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Human–AI Collaboration and Workplace Efficiency: The Mediating Role of Task Automation

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Abstract:
The increasing integration of artificial intelligence into organizational processes has transformed the nature of contemporary work by enabling employees and intelligent systems to collaborate in performing routine, analytical, and decision support activities. Human–AI collaboration represents an emerging organizational phenomenon in which human capabilities and artificial intelligence capabilities are combined to improve task execution and organizational performance. Although artificial intelligence has considerable potential to improve workplace efficiency, the mechanisms through which collaboration between employees and AI produces efficiency gains remain insufficiently understood. This study examines the relationship between Human–AI Collaboration and Workplace Efficiency while investigating the mediating role of Task Automation. The study proposes that effective collaboration between employees and artificial intelligence enables organizations to distribute tasks according to the relative strengths of humans and AI systems. AI can perform repetitive, time consuming, data intensive, and standardized activities, allowing employees to concentrate on complex decision making, creativity, interpersonal activities, problem solving, and strategic responsibilities. Consequently, task automation is expected to represent an important mechanism through which Human–AI Collaboration contributes to workplace efficiency. The study adopts a quantitative cross sectional research design and proposes collecting primary data from employees working in organizations that use AI supported technologies. Partial Least Squares Structural Equation Modeling through SmartPLS is considered appropriate because the proposed framework contains latent constructs and a mediation relationship. The measurement model should be assessed using indicator loadings, Cronbach's alpha, composite reliability, average variance extracted, and discriminant validity. The structural model should be examined through path coefficients, bootstrapping, R squared, effect sizes, predictive relevance, and direct and indirect effects. Illustrative results indicate that Human–AI Collaboration has a significant positive relationship with Workplace Efficiency and Task Automation. Task Automation also positively influences Workplace Efficiency. Furthermore, the indirect relationship between Human–AI Collaboration and Workplace Efficiency through Task Automation is positive and significant, indicating partial mediation. The study contributes to the emerging literature on AI enabled work by explaining that efficiency improvements do not result simply from the presence of AI but from effective human and AI collaboration and the strategic automation of suitable tasks. The findings suggest that organizations should design AI systems around human capabilities, automate appropriate activities, develop employee AI competencies, and maintain human oversight over complex decisions. The study provides practical implications for managers seeking to use artificial intelligence as a complement to human labor rather than merely as a substitute for employees.

Keywords: Human–AI Collaboration, Artificial Intelligence, Workplace Efficiency, Task Automation, Employee Performance, Digital Transformation, AI Adoption, Organizational Productivity, PLS SEM, SmartPLS

Introduction:

Artificial intelligence has rapidly evolved from an experimental technological capability into an important component of modern organizational systems.

Organizations increasingly employ AI for data analysis, customer service, forecasting, document processing, decision support, scheduling, quality control, recruitment, financial analysis, and other workplace activities.

The growing integration of AI is consequently changing how employees perform their jobs and how organizations structure work.

Rather than viewing AI exclusively as a replacement for human workers, contemporary organizational research increasingly emphasizes collaboration between humans and intelligent systems.

Human–AI collaboration refers to situations in which human employees and AI technologies jointly contribute to the completion of organizational tasks.

Humans contribute contextual understanding, judgment, creativity, ethical reasoning, interpersonal skills, and domain knowledge.

AI contributes computational capacity, speed, pattern recognition, information processing, prediction, and the ability to perform repetitive activities at scale.

The combination of these capabilities can potentially create higher levels of workplace efficiency.

The importance of this relationship has increased with the emergence of generative AI.

Generative AI systems can assist employees with writing, coding, information retrieval, analysis, communication, and problem solving.

Recent research suggests that generative AI can substantially influence worker productivity when it is appropriately integrated into workplace tasks.

However, the productivity consequences of AI are not automatic.

They depend on how employees interact with AI, how tasks are redesigned, and whether organizations develop appropriate human oversight and complementary capabilities.

One important mechanism connecting Human–AI Collaboration with workplace efficiency is

Task Automation.

Task automation occurs when technological systems perform activities that were previously performed manually by employees.

Automation can reduce the time required for repetitive tasks and minimize routine administrative workloads.

It can also reduce human error and allow employees to redirect their attention toward higher value activities.

For example, an AI system can automatically classify documents, generate preliminary reports, summarize information, identify patterns, schedule appointments, or process large volumes of data.

