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Consequences of Big Data Analytics on Decision Processes, Estimation Accuracy, and Viability in Indian Enterprises

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Introduction: Big Data (BD) analytics has transformed the corporate environment due to the fast growth of electronic information and advances in analytics technology. This paper examines how BD analytics affects estimate accuracy, decision-making and profitability in Indian organizations.
Objective: This study examines the multifaceted effects of BD analytics on business operations, including strategy, decision-making, operational efficacy, economic outcomes and enterprise success in India.
Method: A conceptual model is created to achieve this goal, including essential elements such as BD analytics implementation. 400 participants from Indian enterprises were evaluated for the conceptual framework using Structural Equation Modelling-Partial Least Squares (SEM-PLS).
Result: The study found that BD analytics improves precise prediction and decision-making. According to the data, BD analytics impacts decision-making, strategy prediction and corporate success. However, cross-sectional data can add variable biases and causal flaws, limiting the study.
Conclusion: The study concludes that BD analytics affects crucial business features, although its cross-sectional data requires caution. The research shows that BD analytics influences decision-making and strategy in Indian enterprises' dynamic corporate landscapes, despite this limitation.

Keywords: Big Data Analytics (BDA), Enterprises, Decisions, Prediction, Success of the

Enterprise.

1. Introduction

BDA has affected enterprises globally. BDA's long-term effects on Indian business decision-making, accuracy and viability are examined. As more firms see data as a strategic resource, advanced analytics consumption is crucial for insights and a competitive advantage in today's unpredictable business climate. [1, 2] Decisions made using BDA impact how firms function and plan. Indian corporations are impacted by BDA due to its diversified industries and growing digital economy. BDA's planned and inadvertent impacts on Indian enterprises are examined. Explaining how this method influences decision-making, estimate accuracy and corporate profitability. [3, 4] BDA helps organizational decision-making. New analytical methods are needed to understand the digital age's data volume, velocity and diversity. The benefits and drawbacks of employing analytics in decision-making include data quality, privacy and a shortage of qualified individuals.[5] BDA is crucial to business planning, forecasting and estimating accuracy. Large datasets can be analysed in real time to assist businesses predict and estimate. It shows how BDA improves market trend, customer behaviour and resource projections for better decision-making. It encompasses data bases and algorithmic restrictions from enhancing estimate accuracy. [6, 7] BDA have influence on Indian businesses' decision-making, accuracy and viability. The aim of the study is to comprehend the effects of BDA implementation on estimating accuracy, decision-making dynamics along with the sustainability and efficacy of Indian businesses.

The following research questions (RQs) listed below should be investigated.

RQ1: In what ways may big data analytics impact forecasting and decision-making inside an organization?

RQ2: Is there a chance that using big data analytics would improve the company's operational and financial performance and hence have an effect on its overall success?

BDA software examined massive volumes of unprocessed data, identifying numerous correlations between elements, improving business style understanding and the research outcomes [8] process performance showed how BDA improved company performance. BDA enabled real-time precise decision-making, reduced operational expenses, increased product quality and ensured product availability in study. [9] BDA has DCV-capable data centre features. The article [10] mentioned its importance for hospitality, tourism and smart manufacturing business performance. Businesses invest in BDA solutions for better internal and external operations. BDA integration can affect forecasts and decision-making.Planning; forecasting and other processes were affected by business process analytics. Expert analysis helped BDA to make smart decisions, save costs and increase profits, according to the research [11] most machines learning algorithms' predictability limitations reduced BDA decision-making accuracy. Humans had trouble understanding such algorithms' decisions in research due to insufficient forecasting. [12] These three models Normative, descriptive and viewpoint decisions were classified. In most machine learning algorithms, predictability difficulties precluded BDA systems from generating

precise selections. According to the author [13] clients struggle with algorithmic predictions. Decision-making lowered operational expenses and improved performance, according to the research [14] forecasting enterprise financial success required historical data analysis, market trends and prediction. Successful forecasting helped businesses plan by anticipating future revenues for various operations in a particular time. [15] Thus, accurate forecasting was assumed to improve business strategy and corporate success, leading to the hypothesis.

The study proposed the following hypothesis:

Hypothesis 1: The enhancement of Economic Performance (EP) is positively correlated with the overall business performance (OBP).

Hypothesis 2: The enhancement of Functional Performance (FP) in a company has a positive correlation with the overall business performance (OBP).

Hypothesis 3 (H3a): The "adoption of big data analytics (ABDA)" has a significant positive influence on the decision-making procedure (DP) in business.

Hypothesis 3 (H3b): ABD positively significant the predicting process (PP) in the business.

