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

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

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

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

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

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

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

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

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

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

2. Review of Literature

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

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

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

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

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

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

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

3. Applied Methodology

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

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

3.1 Objectives:
The main research objectives are as follows:
1. Measure the impact of big data analytics & business intelligence system on decision making in both public and private sector organizations.
2. To find the association between use of big data analytics & business intelligence system and decision effectiveness.
3. To identify impact of big data analytics & business intelligence system on key performance indicators.

3.2 Hypotheses:
Hypothesis 1: There is no significant impact of big data analytics & business intelligence system on decision making in both type of organizations.
Hypothesis 2: There is no significant impact of big data analytics & business intelligence system on key performance indicators.

4. Data Analysis and Interpretation
4.1 Respondent Profile:
Gender wise classification:
The total sample size consists of 200 respondents, the sample size was selected based on the sampling technique convenience sampling. About 50% respondents being considered were male and 50% were female from different organization either private or public organizations.
Classification based on type of organization:

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

Table 4.1: Type of Organization

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

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

4.2 Decision making and BDA-BIS:
In order to measure the impact of big data analytics & business intelligence system on decision making in both public and private sector organizations following hypothesis is being framed:
H_01: "There is no significant impact of big data analytics & business intelligence system on decision making in both type of organizations".
H_a1: "There is significant impact of big data analytics & business intelligence system on decision making in both type of organizations".
Further the above-mentioned hypothesis was being divided into sub hypotheses $H_01.1$, $H_01.2$ and $H_01.3$.

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

$H_0$1.1: "There is no significant impact of big data analytics & business intelligence system on decision effectiveness in both type of organizations".

H_a1.1: "There is significant impact of big data analytics & business intelligence system on decision effectiveness in both type of organizations".

Cross tabulation between the type of the organization and decision effectiveness is shown below in the table.

Table 4.2: Decision Effectiveness and Type of Organization

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

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

Table 4.3: Chi-Square Test

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

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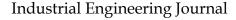
Accuracy and Type of Organization:

$H_0$1.2: "There is no significant difference between the impact of big data analytics & business intelligence system on accuracy of decision making in both type of organizations (Private and Public)".

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

Table 4.4: Accuracy of decision making and Type of Organization

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

To test the null hypothesis $H_01.2$ the Chi-Square test is being used. The two categorical variables being considered are "Type of Organization" and "Managerial Decision Making: Accuracy". The outcomes of the Chi-Square test are shown in the table below.

Table 4.5: Chi-Square Test

Chi-Square Test			
	Value	Degree of Freedom	Asymptotic Significance (2-sided)
Pearson Chi-Square	32.083[a]	4	.000
Likelihood Ratio	37.973	4	.000
N of Valid Cases	200		

a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 2.50.

The calculated Pearson Chi-Square statistic was determined to be 32.083, while the Likelihood Ratio value was found to be 37.973, both with 4 degrees of freedom. The corresponding p-values for both tests were calculated to be 0.000. Since these p-values are less than the standard alpha value of 0.05, we can confidently reject the null hypothesis $H_01.2$. This leads us to accept the alternative hypothesis, indicating a significant difference in the impact of big data analytics and business intelligence systems on the accuracy of decision-making between two types of organizations: Private and Public.

Timeliness/Speed of Decision Making and Type of Organization:

$H_01.3$: "There is no significant difference between the impact of big data analytics & business intelligence system on timeliness/speed of decision making in both type of organizations (Private and Public)".

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

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

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

To test the null hypothesis $H_01.3$ the Chi-Square test is being used. The two categorical variables being considered are "Type of Organization" and " Timeliness/Speed of Decision Making ". The outcomes of the Chi-Square test are shown in the table below.

Table 4.7: Chi-Square Test

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

Accordingly, the calculated Pearson Chi-Square is found to be 37.159, Likelihood Ratio value found to be 49.586 at degree of freedom 4 and the corresponding p-value for both is 0.000 further as the p-value of 0.000 is lower than the standard alpha value of 0.05 which concludes that the null hypothesis $H_01.3$ is being rejected and the alternate is true which interprets that there is significant difference between the impact of big data analytics & business intelligence system on timeliness/speed of decision making based on type of organizations (Private and Public)".

4.3 Key Performance Indicators and Type of Organization:
H_02: "There is no significant difference between the impact of big data analytics & business intelligence system on decision making related to key indicators in both type of organizations (Private and Public)".
Cross tabulation between the type of the organization and key performance indicators is shown below in the table.

Table 4.8: Key Performance Indicators and Type of Organization

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

To test the null hypothesis H_02 the Chi-Square test is being used. The two categorical variables being considered are "Type of Organization" and "Key Performance Indicators ". The outcomes of the Chi-Square test are shown in the table below.

Table 4.9: Chi-Square Test

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

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

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

5. Conclusion

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

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