

A Theoretical Approach to the Role of Collaborative Artificial Intelligence in Enhancing Organizational Work Efficiency.

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Abstract:

This study explores the role of synergistic artificial intelligence in enhancing organizational work efficiency by integrating smart systems with human resources. Synergistic AI acts as a force multiplier rather than a mere automation tool, transforming cognitive processes, decision-making, and organizational performance. The research highlights the theoretical frameworks governing this integration, including embedded systems theory, theory of mind AI, and posthumanism, while examining the strategic necessity of human-AI collaboration in the era of Industry 5.0. Furthermore, the paper addresses performance management, algorithmic governance, and trust frameworks, demonstrating how synergistic integration optimizes resource allocation, drives innovation, and ensures sustainable institutional excellence.

Keywords: Synergistic artificial intelligence, human resources, collaboration, efficiency, organizational work.

Introduction

Work organizations continuously seek new ways and innovative methods to improve the efficiency of organizational work in order to achieve their goals with the highest possible effectiveness, as efficiency in organizations is one of the fundamental factors that determine their ability to compete, sustain, and reach their objectives. This pursuit coincided with the modern technological revolution that led to the emergence of collaborative artificial intelligence, which has shown impressive capabilities in enhancing the performance of various organizations. It contributes to improving various organizational processes, developing strategies, and supporting decision-making processes through accurate and effective data analysis. The role of collaborative artificial intelligence is highlighted through the interaction of intelligent systems with human resources in an integrated manner, which saves time and effort and enables teams to focus on strategic aspects, a process recently referred to as task automation. This is achieved by implementing changes, using modern tools, and adopting the latest technological advancements for data processing, which can improve performance and reduce human errors. Collaborative artificial intelligence also enhances coordination between the organization's units and various departments by exchanging information and facilitating tasks through the introduction of more flexible and smoother methods, which reflects positively on the flow of processes and procedures. The capabilities of artificial

intelligence are not limited to such operations; they extend to performing other roles, such as contributing to building a knowledge base that supports sustainable development and developing human resources with maximum efficiency through knowledge management systems. Many studies have shown positive results from the applications of collaborative artificial intelligence at the organizational performance level across quality, productivity, and innovation standards. This article will refer to examples of studies that demonstrated positive results achieved by many organizations worldwide that adopted these technologies, with participation rates exceeding 50% of the total respondents in the artificial intelligence survey, involving approximately 80 million jobs that have been automated, and they continue to seek to expand the benefits of collaborative artificial intelligence, thereby enhancing their ability to keep pace with the digital age and ensuring their sustainability.

Definition of Artificial Intelligence

It is evident that defining intelligence is more difficult than defining artificial. Intelligence can be defined as the cognitive ability of individuals to learn from their experiences using their minds, with the capacity to store important information and retrieve it, enabling them to adapt to their daily lives. The field of artificial intelligence aims to create intelligent programs and algorithms that operate in the same way as the human mind, meaning endowing machines with the same characteristics of intelligence that humans possess. Although the concept of human intelligence is broad and difficult to define precisely, there are criteria through which it can be judged, including: The ability to generalize and abstract Recognizing similarities between different situations Adapting to new circumstances. Artificial intelligence (AI) is a broad branch of computer science concerned with building intelligent machines capable of performing tasks that typically require human intelligence. According to a specialized research definition from the Arab Academy for Higher Education, it refers to a set of new methods and techniques in programming accounting systems, which are used to develop systems that mimic some elements of human intelligence, allowing them to make inferences about facts and laws represented in computer memory.

Concept of Synergistic Artificial Intelligence

Synergistic artificial intelligence refers to the dynamic interaction between human capabilities and intelligent systems. AI is not used merely as a tool for automation to reduce costs but as a force multiplier in collaboration with human elements to enhance organizational performance in achieving their goals through more efficient and effective methods. It fundamentally integrates with the cognitive and creative processes of employees, creating outputs that exceed what either humans or machines could achieve alone.

