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The influence of input matrix variations on corporate performance : Exploring leadership dynamics

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Abstract

This study examines the complex dynamics of changes in input matrix within the banking industry, with a special focus on how it affects organizational decision-making processes and performance indicators. A relevant questionnaire was prepared and solicitated many Senior management respondents from different banks, utilizing snowball sampling approaches. By utilizing component analysis, the research revealed crucial elements that contribute to the variation in the input matrix. These factors account for a significant 72.1% of the overall variance. Later, Partial Least Squares Structural Equation Modeling (PLS-SEM) was used to thoroughly evaluate the complex connections between these elements and the outputs of the organization. The findings provide detailed insights that emphasize the important impact of elements such as inconsistencies in Artificial Intelligence (AI), frequent input of data's, errors made by humans, and cognitive biases in determining the variance of the input matrix impacting the crucial decisions. Furthermore, the study highlights the crucial role of competent leadership in mitigating the negative consequences of fluctuations in input matrix on corporate performance indicators. This research provides useful insights

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for the banking sector, including concrete solutions to optimize decision-making processes and improve organizational performance in dynamic and data-driven contexts.

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1. Introduction

In the constant changing geography of corporate environments, understanding the delicate link between input matrix, leadership dynamics and corporate performance has become a vital field of research. The current corporate environment is characterized by swift transformations, technological progress, and worldwide interconnections, necessitating executives to traverse intricacies and adjust to developing frameworks and at times more data capturing from the market. This study examines a particular aspect of this connection, specifically investigating how changes in the input matrix impact corporate performance.

The phrase "input matrix variations" refers to a wide range of elements that influence the makeup and effectiveness of leadership teams in businesses. These criteria may encompass, but are not restricted to, a wide range of skills, extensive expertise in the business, diverse cultural backgrounds, and different cognitive types exhibited by leaders. The study aims to understand how the interaction of various variables within the leadership matrix influences the overall performance of organizations.

To achieve innovation, resilience, and sustained growth, businesses must understand the intricate dynamics inside their leadership hierarchies. This research seeks to analyse the impact of input matrix variations on corporate performance. Its objective is to offer valuable insights to businesses aiming to optimize the role of leaders in reducing the influence of input variations, thereby improving overall efficacy and corporate performance.

This research aims to comprehend the moderating impact of leadership on enhancing corporate performance, particularly in situations where there is variability in the input of information, whether it occurs automatically or through human intervention. Given the absence of any specific research in the literature, it is evident that there is a significant gap in the current body of knowledge. Therefore, this study has aimed to comprehend the factors that contribute to variations in input text and their impact on corporate performance.

2. Literature Review

2.1 *AI and information system*

In the contemporary business landscape, the integration of artificial intelligence (AI) into Management Information Systems (MIS) has become imperative for efficient data capture and processing. AI technologies, leveraging techniques like natural language processing (NLP) and machine learning algorithms, offer unparalleled capabilities in extracting structured information from diverse and unstructured data sources, including emails, documents, and social media feeds [1]. However, amidst the integration of AI, organizations encounter a persistent challenge: inconsistent data input. Johnson et al., [2] underscore the repercussions of inconsistent data, ranging from format disparities to missing values and erroneous entries, which can significantly undermine the reliability and integrity of MIS. These inconsistencies often stem from human error, system limitations, or the integration of disparate data sources, posing formidable barriers to accurate analysis and decision-making processes. Nonetheless, researchers have proposed AI-driven solutions to mitigate these challenges. Wang and Zhang [3] emphasized the potential of AI techniques, such as data cleansing and normalization, in identifying and rectifying errors within input data. By leveraging machine learning algorithms, AI systems can discern patterns and anomalies, facilitating the identification and rectification of inconsistent data points. Moreover, AI-powered data validation tools offer real-time feedback on data quality, enabling users to assess the reliability of input data before its integration into MIS [4]. These tools employ rule-based algorithms and statistical analyses to flag inconsistencies and outliers, thereby enhancing the overall accuracy and effectiveness of MIS. In sum, while inconsistent data input poses a persistent challenge in the realm of MIS, AI-driven approaches offer promising avenues for addressing these issues and optimizing data management processes for enhanced decision-making capabilities within organizations.

