The Pivotal Role of Business Intelligence and Data Analytics for the Textile Industry in India

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Business intelligence systems (BIS) provide critical information to the planners and decision-makers of an organization through the integration of analytical tools with operational and historical data. The objective of business intelligence (BI) is to enhance the quality and promptness of information, thereby enabling executives to gain a more comprehensive understanding of their organization's standing in comparison to competitors. Utilizing business intelligence tools and technology, one may analyze, for instance, fluctuations in consumer expenditure and behavior, corporate capabilities, customer preferences, and market conditions. Furthermore, business intelligence can be employed by analysts and managers to ascertain which modifications are most prone to accommodating evolving trends. Mining of data is the process of extracting potentially advantageous, implicit information from data in a nontrivial manner. Examples of technological techniques include clustering, discovering dependency networks, learning classification rules, data summarization, anomaly detection, and change analysis. The integration of web architecture, improvements in hardware and software capabilities, the introduction of the advancements and the data warehouse as a repository in data purification have collectively created a more comprehensive business intelligence environment than was previously attainable. The purpose of this document is to provide a structure for the creation of a business intelligence system. Utilizing artificial intelligence (AI) to investigate and detect security vulnerabilities is possible. Acts of manipulation and motion Given a restricted, static environment, artificial intelligence devices can easily detect and map their surroundings.

Keywords: Business intelligence systems (BIS), Artificial Intelligence (AI), Data mining, Technological techniques.

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1. Introduction

Foreign exchange earnings from the textile industry in India are substantial, accounting for more than 35% of the country's total export revenue. Since ancient times, it has been an indispensable component of the worldwide economy, helping to sustain the livelihoods of millions of individuals across more than two hundred nations [1]. The government intends to support annual development of 18% by addressing labor force generation through the construction of new infrastructure and the improvement of existing systems. The sector is dominated by traditional powerhouses such as China, India, Pakistan, and Vietnam, with India making investments in spinning and weaving machinery [5]. In comparison to positive growth factors such as biodegradable and environmentally friendly cotton, the textile industry is falling behind due to obsolete machinery and skilled labor [2]. The textile and garment industry (TCI) in India has become a vital sector of the global economy, earning over $1 trillion annually and employing 35,000 people worldwide. The Indian textile industry, which contributes to India's economic growth, employs 35 million people and generates over 14% of industrial output, 3% of GDP, 8% of total excise income, and 17% of export revenue [4]. The Indian technical textiles market is expected to grow rapidly, with the fastest growth rate in the Asia-Pacific region. Indian textile industry is creating jobs and attracting skilled workers. The state government has designated textile manufacturing as a thrust area and approved the establishment of six integrated textile parks [3].

2. Literature Review

Balapriya& Srinivasan [6] argue that AI is a solution for efficiency issues in digital commerce systems. It provides effective and accurate evaluation customer data, aiding in managerial decision-making and customer satisfaction. AI enhances e-commerce industry quality and profits. Pallathadka et al. [7] highlighted the use of a business intelligence in finance and e-commerce for improved customer experience, supply management, business efficiency, and size reduction, focusing on deep learning and machine learning techniques. Madhavi [8] highlights the growing adoption of artificial intelligence by corporations for business efficiency. AI tools enable accurate predictions, wise decision-making, and process changes, enhancing operating performance and generating goods and services quickly. Kitsios&Kamariotou [9] highlight the potential of artificial intelligence technology in resolving challenges but note challenges in sensible application and a lack of knowledge in strategic usage. They suggest that AI tools can enhance consumer experiences and employee engagement, and new series will be developed through innovation. Paliwal, Patel, Kandale, &Anute [10] discuss the integration of AI in business operations, highlighting its potential for quick opportunity acquisition, reduced errors, increased transparency, and revenue growth. They predict AI will perform tasks more accurately than humans, potentially achieving a hypothetical future. Enholm, Papagiannidis, Mikalef, &Krogstie [11], and Bencsik [12] highlight the connection between knowledge management and AI, presenting a model for forecasting successful inventions. AI aids in knowledge development, guiding management decisions, and influencing business success through innovative investments. Palanivelu&Vasanthi [13] explore the growing importance of business intelligence (BI) in the business world. They argue that AI can improve marketing, provide faster, less costly, and more accurate solutions, and help entrepreneurs achieve strong market competition. AI can also help businesses renovate with innovative ideas, identify data trends, enhance customer service, and identify failures. Razauddin&Sabir [14] highlight the benefits of artificial intelligence for organizations, including customized marketing, client administration, computerization of operations, stock administration, and enrolment. AI helps businesses focus on their expertise, while advanced tools help businesses stay competitive and efficient. As businesses grow, it's essential to upgrade to the latest AI tools to stay competitive and profitable. Jain [15] highlights the significant impact of business intelligence on society, government, and humans. AI is crucial for businesses, predicting customer choices and expanding sales through automation and data analysis. Despite a lack of skilled talent, AI solutions can transform workplaces. Humans are more prone to errors, but AI systems can behave intelligently, affecting economic growth, cyber security, and income equality. Mesir [16] found that artificial intelligence enhances decision efficiency and quality, improving search operations. Expert systems shape decision-making models with ambiguity and

