital Marketing and Business	Mobile commerce and e-marketing are achievable with the use of digital and internet technologies.	Hotels, travel, and healthcare are just a few of the businesses that employ digital marketing and customer relationship management. The Ideal Business Partnership [9].
7	3D Printing is a technology that allows you to create three-dimensional objects	Making three-dimensional buildings from a computer file. This is achieved by additive manufacturing techniques, which require less material than traditional methods.	Health Sciences, Forest Industry, and Ideal Component and Device Manufacturing [10].
8	The Internet of Things (IoT) is a type of technology that allows you to connect your devices to the internet	Through the linkage and integration of the physical and cyber worlds, equipment may be controlled remotely.	The Internet of Things enables service innovation. Smart city services include tourism, healthcare, telecommunications, logistics, transportation, and retail. The combination of control and connection is great [11].
9	Technology for Data Storage	A big quantity of data may be stored in a small space if the right technology is used.	All sectors of the service industry where a high volume of business data and information must be stored and accessed promptly on a small device. This is a wonderful storage system [12].
10	Technology of Quantum Computers	High-throughput data processing	High-speed computers based on optical technology will be crucial in the future retail, logistics and supply chain, telecommunications, and information security industries, to name a few. Computers that are perfect [13].
11	Technology in Online Education	Everyone may acquire an education via technology, regardless of their location, age, or economic situation.	To mention a few, there are education, library services, retail banking, and healthcare. The best educational system [14]
12	Technology for Virtual and Augmented Reality	Virtual reality is a three-dimensional simulation of body feelings.	To name a few, tourism, the travel industry, banking, and education and training. Virtual reality is the best option [15]

2. OBJECTIVE OF THE REVIEW:

The objectives of this paper include:
(1) Analysing the importance of Data Science (Big Data) and Business Analytics (BA) in future business decisions in various industries.
(2) Possibility of use of ICCT underlying technologies in improving the quality of Business Analytics.
(3) A systematic review of BA and ICCT underlying technologies to know the status of bridging BA and ICCT underlying technologies.
(4) To predict the desired status of an integrated system of BA and ICCT underlying technologies and its consequences.

(5) To identify the research gap which is the difference between the status and desired status to integrate BA & ICCT underlying technologies.
(6) To develop research agendas of the integrated concept called Tech-Business Analytics (TBA) in different industry sectors.
(7) To study the advantages, benefits, constraints, and disadvantages of Business Analytics using a qualitative ABCD analysis framework to propose the importance of integrating BA with ICCT underlying technologies [11-12].

3 POSSIBILITY OF USE OF ICCT UNDERLYING TECHNOLOGIES IN IMPROVING QUALITY OF BUSINESS ANALYTICS :

A business is anything that is done for the sake of profit. Profit can be tangible or intangible, depending on the resources employed, including money, materials, machines, people, information, and time. Profit motivation may be found in many types of businesses, to generate long-term profitability. The four types of industrial sectors in which enterprises operate are primary, secondary, tertiary, and quaternary. Companies in the primary industrial sector offer raw resources to secondary industries such as agriculture, mining, and fishing. Food processing, automobiles, cement, steel, computer hardware, and electronic devices are all part of the secondary industrial sector, which turns raw resources into completed tangible items known as goods. The tertiary industrial sector includes all service firms that provide intangible services to clients, such as banking, insurance, tourism, education, healthcare, legal services, and so on. The quaternary industrial sector includes information technology services, research and development, business consulting, and other services. Various variables impact how individuals do business in society, but integrating technology into the workplace and managing it effectively increases productivity, efficiency, and profit. Technology is the systematic application of science to many complicated societal problems to improve human comfort and enjoyment of life. The term "General-Purpose Technologies" refers to technologies that have spread their branches throughout a wide range of disciplines and sectors of practice. Many industries have recognized and used general-purpose technology to assist them in conducting business and solving or simplifying problems. Pervasiveness, in which they have an inherent potential for technological breakthroughs, and innovation complementarities, in which the productivity of industrial sectors may be enhanced via inventive research and development, are two characteristics that constitute General Purpose Technologies (GPT).
Market analytics entails using data and mathematical tools to obtain new tools and an understanding of a company's response. Market analytics allows for the systematic use of statistical modelling and mathematical analysis, relating to prediction modelling, as well as fact-based management, to guide decision-makers [13-15].
The word "analytics" has gained popularity in the last decade or so. Analytics has become increasingly relevant in the digital age of the internet and information technology. Database, IT systems, mathematical analysis, computational methods, and system-based models are all part of analytics. All of this is combined to give policymakers all the possible outcomes so they can make an educated and well-researched decision. Decision-makers can see how their decisions perform in various situations thanks to the computer-based model. A technique or instrument for making sound commercial decisions is business analytics. As a result, it is giving competition in the market [16-17].

It all began with a visit to sciencedirect.com the world's largest publisher. While there were a few publications in the early 2000s, by the end of 2014, there were over 2500 outlets in just one database that met the requirements of BA, BI, or BD. As per a study, the capabilities, applications, and tools associated with tech business analytics have emerged fastest growing fields in coming years. Although there was almost no work of publication done on tech-business analytics since 2013. This may be because the IT/IS group is constantly using the term "big data" to convey their findings to the rest of the business world [18-19].

It examined each of the databases to get a more complete picture of the frequency of these terms and the disciplines in which they are used. All disciplines of the three major keywords of each discipline. As anticipated, the three main words appear 20654 times in publications in the Computer Science field. In titles, abstracts, and body text of publications in the Business & Management area, the same three key terms appear 5423 times. It shows how BA skills and techniques are used in a wide range

of disciplines, including all disciplines. These findings demonstrate that the capabilities of BA/BI/BG are not limited to IT/IS applications [20].