Hypothesis 4 (H4a): There is a positive correlation between the accuracy and efficiency of the decision-making procedure (DP) and the economic performance (EP) of business.

Hypothesis 4 (H4b): There is a positive relationship between the accuracy and efficiency of the decision-making procedure (DP) and the overall business performance (OBP).

Hypothesis 4 (H4c): The accurate predicting processes (PP) have a positive impact on the overall business performance (OBP).

Hypothesis 4 (H4d): There is a positive correlation between accurate predicting processes (PP) and the economic performance (EP) of business.

2. Methodology

Adoption of Big Data Analytical affects decision-making (DP) and prediction (PP), as seen in Figure 1. These can affect functional operational (FP) and economic performance. These factors affect corporate performance. OBP has been explored to assess their impact.

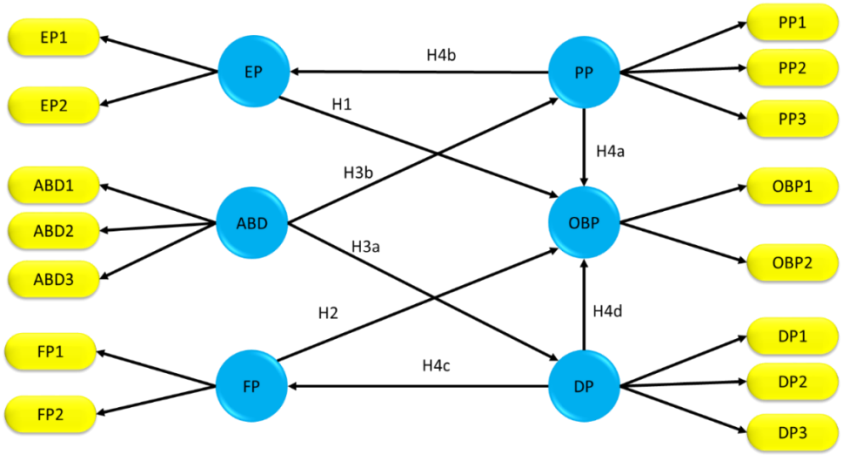

Figure 1. Conceptual model [Source: Author]

Generating questionnaires

The aspects are rated on a 5-point Likert scale from (1) "strongly disagree" to (5) "strongly agree." To make their responses better, nine experts reviewed the questions before to distribution. The pre-test was followed by a pilot test with 14 convenience-sampled respondents. Take note that most of these responders are executives and managers from BDA-adopting companies. These 14 responders' insights improved the questionnaire's clarity and depth. These 14 respondents were excluded from the main poll, creating 15 questions. Table 1 displays the research-based questionnaire.

Table 1. Construct operationalization [Source: Author]

Items	Statement
ABD1	Using innovative technology adds value to the companies.
ABD2	I agree that trained employees are necessary to use big data applications efficiently.
ABD3	To introduce new technology into our business, we receive sufficient leadership support.
DP1	I suspect effective decision-making can be aided by big data analytics technologies.
DP2	Real-time business insights might be obtained with big data analytics.
DP3	I believe making judgments quickly and accurately, might improve a business's bottom line.
PP1	I believe forecasting is essential for every company to deploy adequate resources.
PP2	The majority of employees for predicting employ big data analytics techniques.
PP3	Using big data analytics can generate accurate prediction statistics.
EP1	I agree that implementing big data analytics could result in organizations seeing a rise in profits.
EP2	Big data analytics applications are not very affordable.
FP1	I agree that increasing a company's operational efficiency can improve its overall performance.
FP2	I believe big data analytics technologies may help organizations enhance their supply chain efficiency.
OBP1	I believe using big data analytics tools well, improves revenue collection.
OBP2	I believe businesses need to provide sufficient funds for big data analytics tools to be implemented across multiple divisions.

Data collection

Through their high-ranking connections, several researchers involved in this study were connected to prominent figures within organizations In line with associations like the "National Association of Software and Service Companies (NASSCOM) and the Federation of Indian Chambers of Commerce and Industry (FICCI), and the Confederation of Indian Industry (CII)". Researchers contacted other firms' workers via their network. The questionnaire was sent to Information Technology (IT), healthcare, retail, telecommunications, cars, pharmaceuticals and other industry association executives with network skills. Simplification of business leader questionnaire responds. Executives were criticized for business choices. Leaders and managers have to complete the questionnaire, 15 statement questions per answer. On-time replies were 382 out of 918 (41,6 %). The first and final 100 responses were identical after chi-square and independent t-tests. After excluding 15 partial responses from the same businesses, 400 respondents and 15 questions remained. Table 2 lists the sample characteristics.