limited information. Internet technology produces intelligent agent technology, adapting to decision-makers styles and behaviors for routine tasks.

2.1 India's Textile Industry

The Indian textile sector significantly contributes to the country's economy and exports, contributing 11% to the total exports. The labor-intensive industry employs over 45 million people, making it the second-largest employer after agriculture. The Indian government has implemented export promotion policies and allowed 100% foreign direct investment (FDI) in the sector under the automatic route [17]. The industry's growth is attributed to its strong natural and synthetic fibre production base. The sector is the single largest industry in India, employing 50 lakh people directly or indirectly, with 1800 textile mills across the country. The industry's growth and development directly impact India's economy [18].

2.2 Skill Development and Textile Education

The Ministry of Textiles in India has been started an "Integrated Skill Development Scheme for the Textile and Apparel Sector" to assess the skilled manpower needs of the sector. The scheme aims to upgrade laborers' skills for increments, self-employment, and incentives, ultimately benefiting the trainees' livelihoods [19]. The training programs will be tailored to meet the demand for skilled workers in various fields, including fashion technology, textile technology, apparel merchandise, CAD, import, export, and power loom units. Private sector organizations like the Centre of Textile Functions aim to develop social responsibility textile experts by providing quality education to urban and rural youth [20].

2.3 Data Analytics

The idea of data analytics is not new. Machine learning and regression analysis are only two of the numerous analytic methods that have been around for a while. There has long been an understanding of the need for analyzing documents and e-mail, which are examples of unstructured data. Something fresh has happened: new software and hardware, data sources (like social media), and commercial opportunities have all come together. The present enthusiasm for and potential for data analytics are outcomes of this confluence. A new academic discipline called "data science" is emerging as a result of this trend; this area deals with the methods, software, and hardware used to analyze and understand massive data sets. The source is Watson [21]. Demand for data science and analytics has been on the rise due to the expanding awareness of the social and economic advantages of these fields.

The manufacturer may learn about the production process from the technical design. A product's design becomes more conducive to manufacturing as a result. This includes skills like pattern creation, sewing, and more. These datasets need to be connected in order to get insights from them. This data will be used by the suggested system, which is detailed in the section that follows. (see figure 1)