4. ANALYSING THE IMPORTANCE OF DATA SCIENCE (BIG DATA) AND BUSINESS ANALYTICS (BA) IN FUTURE BUSINESS DECISIONS IN VARIOUS INDUSTRIES :

Data science is an extremely popular new study and professional field. Data Science is the fastest-growing new employment sector, according to LinkedIn study. Over the past three years, employers have hired more people with data science training than usual—up 37%. Every industry is being transformed by data science, which is gaining popularity every day. The knowledge and instruction needed to succeed in data analytics can be found in a Data Science certification course. There are several reasons why data science is important in business [21].

(1) In order to improve decision-making throughout the organization, businesses can monitor, manage, and gather performance measures.

(2) Trend analysis can be used by businesses to inform important choices that will raise revenue and increase consumer involvement.

(3) Models created by data scientists can replicate a wide range of operations and use current data. Businesses might therefore seek out candidates who have professional certificates and have taken the best data analytics courses.

Data science assists organizations in defining and identifying target audiences by fusing existing data with fresh data points to provide smart insights. Refining current or historical company data with the help of innovative technology is what is referred to as business analytics. They are utilized to create complex models for generating future growth. A typical business analytics procedure could involve data collection, data mining, sequence identification, text mining, forecasting, predictive analytics, optimization, and data visualization. Nowadays, every company generates a sizable amount of data in a particular way. To examine historical data, business analytics is currently making use of statistical techniques and technologies. They use this to unearth fresh perspectives that will aid in future strategic decisions. Using numerous tools and techniques, including machine learning and artificial intelligence technology, to predict and integrate insights into daily operations is crucial for business intelligence, a subset of the business analytics discipline. Company analytics thereby combines the domains of computing and business management to produce insights that can be put into practise. Then, to increase efficiency and create a productive workplace, these values and inputs are applied to change business practices. To use this knowledge in decision-making, business analytics may transform raw data into more valuable inputs. We can have a deeper understanding of the primary and secondary data that results from their actions with the help of business analytics technologies. Businesses benefit from additional method improvement and increased productivity as a result. Companies need to be ahead of their competitors and equipped with the most up-to-date toolkits to help them make decisions that will increase efficiency and revenue [22-25].

5. POSSIBILITY OF USE OF ICCT UNDERLYING TECHNOLOGIES IN IMPROVING THE QUALITY OF BUSINESS ANALYTICS :

Information, Communication, and Computation Technology (ICCT), also known as Digital Technology, is regarded as a general-purpose, universal technology because of its capacity to address a wide range of issues in human society pertaining to fundamental requirements, innovative desires, and aspirational desires. Here, we have first identified several high-quality characteristics of digital services as well as some notable examples of published works on the innovation of digital services. The significant supporting ICCT technologies that are emerging as 21st-century technologies, such as artificial intelligence and robotics, big data and business analytics, cloud computing and storage, digital marketing, 3D printing, the Internet of Things, ubiquitous online education, quantum computing, information storage technology, and virtual and augmented reality, are taken into consideration for potential innovations in these fields. The use of ICCT underlying technologies in some of the key service industry sectors is recognised, and management of ICCT underlying technology usage techniques for digital service innovation in tertiary sector businesses are analysed [26-27].

Any action motivated by a desire for profit is seen as business. Profits can be material or intangible depending on the resources used, which might be cash, goods, labour, machinery, people, knowledge, or time. The goal of all commercial organisations is to generate long-term, sustainable profit. The four

categories of industrial sectors into which business entities are separated are the primary industry sector, secondary industry sector, tertiary industry sector, and quaternary industry sector. Businesses that produce the raw materials for secondary industry sectors including the agricultural, mining, and fishing industries make up the primary industry sector. The secondary industry sector, which comprises all manufacturing industries such as food processing, vehicles, cement, steel, computer hardware, electronic gadgets, etc., transforms raw resources into finished tangible items. The tertiary industrial sector includes all service sectors that offer customers intangible services, such as banking, insurance, travel, education, healthcare, and legal services. Information technology services, R&D, business consultancy, and other support services are included in the quaternary industry sector. These services are provided to the other three types of industry sectors. Numerous factors can affect how businesses operate in society, but implementing technology into operations and efficiently managing it boosts productivity and efficiency, which in turn increases business profits. Technology is a systematic application of science that aims to address society is many complex problems and improve the quality of people's lives. Some technologies have developed and broadened their branches into numerous fields and industries of practise, earning the title of "General-Purpose Technologies." Such all-purpose technologies are recognised and employed in numerous industries to conduct business and address or ameliorate industry-specific issues. General Purpose Technologies (GPT) are characterised by their pervasiveness, where they have an inherent potential for technical advancements, and by their complementarities in terms of innovation, which means that through creative research and development, industry sectors' productivity can be raised. A new production or invention method significant enough to have a long-term cumulative impact is referred to as a general-purpose technology, or GPT. Until the 20th century, electricity, and information technology (IT) were the two most significant GPTs. A GPT might be an organisational structure, a process, a product, or a piece of technology. A small number of "General Purpose Technologies" (GPTs), like the steam engine, the electric motor, and semiconductors, seem to have propelled entire eras of technological development. GPTs are defined by their pervasiveness across numerous industries, inherent technical improvement potential, and innovative complementarities across multiple applications, leading to an expansion in operational scale. Only 24 innovations in history have been designated as genuine GPTs, according to economists Richard Lipsey and Kenneth Carlaw. Thus, the advancement of ICCT's underlying technologies and their capacity for digital service innovation are anticipated to contribute to the larger goal of a technology to meet people's basic needs, advanced wants, and aspirational desires as well as enable organisations to adopt various survival, sustainability, monopoly, differentiation, and development through growth & prosper strategies [28-30].