Table 2. Sample attributes (N=400) [Source: Author]

Particular	Characteristics	Percentage (%)	Frequency
Industrial type	IT	18,7	75
	Health care	16,3	65
	Retail	21,2	85
	Telecommunication	17,5	70
	Automobile	13,0	52
	Pharmaceuticals	13,3	53
Business period	Senior enterprises (greater than 25 years old)	39,8	159
	Junior enterprises (5 to 25 years old)	30	120
	Start-ups (less than 5 years old)	30,2	121
Business type	Large business (more than 25 000 employees)	46,3	185
	Mid-level business (5000 to 25 000 employees)	30	120
	Small business (less than 5 000 employees)	23,7	95
Management structure	Junior manager (less than 5 years' involvement)	33,5	134
	Medium level manager (5-10 years' involvement)	27,5	110
	Senior Supervisor (more than 10 years' involvement)	22,5	90
	Leaders (senior executives)	16,5	66

3. Data Analysis with the Result

Model validation and hypothesis testing use SEM-PLS. SEM-PLS does not restrict sample count and allows intricate model creation without a normal distribution, unlike CB-SEM. It assists with exploratory research and evaluation. For simplicity, users' input was evaluated using a 5-point Likert scale. "Neither agree nor disagree" allows respondents be neutral.

Parameter measurement and discriminant validity testing

We used Cronbach's alpha (∝), Composite Reliability (CR), and Average Variance Extracted (AVE) to evaluate each concept's internal consistency, validity, and reliability. According to our results, every computed AVE (Average) value is more than the minimum requirement of 0,5, and every computed LF (Loading Factor) value is greater than the minimum requirement of 0,7. For a comprehensive parameter evaluation, see Table 3. Furthermore, Table 4 displays the results of the discriminant validity test, which demonstrate that the HeterotraitMonotrait Test (HTMT) effectively satisfied the requirement with a score of less than 0,85.

Table 3. Assessment of parameter [Source: Author]

Construct and Item	AVE	LF	t-Statistics	CR	∝
ABD	0,76			0,82	0,84
ABD1		0,92	22,18		
ABD2		0,91	24,12		
ABD3		0,79	26,02		
DP	0,85			0,88	0,90
DP1		0,96	24,28		
DP2		0,86	31,40		
DP3		0,95	27,32		
PP	0,82			0,84	0,86
PP1		0,86	26,02		
PP2		0,90	37,93		
PP3		0,92	24,08		
EP	0,81			0,86	0,90
EP1		0,94	31,23		
EP2		0,97	37,18		
FP	0,83			0,86	0,90
FP1		0,91	24,73		
FP2		0,97	36,33		
OBP	0,80			0,84	0,88
OBP1		0,81	29,18		
OBP2		0,93	30,67		

Table 4. Discriminant validity test [Source: Author]

Construct	ABD	DP	PP	EP	FP	OBP	AVE
ABD	0,87						0,76
DP	0,27	0,92					0,85
PP	0,30	0,34	0,90				0,82
EP	0,18	0,29	0,33	0,90			0,81
FP	0,23	0,40	0,25	0,19	0,91		0,83
OBP	0,32	0,38	0,20	0,28	0,33	0,93	0,80

Common bias method

Survey data in this study involves common bias. Risk was mitigated by proactive research. Before the survey, all items were reviewed in pre-test and pilot-test. IDs were confidential. For objective answers, these measures were taken. Despite these efforts, Harman's Single Factor Test (SFT) evaluated biases. It found that the first component accounts for 20,62 % of variation, over 50 %. Harman's SFT doesn't detect CMB; hence a statistical study was conducted. CMB can influence data, but this study found no evidence.

The f^2Test's Effect

The effect size f^2test was used to measure the impact of independent factors on their corresponding dependent variables. Large f^2 values are more than 0,360; medium values are between 0,160 and 0,360 as well as weak values are between 0,030 and 0,160. Table 5 emphasizes the f^2 test's outcomes.

Table 5. The f^2 test's effect [Source: Author]

Construct	DP	PP	EP	OBP	FP
ABD	0,297	0,168			
DP			0,115	0,379	
EP				0,162	
PP				0,292	0,142
FP				0,372	

Test for Hypothesis

The hypothesis was validated using bootstrap samples. The separation distance was 8 and a positive Q^2 value of 0,067 indicated cross-validated redundancy. Model predictive relevance is shown by positive Q^2 values. Model fit was examined using Standardized Root Mean Square Residual (SRMR). This makes the model acceptable. Figure 2 depicts the confirmed Structural Equation Model (SEM) with the dependent variable, independent variable, AVE values and route coefficients.