Employees can then verify outputs, make judgments, communicate with stakeholders, and perform activities requiring creativity and contextual understanding.
Consequently, task automation may explain why effective Human–AI Collaboration improves workplace efficiency.
Workplace efficiency refers to the ability of employees and organizations to accomplish tasks using available resources efficiently while minimizing unnecessary time, cost, effort, and errors.
AI supported collaboration can potentially improve efficiency by accelerating information processing, reducing repetitive work, improving decision support, and enabling employees to focus on higher value responsibilities.
However, poorly designed collaboration can create inefficiencies.
Employees may need to repeatedly verify inaccurate AI outputs.
Poorly integrated AI systems can increase workload rather than reduce it.
Employees may also experience uncertainty regarding responsibility and accountability.
Therefore, the effectiveness of AI depends on the quality of collaboration between human employees and intelligent systems.
The present study addresses this issue by proposing a mediation model in which Task Automation explains the relationship between Human–AI Collaboration and Workplace Efficiency.
The proposed framework is:

Human–AI Collaboration → Task Automation → Workplace Efficiency
The study also investigates the direct relationship:

Human–AI Collaboration → Workplace Efficiency
The research is theoretically relevant because it shifts attention from simple AI adoption toward the organizational consequences of human and AI complementarity.
The framework can be explained through the **Human–Technology Interaction perspective**, **Task–Technology Fit Theory**, and principles of **sociotechnical systems theory**.
Task–Technology Fit suggests that technology generates positive outcomes when its capabilities appropriately match task requirements.
In the context of AI, collaboration becomes valuable when AI capabilities complement human capabilities and are applied to tasks for which AI is appropriate.
Sociotechnical systems theory similarly emphasizes that technological systems should be integrated with human and organizational systems rather than considered independently.
From this perspective, workplace efficiency depends on the interaction between employees, AI technologies, tasks, and organizational structures.
The research also has important managerial implications.
Organizations investing in AI need to identify which tasks should be automated and which should remain under human control.
Routine and repetitive tasks may be suitable for automation, whereas activities involving ethical judgment, interpersonal relationships, strategic decision making, and ambiguous situations may require human involvement.
Employees also require AI literacy to collaborate effectively with intelligent systems.

Training should therefore focus not only on operating AI tools but also on evaluating AI outputs, recognizing errors, maintaining human oversight, and understanding appropriate automation boundaries.
This study seeks to determine whether Human–AI Collaboration improves workplace efficiency and whether Task Automation explains this relationship.

Literature Review

Human–AI Collaboration

Human–AI Collaboration describes situations in which employees and AI systems jointly perform work activities.
Unlike complete automation, collaboration retains a meaningful role for human employees.
Humans may define objectives, provide contextual information, evaluate AI outputs, make final decisions, or manage interpersonal consequences.
AI systems can process information, identify patterns, generate recommendations, and automate repetitive activities.
The complementary nature of human and machine capabilities is central to the concept.
Humans possess abilities related to contextual reasoning, empathy, creativity, and ethical judgment.
AI systems are particularly capable of processing large datasets, recognizing patterns, generating outputs, and performing standardized activities.
Research on AI and organizational work increasingly argues that organizations should consider AI as a complement to human capabilities rather than simply as a labor substitute.

Human–AI Collaboration and Workplace Efficiency

Effective collaboration between humans and AI can improve workplace efficiency.
AI can increase the speed of information processing and reduce the amount of time employees spend on repetitive activities.
Employees can subsequently allocate more time to complex tasks.
Generative AI research has provided emerging evidence that AI assistance can increase productivity in certain workplace contexts.
For example, experimental research has shown that generative AI can improve performance on particular knowledge work tasks, although benefits vary according to task characteristics and worker expertise.
Workplace efficiency may therefore improve when AI systems are integrated into tasks where their capabilities complement human expertise.
Accordingly:

H1: Human–AI Collaboration positively affects Workplace Efficiency.

Task Automation

Task Automation refers to the use of technological systems to execute tasks with limited direct human intervention.
Automation can range from simple rule based processes to advanced AI driven activities.
Traditional automation typically follows predefined rules.

AI based automation can be more adaptive because intelligent systems can analyze data, identify patterns, generate content, and support decisions.
Task automation can reduce repetitive workload and processing time.
It can also improve consistency and potentially reduce errors.
However, automation is not universally beneficial.
Some tasks require human judgment and accountability.
Excessive automation can also create new monitoring and verification requirements.
Therefore, appropriate task selection is essential.

Human–AI Collaboration and Task Automation

Human–AI collaboration can increase task automation because employees who effectively collaborate with AI are better positioned to identify suitable activities for automation.
Employees understand the contextual requirements of their work.
AI provides capabilities for processing and executing suitable tasks.
Together, employees and AI systems can determine which activities should be automated and which should remain under human control.
For example, an employee may use AI to automatically summarize reports while retaining responsibility for reviewing and interpreting the summary.
Similarly, AI can automatically categorize customer requests while employees handle complex cases.
Therefore:

H2: Human–AI Collaboration positively affects Task Automation.

Task Automation and Workplace Efficiency

Task automation can directly increase workplace efficiency.
Automated activities can be completed faster than manual processes when tasks are repetitive and standardized.
Automation can also allow employees to concentrate on higher value activities.
Reduced processing time can improve organizational responsiveness.
Automation may also reduce operational costs and improve consistency.
However, these benefits depend on the reliability of automated systems.
If AI generates frequent errors, employees may spend additional time checking outputs.
Thus, the positive relationship between task automation and efficiency depends on appropriate implementation.
Nevertheless, when automation is effectively designed and supervised:

H3: Task Automation positively affects Workplace Efficiency.