6. METHODOLOGY OF INFORMATION COLLECTION & ANALYSIS :

Information collection and analysis can be taken from various sources of internet, books, electronic-books, and international journals. Web of science, SCI journals, UGC- care journals and Scopus journal are also here to improve the quality of information collection and its analysis. Research Methodology and Data Collection Data, records, and publications from well-known databases such as sciencedirect.com were used in this study. Although the internet is full of websites where you can find a wealth of information on any topic, we used the following major databases in this study, which are well-known and commonly used by academics all over the world. It acknowledges that the table above is not complete. It could be added to the list in the future. Despite this, represents a massive portion of the knowledge base that most academics, scientists, and academicians would consult while undertaking a review of the literature. The databases can be fetched from any college and university network for finding tech-business analytics [4]. The research scholar and Google Scholar are also the information collection and analysis tools for research and same can be done here [31].

7. RELATED WORK ON BIG DATA, ICCT UNDERLYING TECHNOLOGIES, & BUSINESS ANALYTICS :

Ahmad, A. (2015) adds to the current literature in a way that will benefit potential BI researchers, especially in terms of gaining long-term competitive advantage. The model will help clinicians think about which programs they will need while implementing BI. Finally, the study's applicability can be broadened by applying it to other industries and geographical settings [1].

The aim of Hallikas, J. et al. (2021) is to the role of business analytics in changing business analytics, and supply chain performance, as well as how these factors influence business profit. A model and its

features for empirical testing were developed, as well as the capabilities of digital procurement. Data from the surveys and the equations process are then used to evaluate the theory [2].

According to the findings of Handfield, R., et al. (2019), significant changes in the procurement and supply chain technology landscape will continue to occur in the next five years. Advanced procurement analytics, on the other hand, is currently underutilized, and questions about precision and accuracy are preventing in tech business analytics. In its evolution, organizations must manage the transition and nurture an analytical culture [3].

To capture the effect of AI market importance on firm performance, S. L. Wamba-Taguimdje et al. (2020) apply IT capabilities theory. It deals with 650 case studies from different big portals [4].

The effect of tech-business analytics, data protection, and service supply chain was investigated by Y. Fernando et al. (2018). Tech business analytics has a significant and beneficial impact on a company's data security, as well as service supply chain innovation and performance [5-6].

Enad Al-Qaralleh, R. et al. (2021) explore the combined impact of business analytics expertise, and organizational resilience on progressive achievements. Even though business analytics is a required condition for highly progressive achievements [7].

According to Mawed, M.et al., (2017), business analytics gathered and analyzed will play a key role in enhancing the FM industry's performance management system. It explains the tech business analytics components and addresses the advantages of tech business analytics in any market [8].

Carillo, K.D.A. (2017) investigates the limitations of modern electronic commerce in terms of resolving educational issues. It explores the impact of digitization on organizations, especially business analytics and data science with a view to decision-making [9].

Singh, R.K., et al. (2021) want to look at the advantages, and disadvantages of business analytics in the healthcare sector. Business analytics analysis is rapidly gaining popularity in the healthcare sector to make use of the useful data available in terms of tech business analytics [10].

According to Sedkaoui (2018) has changed the industry landscape drastically in business analytics. Tech business analytics are becoming increasingly popular, particularly among businesses looking for new ways to improve their performance in the industry. Universities and colleges are concerned about this trend, which is shifting learning requirements and necessitating a refocus on developing novel approaches and innovations in their programs [11].

Bag S. et al. (2020) have presented industrial companies with numerous problems and prospects. Industry 4.0's impact on sustainable manufacturing and the circular economy has been understudied. It is in the field of Industry 4.0, sustainable manufacturing, and the circular economy, and it has built a research framework outlining essential pathways [12].

Artificial intelligence and analytics (AIA) have been integrated into energy smart grid projects by Khosrojerdi, F. et al. (2021). The empirical findings are combined to emphasize their technical and project management importance, revealing many lessons gained that can be used in the planning of highly integrated and automated smart grid projects [13].

Table 2: Related work on Big Data

S. No.	Area of Big Data	Focus & Findings	Reference
1.	Marketing at the intersection of data, social science, and consumer intelligence is known as "humanising big data."	Anyone dealing with big data will not overlook the application of big data for marketing purposes. Consequently, it's a story about us and our ability to interpret information.	Strong, C. (2015). [15]
2.	Big data and marketing science are two terms that are often used interchangeably.	To make advantage of big data, marketing science will need to combine subjects such as data science, machine learning, text processing, audio processing, and video processing.	Chintagunta, P. et al. (2016). [16]
3.	The revolution of marketing and big data consumer analytics	It is a style of acting and thinking about marketing strategies. The report defines Big Data consumer analytics as the	Erevelles, S. et al. (2016). [17]

		extraction of hidden consumer knowledge from Big Data and the revolution of marketing.	
4.	A text mining and topic modelling-based literature study of research trends in Big Data in Marketing.	We have five dimensions: Big Data, Marketing, Geographic location, and research areas, with no unique Big Data publications, given the study interest in Big Data in Marketing.	Amado, A. et al. (2018). [18]
5.	Through the perspective of the marketing mix, decoding big data analytics for business insight	A marketing mix framework may be used to manage massive data for marketing intelligence. This model distinguishes between several types of data. Based on the marketing mix, the marketing intelligence study was split into five areas.	Fan, S. et al. (2015). [19]
6.	Big data and marketing intelligence: Digital marketing tools are evolving into marketing social engineering approaches.	Social engineering and marketing intelligence are also highlighted. IT- and big data marketing were previously referred to as "digitalized trust marketing" before marketing 5.0.	Lies, J. (2019). [20]
7.	Making better marketing decisions using big data analytics	A well-thought-out big data and analytics approach. As a Source of Value, Big Data Analytics is It adopts a more nuanced approach to big data development, stating that enormous data is not inherently an issue.	Verhoef, P. et al. (2016). [21]
8.	A look at big data analytics in the context of marketing plans	Integration of marketing and social big data methodologies, as well as the use of social big data for marketing reasons. Some of the most popular social media marketing methods are incorporated into the model.	Ducange, P. et al. (2018). [22]
9.	Big Data Marketing: A Closer Look	The term "big data marketing" relates to the selling of massive volumes of data. Big-Data Marketing is based on integrated marketing management and aims to simplify both external and internal marketing tasks, including data, procedures, and analytics.	Goyzueta Rivera, S. I. (2015). [23]
10.	In the marketing world, big data is a hot topic. An integrated picture of a large opportunity, a large difficulty, and research trends	Even though big data has the potential to flourish in the marketing industry, it reveals that research into big data marketing applications and approaches is still in its infancy. This paper is about marketing.	Alshura, M. S. et al. (2018). [24]
11	Evidence from the online big data platform suggests that when a pop singer committed suicide in China, there is increased public	The big data platform to investigate the worry of depression among online users. The study specifically seeks to compare the depression-related employment schedules that involve shifting between shifts.	Yu, H. Z et al. (2021). [25]

