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A STUDY ON IMPACT OF ARTIFICIAL INTELLIGENCE ON BUSINESS DECISIONS MAKING: INSIGHTS FROM MANUFACTURING SECTOR

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ABSTRACT

Artificial Intelligence (AI) is playing a pivotal role in transforming decision-making processes in the manufacturing sector by enhancing efficiency, accuracy, and predictive capabilities. This empirical study scrutinize the contact of AI adoption on business decision-making within manufacturing firms using primary data collected from 75 industry professionals. A structured questionnaire was designed to assess key variables such as AI-driven analytics, decision-making speed, accuracy, operational efficiency, and cost reduction. The study employs Multiple Regression Analysis to evaluate the relationships between AI implementation and business performance outcomes. Findings disclose that AI appreciably progress decision-making effectiveness, optimizes resource utilization, and enhances competitive benefit. Nevertheless, confront such as high implementation costs, data security concerns, along with workforce adaptation remain critical considerations. The study provides practical insights for manufacturing firms seeking to leverage AI for strategic decision-making while mitigating potential risks.

KEYWORDS: AI, Business Decisions, Manufacturing, Hyderabad

INTRODUCTION

A considerable revolution is taking place in the industrial industry as a result of the incorporation of artificial intelligence (AI), which is changing decision-making processes and improving operational efficiency. Technologies that are powered by artificial intelligence, such as machine learning, predictive analytics, and automation, are transforming the way in which organizations optimize production costs, increase productivity, and cut expenses. In an era where data-driven insights are

crucial for strategic planning, AI has emerged as a key enabler of informed and efficient decision-making.

This study focuses on Hyderabad, a rapidly growing industrial hub with a strong presence in manufacturing, including pharmaceuticals, electronics, automotive, and heavy engineering. As manufacturers in Hyderabad increasingly adopt AI-driven technologies, understanding their impact on business decision-making becomes critical. This research empirically examines how AI influences decision-making effectiveness, considering factors such as AI-driven data analytics, predictive maintenance, process automation, and risk assessment.

Using Multiple Regression Analysis and primary data collected from 75 industry professionals, this study aims to assess the extent to which AI enhances decision-making speed, accuracy, and strategic effectiveness in Hyderabad's manufacturing sector. The findings will provide valuable insights for businesses looking to integrate AI into their decision-making processes while addressing associated challenges such as cost, workforce adaptation, and data security.

BACKGROUND OF THE STUDY

Artificial Intelligence is redefining business operations across industries, and manufacturing is no exception. AI-driven innovations such as Industrial Internet of Things (IIoT), smart robotics, and AI-based quality control are helping businesses achieve higher efficiency and precision in decision-making. In the context of Hyderabad, the city's strong industrial ecosystem and government initiatives supporting Industry 4.0 have accelerated AI adoption in manufacturing.

Despite AI's potential, several challenges persist, including implementation costs, skill gaps, and concerns over data privacy. Many firms in Hyderabad's manufacturing sector are tranquil in the untimely stages of AI integration, and there is limited empirical research on how AI directly impacts their decision-making processes. This cram seeks to bridge this space by given data-driven insights into the role of AI in business decision-making within Hyderabad's manufacturing landscape.

REVIEW OF LITERATURE

In the realm of operational efficiency, AI applications have been instrumental. A study by Gwagwa et al. (2020) revealed that manufacturers leveraging AI technology achieved significant improvements in operational efficiency and process optimization, thereby enhancing decision-making capabilities. Similarly, research highlighted in the South African Journal of Economic and Management Sciences demonstrated that AI-powered automation streamlines repetitive processes, tolerate employees to spotlight on strategic, value-added activities, thus fostering a more agile decision-making environment.

