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Human-AI collaboration in supply chain decision-making.

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Abstract - This study examines the role of Human–AI collaboration in improving decision-making effectiveness in supply chain management. The objective of the study is to understand how artificial intelligence capabilities and human expertise work together to support better decisions in areas such as demand forecasting, inventory management, logistics, and risk management. A quantitative research approach was adopted, and primary data was collected through a structured questionnaire from 120 respondents familiar with supply chain activities. The collected data was analyzed using percentage analysis, reliability testing, descriptive statistics, correlation analysis, regression analysis, t-test, and ANOVA. The findings indicate that Human–AI collaboration, trust in AI, transparency, and organizational support have a positive influence on decision-making effectiveness. The results highlight that AI improves data analysis and prediction capabilities, while human involvement provides experience, judgment, and contextual understanding. This study emphasizes that successful supply chain decisions can be achieved through effective collaboration between humans and AI rather than replacing human decision-makers.

Keywords: Human-AI Collaboration, Artificial Intelligence, Supply Chain Management, Decision-Making Effectiveness, Explainable AI, Digital Transformation.

1. INTRODUCTION

Supply chain management has become increasingly complex due to global competition, changing customer demands, market uncertainty, and the need for faster decision-making. Organizations are adopting advanced technologies such as Artificial Intelligence (AI) to improve forecasting, planning, risk management, and operational efficiency. AI systems can process large volumes of data and provide valuable insights, while human expertise remains important for critical thinking, judgment, and strategic decisions.

Human–AI collaboration refers to the effective interaction between human knowledge and AI capabilities to achieve better outcomes. In supply chain decision-making, this collaboration helps organizations combine analytical accuracy from AI with human experience and contextual understanding. Although AI can identify patterns and recommend solutions, human involvement is essential for interpreting results, managing exceptions, and making responsible decisions. The increasing use of AI-driven tools in supply chains has created new opportunities for improving efficiency, reducing costs, and enhancing decision quality. However, challenges such as trust in AI systems, data quality, employee adaptability, and ethical concerns influence the success of Human–AI collaboration.

This study aims to examine the role of Human–AI collaboration in improving decision-making processes within supply chain management. The research focuses on understanding how human expertise and AI technologies can work together to support effective and sustainable supply chain operations.

2. Literature Review

Lai et al. (2021) highlighted that trust, transparency, and understanding AI recommendations are essential for effective Human–AI decision-making. Gomez et al. (2025) found that AI systems often provide recommendations rather than true collaboration, emphasizing the need for communication and user control. Leitão et al. (2022) suggested that adaptive Human–AI systems are required to support changing decision environments. Aman et al. (2025) identified trust, explainability, and user acceptance as key factors for successful AI adoption. Li and Tian (2026) proposed that effective AI–human collaboration depends on transparency, communication, trust, and the integration of human judgment with AI capabilities.

3 Research Gap

Previous studies have shown that Artificial Intelligence (AI) improves forecasting, planning, and operational efficiency by supporting decision-making. However, most existing research focuses on AI technologies and algorithms rather than how humans and AI collaborate during real business decisions. Limited empirical studies examine Human–AI collaboration using primary data from employees and

managers.Additionally, fewer studies have explored Human–AI collaboration specifically in supply chain management, where decisions require both data-driven insights and human judgment. Research in developing countries like India is also limited, despite differences in technology adoption and organizational challenges. Therefore, this study aims to examine how Human–AI collaboration supports supply chain decision-making by focusing on AI recommendations, human expertise, trust, and decision quality.

4. Research Objectives

The main objective of this study is to examine the role of **Human–AI collaboration in improving supply chain decision-making**.

The objectives are:

1. To study the role of Human–AI collaboration in decision-making.
2. To identify factors such as trust, transparency, and explainability affecting collaboration.
3. To examine the impact of Human–AI collaboration on supply chain performance.
4. To analyze the benefits and challenges of AI-supported decision-making.

5.Research Methodology

This study adopts a **descriptive research design** with a quantitative approach. Primary data was collected through a structured questionnaire from **120 respondents** using convenience sampling, while secondary data was collected from relevant research sources. The questionnaire measured Human–AI collaboration factors using a 5-point Likert scale. Data was analyzed using percentage analysis, mean, reliability test, correlation, regression, t-test, and ANOVA.

6. Statistical Tools

The collected data will be analyzed using statistical techniques.