Mediating Role of Task Automation

Task automation provides a logical mechanism connecting Human–AI Collaboration with workplace efficiency.
Collaboration allows humans and AI to combine their capabilities.
This collaboration facilitates identification and execution of tasks suitable for automation.
Automation subsequently reduces repetitive workload and processing time.

Consequently, efficiency increases.
The mediation framework therefore suggests that Human–AI Collaboration does not improve efficiency only through direct interaction.
It also improves efficiency by enabling organizations to automate suitable work activities.
Therefore:

H4: Task Automation mediates the relationship between Human–AI Collaboration and Workplace Efficiency.

Theoretical Foundation

The study draws primarily upon **Task–Technology Fit Theory**.
The theory proposes that technology improves individual performance when its capabilities appropriately fit task requirements.
AI systems are particularly valuable when applied to tasks involving large amounts of information, repetitive processing, prediction, classification, or pattern recognition.
Human expertise remains valuable for ambiguous, interpersonal, ethical, and strategic tasks.
Human–AI collaboration therefore represents a mechanism for achieving task–technology fit.
The framework also reflects **Sociotechnical Systems Theory**, which emphasizes that technological performance depends on integration between technological and social systems.
AI should therefore be designed around employees rather than implemented independently of organizational practices.

Research Gap

Existing AI research has extensively examined technology adoption, employee attitudes, automation, productivity, and AI acceptance.
However, less attention has been given to the mechanism through which Human–AI Collaboration translates into workplace efficiency.
In particular, Task Automation has often been studied as an outcome of technological advancement rather than as a mediator connecting collaboration with efficiency.
This study addresses this gap by integrating Human–AI Collaboration, Task Automation, and Workplace Efficiency into one empirical framework.

Conceptual Model / Theoretical Framework

The conceptual framework proposes that effective collaboration between employees and AI systems improves workplace efficiency.
However, part of this relationship is expected to occur through task automation.

Conceptual Model

Independent Variable: Human–AI Collaboration
Mediating Variable: Task Automation
Dependent Variable: Workplace Efficiency

Proposed Relationships

Human–AI Collaboration → Workplace Efficiency
Human–AI Collaboration → Task Automation

Task Automation → Workplace Efficiency
Human–AI Collaboration → Task Automation → Workplace Efficiency

Hypotheses

H1: Human–AI Collaboration positively affects Workplace Efficiency.
H2: Human–AI Collaboration positively affects Task Automation.
H3: Task Automation positively affects Workplace Efficiency.
H4: Task Automation mediates the relationship between Human–AI Collaboration and Workplace Efficiency.

Methodology

A quantitative cross sectional research design is recommended for examining the relationships among Human–AI Collaboration, Task Automation, and Workplace Efficiency. The target population should consist of employees working in organizations that use artificial intelligence or AI supported digital technologies in their work processes. Employees from sectors such as banking, telecommunications, information technology, education, healthcare administration, retail, logistics, consulting, and professional services may be included. A sample of approximately 250 to 400 respondents is suitable for PLS SEM, although the final sample should be determined using statistical power analysis.

Data should be collected through a structured questionnaire using a five point or seven point Likert scale. Human–AI Collaboration should be measured through indicators assessing the extent to which employees and AI systems jointly perform tasks, exchange information, complement each other's capabilities, and share responsibilities. Task Automation should measure the extent to which AI systems automatically perform repetitive, standardized, data processing, administrative, and routine activities. Workplace Efficiency should measure task completion speed, productivity, resource utilization, reduced effort, reduced errors, and overall work efficiency.

A pilot study should be conducted to assess questionnaire clarity and reliability before the main survey. Participation should be voluntary and respondents should be informed about confidentiality and the academic purpose of the research.

SmartPLS should be used to estimate the measurement and structural models. Indicator loadings should preferably exceed 0.70. Cronbach's alpha and composite reliability should exceed 0.70, while AVE should exceed 0.50. Discriminant validity should be assessed through HTMT. The structural model should be evaluated using path coefficients, bootstrapping, t statistics, p values, confidence intervals, R squared, f squared, and predictive relevance. The mediation relationship should be assessed through the bootstrapped indirect effect of Human–AI Collaboration on Workplace Efficiency through Task Automation. If both the direct and indirect effects are significant, partial mediation is indicated.

Measurement Model

Table 1
Reliability and Convergent Validity

Construct	Cronbach Alpha	Composite Reliability	AVE	Decision
Human–AI Collaboration	0.918	0.939	0.754	Acceptable

Construct	Cronbach Alpha	Composite Reliability	AVE	Decision
Task Automation	0.907	0.932	0.734	Acceptable
Workplace Efficiency	0.925	0.944	0.771	Acceptable

Note. These are illustrative SmartPLS results and do not represent actual collected data.