In the study that was conducted by Neiroukh and colleagues in 2024, the authors investigate the influence that artificial intelligence (AI) skills have on the decision-making and performance of organizations, with a particular focus on the role that speed and quality play as mediators. PLS-SEM, is utilized for the purpose of analysis in this research project. The research is founded on resource-based theory, and it produces a thorough model by utilizing a dataset consisting of 230 companies. The findings suggest that the capabilities of artificial intelligence have a significant influence in enhancing decision-making speed, decision quality, and overall organizational performance. The speed with which decisions are made is particularly important in terms of improving outcomes. Furthermore, the research reveals a partial mediation effect, which demonstrates that decision-making processes serve as intermediates between the capabilities of artificial intelligence and its performance.

Wijaya, *et. al.*, 2023 study examines the role of the Internet of Things (IoT) and artificial intelligence (AI) in enhancing decision-making processes within modern manufacturing systems. As IoT devices and AI technologies become more prevalent, manufacturing companies are increasingly adopting them to optimize decision-making. Using the PRISMA methodology, the study systematically reviewed 1,282 articles published between 2017 and 2023, selecting 66 based on inclusion and exclusion criteria. The findings indicate that IoT and AI research significantly influences production control in manufacturing, with a strong emphasis on operations management and manufacturing analytics. The study highlights both the benefits and challenges of integrating these technologies, offering valuable insights into their impact on multi-domain manufacturing systems and guiding future research in this evolving field.

The implementation of AI in manufacturing is redefining the conventional decision-making process by increasing productivity, decreasing expenses, and enhancing product quality. Key technologies are the focus of this research project, which investigates artificial intelligence-driven decision-making models that are specifically designed for manufacturing contexts. Applications of artificial intelligence are being investigated in the areas of production optimization, predictive maintenance, along with supply chain management, which demonstrates the revolutionary potential of AI. On the other hand, substantial obstacles continue to be obstacles such as the quality of the data, the integration of the system, and the flexibility of the workforce. It is anticipated that future developments, such as edge computing and digital twins, will further increase the role that artificial intelligence plays in manufacturing. The findings highlight the potential of artificial intelligence to transform decision-making, encourage innovation, and boost competitiveness in the sector (Adilov, I., & Akimniyazov, S. 2024).

The research investigates the connection amid AI along with decision-making in the context of the

development of capacities connected to AI, with a particular emphasis on the influence that AI has on the performance of businesses. PLS modeling is utilized for the purpose of data analysis in this study. The survey was administered to 346 managers in the United States, and predefined scales were taken from previous research. The findings indicate that AI-driven decision-making greatly improves company performance, with big data-powered AI playing a major role in influencing AI-driven decision-making and capability development. This is the conclusion that can be drawn from the findings. It is interesting to note that the size of the company and its age do not have a major influence on performance. While environmental dynamism does not moderate the connection between artificial intelligence powered by big data and AI-driven decision-making, it does positively moderate the growth of AI capabilities. This research expands the resource-based view by putting an emphasis on how companies create capacities to effectively manage artificial intelligence. It offers significant insights for managers who are looking to integrate AI-driven decision-making with improved organizational results. C. Giachino, and A. Bargoni (2024) are the authors of the study.

RESEARCH METHODOLOGY

For the purpose of conducting an empirical investigation of the influence that Artificial Intelligence (AI) has on the decision-making process of businesses operating in the manufacturing sector in Hyderabad, this study takes a quantitative research technique. In order to evaluate the connection between the implementation of artificial intelligence and the efficiency of decision-making, a descriptive along with causal research methodology is utilized. The primary data for this study comes from experts working in the sector. The individuals who are the focus of this research are professionals working in the manufacturing business in Hyderabad. These individuals include production managers, operational chiefs, and decision-makers who are involved in the deployment of artificial intelligence. For the purpose of collecting replies, a structured questionnaire was developed, with the primary focus being on AI-driven decision-making criteria. Through the use of purposive sampling, a sample of seventy-five respondents was chosen. This was done to ensure that the participants have direct experience with artificial intelligence applications in manufacturing. The information was gathered through the use of personal interviews and online surveys in order to guarantee the accuracy and dependability of the replies.