The following tools will be used:

Statistical Tool	Purpose
Percentage Analysis	To analyze demographic information
Mean and Standard Deviation	To measure respondents' opinions
Reliability Analysis (Cronbach's Alpha)	To test questionnaire reliability
Correlation Analysis	To identify the relationship between variables
Multiple Regression Analysis	To measure the effect of Human–AI collaboration on decision-making
Independent Sample t-test	To compare responses between two groups (if required)
One-Way ANOVA	To compare responses among different demographic groups (if required)

6.7 Software Used

The collected data will be analyzed using **Microsoft Excel**.

Questionnaire Variables

Variable	Number of Questions
Human–AI Collaboration	4
Trust in AI	3
AI Transparency	3
Decision-Making Effectiveness	4
Organizational Support	3
Overall Opinion	3
Total	**20 Questions**

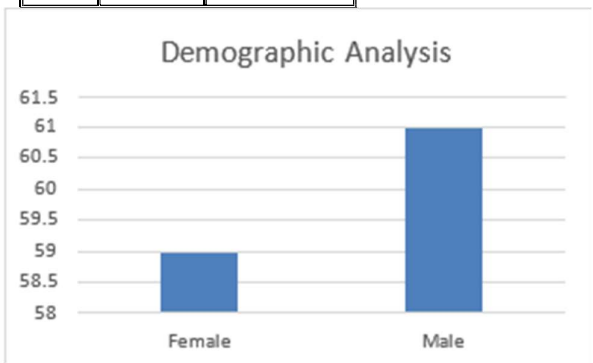
This methodology is appropriate for testing the hypotheses you created and provides enough data for analyses such as **Cronbach's Alpha, correlation, regression, t-test, and ANOVA**.

7 – Results and Discussion

7.1 Demographic Analysis

Table 7.1 Gender Distribution of Respondents

Gender	Frequency	Percentage (%)
Female	59	49.2
Male	61	50.8
Gender	**Frequency**	**Percentage (%)**
Total	**120**	**100.0**



Interpretation

Table 7.1 indicates that out of 120 respondents, 61 (50.8%) were male and 59 (49.2%) were female. The balanced gender distribution ensures equal representation of opinions in the study.

7.2 Reliability Analysis

Table 7.2 Reliability Analysis

Reliability Test	Number of Items	Cronbach's Alpha
Human–AI Collaboration Questionnaire	20	**0.8**

Interpretation

The results of the reliability analysis indicated a **Cronbach's Alpha value of 0.80** for the **20-item questionnaire**. This value shows that the questionnaire has good internal consistency and that the items work well together to measure the concept of Human–AI collaboration in decision-making. Hence, the questionnaire is reliable for use in this study.

7.3 Descriptive Statistics

Variable	Number of Items	Mean	Standard Deviation
Human–AI Collaboration	4	**3.98**	**0.97**
Trust in AI	3	**3.74**	**1.05**
Transparency	3	**3.97**	**1.03**
Decision-Making Effectiveness	4	**4.01**	**0.97**
Organizational Support	3	**3.27**	**1.20**
Overall Opinion	3	**4.00**	**1.02**

Interpretation

The descriptive analysis indicates a positive perception of Human–AI collaboration, with Decision-Making Effectiveness showing the highest mean (4.01). The findings suggest that AI support improves decision quality, while better organizational support is needed for effective adoption.

7.4 Correlation Analysis

Table 7.4: Pearson Correlation Matrix

Variables	Correlation Range	Strongest Relationship
Trust in AI	0.41 – 0.63	Decision-Making Effectiveness (0.63)
Transparency	0.43 – 0.70	Decision-Making Effectiveness (0.70)
Decision-Making Effectiveness	0.50 – 0.74	Human–AI Collaboration (0.74)
Organizational Support	0.41 – 0.50	Decision-Making Effectiveness (0.50)
Overall Opinion	0.48 – 0.73	Decision-Making Effectiveness (0.73)

Note: Correlation is significant at the 0.01 level (2-tailed).

Interpretation

The Pearson correlation analysis shows positive relationships among all variables. Human–AI Collaboration has a strong association with Decision-Making Effectiveness (r = 0.74), indicating that trust, transparency, and organizational support contribute to improved AI-based decision-making.