Beyond AI, numerous external and internal factors contribute to the input matrix. Economic downturns, technological disruptions, and competitor actions can significantly impact performance [5]. Additionally, internal factors like employee skills, resource allocation, and corporate culture play a crucial role [6].

2.2 *Human Competency on information system*

In the realm of information systems, human competency serves as a critical factor influencing the input of data. Human expertise enables the

interpretation and accurate representation of information, thereby facilitating its integration into organizational systems. This competency is particularly valuable in decision-making processes, where human judgment and intuition play a crucial role. According to Smith [7] the ability of individuals to discern relevant information from a myriad of data sources contributes significantly to informed decision making. However, despite its benefits, human involvement in data input can also introduce challenges. As noted by Jones [8], the phenomenon of over-capturing data can lead to the duplication of information and errors within the system, potentially compromising the quality of decision making. Moreover, the overload of irrelevant or extraneous information can further exacerbate these issues, hindering the efficiency and effectiveness of decision-making processes. These negative effects can have far-reaching consequences for corporate performance, impacting productivity, resource allocation, and ultimately, organizational outcomes. Thus, while human competency is essential for information systems, organizations must implement strategies to mitigate the risks associated with data redundancy and information overload, ensuring optimal performance [9].

2.3 *Cognitive ability and information system*

Cognitive ability plays a crucial role in the accuracy and effectiveness of decision-making processes within organizations, particularly when utilizing information systems for data entry and analysis. Research indicates that individuals with higher cognitive abilities demonstrate superior problem-solving skills and are better equipped to interpret complex data accurately [10]. This proficiency in cognitive processing enhances the quality of information available to decision-makers, leading to more informed and strategic decision-making [11]. Moreover, cognitive abilities such as critical thinking and analytical reasoning enable individuals to identify patterns and trends within data, facilitating predictive analytics and proactive decision-making [12][13].

However, despite the benefits associated with cognitive ability, errors in data interpretation can still occur, leading to detrimental effects on decision-making and organizational performance. For instance, cognitive biases such as confirmation bias or anchoring bias can distort the interpretation of data, leading to flawed conclusions and suboptimal decisions [14]. Additionally, individuals with lower cognitive abilities may struggle to comprehend complex datasets accurately, resulting in errors during data entry or analysis [15]. These errors can propagate throughout

the decision-making process, leading to inefficiencies, missed opportunities, and ultimately, diminished corporate performance.

2.4 *Leadership and organization performance*

Effective leadership plays a pivotal role in enhancing organizational performance by mitigating input errors and human errors. Research has demonstrated that strong leadership fosters a culture of accountability and attention to detail, thereby reducing the likelihood of input errors in organizational processes [16]. Additionally, leaders who prioritize communication and provide clear direction can minimize misunderstandings and human errors within teams [17]. However, it is important to acknowledge that leadership influence can also have negative implications. For instance, when leaders exhibit authoritarian behaviour or fail to empower their subordinates, it can stifle innovation and lead to increased errors due to fear of speaking up or lack of autonomy [18]. Therefore, while leadership is generally associated with improved organizational performance, its impact can vary depending on the leadership style and approach employed within the organization.

The significant contributions in the field of input matrix variation over the last five years are summarized in Table 1.

Table 1

Year	Source	Methodology	Contribution/Findings
2019	[19]	Qualitative interviews	Investigated the negative implications of authoritarian leadership styles on innovationand error rates within organizations.
2020	[3]	Survey	Explored the impact of cognitive aptitudeon the quality of information available to decision-makers and strategic decision-making processes.
2020	[20]	Survey	Explored the impact of clear communicationand guidance from leaders on minimizing human errors within teams.
2021	[21]	Experimental study	Highlighted the role of effective leadershipin cultivating a culture of accountability to reduce input errors.
2021	[22]	Experimental study	Highlighted the relationship between cognitive ability and problem-solving capabilities in data interpretation.