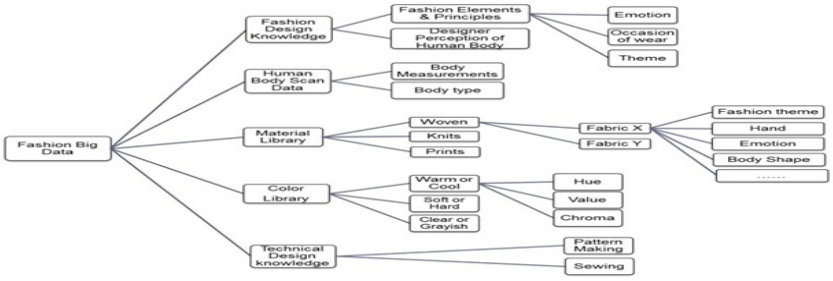

Figure 1. Data in Textile

The need for additional data and developments in machine learning are direct outcomes of this surge in demand. The direct ideas and words used as facilitators in this brave new world are big data (BD) and artificial intelligence (AI) Boire [22]. Marketers can make more informed predictions and better exploit their understanding of consumer behaviour with the help of big data. As a result, it facilitates the most accurate forecasting of company choices and boosts production performance. In terms of early decision-making and production development, all marketing contexts show that the market turbulence model and approach have a favourable influence Huang et al., [23]. In the realms of society, economy, and politics, big data and AI have captivated the public's imagination and made significant impacts. Examining the past, present, and future of these technologies through the lens of their shaping myths is necessary to cast doubt on the alleged magic they embody. There is a growing reliance on data-driven technology without critical thinking [Elish& Boyd, [24]. According to Ogbuokiri et al. [25], data analytics may aid organisations in deciphering data for actionable insights and making informed business choices. However, it is also capable of handling a wide variety of cutting-edge data analytics tools. Data analytics is no longer a luxury reserved for large corporations. Data analytics may help small companies make smart, data-driven choices that will help them expand.

2.4 Artificial Intelligence (AI)

The word "intelligence" has two distinct but related meanings in the context of business intelligence (BI). Human intelligence, as it pertains to corporate matters and operations, is crucial. The emerging discipline of business intelligence (BI) studies the use of human intelligence and AI in the management and decision-making processes of various business challenges Ranjan, [26]. The term "artificial intelligence" (AI) has revolutionised both the professional and private spheres. Combining the meanings of "artificial" (something developed by people) with "intelligence" (the capacity to think independently), we get the phrase "artificial intelligence" (AI) as "thinking power created by humans." In Industry 4.0, the use of AI is seen as a crucial step. Ever since it came into being, it has presented both possibilities and problems to many industries. The development of several AI-powered technologies has been driven by the hope that they may enhance various areas of society and, by extension, the economy Dhanabalan& Sathish, [27]. According to Riley [28], one strategy for staying ahead of the competition is to master the data. Among the most talked-about innovations of late have been AI, cloud computing, and big data.

2.5 Business Intelligence Systems

Using a variety of technological methods and approaches, BIS compiles historical data for its users to conduct queries, analyses, and generate reports that aid in managerial decision-making and the improvement of corporate process efficiency. Business intelligence systems allow companies to increase market share and income via better decision-making [29]. Academics and professionals in the field agree that business intelligence (BI) solutions have garnered much interest from companies and other groups [30, 31]. According to polls conducted by the Gartner Group, nearly 80% of US corporations and 50% of EU organisations have implemented BIS [32]. Adopting BIS yields a myriad of advantages for a business. BIS stands out because of a few key features that modern company decision-makers find appealing. BIS simplifies analytical procedures about the firm's market positioning, capabilities, operations, and objectives by translating internal and external data into useful information. This, in turn, helps the organisation remain sustainable and competitive. Business Information Systems (BIS) are used across several industrial domains, including production, supply chain management, manufacturing, sales, inventory management, finance, marketing, retailing, and so forth, to facilitate efficacious marketing campaigns, monitor customer behaviour, and assess product profitability. One measure of the value of BIS is the most often used BI analysis: Credit scoring is the first step in the process, followed by upselling and cross-selling analysis, web and text mining, logistics optimisation, customer loyalty analysis, fraud detection, fraud detection forecasting, profiling and customer segmentation, and survival time and parameter importance analysis [33]. Hannula and

Pirttimaki [34] and Olexov [32] discovered that adopting BIS was viewed favourably in their surveys of significant corporations. The following benefits were the main outcomes of BIS adoption: (see figure 2)

a. Faster decision-making,
b. Obtained quality information for decision-making,
c. More accurate and quick reporting,
d. Escalate revenues.
e. Improved customer services,
f. Enhanced ability to analyse the expected opportunities and threats,
g. Enhanced quality of decision-making,

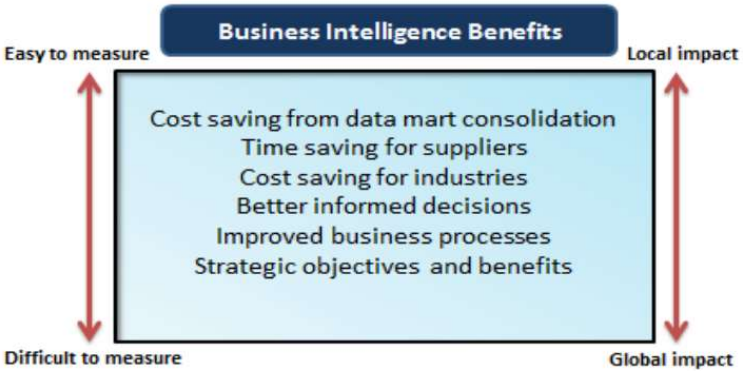

Figure 2. Benefits of business intelligence (BI), [32].