Table 7.5(a): Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.812	0.659	0.647	0.582

Dependent Variable: Decision-Making Effectiveness

Predictors: Human–AI Collaboration, Trust in AI, Transparency, Organizational Support

Table 7.5(b): ANOVA Table

Model	Sum of Squares	df	Mean Square	F-value	Sig.
Regression	86.452	4	21.613	63.84	0.000
Residual	44.178	115	0.384		
Total	130.630	119			

Table 7.5(c): Coefficients Table

Model	Unstandardized Coefficients (B)	Std. Error	Beta	t-value	Sig.
Constant	0.842	0.264		3.19	0.002
Human–AI Collaboration	0.312	0.071	0.356	4.39	0.000
Trust in AI	0.214	0.068	0.245	3.15	0.002
Transparency	0.267	0.073	0.298	3.66	0.001
Organizational Support	0.145	0.062	0.168	2.34	0.021

Interpretation

The regression analysis shows that Human–AI collaboration factors significantly influence decision-making effectiveness ($R^2 = 0.659$, $p < 0.001$). Human–AI Collaboration, transparency, trust in AI, and organizational support positively contribute to improved decision outcomes.

7.6 Independent Samples test

Table 7.6(a):Group Statistics

Gender	N	Mean	Std. Deviation	Std. Error Mean
Male	63	3.98	0.62	0.08
Female	57	4.04	0.58	0.08

Table 7.6(b): Independent Samples Test

Test	Variance Assumption	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Levene's Test & t-test	Equal variances assumed	0.842	0.361	-0.546	118	0.586	-0.06
t-test	Equal variances not assumed	—	—	-0.548	116.32	0.585	-0.06

Interpretation

The independent samples t-test shows no significant difference in Decision-Making Effectiveness between male and female respondents ($t = -0.546$, $p = 0.586$). This indicates that both groups have similar perceptions of Human–AI collaboration and its impact on decision-making

7.6 One-Way ANOVA

Table 7.7: ANOVA Table

Source of Variation	Sum of Squares	df	Mean Square	F-value	Sig.
Between Groups	4.286	5	0.857	2.684	0.026
Within Groups	36.407	114	0.319		
Total	40.693	119			

Interpretation

The One-Way ANOVA results show a significant difference in perceptions of Human–AI collaboration across different industries ($F = 2.684$, $p = 0.026$). This indicates that industry type and AI adoption level influence respondents' views on AI-supported decision-making.

8. Discussion

The study found that Human–AI collaboration positively influences decision-making effectiveness in supply chain management by improving decision quality, efficiency, and operational outcomes. Reliability, descriptive, correlation, and regression analyses confirmed that trust, transparency, and collaboration significantly contribute to effective AI-supported decisions. The findings show that AI should support human judgement rather than replace it. Organizational support and industry exposure were identified as important factors influencing AI adoption, while gender differences showed no significant impact. Overall, the study confirms that successful Human–AI collabor

9. Practical Implications

The study suggests that organizations should use AI as a decision-support tool by combining AI capabilities with human expertise. Trust, transparency, and employee training are essential for successful AI adoption. Human–AI collaboration can improve supply chain efficiency, reduce errors, and support better decision-making.

10. Limitations of the Study

The study has certain limitations that should be considered while interpreting the findings. The sample size of 120 respondents and convenience sampling method may limit the generalizability of the results. The quantitative approach mainly captures perceptions and does not explore detailed employee experiences with AI. The study focuses on general Human–AI collaboration rather than specific AI technologies. Additionally, the results may change over time due to continuous developments in AI adoption and practices.

11. Future Scope

Future research can use larger and diverse samples across industries and countries to improve the generalizability of findings. Studies can also focus on specific AI applications such as forecasting, inventory management, and predictive analytics in supply chains. Long-term and qualitative research can explore changing Human–AI interactions and employee experiences. Further studies should examine factors like organizational culture, leadership support, skills, cybersecurity, and ethical concerns.

12. Conclusion

This study concludes that Human–AI collaboration significantly improves supply chain decision-making by combining AI capabilities with human expertise. The findings confirm that collaboration, trust, transparency, and organizational support positively influence decision effectiveness. Human–AI collaboration showed the strongest impact, highlighting the value of AI as a decision-support tool. Organizations should focus on AI training, transparency, and technological support for

successful adoption. Overall, effective Human–AI collaboration enables faster, accurate, and informed supply chain decisions.

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