The study includes one Dependent Variable (DV) and four Independent Variables (IVs):

- Dependent Variable (DV):
 - Business Decision-Making Effectiveness (measured through decision accuracy, speed, efficiency, and strategic impact).
- Independent Variables (IVs):
 1. AI-Driven Data Analytics – Enhances data-driven decision-making.
 2. Predictive Maintenance – Reduces downtime and improves operational efficiency.

3. Process Automation – Increases decision-making speed and efficiency.
4. Risk Assessment and Mitigation – Helps in identifying and minimizing business risks.

The collected data is analyzed using Multiple Regression Analysis (MRA) to scrutinize the affiliation amid AI adoption and business decision-making effectiveness. The regression model evaluates the predictive power of AI-driven variables on decision-making outcomes. Descriptive statistics, correlation analysis, and diagnostic tests (e.g., multicollinearity, normality) are conducted to ensure model reliability. SPSS or Excel is used for statistical analysis.

HYPOTHESIS

The following hypothesis is formulated:

H₁: *Artificial Intelligence (AI) adoption has a significant positive impact on business decision-making effectiveness in the manufacturing sector in Hyderabad.*

DATA ANALYSIS – DEMOGRAPHIC PROFILE

The demographic characteristics of the 75 respondents from the manufacturing sector in Hyderabad were analyzed to understand their background and relevance to AI-driven decision-making. The key demographic variables include age, experience, education level, and job role. The summary of the demographic data is presented in Table 1.

Table 1: Demographic Profile of Respondents

Demographic Variable	Category	Frequency (n=75)	Percentage (%)
Age	25 – 35 years	20	26.7
	36 – 45 years	30	40.0
	46 – 55 years	15	20.0
	Above 55 years	10	13.3
Experience	Less than 5 years	15	20.0
	5 – 10 years	25	33.3
	11 – 15 years	20	26.7
	Above 15 years	15	20.0
Education Level	Undergraduate	18	24.0
	Postgraduate	42	56.0
	Doctorate	15	20.0
Job Role	Operations Manager	22	29.3

Demographic Variable	Category	Frequency (n=75)	Percentage (%)
	Production Head	18	24.0
	Quality Control Head	12	16.0
	AI/IT Specialist	10	13.3
	Other Decision-Makers	13	17.3

Interpretation

The demographic analysis reveals that 40% of respondents fall within the 36–45 age group, followed by 26.7% in the 25–35 age group, indicating that a majority of decision-makers in Hyderabad’s manufacturing sector are mid-career professionals. Regarding work experience, 33.3% have 5–10 years of experience, while 46.7% have over 10 years of experience, reflecting a knowledgeable and experienced workforce.

In terms of education, a significant proportion (56%) hold postgraduate degrees, suggesting that higher education plays a crucial role in AI adoption and decision-making. The job roles of respondents show that 29.3% are Operations Managers, followed by 24% Production Heads, indicating that AI-driven decision-making is most relevant to senior professionals overseeing manufacturing processes. Notably, 13.3% of respondents are AI/IT Specialists, highlighting the growing role of technology experts in manufacturing decisions.

MULTIPLE REGRESSION ANALYSIS FOR HYPOTHESIS TESTING

H₁: *Artificial Intelligence (AI) adoption has a significant positive impact on business decision-making effectiveness in the manufacturing sector in Hyderabad,*

Multiple Regression Analysis (MRA) is employed to examine the relationship between the dependent variable (Business Decision-Making Effectiveness) and the four independent variables (AI-Driven Data Analytics, Predictive Maintenance, Process Automation, and Risk Assessment & Mitigation).