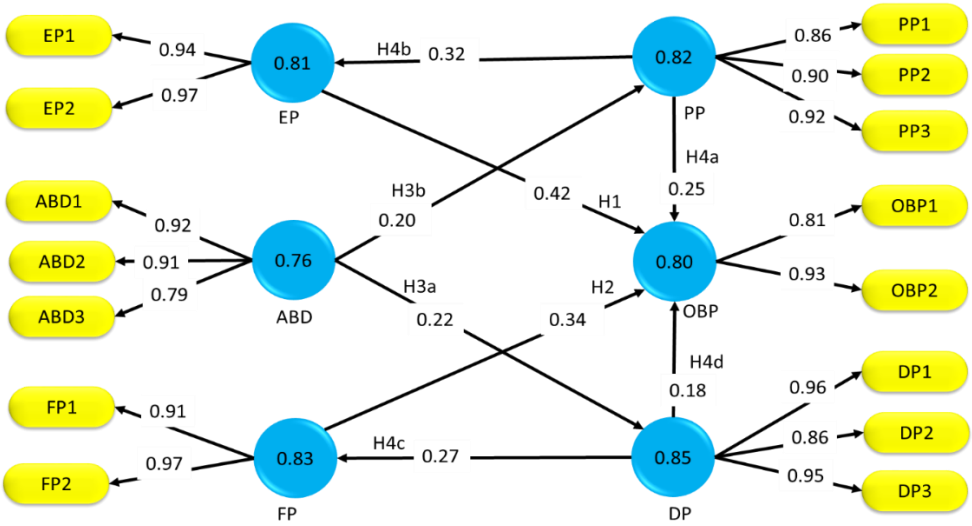

Figure 2. Graphical Representation of Structural Equation Model (SEM) [Source: Author]

A statistical model's predictive efficacy in predicting outcomes is evaluated using the coefficient of determination (R^2), a numerical metric with a range of 0 to 1. R^2 Values, p-values and Path coefficients can be found by using modelling using structural equations technique. Table 6 shows the results of model evaluation.

Table 6. Model evaluation [Source: Author]

Hypotheses	Connections	Path coefficient	**p**-value	Remarks
H1	EP→ OBP	0,42	P < ,001 (***)	Significant
H2	FP→ OBP	0,34	P < ,001 (***)	Significant
H3a	ABD→DP	0,22	P < ,001 (***)	Significant
H3b	ABD→ PP	0,20	P < ,01 (**)	Significant
H4a	DP→ EP	0,25	P < ,01 (**)	Significant
H4b	DP→ OBP	0,32	P < ,001 (***)	Significant
H4c	PP→ OBP	0,27	P < ,001 (***)	Significant
H4d	PP→ FP	0,18	P < ,05 (*)	Significant

Note: (***), (**) and (*) represent highly significant, significant and marginally significant.

4. Discussion

Eight associations were significant in this investigation. Path coefficients (β-values) of 0,22 and 0,20 indicate that ABD strongly affects DP and PP, with significant level of p < ,001 (***) and p < ,01 (**). With comparable β-values (0,25 and 0,32), significant levels of p < ,01 (**) and p < ,001(***), the findings indicate that DP has a substantial beneficial impact on EP as well as OBP. PP increases OBP and FP, as shown by β-values (0,27 and 0,18) along with significance levels of p < ,05 (*) and p < ,001 (***). The study found that FP and EP positively influence OBP, with 0, 42 and 0,34 β-values, respectively, equivalent degrees of significance of p < ,001 (***). According to the study, every control variable had minimal influence on OBP with coefficients of determination R^2 of 39 % and 45 %, ABD can predict DMP and PP. The independent prediction accuracy of DMP and PP is 52 % for EP and 57 % for FP. Based on the study's findings, EP, DP, PP and FP predict OBP, which constitutes 80 % of the model's predictive ability. The findings show how BDA improves company operations by enabling speedy and precise decision-making. Companies need well-organized and dependable datasets for accurate decision-making and efficient forecasting. It recommends enterprises to use BDA technology. These new tools help company decision-makers to gain meaningful data insights. This study showed the importance of adopting BDA technology to obtain client, consumer and other preferences.