Contd...

2022	[23]	Qualitative interviews	Investigated how critical thinking and analytical reasoning contribute to predictiveanalytics and proactive decision-making.
2022	[24]	Experimental study	Investigated the impact of user training programs on improving data input accuracyand reducing errors in information systems.
2022	[25]	Qualitative interviews	Explored challenges in implementing AI-based solutions for data quality management and proposed strategies.
2023	[26]	Survey and interviews	Explored the role of organizational culture in promoting data literacy and competencyamong employees in information systems.
2023	[23]	Quantitative survey	Investigated impact of inconsistent data inputon decision-making processes; proposed framework for enhancing data quality control.
2024	[27]	Case study	Examined effectiveness of AI-driven data validation tools in improving data quality management and decision-making.
2024	[22]	Case study	Analyzed the effectiveness of gamification techniques in enhancing user engagement and proficiency in data input tasks.

Source: Authors Compilation

As illustrated in Figure 1, a conceptual framework has been designed to examine the influence of input matrix variations on corporate performance, as well as the moderating role of leadership.

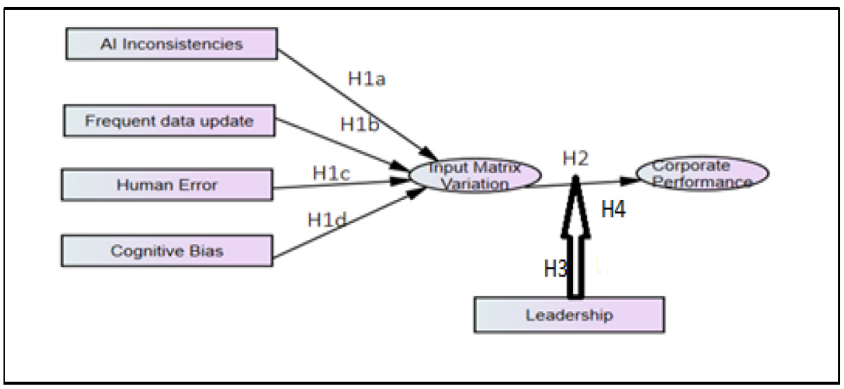

Figure 1

Conceptual Framework

2.4.1 Objectives

- Investigating the underlying factors contributing to input matrix variation within the information system and their implications on decision-making processes.
- Assessing the direct impact of input matrix variation on corporate performance metrics and outcomes.
- Examining the moderating influence of leadership dynamics on the relationship between input matrix variation and corporate performance.

2.4.2 Hypothesis

Based on the above discussion, the following are the hypothesis framed for testing and is shown in Table 2.

Table 2

Hypothesis of the Study

H_1	There is a significant relationship between AI inconsistency, human error in data entry, cognitive biasness, and frequent information updates, WITH input matrix variation within the information system.
H_2	Input matrix variation negatively impacts corporate performance metrics.
H_3	Leadership has positive significant effect on corporate performance.
H_4	Leadership dynamics moderate the relationship between input matrix variation and corporate performance, such that effective leadership mitigates the negative impact of input matrix variation on organizational outcomes.

Source: Authors

2.4.3 Significance of Research

Table 3 clearly explains the in-depth importance of the research, offering a thorough summary of its significance and contributions.