2.6 BI Solutions for the Apparel Industry and Textile Industry

The business intelligence (BI) market is saturated with proprietary solutions, according to an empirical study [35]. Proper vendor selection is critical to attaining the tremendous success of BIS adoption due to research approved by Dresner Advisory Services, Gartner, and other studies. Here are a few business intelligence systems with vendor information and features summarised in Table 1.

Table 1: solutions for business intelligence (BI) used by textile and apparel (T&A) firms.

SL	Names	Description
1	TradeGeeko	TradeGeeko offers cloud-based BI solutions for inventory management. TradeGeeko solutions enable organizations to improve online retail and wholesale processes. Pink Boutique, Cloth & Co., and Zara are benefiting by TradeGeeko.
2	Oracle	Role-based intuitive intelligence is supported by complete Oracle built-in BI solutions across the enterprise. Oracle cloud-based BIS offer scalable, efficient reporting solutions for distributed complex environment. Its central architecture empowers organizations for statistical and predictive analytics with mobile functionality.
3	MicroStrategy	Companies are integrating MicroStrategy analytics as the front end of BIS. It empowers companies to consolidate various independent data warehouses into one single platform running on HANA in-memory database. Microstrategy provides faster aggregation analysis with greater computational power. Company d and Adidas are using MicroStrategy.
4	Dematic	Dematic BI solutions empower companies to enhance supply chains and provide a competitive edge to organizations. The supply chain management of

		Adidas, Gap, and Next is benefiting from Dematic BI solutions.
5	Tableau	Tableau BI solutions enable the company to identify the key matrices to confirm the right product availability before it is ordered and shipped. Abercrombie and Fitch are benefiting from Tableau solutions for improvement of their merchandising operations.
6	TIBCO Spotfire	Marks & Spencer and H&M are using TIBCO Spotfire. The TIBCO solutions empower the analysts of the companies to integrate all data sources, such as Hadoop databases and data warehouses, without an information technology (IT) specialist. Executives and employees can also analyze complicated data without IT expertise.
7	SAP HANA in memory database	SAP HANA in-memory database is based on an independent data werehouse. Third party databases, sensors, and Hadoop can be integrated into a single platform by SAP solutions. Cloud-based SAP has the ability to process high volumes of data for data modeling at high speed. Company B and Adidas have implemented SAP solutions.
8	Birst	Birst BI is built with machine learning patented automation technologies. This approach connects applications and teams across the organizations.
9	Qlik	Qlik BI solutions are complete enterprise solutions that provide quick analysis of vast amounts of data sourcing from retailers. Tantex textile industry uses Qlik solutions.

3. Objectives

I. The purpose of this research is to illuminate how data analytics has changed the face of business intelligence (BI) in India's textile sector. It may be useful for the owner to improve the use of AI technology in the Indian textile industry.
II. To understand the role and uses of "business intelligence" in business analytics. Second, to understand how "business intelligence" affects business analytics.

4. Research Methodology

A total of 196 participants from a wide range of industries were randomly chosen to provide insight into the role, uses, and impacts of AI in business analytics. The critical review research relies on a structured questionnaire as its main data collection tool. A random sample strategy was used to acquire the data. The data was analyzed and assessed using statistical techniques such as the mean and t-test to acquire the findings.

5. Findings of the study

There are a total of 196 respondents; 57.12% are male, and 42.88% are female, as shown in Table 2, which displays the demographic information. A third (Table 3) of the population is under the age of thirty-five, almost half is in the middle age bracket (36–43), 22.22% are over the age of 43, and 31.12% are employed by ready-made garments (RMG). The next (Table 4) highest percentage of sectors using AI in business analytics is Jute, at 28.57%, Knit at 30.0%, and other industries at 9.69%.