Table 2
Illustrative Outer Loadings

Construct	Indicator	Loading
Human–AI Collaboration	HAC1	0.871
Human–AI Collaboration	HAC2	0.903
Human–AI Collaboration	HAC3	0.918
Human–AI Collaboration	HAC4	0.889
Human–AI Collaboration	HAC5	0.905
Task Automation	TA1	0.856
Task Automation	TA2	0.891
Task Automation	TA3	0.917
Task Automation	TA4	0.903
Task Automation	TA5	0.882
Workplace Efficiency	WE1	0.887
Workplace Efficiency	WE2	0.921
Workplace Efficiency	WE3	0.932
Workplace Efficiency	WE4	0.905
Workplace Efficiency	WE5	0.916

Table 3
Discriminant Validity Using HTMT

Construct Pair	HTMT	Threshold	Decision
Human–AI Collaboration and Task Automation	0.721	< 0.850	Established
Human–AI Collaboration and Workplace Efficiency	0.746	< 0.850	Established
Task Automation and Workplace Efficiency	0.783	< 0.850	Established

Structural Model Analysis
Table 4
Direct Effects

Hypothesis	Relationship	Beta	SE	t value	p value	Decision
H1	Human–AI Collaboration → Workplace Efficiency	0.397	0.058	6.845	< 0.001	Supported

Hypothesis	Relationship	Beta	SE	t value	p value	Decision
H2	Human–AI Collaboration → Task Automation	0.612	0.046	13.304	< 0.001	Supported
H3	Task Automation → Workplace Efficiency	0.361	0.061	5.918	< 0.001	Supported

Note. Values are illustrative.

Table 5
Mediation Effect

Hypothesis	Indirect Relationship	Beta	SE	t value	p value	Decision
H4	Human–AI Collaboration → Task Automation → Workplace Efficiency	0.221	0.040	5.525	< 0.001	Supported

Note. Values are illustrative.

Table 6
Direct, Indirect and Total Effects

Effect	Beta	Interpretation
Direct effect: Human–AI Collaboration → Workplace Efficiency	0.397	Positive
Indirect effect through Task Automation	0.221	Positive
Total effect	0.618	Strong positive overall effect

Table 7
R Squared and Effect Sizes

Endogenous Construct	R²	Predictor	f²	Interpretation
Task Automation	0.374	Human–AI Collaboration	0.602	Large
Workplace Efficiency	0.549	Human–AI Collaboration	0.198	Medium
Workplace Efficiency	0.549	Task Automation	0.174	Medium

Interpretation of Table 1

Table 1 presents the illustrative reliability and convergent validity results for Human–AI Collaboration, Task Automation, and Workplace Efficiency.
The Cronbach's alpha coefficients range from 0.907 to 0.925.
All values substantially exceed the recommended threshold of 0.70.
This indicates strong internal consistency among the measurement items.
The composite reliability coefficients range from 0.932 to 0.944.
These results provide additional evidence that the indicators consistently measure their respective constructs.

The AVE values range from 0.734 to 0.771.
All values exceed the recommended minimum of 0.50.
Therefore, convergent validity is established.
The Human–AI Collaboration construct demonstrates particularly strong reliability.
This suggests that the indicators consistently capture employees' perceptions regarding cooperation between human workers and AI systems.
The construct should theoretically reflect complementary work, information exchange, shared task execution, human oversight, and coordination between employees and intelligent systems.
The strong reliability of Task Automation indicates that the selected indicators consistently capture employees' perceptions of AI enabled automation.
Task automation should reflect whether AI systems perform repetitive, routine, standardized, or information processing activities with reduced human intervention.
Workplace Efficiency also demonstrates excellent reliability.
This indicates that the measurement items consistently capture perceived improvements in productivity, speed, resource utilization, workload reduction, and error reduction.
The high AVE values demonstrate that each construct explains a substantial proportion of the variance in its indicators.
These results provide a strong foundation for structural model analysis.
However, high reliability does not automatically guarantee that a scale is theoretically comprehensive.
Human–AI Collaboration is a relatively broad construct and should include both technological and human dimensions.
Likewise, workplace efficiency should not be reduced only to speed because excessive automation may increase monitoring costs or create new forms of work.
The actual research should therefore use validated measurement scales and establish content validity before collecting the final data.
Overall, the illustrative results indicate satisfactory internal consistency and convergent validity.

Interpretation of Table 2

Table 2 presents the illustrative outer loadings for all measurement indicators.
The loadings range from 0.856 to 0.932.
All values exceed the commonly accepted threshold of 0.70.
This demonstrates strong indicator reliability.
The Human–AI Collaboration indicators range from 0.871 to 0.918.
These results suggest that the indicators strongly represent the underlying collaboration construct.
The high loadings imply that employees consistently recognize the role of cooperation between human expertise and AI capabilities in their work.
The Task Automation indicators range from 0.856 to 0.917.
These values indicate that the indicators provide strong representations of AI supported task automation.
Automation can involve repetitive administrative work, information processing, classification, reporting, scheduling, and other standardized activities.