	concern about depression.		
12	Blockade and sleep-related adverse medication events were reported in over 37,000 Dupilumab individual case safety reporting pharmacovigilance database reports.	In this study, we found 1,294 different case-reports of Dupilumab side effects linked to sleep problems out of over 37,000 total. Our results from a wide number of situations provide information.	Alroobaea, R., et al. (2022). [26]

Table 3: Related work on ICCT UNDERLYING TECHNOLOGIES

S. No.	Area of ICCT underlying technologies	Focus & Findings	Reference
1.	ICCT fundamental technologies for digital service innovation are managed.	In some of the most significant service industry sectors, the management of ICCT underlying technology, as well as information storage technology and ICCT underlying technologies, is highlighted.	Aithal, P. S., et al. (2019). [27]
2.	ICCT-based underlying technologies for digital service innovation	In some of the most well-known service industry sectors, information storage technology and ICCT underlying technologies, as well as ICCT underlying technology management, are highlighted.	Aithal, P. S., et al. (2019). [28]
3.	Industry sectors can use information, communication, and computation technology (ICCT) as a strategic tool.	In this paper, the major underlying technologies of ICCT have been evaluated and discussed, as well as their growing patterns of applications in the primary, secondary, tertiary, and quaternary industries.	Aithal, P. S., et al. (2019). [29]
4.	An Overview of Industrial Applications of Information, Communication, and Computation Technology (ICCT)	In this article, the applications of ICCT and its underlying 10 technologies were identified as Universal technologies among the 21 key underlying technologies of ICCT and their growing technologies.	Aithal, P. S., et al. (2019). [30]
5.	Universal Technologies Management and Industry Consequences	In this post, we will go through a variety of ways for effectively managing the underlying technologies of ICCT and NT to solve issues including basic needs, advanced demands, and more.	Aithal, P. S., et al. (2019). [31]
6.	Redefining Productivity and Performance via Strategic Management of Universal Technologies	In this post, we will go through a variety of ways for responsibly managing the underlying technologies of ICCT and NT to solve issues including basic needs, advanced demands, and more.	Aithal, P. S., et al. (2019). [32]
7.	Emerging ICCT Trends in Survival, Sustainability, Differentiation,	In this study, the major underlying technologies of ICCT have been evaluated and discussed, as well as their growing patterns of applications in	Aithal, P. S. (2018). [33]

	Monopoly, and Development	the primary, secondary, tertiary, and quaternary industry sectors.	
8.	Analysis of ICCT Underlying Technologies' Interdependency and Related New Research Opportunities, with a Focus on Cyber Security and Forensic Science	Virtual and augmented reality, technology, and quantum computing are among topics that will be discussed. These ICCT are recognised as twenty-first-century emerging technologies since they support society's technology.	Aithal, P. S. (2020). [34]
9.	The Contribution of Information, Communication, and Computation Technology (ICCT) to Universal Technology for Societal Transformation. The Pillar for Transformation: Information, Communications, and Computation Technology	Many new developing technologies known as ICCT underlying technologies will be held, and their applicability in many industrial and service industries will be investigated.	Aithal, P. S. (2020). [35]
10.	Higher Education Strategies for Different Tech-Generations: A Conceptual Analysis	Universal technologies, such as ICCT underlying technologies and nanotechnology, have the potential to automate a wide range of products and services, and are thus viewed as a breakthrough.	Aithal, P. S. (2020). [36]
11	Sustainable nanotechnology ideas and potential applications.	A thorough analysis of key publications in the field that have lately been published on a variety of connected, fundamental subjects the key ICCT underpinning technologies that interact with green nanotechnology.	Aithal, S et al. (2021). [37]
12	Green and eco-friendly nanotechnology's opportunities and challenges in the twenty-first century. Sustainable Nanotechnology: Methods, Items, and Uses.	Total auto support is provided by ICCT underpinning technologies. The key ICCT supporting technologies that integrate. The relationship between countries and technical advancements is indirect.	Aithal, P. S et al. (2022). [38]

Table 4: Related work on Business Analytics (BA)

S. No.	Area of Business Analytics	Focus & Findings	Reference
1.	Enterprise information systems using business analytics.	It starts with a proposal for a business analytics ontology, followed by a presentation of analytics service-	Sun, Z. et al. (2017). [50]