Table 3
Significance of the Research

Significance of Research
Fills a significant gap in the existing literature by providing valuable insights on enhancing data quality management techniques, specifically in relation to variation in input matrices among businesses.
Provides valuable contributions to the growth of theory in the field of information systems through the analysis of the moderating influence of leadership.
Offers practical insights for improving organizational performance by examining the role of leadership in data quality management.
Expands on prior studies by identifying crucial components that contribute to variations in the input matrix, thus enhancing understanding of this complex phenomenon.
Presents possibilities for additional exploration into effective methods for reducing input mistakes, contributing to ongoing research efforts in data qualitymanagement.
Seeks to improve comprehension and offer practical suggestions for enhancing data management operations, with potential applications across various sectors

Source: Authors Compilation

3. Research Design

To accomplish the objectives of our study, we employed a combination of qualitative (case study) and quantitative research methodologies. The study's qualitative quality is ascribed to the components obtained from various literary sources. To analyse the input variation matrix and its impact on corporate performance. Experienced personnel in the banking sector assisted in the conception and development of a meticulously crafted questionnaire. The data for our study was collected from a sample of 121 valid respondents who held senior positions in various banks in Delhi and NCR.

A professionally crafted questionnaire was prepared, with a Likert scale ranging from 1 to 5, to collect data. The researchers utilized the non-probability sampling technique called snowball sampling. This method enabled the researchers to acquire references from the respondents. At first, a pilot study was carried out to evaluate the validity and comprehensibility of the participants. After making slight adjustments, the data was distributed to the participants, namely the high-ranking managers and executives in the banks.

4. Data Analysis

4.1 *Demographic Analysis*

Table 4
Demographic Analysis

Profile of Respondents		Freq	%age
Age	<45	45	39.13
	45-55	52	45.22
	>55 Years	18	15.65
Gender	Male	65	56.52
	Female	45	39.13
	Others	5	4.35
Positions	Managers	12	10.43
	Assistant Vice President	36	31.30
	Vice President	12	10.43
	Loan officer	26	22.61
	Branch Managers	25	21.74
	Other (Sr. Executive)	4	3.48
Level of Management	Top Management	37	32.17
	Senior Management	49	42.61
	Middle Level Mgmt.	29	25.22
Type of Banks	Private Sector Banks	55	47.83
	Public Sector Banks	36	31.30
	Foreign Banks	12	10.43
	Others (Rural, Cooperative, Small finance Banks)	12	10.43

Source: Authors Analysis

The analysis shown in Table 4 of the responses offers useful insights into the characteristics of the people engaged in the study. The majority of respondents fell within the age brackets of 45 to 55 years (45.22%) and below 45 years (39.13%), suggesting a relatively balanced distribution across different age groups. In terms of gender, male respondents constituted the largest proportion at 56.52%, followed by females at 39.13%, with a small percentage identifying as 'Others' (4.35%). Regarding positions held within their respective organizations, the survey

encompassed a diverse range, with Vice Presidents comprising the highest frequency (31.30%), followed by Loan Officers (22.61%) and Branch Managers (21.74%). Notably, participants from top and senior management levels collectively represented the majority, with 32.17% and 42.61%, respectively. Finally, the breakdown of respondents by the type of banks they represent reveals a varied mix, with Private Sector Banks accounting for the largest segment (47.83%), followed by Public Sector Banks (31.30%), Foreign Banks (10.43%), and others such as Rural, Cooperative, and Small Finance Banks (10.43%). This comprehensive profile offers a nuanced understanding of the diverse perspectives and experiences contributed by respondents across different demographics and organizational affiliations, enriching the depth and breadth of insights derived from the study.

4.2 *Exploratory, confirmatory factor analysis Using PLS-SEM*

Factor analysis using SPSS-25 was conducted to discern the key factors influencing input matrix variation within the organization, thereby impacting managerial decision-making. Through principal component matrix analysis, employing 25 iterations, four significant factors were identified, collectively explaining 71.2% of the variance. Notably, all attribute values exceeded the threshold of 0.5, indicating strong factor loadings [28][29]. For further insight, refer to Table 5, which provides a comprehensive overview of the extracted factors from the factor analysis.

Table 5
Exploratory Factor Analysis

S. N	Statements	Factors	F. Loading	CR	AVE
1	How frequently do you encounter discrepancies or inconsistencies in the data generated by AI algorithms when information is entered into the MIS	AI Inconsistency	0.87	0.869	0.69
2	To what extent do you perceive AI-generated data to be reliable and accurate for input into the MIS		0.83		
3	How confident are you in the consistency of AI-generated data compared to manually input data when inputting information into the MIS		0.79		

Contd...