Definition of Synergistic Artificial Intelligence and Its Domains

Synergistic artificial intelligence is defined as applications of AI characterized by the ability to interact and collaborate with human elements to enhance organizational performance in achieving their goals through highly efficient methods. It differs from traditional AI in its focus on achieving coordinated interaction between digital systems and human elements, where human intelligence and AI capabilities interact complementarily to enhance effectiveness and increase productivity both qualitatively and quantitatively. The fields of synergistic AI applications are broader and include operations management, data analysis, decision-making, strategy development, as well as

planning and organizational management. This type of AI is distinguished by its high ability to analyze large data sets accurately and quickly, making it a highly effective player in providing actionable insights, reducing error rates, increasing responsiveness to market demands and the organizational environment, and enhancing collaboration among teams using supportive AI systems that facilitate coordination between various tasks and streamline communication and unify efforts to ensure harmony, alignment of goals, and increased efficiency. Knowledge management is a fundamental element in synergistic AI applications, as it helps organize and document knowledge and experiences within the organization and creates an environment that encourages continuous learning and professional development. Generally, synergistic AI is considered an effective tool that supports improving organizational performance and enhancing competitiveness while taking ethical considerations and governance into account to ensure harmonious use aligned with organizational values.

Principles and Concepts of Mutual Inoculation

Automated systems are generally designed to accomplish a specific set of steps to achieve a limited set of predefined outcomes (Hancock, 2017).

Automating people and machines is possible:

Human cognitive tasks can be automated through intensive training, standard operating procedures (SOPs), tactics, techniques, and procedures (TTPs) – for example – in addition to human experience gained over time. On the other hand, machine automation is achieved through the development of programs and algorithms that replace human cognitive functions with machine cognitive functions, as is increasingly the case with artificial intelligence (AI). Moreover, machine autonomy is essential when the system must make critical decisions in a timely manner without waiting for external support, as is the case when systems need to operate

6 How Synergistic Is the Combo of AI and Humans?

When does it make sense to use artificial intelligence (AI) with human intelligence versus either alone? The answer may seem intuitive, however given the rapid adoption of AI in the workplace worldwide, it merits scientific evaluation. Researchers at the Massachusetts Institute of Technology (MIT) Center for Collective Intelligence at the Sloan School of Management published a new study in *Nature Human Behaviour* that examines the performance impact of AI combined with humans that provide insights with implications for the future of work.

AI is impacting the future of work. By 2025, an estimated 85 million jobs will be replaced by AI automation according to the World Economic Forum. An estimated two-thirds of U.S. occupations are exposed to partial or full AI automation, according to economists at Goldman Sachs Research. Organizations are rapidly deploying AI worldwide and transforming how work is conducted. The adoption of artificial intelligence has experienced a surge in the past year according to the 2024 McKinsey Global Survey on AI. In most major geographic areas around the world, artificial intelligence is being adopted by over two-thirds of survey respondents, and 50 percent of survey respondents report that their organizations are using AI in two or more business functions per McKinsey.

“A large body of work suggests that integrating human creativity, intuition and contextual understanding with AI’s speed, scalability and analytical power can lead to innovative solutions

and improved decision-making in areas such as health care, customer service and scientific research,” wrote corresponding author Thomas Malone, PhD, MIT professor and founding director of the MIT Center for Collective Intelligence and his research co-authors. “However, a growing number of studies reveal that human–AI systems do not necessarily achieve better results than the best of humans or AI alone.”