		oriented for business analytics service-based EIS. The relevant work will be discussed in the latter parts.	
2.	A survey of the literature and the creation of a taxonomy for employing semantic text mining in decision support and business analytics	For our research, we selected a random sample of terms related to social media analytics. Prominet was used to enter the keyword lists. To broaden the necessary vocabulary.	Ko, A., et al. (2020). [51]
3.	Business analytics and big data analytics	It has a significant impact on data concerns. In this essay, we will look at the underlying challenges of big data analytics before moving on to its business applications.	Duan, L., et al. (2015). [52]
4.	A comparison study on business analytics employing random forest trees for credit risk prediction.	The work's principal goals are focused on. This work is divided into five portions, the first of which summarises previous relevant work and efforts at prediction, and the second of which is divided into five sections.	Ghatasheh, N. (2014). [53]
5.	A thorough assessment of business analytics in Industry 4.0	Because this SLR is primarily focused on the broad concept of Industry 4.0, it does not go into great length about Business Analytics techniques. The associated research is summarised.	Silva, A. J., et al. (2021). [54]
6.	A semantic approach to business analytics specification and generation of key performance indicators	Work in this field This section includes work on KPI formulation and business modelling that is connected to the previous work. The principles of the Balanced Scorecard are first outlined in [18- 19].	Maté, A et al. (2017). [55]
7.	With real-time business analytics, you can improve your business intelligence and assist your processes.	2 summarises previous research and discusses key future problems in decision assistance and business intelligence. In Section 3, you will learn about a framework for enhancing business intelligence.	Seufert, A., et al. (2005). [56]
8.	Accelerating business analytics applications	Applications for business analytics Business analytics and associated work differs from network intrusion detection systems applications, which require streaming data to be reviewed at wire speed.	Salapura, V. et al. (2012). [57]
9.	Text categorization and clustering for business analytics using Twitter data	Businesses may use Twitter data analytics to get client feedback on their products and services, as well as their brand. Several relevant works in sentiment analysis for business were also mentioned in this article.	Halibas, A. S. et al. (2018). [58]
10.	Designing business analytics solutions	We have proposed that we help in a variety of areas related to the creation of analytics solutions since we are unfamiliar with analytics design to data	Nalchigar, S., et al. (2020). [59]

		preparation. We compare a few similar initiatives.	
11	A paradigm for conceptual modelling in business analytics	It is a repository of information about how to generate business analytics. Frameworks are used in three analytics initiatives.	Nalchigar, S. et al. (2016). [60]
12	Business analytics in (a) blink	The Blink project's ambitious goal is to reply to all Business Intelligence (BI) queries in seconds, regardless of database size, and at an unbelievably cheap total cost of ownership.	Barber, R., et al. (2012). [61]
13	For graph-based business analytics, Food Broker creates synthetic datasets.	We talk about previous benchmark-related data producers and associated projects. Then, in Section 3, we explain our business process and simulate it. It is currently being implemented.	Petermann, A., et al. (2014). [62]
14	Trustworthiness and the Adoption of Business Analytics	Managers' happiness with their business analytics is tied to their perception of the business analytics team's trustworthiness, which influences both the degree of analytics they use.	Nacarelli, V. et al. (2021). [63]
15	A qualitative investigation on the success and influence of business analytics.	Our evaluation focused on work linked to business analytics, with a particular emphasis on current organisational theories and frameworks. After going through the advantages, we concluded.	Parks, R., et al. (2017). [64]
16	The case study of churn prediction, from Big Data to Business Analytics	We implemented the related works that propose alternative techniques associated and experimental assessment over the related approaches, which were motivated by this work in the telecom business.	Zdravevski, E., et al. (2020). [65]
17	In free float: Supporting carsharing companies with business analytics	We begin with an overview of car sharing and associated studies in this section. This is what we do. We wrap up this part by situating our findings in the context of Business Analytics.	Wagner, S., et al. (2016). [66]
18	Moving toward a circular economy-focused business analytics capacity	For the sake of this study, we treat the terms big data analytics and business analytics as one. While our study draws on earlier, closely comparable contributions from BA and CE theory, there are a few additions.	Kristoffersen, E. et al. (2021). [67]
19	Analyzing a company's operational efficiency and competitiveness using integrated business analytics to understand the negative aspects of artificial intelligence (AI)	As a result of AI-BA opacity, poor business judgement, and perception, a firm's performance may be influenced. AI-related integrated business analytics solution (TER).	Rana, N. P et al. (2021). [68]

20	What turns huge data into useful information for businesses? The effects of business analytics on firm performance are examined in a meta-analysis.	Business analytics to add value to the company (BA). We do a meta-analysis of as a result. The literature on BA business value has already viewed studies that are like our definition.	Oesterreich, T. D. et al. (2022). [69]
21	Algorithmic fairness in corporate analytics: Research and application prospects	It is relevant in terms of adherence to the law, social duty, and utility; unfair BA if not appropriately and consistently addressed, future projects that capitalise on the BA/advantages.	De-Arteaga, M. et al. (2022). [68]

Business analytics is frequently used to analyse data from many sources when it comes to commercial enterprises. This might include everything from cloud-based software to marketing automation and CRM tools. The potential applications of ICCT and its ten key underlying emerging technologies—artificial intelligence, big data & business analytics, cloud computing, digital marketing, 3D printing, internet of things, online ubiquitous education, optical computing, storage technology, and virtual & augmented reality—are investigated. Using a newly created predictive analytic model, the rising trends of applications of the ICCT's underlying technologies in the primary, secondary, tertiary, and quaternary industries sectors of society are examined, studied, and predicted. The pros, downsides, limitations, and drawbacks of these technologies from the perspectives of many stakeholders are discovered and analysed to satisfy human wants to lead wealthy and comfortable lifestyles. The article also focuses on the possible benefits of ICCT as a tactical tool for the development, differentiation, and survival of various primary, secondary, tertiary, and quaternary sectors.

8. CURRENT STATUS & NEW RELATED ISSUES :

8.1 Current Status:

On their path to maturity, technological advancements in business analytics present new difficulties. However, businesses can only address them and make a tidy profit if they qualify as trends. Thanks to modern technology, the cloud will continue to be a market disruptor and mover in the future of business analytics, business analytics are surrounded by rules and scandals in the future. Important discussions on information security and ethics have been sparked by data breaches.

8.2 New related Issues:

(1) Today's managers need fresh and creative decision-making facts in solving problems in an increasingly dynamic and internationally competitive business environment.
(2) Industry-created business analytics is the best data-hiding tool for turning data into fact-full knowledge using a mathematical approach.
(3) Managers want market analytics that have new concepts and techniques from data as well as a deeper understanding of complex organizational dynamics, to assist them in making good decisions to succeed and predicted.
(4) Use of ICCT technologies in business analytics encompasses all facets of analytics in quantitative and field research, to categorize, describe, and resolve all problems.
(5) Solving common problems with traditional mathematical or artificial intelligence solutions [39-42].