5. Conclusion

This study investigated BDA's transformation of Indian firms. BDA's implications on estimating accuracy, decision-making and profitability must be examined owing to the rise of electronic data and analytics technologies. On 400 Indian firm participants, SEM-PLS examined the conceptual model for BDA implementation, predictive strategy, decision-making, operational effectiveness, economic repercussions and enterprise success. BDA increases corporate performance by improving prediction and decision-making. The research contains limitations due to cross-sectional data biases and causality errors. However, it emphasizes BDA role in generating the present corporate environment and long-term effects on decision-making, strategy and organizational performance. These assumptions show that BDA, DP and PP enhance corporate performance. Research

highlights these features and their potential use across company sizes. The cross-sectional data could have biases and structural errors. It should explore how BDA influences Indian business decision processes, estimate accuracy and viability over time.

References

1. Iqbal J, Jaimes DC, Makineni P, Subramani S, Hemaida S, Thugu TR, et al. Reimagining healthcare: unleashing the power of artificial intelligence in medicine. Cureus. 2023 Sep 4;15(9). https://dx.10.7759/cureus.44658
2. Narwane VS, Raut RD, Yadav VS, Cheikhrouhou N, Narkhede BE, Priyadarshinee P. The role of big data for Supply Chain 4.0 in manufacturing organisations of developing countries. Journal of enterprise information management. 2021 Nov 9;34(5):1452-80. https://dx.10.1108/JEIM-11-2020-0463
3. Sarker IH. Data science and analytics: an overview from data-driven smart computing, decision-making and applications perspective. SN Computer Science. 2021 Sep;2(5):377. https://dx.10.1007/s42979-021-00765-8
4. Awan U, Shamim S, Khan Z, Zia NU, Shariq SM, Khan MN. Big data analytics capability and decision-making: The role of data-driven insight on circular economy performance. Technological Forecasting and Social Change. 2021 Jul 1;168:120766. https://dx.10.1016/j.techfore.2021.120766
5. Talwar S, Kaur P, FossoWamba S, Dhir A. Big Data in operations and supply chain management: a systematic literature review and future research agenda. International Journal of Production Research. 2021 Jun 3;59(11):3509-34. https://dx.10.1080/00207543.2020.1868599
6. Jain P, Tambuskar DP, Narwane VS. Is the Implementation of Big Data Analytics in Sustainable Supply Chain Really a Challenge? The Context of the Indian Manufacturing Sector. International Journal of Innovation and Technology Management. 2023 Apr 10:2350033https://dx.10.1142/S0219877023500335
7. Niu Y, Ying L, Yang J, Bao M, Sivaparthipan CB. Organizational business intelligence and decision making using big data analytics. Information Processing & Management. 2021 Nov 1;58(6):102725. https://dx.10.1016/j.ipm.2021.102725
8. Aydiner AS, Tatoglu E, Bayraktar E, Zaim S, Delen D. Business analytics and firm performance: The mediating role of business process performance. Journal of business research. 2019 Mar 1;96:228-37. https://dx.10.1016/j.jbusres.2018.11.028
9. Wamba SF, Dubey R, Gunasekaran A, Akter S. The performance effects of big data analytics and supply chain ambidexterity: The moderating effect of environmental dynamism. International Journal of Production Economics. 2020 Apr 1;222:107498. https://dx.10.1016/j.ijpe.2019.09.019
10. Sharma M, Sehrawat R, Daim T, Shaygan A. Technology assessment: Enabling Blockchain in hospitality and tourism sectors. Technological Forecasting and Social Change. 2021 Aug 1;169:120810. https://dx.10.1016/j.techfore.2021.120810
11. Tseng HT, Aghaali N, Hajli N. Customer agility and big data analytics in new product context. Technological Forecasting and Social Change. 2022 Jul 1;180:121690.https://dx.10.1016/j.techfore.2022.121690
12. Hristov I, Appolloni A, Cheng W, Huisingh D. Aligning corporate social responsibility practices with the environmental performance management systems: A critical review of the relevant literature. Total Quality Management & Business Excellence. 2022 Mar 30:1-25. https://dx.10.1080/14783363.2022.2048951
13. Zytek A, Liu D, Vaithianathan R, Veeramachaneni K. Sibyl: Understanding and addressing

the usability challenges of machine learning in high-stakes decision making. IEEE Transactions on Visualization and Computer Graphics. 2021 Sep 29;28(1):1161-71. https://dx.10.1109/TVCG.2021.3114864

14. Chatterjee S. Impact of AI regulation on intention to use robots: From citizens and government perspective. International Journal of Intelligent Unmanned Systems. 2019 Dec 10;8(2):97-114. https://dx.10.1108/IJIUS-09-2019-0051
15. Kang Y, Spiliotis E, Petropoulos F, Athiniotis N, Li F, Assimakopoulos V. Déjà vu: A data-centric forecasting approach through time series cross-similarity. Journal of Business Research. 2021 Aug 1;132:719-31. https://dx.10.1016/j.jbusres.2020.10.051