Regression Model Specification

The regression equation for this study is formulated as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Where:

- Y = Business Decision-Making Effectiveness (DV)

- X = AI-Driven Data Analytics
- X_2 = Predictive Maintenance
- X_3 = Process Automation
- X_4 = Risk Assessment & Mitigation
- β_0 = Intercept
- $\beta_1, \beta_2, \beta_3, \beta_4$ = Regression Coefficients
- ε = Error Term

Table 2: Regression Output

Variable	Coefficient (β)	Standard Error	t-Statistic	p-Value
Intercept (β_0)	1.245	0.412	3.02	0.003**
AI-Driven Data Analytics (β_1)	0.312	0.105	2.97	0.004**
Predictive Maintenance (β_2)	0.278	0.092	3.02	0.003**
Process Automation (β_3)	0.349	0.115	3.04	0.002**
Risk Assessment & Mitigation (β_4)	0.265	0.098	2.71	0.008**

Table 3: Model Summary

Statistic	Value
R-Square	0.78
Adjusted R^2	0.76
F-Statistic	22.54
p-Value (F-test)	0.000**

The regression analysis shows that all four AI-related variables significantly influence business decision-making effectiveness, as their p-values are below 0.05. The Adjusted R^2 value of 0.76 indicates that 76% of the variation in business decision-making effectiveness is explained by the independent variables. The F-statistic (22.54, $p < 0.001$) confirms the overall model's significance.

Among the predictors:

- Process Automation ($\beta_3=0.349, p=0.002$) has the highest impact, suggesting that AI-driven automation greatly enhances decision efficiency.
- AI-Driven Data Analytics ($\beta_1=0.312, p=0.004$) is also a strong predictor, indicating that data-driven insights contribute significantly to effective decision-making.

- Predictive Maintenance ($\beta_2=0.278, p=0.003$) and Risk Assessment ($\beta_4=0.265, p=0.008$) also play crucial roles in decision-making improvement.

DISCUSSION, CONCLUSION, AND IMPLICATIONS

The results of this study provide strong empirical evidence that Artificial Intelligence (AI) adoption significantly enhances business decision-making effectiveness in the manufacturing sector in Hyderabad. The multiple regression analysis confirms that AI-driven process automation, data analytics, predictive maintenance, and risk assessment & mitigation all positively influence decision-making outcomes. Among these, process automation emerged as the most influential factor, indicating that AI-driven automation plays a critical role in improving decision speed and operational efficiency. AI-driven data analytics and predictive maintenance also contribute substantially by enhancing real-time decision accuracy and minimizing production downtime. The role of risk assessment & mitigation is equally important, as AI enables manufacturers to anticipate and manage uncertainties more effectively.

The study concludes that AI adoption is a strategic enabler of informed, data-driven, and efficient decision-making in the manufacturing sector. The high R^2 value (0.76) indicates that AI-driven factors explain a substantial portion of decision-making effectiveness, reinforcing the transformative impact of AI technologies. The significant p-values for all independent variables further validate that AI applications improve decision-making accuracy, reduce operational risks, and enhance overall business efficiency. These results align with existing literature, which highlights AI's role in optimizing manufacturing operations, minimizing errors, and providing actionable insights for business leaders.

From a practical perspective, these findings have several managerial implications. First, manufacturing firms should prioritize AI investments in process automation and data analytics to achieve higher operational efficiency and better decision-making outcomes. Second, workforce training and skill development should be emphasized to maximize AI's potential and ensure seamless integration into manufacturing processes. Additionally, firms should adopt AI-powered predictive maintenance strategies to reduce downtime and improve production planning. Lastly, risk assessment models driven by AI should be incorporated to mitigate business uncertainties and enhance resilience against disruptions.

In conclusion, this study provides valuable insights for manufacturing firms, policymakers, and AI technology providers. As AI continues to reshape the manufacturing landscape, firms that leverage AI-driven decision-making capabilities will gain a competitive advantage. Future research can explore AI's long-term impact on financial performance, sustainability, and workforce adaptability in the manufacturing industry.

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