9. DESIRED STATUS AND RESEARCH GAP :

Business analytics can have a slew of advantages. Allow for data-driven decision-making with the ability to boost profits and productivity. Predictive analytics enables companies to prepare for the future in previously unthinkable ways. Aids a business in making well-informed decisions. Business analytics helps us to make marketing or business development decisions based on your sources, enabling you to confidently grow your business. Companies use business analytics to make data-

driven decisions. Business analytics offers a detailed overview and insight into how companies can enhance their performance by simplifying and automating processes [43-44].

9.1 Research Gap:

Environmental scanning benefits from business analytics clearly and optimistically. Through the mediation of a culture of data-driven, business analytics has an indirect impact on inputs from the environment. The novel new idea of a product has an impact on the novelty of good products. Environmental scanning improves the usefulness of new products. Competitive advantage is strongly linked to new product novelty. The importance of a new product is linked to competitive advantage. technologies which is a new idea [45-46]. According to fig. 1, the new conceptual model is based on business analytics and is the superset of big data/data science, and is a subset of ICCT underlying technologies. This new concept integrated version of big data/data science and ICCT will form a new kind of analytics called Tech-business analytics. Here, ICCT underlying technologies are superset, Tech-business Analytics id sub-set, and Big data/Data science is sub-sub-set.

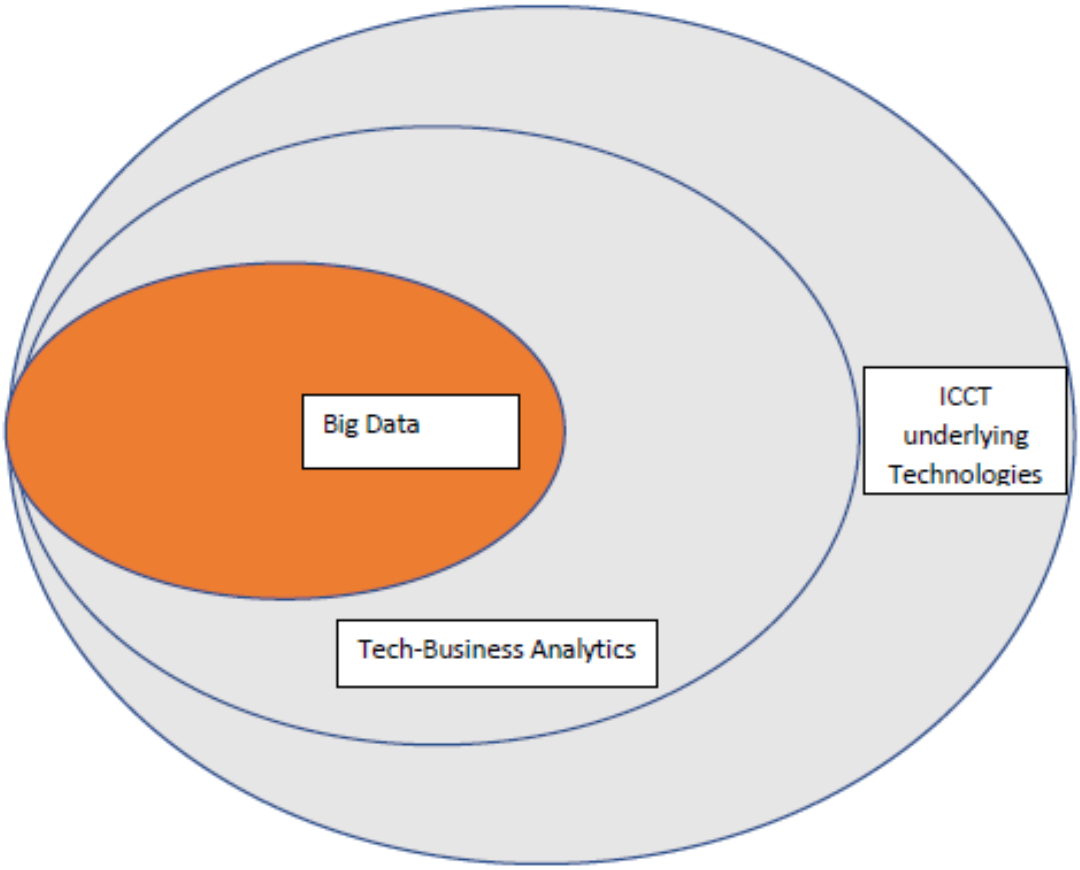

Fig. 1: Research Model based on Tech-Business Analytics

9.2 Tech- Business Analytics as new research Agenda:

On the other side, tech- business analysis is frequently employed when the business requirements created by a business analyst necessitate technical answers. Tech-business analysis lays the groundwork for applying technical solutions to address business needs. This is true because tech-business analysts always start with the business requirements specified by the business analyst and work to discover technical solutions for them. Tech- business analysis is an overly complicated job. Some businesses wrongly search for business analysis when tech- business analysis would be a better fit to address their current issue. So, what exactly is tech- business analysis? Tech- business analysis is a subset of business analysis that has as its only objective translating business needs into terms that a technical audience may easily understand. As a result, Tech- Business Analysis enters the picture as a mechanism for connecting business issues with their technology solutions. Only once business

analysts have performed their job of identifying business problems can the work of the tech- business analyst be understood the tech- business analyst would next convert the business requirements created by the business analyst into technical objects. A business analyst would discover current business issues with a specific organization that might deviate from a system or even a business process, and a tech- business analyst would use technology to propose technical answers to those issues. As a result, tech- business analysis is concerned with the process of applying technology to analyse, change, and resolve current business issues. Tech- business analysts are deeply involved with business operations and procedures, despite the impression that they are more closely tied to technology than to the business itself [47-50].