The Workplace Efficiency indicators range from 0.887 to 0.932.
The results demonstrate that the indicators strongly capture employees' perceptions of efficiency.
The high loading of WE3 indicates that the corresponding efficiency dimension is particularly strongly associated with the overall construct.
High outer loadings indicate that the measurement items contribute substantially to their respective constructs.
Nevertheless, researchers should evaluate the theoretical content of each item.
An AI collaboration scale should distinguish genuine collaboration from simple technology usage.
Similarly, automation should capture the transfer of task execution from humans to AI rather than general perceptions of technological sophistication.
Workplace efficiency should reflect meaningful productivity improvements rather than merely employees' perceptions that technology is advanced.
Overall, the results indicate a strong measurement model.
The indicators demonstrate sufficient reliability and make meaningful contributions to their corresponding latent variables.

Interpretation of Table 3
Table 3 presents HTMT values used to assess discriminant validity.
All values are below the recommended threshold of 0.85.
This indicates that Human–AI Collaboration, Task Automation, and Workplace Efficiency represent empirically distinct constructs.
The HTMT value between Human–AI Collaboration and Task Automation is 0.721.
This indicates that the constructs are related but conceptually different.
Human–AI Collaboration concerns the relationship and coordination between people and AI systems, whereas Task Automation concerns the extent to which specific work activities are performed automatically.
The HTMT value between Human–AI Collaboration and Workplace Efficiency is 0.746.
This suggests that effective collaboration is associated with efficiency while remaining distinguishable from efficiency itself.
The HTMT value between Task Automation and Workplace Efficiency is 0.783.
This is the highest value in the model but remains below the conservative 0.85 threshold.
This relationship is theoretically logical because automation can reduce repetitive workload and improve processing speed.
However, the constructs remain distinct because automation represents a mechanism or process while efficiency represents an organizational or employee outcome.
Establishing discriminant validity is particularly important for mediation analysis.
If Task Automation and Workplace Efficiency were empirically identical, it would be impossible to confidently interpret Task Automation as a mediator.
The results therefore support the conceptual structure of the proposed model.
In the actual analysis, HTMT confidence intervals should also be examined.
Researchers should investigate any values approaching one because they may indicate insufficient discriminant validity.

Overall, the illustrative results indicate that the three constructs have adequate conceptual and empirical distinctiveness.

Interpretation of Table 4

Table 4 presents the direct relationships among Human–AI Collaboration, Task Automation, and Workplace Efficiency.

The first relationship demonstrates that Human–AI Collaboration positively affects Workplace Efficiency.

The path coefficient is 0.397, with a t value of 6.845 and a p value below 0.001.

Therefore, H1 is supported.

The result suggests that effective cooperation between employees and AI systems is associated with higher workplace efficiency.

AI can provide computational and analytical capabilities, while employees provide contextual understanding, judgment, creativity, and responsibility.

Combining these capabilities can improve task execution.

The second relationship indicates that Human–AI Collaboration positively affects Task Automation.

The coefficient is 0.612, with a t value of 13.304 and a p value below 0.001.

Therefore, H2 is supported.

This is the strongest direct relationship in the proposed model.

The finding suggests that collaboration provides an important foundation for identifying and implementing appropriate automation.

Employees understand their workflows and can identify repetitive activities that AI systems can perform efficiently.

The third relationship demonstrates that Task Automation positively affects Workplace Efficiency.

The coefficient is 0.361, with a t value of 5.918 and a p value below 0.001.

Therefore, H3 is supported.

The finding suggests that automating suitable tasks can reduce processing time, repetitive workload, and unnecessary effort.

Employees can redirect their attention toward higher value activities.

However, the findings should not be interpreted as evidence that all automation is beneficial.

Automation must be matched to appropriate tasks.

Activities involving ambiguity, ethical judgment, interpersonal interaction, and strategic decision making may require human involvement.

The results therefore support a complementary rather than purely substitutive view of AI.

Overall, the direct effects demonstrate that collaboration and task automation are significant components of workplace efficiency.

Interpretation of Table 5

Table 5 presents the illustrative mediation analysis.

The indirect effect of Human–AI Collaboration on Workplace Efficiency through Task Automation is 0.221.

The t value is 5.525 and the p value is below 0.001.
Therefore, H4 is supported.
The significant positive indirect effect indicates that Human–AI Collaboration improves workplace efficiency partly because it facilitates task automation.
This finding provides evidence for the proposed explanatory mechanism.
The result suggests that organizations do not obtain efficiency benefits simply because employees use AI.
Rather, collaboration enables employees and AI systems to identify appropriate tasks for automation.
When repetitive activities are automated, employees can devote more time to complex activities requiring human capabilities.
This can improve productivity and resource utilization.
The mediation result therefore extends the direct relationship between Human–AI Collaboration and Workplace Efficiency.
It demonstrates that automation is an important organizational process connecting AI collaboration with efficiency.
The finding has important managerial implications.
Organizations should not focus exclusively on increasing AI adoption rates.
They should examine whether AI is being integrated into workflows in ways that actually reduce unnecessary work.
Managers should identify repetitive and standardized activities suitable for automation while maintaining human oversight over important decisions.
Employee participation is particularly important because workers possess practical knowledge regarding workflow problems and task requirements.
The positive indirect effect also supports the theoretical assumption that technology creates value when it fits task requirements.
AI should therefore be deployed selectively rather than indiscriminately.
The actual study should assess the indirect effect using bootstrapping and report confidence intervals.
If the confidence interval does not include zero, mediation can be established.
Overall, the illustrative mediation result indicates that Task Automation is a significant mechanism through which Human–AI Collaboration contributes to workplace efficiency.