4	To what extent do you believe that frequent updates to information in the MIS contribute to inaccuracies in data	Frequent data updation inaccuracy	0.81	0.904	0.76
5	To what extent discrepancies or inconsistencies in data accuracy takes place due to frequent updates to information in the MIS		0.88		
6	Rate your level of confidence in the reliability of data stored in the MIS after frequent information updates		0.92		
7	How frequently do you observe errors made by human operators during the data entry process when inputting information into the MIS	Human Error	0.92	0.916	0.78
8	To what extent do you believe human errors significantly impact the accuracy of data input into the MIS		0.88		
9	How confident are you in the reliability of data entered manually compared to AI-generated data when inputting information into the MIS		0.86		
10	To what extent do you believe cognitive biases influence the accuracy of data input by human operators into the MIS	Cognitive Bias in Data Input	0.78	0.852	0.66
11	To what extent you believe cognitive biases affect the accuracy of data input into the MIS		0.84		
12	To what extent do you believe the organization effectively addresses or mitigates cognitive biases in the data input process when entering information into the MIS		0.81		
13	Rate the leadership's effectiveness in fostering a culture of innovation and resilience amidst input matrix variations, ultimately contributing to sustained corporate performance.	Leadership	0.89	0.898	0.74
14	Rate the leadership's ability to adapt and implement agile strategies in response to changes in input matrix variations, thereby influencing corporate performance positively		0.91		
15	To what extent do you believe the leadership within the organization effectively communicates and aligns strategic goals with teams to manage fluctuations in input matrix variations		0.79		

Contd...

16	To what extent organization is leveraging AI and data analytics to optimize operational processes, decision-making to improve corporate performance	Corporate Performance	0.82	0.857	0.66
17	Rate the effectiveness of knowledge management systems in facilitating knowledge sharing and innovation within the organization in improving organization performance		0.78		
18	Rate the organization's agility in responding to insights generated by Management Information Systems (MIS) and adjusting strategies accordingly to improve corporate performance		0.85		
19	To what extent do you perceive variations in the input matrix to impact the complexity of strategic decision-making processes within the organization	Input Matrix Variation	0.85	0.891	0.73
20	How challenging do you find it to make informed decisions when faced with frequent updates or inconsistencies in the input matrix data		0.86		
21	To what degree does input matrix variation affect the accuracy and reliability of information crucial for making strategic decisions within the organization?		0.86		

Source: Authors Compilation

Confirmatory factor analysis using PLS-SEM was conducted to evaluate model fit and validate hypotheses. Figure 2 illustrates the strength and direction of the relationship between exogenous and endogenous constructs. Regarding Hypothesis 1, which posits a significant relationship between AI inconsistency, human error in data entry, cognitive biasness, frequent information updates, and input matrix variation within the information system, all beta values stemming from the constructs or exogenous constructs were positive. Therefore, it can be inferred that the hypothesis H_1 is supported.

The beta value for hypothesis H_2 was determined to be -0.56 with a p-value of 0.000. The negative beta coefficient suggests an inverse relationship between input matrix variation and corporate performance metrics. The statistically significant p-value of 0.000 indicates that the relationship observed is unlikely to be due to random chance, thereby