Table 2. Demographic details (Gender)

Variables	Respondents	Percentage
Female	84	42.88
Male	112	57.12
Total	196	100

Table 3. Demographic details (Age)

	Respondents	Percentage
Below 35 years	70	35.72
35-45 years	82	41.84
Above 45 years	44	22.44
Total	196	100

Table 4. Demographic details (Working Area)

	Respondents	Percentage
RMG	61	31.12
Jute	56	28.57
Knit	60	30.62
others	19	9.69
Total	196	100

Table 5. Artificial Intelligence's Function and Use in Business Analytics

Serial	Statements	Mean Score	t value	Sigma
1	AI helps to customize marketing and advertising, stock and client computerization and administration of operation	4.00	7.452	0.000
2	AI helps to achieve effective supply chain management of supply change, better customer service and improved business operation	3.89	5.744	0.000
3	AI increases the quality and efficiency of decisions	3.84	5.088	0.000
4	AI increase the economic growth	3.90	5.933	0.000
5	AI increases productivity; reduce cost and time and human errors in business	3.29	2.868	0.001
6	AI maintains the accurate production	3.65	2.334	0.010
7	AI give solution easily of any tough task	3.87	5.542	0.000
8	AI makes the business to achieve strong competition	3.69	2.929	0.001
9	AI helps to entrepreneur	3.95	6.629	0.000
10	AI makes business fast, accurate and reduce cost	3.71	3.151	0.001

Table 5 shows how AI works and what kinds of business analytics it may be used for. The table reveals that AI aids in computerising processes, customer and stock administration, and customised marketing and advertising, with an average score of 4.00. On average, AI helps entrepreneurs generate large profits and improve customer response (3.95). According to the respondent, AI helps with "effective supply chain management of supply change," "better customer experience," and "improved business operations promotes income equality in business, and helps with economic growth (mean score: 3.90). AI improves efficiency, finds solutions to difficult problems, helps businesses expand (mean score: 3.88), and makes better decisions and searches for solutions (mean score: 3.85). In addition, with an average score of 3.71, respondents assert that AI makes businesses more efficient, cheaper, and more accurate in their marketing strategies; with an average score of 3.69, they state that AI helps businesses accomplish strong market competitiveness. On average, AI trains unstructured data models to improve prediction accuracy, decision-making, and business process optimisation with a score of 3.66. On average, AI improves corporate efficiency by 3.29 points while simultaneously decreasing expenses, time, and human error. All of the claims were found to have significance values below 0.05 when a further t-test was used to evaluate their significance.

6. Conclusion

The study examines the advantages and disadvantages of business intelligence systems (BIS) in business analytics. It highlights its potential for creating a better world and its role in various applications, such as marketing, stock administration, and operations. AI is used in business analytics to increase economic growth, protect online privacy, promote income equality, and improve customer experiences. However, it also has potential employment and life-loss costs. Organizations must be prepared for the future.

Technopak Advisors predicts that by 2021, the textile and apparel sector in India will be worth 223 billion US dollars. The nation has become a sourcing centre due to its abundant supply of raw materials and trained workers. Companies should keep their workers by offering competitive pay and benefits so that they can stay in the sector. Everyone involved in the textile industry—from managers to employees—must be prepared to compete for long-term market viability. Intelligent clothing is a topic that is currently being researched. In these uses, textiles are combined with electronics and IT. It all started with military uses, but now you can find these solutions in recreational items and protective gear. The report concludes by stating that the expansion of India's textile industry can only be achieved by the concerted efforts of all parties involved, including producers, consumers, wholesalers, retailers, the government, and other investors.

The Indian government shifted its focus from boosting exports and manufacturing to improving educational institutions and creating more jobs. By 2021, the textile and apparel industry in India is projected to be worth $223 billion, according to a report by Technopak Advisors. A sourcing powerhouse, the nation is known for its skilled workforce and abundant raw material supplies, including jute, cotton, wool, and silk. To address the important parameter problems and increase textile product exports from India, the government and the manufacturing sector of these products should collaborate. Novel approaches to product labelling, quality assurance, and supply chain management are crucial for the survival of the export textile sector. Companies should provide competitive wages and benefits packages to attract and retain employees. Everyone involved in the textile sector, from executives to workers, has to be ready to compete if they want to stay in business for the long haul. A lot of research is still going into smart clothing. For these uses, textiles, electronics, and information technology all come together. These solutions have made it into consumer items and protective gear after originally being created for military use. The article concludes by stressing the significance of collaboration among manufacturers, retailers, wholesalers, the government, and other interested parties in order to boost India's textile industry. The Indian government has changed its attention from increasing exports and manufacturing to enhancing educational institutions and generating more employment opportunities.

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