Interpretation of Table 6

Table 6 presents the direct, indirect, and total effects.
The direct effect of Human–AI Collaboration on Workplace Efficiency is 0.397.
The indirect effect through Task Automation is 0.221.
The total effect is 0.618.
These findings indicate that Human–AI Collaboration has a substantial overall relationship with workplace efficiency.
The direct effect indicates that collaboration can improve efficiency independently of automation.

For example, AI may assist employees in analysis, decision support, communication, information retrieval, or problem solving without completely automating the task.
The indirect effect demonstrates that task automation provides an additional pathway.
Employees and AI can jointly identify repetitive activities and automate them.
Automation then reduces workload and improves process efficiency.
Because the direct and indirect effects are both positive, the model demonstrates partial mediation.
This means that Task Automation explains part of the relationship between Human–AI Collaboration and Workplace Efficiency but does not explain the entire relationship.
This finding is theoretically meaningful.
It indicates that collaboration produces benefits through multiple mechanisms.
Automation is one important mechanism, but AI assisted decision making, information processing, knowledge sharing, and problem solving may also contribute to efficiency.
The findings suggest that organizations should therefore avoid evaluating AI solely through automation rates.
A highly automated organization may not necessarily be efficient if automated processes generate errors or require extensive human verification.
Instead, managers should focus on the overall fit between AI capabilities and work requirements.
The total effect indicates that effective Human–AI Collaboration can potentially have substantial implications for workplace performance.
However, the illustrative values should not be interpreted as actual empirical evidence until validated using real survey data.
Overall, the results support a complementary human–AI perspective in which automation is an important but not exclusive pathway toward workplace efficiency.

Interpretation of Table 7
Table 7 presents the explanatory power and effect sizes of the structural model.
The R squared value for Task Automation is 0.374.
This means that Human–AI Collaboration explains approximately 37.4 percent of the variance in Task Automation.
The corresponding f squared value is 0.602, indicating a large effect.
This suggests that effective collaboration between employees and AI is strongly associated with the implementation of automation.
The R squared value for Workplace Efficiency is 0.549.
Thus, Human–AI Collaboration and Task Automation jointly explain approximately 54.9 percent of the variance in Workplace Efficiency.
This represents substantial explanatory power for an organizational behavior model.
The f squared value for Human–AI Collaboration is 0.198, representing a medium effect.
This indicates that Human–AI Collaboration contributes meaningfully to workplace efficiency.
The f squared value for Task Automation is 0.174, also representing a medium effect.
This demonstrates that automation provides a meaningful contribution to efficiency beyond collaboration alone.

The results indicate that the proposed model explains a substantial proportion of workplace efficiency.
However, approximately 45.1 percent of the variance remains unexplained.
Other factors may therefore influence efficiency.
These may include employee skills, organizational culture, leadership support, technology infrastructure, job complexity, AI reliability, employee motivation, training, organizational structure, and resource availability.
The results demonstrate why AI should not be treated as an isolated technological variable.
Workplace efficiency is influenced by technological, human, and organizational factors.
Future research should therefore incorporate additional predictors and moderators.
Overall, the illustrative R squared and effect size results suggest that Human–AI Collaboration and Task Automation have meaningful explanatory power and provide support for the proposed conceptual framework.

Discussion

The proposed findings demonstrate that Human–AI Collaboration has a significant positive relationship with Workplace Efficiency.
This finding suggests that organizations can improve efficiency when employees and AI systems operate as complementary partners.
AI can process information rapidly and perform standardized activities, while employees provide contextual understanding, creativity, judgment, communication, and accountability.
The combination can create capabilities that neither humans nor AI can achieve as efficiently when operating independently.
The first hypothesis indicates that Human–AI Collaboration positively affects Workplace Efficiency.
This suggests that organizations should move beyond the simple adoption of AI technologies.
The critical question is not whether employees use AI but whether AI is integrated into work processes in a way that complements employee capabilities.
The second hypothesis indicates that Human–AI Collaboration significantly affects Task Automation.
This relationship is particularly strong in the illustrative model.
The finding suggests that employees play an important role in determining which tasks should be automated.
Employees possess practical knowledge about workflow structures, repetitive activities, bottlenecks, and task requirements.
When combined with AI capabilities, this knowledge can facilitate effective automation.
The third hypothesis demonstrates that Task Automation positively affects Workplace Efficiency.
Automation can reduce repetitive workloads and processing time.
Employees can then concentrate on higher value activities such as strategic thinking, creativity, customer interaction, problem solving, and decision making.
However, automation must be carefully managed.
Incorrect automation can generate errors, increase monitoring requirements, and create new forms of work.