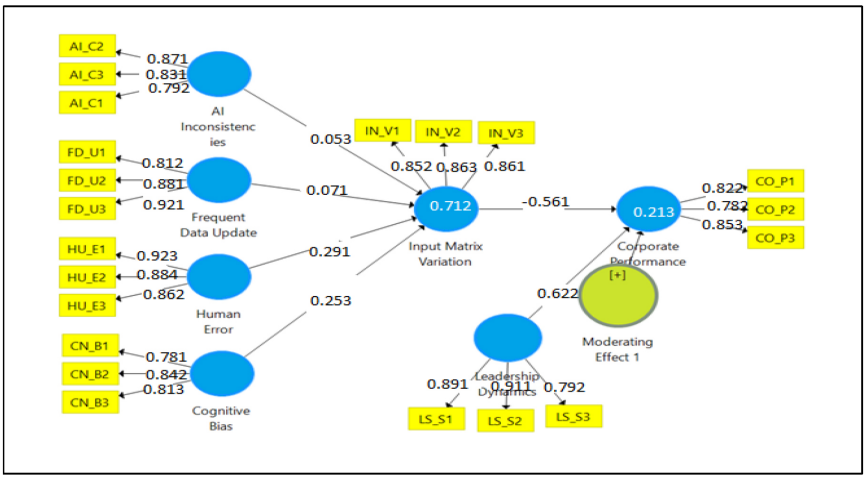

Figure 2

PLS-SEM Analysis and Hypothesis Testing

providing strong evidence to support the hypothesis. Therefore, based on these findings, hypothesis H_2 is accepted, suggesting that input matrix variation indeed has a negative impact on corporate performance metrics. Therefore, as input matrix variation increases, the performance of the organization is expected to decrease.

Table 6

Results of Hypothesis

Effect	Beta Value	T-Value	P value	Hypothesis
AI inconsistencies> Input Matrix Variation	0.05	2.34	0.01	Supported
Frequent Data Update> Input Matrix Variation	0.07	1.98	0.03	Supported
Human Error> Input Matrix Variation	0.29	3.56	***	Supported
Cognitive Bias> Input Matrix Variation	0.25	3.21	***	Supported
Leadership > Corporate Performance	0.62	4.34	0.01	Supported
Moderating Effect (Leadership)---> Co Performance	0.23	2.12	0.03	Supported
Input matrix variation>Co Performance	-0.56	-5.67	***	Supported

Source: Authors Analysis

To evaluate the moderating effect, we initially examined the impact of leadership on corporate performance, revealing a significant enhancement with a beta coefficient of 0.622 ($p = 0.001$) accepting H_3. Subsequently, to test the hypothesis H_4, we employed bootstrapping techniques within PLS-SEM to assess the moderating effect of leadership on the relationship between input matrix variation and corporate performance. The result of hypothesis is shown in Table 6.

The beta coefficient for this moderating effect was determined to be 0.23 ($p = 0.003$). This suggests that the effectiveness of leadership moderates the relationship between input matrix variation and corporate performance.

As for the observed change in direction of the relationship between input matrix variation and corporate performance, it's essential to consider the moderating effect of leadership. While the direct effect of input matrix variation on corporate performance was initially negative, the introduction of the moderating variable (leadership) likely alters this relationship. The positive beta coefficient suggests that effective leadership mitigates the negative impact of input matrix variation on corporate performance, thereby leading to a positive overall effect. This underscores the importance of effective leadership in influencing organizational outcomes amidst varying input matrices.

Conclusion

In the banking industry, understanding the factors influencing input matrix variation and their impact on organizational performance is crucial. Our analysis reveals several key findings. Firstly, factors such as AI inconsistencies, human errors, and cognitive biases significantly contribute to input matrix variation, underscoring the importance of data quality management. Effective leadership emerges as a potent force, positively influencing corporate performance and moderating the adverse effects of input matrix variation. Secondly, while input matrix variation negatively affects corporate performance metrics, leadership interventions can mitigate these impacts. Investment in leadership development and strategies to minimize input matrix variation can enhance decision-making processes and overall organizational performance. For banking managers, these insights highlight the critical role of leadership in navigating data-driven challenges and optimizing performance outcomes. Input data collection which may not be fully accurate, and decision is made upon at times become input burden business unit and at this juncture the leadership has to be balancing the input matrix in order to get desired

output by driving their employees to their true potential. Therefore, leadership dynamism impacts the corporate performance with right usage of input matrix and mitigate the negative impact of input variation matrix.

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