9.3 Postulates of Tech-Business Analytics:

(1) Artificial intelligence and robotics technologies do better than humans in terms of thinking and behaving.
(2) Big data and business intelligence technologies (business analytics) combine hidden patterns, undiscovered connections, market trends, and consumer preferences to provide meaningful data that helps firms make better decisions.
(3) The adoption of blockchain technology makes multistep transactions that need it easier to verify and track. It can secure transactions, save compliance costs, and expedite data transfers. The use of blockchain technology can help with contract management and product audits.
(4) Cloud Computing Technology makes use of computer technology to provide the most cost-effective and efficient service possible from any location.
(5) Forensic technology and cyber security Criminal investigations and law enforcement both involve the use of forensics. Hacking and denial of service (DOS) attacks are examples of situations.
(6) Technology for digital commerce and marketing Mobile commerce and e-marketing are achievable with the use of digital and internet technologies.
(7) 3D printing technology from a computer file, three-dimensional structures are created. This is accomplished by additive manufacturing technologies, which use less material than traditional methods.
(8) IoT allows for remote control of equipment by connecting and integrating the physical and cyber worlds.
(9) Technology Used to Store Data A lot of data may be stored in a small space if the right technology is used.
(10) Data is processed at a rapid pace using quantum computer technology.
(11) The Technology of Online Education Everyone may acquire education via technology, regardless of their location, age, or economic situation.
(12) Technology for Virtual and Augmented Reality Virtual reality is a three-dimensional simulation of body feelings [51-56].
(13) All the above ICCT underlying technologies have the potential advantages and benefits for business analytical solutions by integrating with Data science.

9.4. Tech-Business Analytics Model:

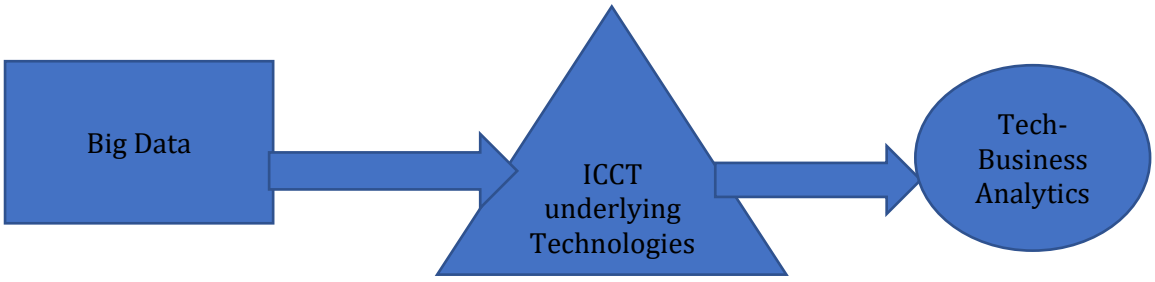

Fig. 2: Tech-Business Analytics Model

Tech-business analytics encompasses both big-data and ICCT technologies. Big data refers to the huge, diverse amounts of information that grow exponentially. It encompasses the volume of data

being gathered, the speed at which it is being produced, and the range or variety of the data points being covered. ICCT, or information and communications technology, is the infrastructure and components that enable modern computing (or technologies). Although there isn't a single, widely accepted definition of ICCT, it is understood to refer to all hardware, software, networking components, applications, and systems that collectively allow people and organizations (like businesses, non-profits, governments, and criminal enterprises) to communicate and collaborate online. Big data along with other ICCT underlying technologies gives rise to a new area for improving industrial solutions and is referred to as tech-business analytics [57-58]. Thus, application of Big data analytics using ICCT underlying technologies in various industry business problems leads to Tech-Business Analytics (TBA).

10. RESEARCH AGENDAS BASED ON RESEARCH GAP IN TECH-BUSINESS ANALYTICS:

10.1 Research Agendas:

Based on the research and the above technology model, we propose Tech-Business Analytics as working in primary industry sectors, secondary industry sectors, tertiary industry sectors, and quaternary industry sectors and compare them with big data, and ICCT technologies [59].

10.2 Analysis Of Research Agendas:

(1) What advantages can various approaches to market analytics have, and how can their drawbacks be overcome?
(2) What are the consequences of these data attributes during their lifecycle of use, and how do data attributes affect their use and severability?
(3) How does the application of various business analytics techniques affect the success potential that can be realized by business analytics?
(4) How can companies develop their market analytics skills?
(5) What are the constraints, pressures, and enablers of market analytics adoption and maturation?
(6) What systems, procedures, and activities are needed to integrate business analytics into organizational capabilities?
(7) How do several types of knowledge governance practices affect the creation of value from business analytics investments?
(8) What are the benefits and drawbacks of using market analytics to make decisions?
(9) What factors lead to mitigating human prejudices or the use of heuristics instead of market analytics-generated insight?
(10) What are the various organizational mediating capabilities from which business analytics can provide value?
(11) What is the relationship between various market analytics technologies and the various forms of success results that can be achieved?
(12) What are the variables that influence whether business analytics investments are valuable or not? [60].

10.3 Tech-Business Analytics – An Opportunity For Improving Industry Performance:

Tech-Business analytics has become an important sector in the industry as well as private institutions and it will be growing fast. Through it, business strategists and decision-makers can predict different results, find their outcomes, check the performance, and opportunities, and make improved decision-making in their fields. More companies are recognizing the usefulness of tech-business analytics in progressing challenges and optimizing data value. Several companies are using tech business analytics to plan and use the work. Every industry has its own set of problems to solve, and business analytics gives decision-makers new tools to do so. Business analytics has already become a business enabler in a variety of sectors, according to several studies reported in the literature review section. With all the tools, templates, technologies, opportunities, and capabilities it offers, BA is more than a fad [61-62].