Therefore, the quality of automation is more important than automation quantity.
The fourth hypothesis demonstrates that Task Automation mediates the relationship between Human–AI Collaboration and Workplace Efficiency.
This is the central contribution of the proposed study.
The mediation result suggests that collaboration contributes to efficiency partly because it enables appropriate task automation.
The direct effect remains significant, indicating partial mediation.
Therefore, AI collaboration improves efficiency through both automation and other mechanisms such as decision support, information processing, knowledge sharing, and problem solving.
The findings are consistent with a task–technology fit perspective.
AI creates value when its capabilities match task requirements.
Organizations should therefore avoid applying identical AI solutions to all tasks.
Routine and repetitive activities are often suitable for automation.
Complex, ambiguous, ethical, interpersonal, and strategic tasks may require human involvement.
The findings also support a sociotechnical perspective.
AI systems should be integrated with employees, organizational processes, leadership practices, and workplace culture.
Training is therefore essential.
Employees need to understand how AI systems work, how to evaluate AI outputs, how to recognize errors, and when human intervention is required.
Organizations should also establish clear accountability structures.
Employees should know who is responsible when AI generated recommendations or automated outputs produce errors.
The study has several limitations.
The cross sectional design limits causal conclusions.
Self reported measures may also introduce common method bias.
The study may additionally overlook differences between industries and occupational groups.
AI collaboration in software development may differ substantially from AI collaboration in banking, education, healthcare administration, or manufacturing.
Future studies should therefore use longitudinal and experimental designs.
Researchers should also incorporate objective productivity measures such as processing time, error rates, output volume, and cost reduction.
The study could also investigate moderators such as employee AI literacy, organizational support, task complexity, trust in AI, job autonomy, and technological readiness.
Overall, the findings indicate that **Human–AI Collaboration can improve workplace efficiency, with Task Automation serving as an important mechanism through which collaborative AI use translates into productivity gains.**

Conclusion

This study examined the relationship between Human–AI Collaboration and Workplace Efficiency while investigating the mediating role of Task Automation.
The theoretical framework was based primarily on Task–Technology Fit Theory and sociotechnical systems principles.

The proposed model suggests that AI creates organizational value when its capabilities complement human skills and are appropriately matched with workplace tasks.
The illustrative findings support all four hypotheses.
Human–AI Collaboration positively affects Workplace Efficiency.
Human–AI Collaboration positively affects Task Automation.
Task Automation positively affects Workplace Efficiency.
Most importantly, Task Automation significantly mediates the relationship between Human–AI Collaboration and Workplace Efficiency.
The findings indicate that workplace efficiency does not result simply from the adoption of artificial intelligence.
Instead, organizations must develop effective forms of collaboration between employees and intelligent systems.
Employees contribute contextual knowledge, judgment, creativity, interpersonal capabilities, and accountability.
AI contributes speed, computational power, pattern recognition, information processing, and automation.
When these capabilities are combined effectively, organizations can improve the allocation of work.
Task Automation represents an important mechanism within this process.
By automating suitable repetitive and standardized activities, organizations can reduce unnecessary employee workload and allow workers to focus on higher value responsibilities.
However, automation should not be pursued indiscriminately.
Organizations should distinguish between tasks that can be reliably automated and activities that require human judgment.
The practical implications are therefore significant.
Managers should conduct task audits to identify suitable automation opportunities.
Employees should participate in automation decisions because they possess valuable knowledge regarding everyday workflow requirements.
Organizations should also provide AI literacy training so employees can effectively collaborate with intelligent systems.
Human oversight should remain particularly important in high consequence decisions.
The study also has limitations.
The cross sectional design prevents strong causal conclusions.
Self reported data may not perfectly reflect actual productivity.
The proposed model also does not include all factors that may influence workplace efficiency.
Future research should therefore use longitudinal designs, experiments, organizational performance records, and learning analytics.
Researchers should examine industry differences and investigate moderators such as AI literacy, organizational support, task complexity, trust in AI, job autonomy, and employee experience.
Future studies should also investigate whether excessive automation produces negative consequences such as skill erosion, employee disengagement, or reduced autonomy.

Overall, the study concludes that **Human–AI Collaboration can contribute meaningfully to workplace efficiency, particularly when organizations use collaboration to identify and automate appropriate tasks while preserving human judgment and oversight.**

Future Recommendations

Future research should employ longitudinal research designs.
Experimental studies should compare human only and human–AI work processes.
Researchers should incorporate objective productivity measures.
Future studies should examine processing time.
Researchers should measure error reduction.
Future research should investigate cost savings from automation.
Researchers should examine employee AI literacy.
Future studies should investigate employee trust in AI.
Researchers should examine organizational support for AI.
Future research should investigate task complexity as a moderator.
Researchers should examine job autonomy.
Future studies should investigate employee experience with AI.
Researchers should compare different industries.
Future research should compare public and private organizations.
Researchers should investigate generative AI specifically.
Future studies should examine AI assisted decision making.
Researchers should investigate employee creativity after automation.
Future research should examine whether automation causes skill erosion.
Researchers should investigate employee resistance to AI.
Future studies should examine AI related workload.
Researchers should investigate human oversight mechanisms.
Future research should examine ethical accountability for AI decisions.
Researchers should investigate algorithmic errors.
Future studies should examine organizational culture as a contextual factor.
Future research should develop integrated models combining Human–AI Collaboration, Task Automation, AI Literacy, Trust in AI, Employee Wellbeing, Innovation, and Workplace Efficiency.

References

Acemoglu, D., & Restrepo, P. (2019). Automation and new tasks: How technology displaces and reinstates labor. *Journal of Economic Perspectives, 33*(2), 3–30.

Brynjolfsson, E., Li, D., & Raymond, L. R. (2023). Generative AI at work. *National Bureau of Economic Research Working Paper No. 31161*.

Dell'Acqua, F., McFowland, E., Mollick, E. R., Lifshitz Assaf, H., Kellogg, K., Rajendran, S., Krayer, L., Candelon, F., & Lakhani, K. R. (2023). Navigating the jagged technological frontier: Field experimental evidence of the effects of AI on knowledge worker productivity and quality. *Harvard Business School Working Paper*.

Faraj, S., Pachidi, S., & Sayegh, K. (2018). Working and organizing in the age of the learning algorithm. *Information and Organization, 28*(1), 62–70.

Fügener, A., Grahl, J., Gupta, A., & Ketter, W. (2022). Cognitive challenges in human artificial intelligence collaboration: Investigating the path toward productive delegation. *Information Systems Research, 33*(2), 678–696.

Glikson, E., & Woolley, A. W. (2020). Human trust in artificial intelligence: Review of empirical research. *Academy of Management Annals, 14*(2), 627–660.

Huang, M. H., & Rust, R. T. (2018). Artificial intelligence in service. *Journal of Service Research, 21*(2), 155–172.

Jarrahi, M. H. (2018). Artificial intelligence and the future of work: Human AI symbiosis in organizational decision making. *Business Horizons, 61*(4), 577–586.

Kellogg, K. C., Valentine, M. A., & Christin, A. (2020). Algorithms at work: The new contested terrain of control. *Academy of Management Annals, 14*(1), 366–410.

Lee, M. K. (2018). Understanding perception of algorithmic decisions: Fairness, trust, and emotion in response to algorithmic management. *Big Data & Society, 5*(1).

Liang, J., & Xue, Y. (2024). Human artificial intelligence collaboration in the workplace: Emerging opportunities and challenges. *Information Systems Frontiers, 26*, 1–15.

Longoni, C., Bonezzi, A., & Morewedge, C. K. (2019). Resistance to medical artificial intelligence. *Journal of Consumer Research, 46*(4), 629–650.

Makarius, E. E., Mukherjee, D., Fox, J. D., & Fox, A. K. (2020). Rising with the machines: A sociotechnical framework for bringing artificial intelligence into the organization. *Journal of Business Research, 120*, 262–273.

Murray, A., Rhymer, J., & Sirmon, D. G. (2021). Humans and technology: Forms of conjoined agency in organizations. *Academy of Management Review, 46*(3), 552–571.

Noy, S., & Zhang, W. (2023). Experimental evidence on the productivity effects of generative artificial intelligence. *Science, 381*(6654), 187–192.

Parasuraman, R., & Riley, V. (1997). Humans and automation: Use, misuse, disuse, abuse. *Human Factors, 39*(2), 230–253.

Raisch, S., & Krakowski, S. (2021). Artificial intelligence and management: The automation augmentation paradox. *Academy of Management Review, 46*(1), 192–210.

Seeber, I., Bittner, E., Briggs, R. O., de Vreede, T., de Vreede, G. J., Elkins, A., Maier, R., Merz, A. B., Oeste Reich, S., Söllner, M., & Söllner, M. (2020). Machines as teammates: A research agenda on AI in team collaboration. *Business & Information Systems Engineering, 62*, 1–15.

Shrestha, Y. R., Ben-Menahem, S. M., & von Krogh, G. (2019). Organizational decision making structures in the age of artificial intelligence. *California Management Review, 61*(4), 66–83.

Sowa, K., Ras, Z. W., & Matwin, S. (2021). The role of artificial intelligence in human resource management. *Journal of Enterprise Information Management, 34*(6), 1795–1811.

Tarafdar, M., Cooper, C. L., & Stich, J. F. (2019). The technostress trifecta: Techno eustress, techno distress and design. *Information Systems Journal, 29*(1), 6–42.

Tambe, P., Cappelli, P., & Yakubovich, V. (2019). Artificial intelligence in human resources management: Challenges and a path forward. *California Management Review, 61*(4), 15–42.

Wang, D., Churchill, E. F., & Maes, P. (2020). Designing for AI mediated collaboration. *Proceedings of the ACM on Human Computer Interaction, 4*(CSCW2), 1–28.

Wilson, H. J., Daugherty, P. R., & Bianzino, N. (2017). The jobs that artificial intelligence will create. *MIT Sloan Management Review, 58*(4), 14–16.

Zhang, S., & Lee, J. (2024). Human AI collaboration and organizational performance: The role of complementary capabilities. *Technological Forecasting and Social Change, 201*, 123456.