10.4: Comparisons of Tech-BA with BA:

Table 5: Comparisons between Business Analytics and Tech-Business Analytics

S. No.	Business Analytics	Tech-Business Analytics
1	It focuses on corporate procedures, methods, and processes.	It focuses on transforming raw business requirements into technical business artefacts.
2	When a particular company needs to overcome difficult challenges and bring about a critical positive change, this approach is used.	Utilize technology to deliver technical answers to business needs in all four industry sectors by using ICCT underlying technologies.
3	Business analysts and functional analysts are needed to carry out business analysis.	Tech-business analysis requires knowledge of computer hardware, software, and ICCT underlying technologies.
4	Its effects can be seen in the fields of technology, organization, process, business, and enterprise.	Performing business analysis requires a distinct set of skills than performing technical business analysis, which differs greatly.
5	A person must always keep in mind that business analysis is a multifaceted field that calls for a variety of distinct abilities to succeed. Such abilities will allow one to identify the present needs of a firm and proceed to thoroughly record them to identify the solutions required.	To become a successful business analyst, one must have strong technical capabilities, including software expertise and IT abilities. To be able to interpret data, a person must be able to analyses, characterize, and evaluate data using logical methods. To solve a particular business function, the person must also be able to analyses a business activity utilizing technical tools [63].

11. ABCD LISTING OF TECH-BUSINESS ANALYTICS :

11.1 Advantages:

(1) Tech business analytics are interactive, allowing users to play around with different variables for access to data by using graphs, charts, and maps.
(2) Tech business analytics insights can be used to evaluate employee productivity, revenue, overall growth, and department-specific performance.
(3) Tech business analytics is a useful way to stay ahead of the market so go far beyond conventional analysis and is easy to apply using a business intelligence software.
(4) Improved data quality is perfect, and inconsistencies and inaccuracies can show up in a variety of ways due to database hacking. Businesses that concentrate on data collection, updating, and growth have a better chance of succeeding.
(5) Tech business analytics tools combine multiple data sources and assist in a company's overall organization and allowing managers and employees to focus on producing accurate information.
(6) Tech business analytics is why companies need to move quickly as well. Customers and sales could be lost if accuracy and speed problems are not addressed. It is reducing the amount of time it takes them to decide.
(7) Growing revenue is a vital goal for any company because Tech business analytics tools will be used to allow them to compare different dimensions.
(8) Profit margins are a source of concern for most businesses so business intelligence can be used to boost profit margins [64].

11.2 Benefits:

(1) Businesses are continually under pressure to not only retain customers but also to consider their needs to strengthen the customer experience and develop long-term relationships.
(2) Products are the lifeblood of every company, and they are often the most important investments. The role of the product management team is to identify patterns that affect the development of a strategic roadmap for new features and services.
(3) Businesses are still working with structured data, and they must be extremely adaptable to cope with the confusion that today's customers face when interacting with modern technology. The only way to answer in real time and make a customer feel valued is to use advanced analytics.

(4) Using tech business analytics to prepare, track, and optimize business processes in the production of products or services ensures consistency and effectiveness in meeting customer demands and achieving operational importance [64].

11.3 Constraints:

(1) Most companies today have some kind of tech-business analytics in place, usually in the form of Business Intelligence or data warehousing.
(2) Analysts are typically grouped by tech business domains in organizations.
(3) Analytical models, by their very design, can increase in accuracy over time as the expected outcomes are compared to real events in the warehouse. However, this is a challenging task that necessitates a lengthy period of commitment to the solution. Many deployments fall short in this region.
(4) Business customers lose confidence because they do not see the promised results right away, and executives lose faith in the solution and fail to believe what the models say.
(5) Without nails, also the finest hammer in the world is worthless, and the same can be said about analytical instruments. The "nails" in an analytics solution must be plentiful and not twisted or misshapen regularly if it is to succeed. The lack or inadequate quality of underlying transactional data causes many implementations to fail. Either there are not any data, the data sources are too complicated, or the data is not well-understood [64].

11.4 Disadvantages:

(1) Customers' details, such as sales, online transactions, and subscriptions, may be available to their parent corporations and customer databases.
(2) Tech business analytics methods are difficult to understand and use.
(3) Tech business analytics knowledge may also be used to discriminate against people from a particular nation, community, or caste.
(4) Tech business analytics software is extremely difficult. This is because it necessitates a thorough understanding of the methods and their precision in analysing applicable data according to applications.
(5) The role of the business analyst or information technology consultant is often significant when it comes to improving project success rates. Therefore, TBA may be a preferable alternative for integrating new business analytics technologies [64].

12. OBSERVATIONS & SUGGESTIONS FOR FURTHER RESEARCH IN BUSINESS ANALYTICS TO IMPROVE INDUSTRY PERFORMANCE:

(1) Businesses that use analytics are five times more likely to make smarter, quicker decisions, according to a Better Buys survey.
(2) From 2016 to 2025, the global BI and analytics market is expected to grow at a CAGR of 26.98 percent, from $147.19 billion in 2016. By 2025, businesses will have created and managed 80% of the world's data.
(3) According to 85 percent of business leaders, big data would drastically change the way they do business, especially in terms of intelligence personalization. Data cleaning is a tool that helps you to clean up your data.
(4) Errors in data sets are detected and corrected. This increases data quality, which benefits both customers and businesses such as banks, insurance companies, and financial institutions.
(5) Based on data collected by many sensors, intelligence forces use it for monitoring and tracking. This helps to avoid any misdeeds and/or disasters [65-66].
(6) For further research tech-business analytics is an exceptionally good novel idea with business analytics to improve industry performance.

13. CONCLUSION :

Tech-business analytics, an integrated and inter-dependent ICCT & Big data tool will get importance in solving challenges, predicting potential outcomes, and optimizing data value for companies. Every industry has its own set of problems to solve, and it is expected that the tech-business analytics gives decision-makers new set of tools to do so. Tech-business analytics is expected to be a market enabler

in several organizations in all industry sectors. With all the resources, templates, technologies, opportunities, and capabilities of integrating Data science with other ICCT underlying technologies, Tech-business analytics will not be just a fad, but a paradigm shifter with a lot of potentials *in solving industrial problems* [67-69].

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