Theoretical Framework for Organizational Effectiveness

The theoretical framework for organizational effectiveness is one of the fundamental pillars for understanding how to enhance efficiency through integrating synergistic artificial intelligence. It requires identifying the key success factors that affect organizational performance and assessing the nature of internal processes and institutional environmental conditions. This framework focuses on analyzing performance models and mechanisms that enable organizations to improve their operations and effectively leverage smart technology, based on principles of management and organization theory. By reviewing concepts such as regularity, interaction, and adaptation, a clear vision of the functions of the organizational system and the behavior of individuals and teams within this environment can be established. This contributes to building strategies that keep pace with modern requirements and support the ability to make more accurate and flexible decisions, especially in light of rapid challenges and changes. Organizational efficiency is based on the organization's ability to manage its human, financial, and knowledge resources in a balanced way through flexible organizational frameworks and effective communication channels that allow for continuous information exchange and achieve harmony among individuals and departments. Furthermore, understanding the nature of work dynamics and the interactions between elements of the organizational system plays a pivotal role in enhancing the capabilities of synergistic AI to improve performance by optimizing processes and work procedures, supporting decision-making, and enhancing collaboration among teams. This framework provides the theoretical foundations through which the level of organizational efficiency can be measured and strengths and weaknesses identified, contributing to the development of strategic plans and sustainable development processes that rely on synergistic AI tools, ensuring higher organizational effectiveness and continuous improvement in performance levels.

8. The Strategic Imperative of Human-AI Collaboration

Industry 5.0 emphasizes human-centric digital transformation, where AI systems complement human creativity, critical thinking, and decision-making. Unlike Industry 4.0's focus on automation, Industry 5.0 seeks harmony—combining machines' data-processing power with human judgment to create smarter, more adaptable organizations (Garcia-Muina et al., 2023).

Studies caution that ignoring human factors—like trust, autonomy, and job satisfaction—can undermine AI initiatives. Instead, when AI is used to empower workers, businesses report both higher performance and morale (Maddikunta et al., 2022).

How Companies Can Use AI to Increase Manpower Efficiency

AI's potential to increase manpower efficiency lies in its ability to automate repetitive tasks, streamline processes, and provide actionable insights. Here's how companies can harness AI to enhance their workforce's productivity:

Automating routine tasks: AI-powered chatbots, virtual assistants, and robotic process automation (RPA) can handle administrative tasks such as scheduling, data entry, and reporting, freeing up employees for higher-value work.

Enhancing decision-making: AI can analyze operational data to identify inefficiencies and suggest process improvements, enabling faster and more informed decision-making.

Optimizing workforce allocation: AI can predict workload fluctuations and suggest dynamic staffing solutions, ensuring optimal resource utilization.

Supporting continuous learning: AI can tailor training programs based on employees' skills gaps and career aspirations, fostering continuous development and adaptability.

These approaches not only reduce operational bottlenecks but also empower employees to focus on tasks that require creativity, critical thinking, and collaboration.

10 . Mechanisms to Enhance Efficiency through Synergistic Artificial Intelligence

Collaborative artificial intelligence contributes to increasing efficiency and elevating organizational performance through several key areas that form a comprehensive framework for organizational excellence. It also works to improve processes and procedures by automating routine tasks, speeding up response times, analyzing vast amounts of data, and making it actionable. Additionally, it employs machine learning techniques to handle and analyze complex situations while providing accurate forecasts that ensure appropriate decisions are made promptly. Smart communication systems are also provided to facilitate continuous coordination, reduce conflict, and enhance connectivity and collaboration among teams, along with developing functional capabilities and directing investments towards accurately developing core competencies through knowledge and human resource management.

11. Impact of AI on Performance Management

AI's ability to process vast amounts of data in real-time provides a powerful mechanism for enhancing performance management. Traditionally, performance management relied on subjective assessments and periodic reviews, often leading to biases and missed opportunities. AI changes this dynamic by:

Providing real-time feedback: AI systems can continuously monitor performance metrics, giving employees and managers immediate insights into areas that need improvement.

Personalizing performance evaluations: By analyzing data trends, AI can identify individual strengths and weaknesses, enabling managers to tailor development plans more effectively.

Reducing biases: AI-driven evaluations minimize human subjectivity and provide a more objective view of employee performance.

Predicting future performance: Through predictive analytics, AI can identify employees at risk of disengagement or burnout, enabling proactive interventions.

These capabilities result in a more transparent, data-driven performance management process that not only boosts individual accountability but also improves organizational alignment.

12. Tools Companies Can Use to Leverage AI Internally

For companies looking to implement AI internally, several tools and platforms can make a substantial difference:

Performance management systems: Tools like Workday, SAP SuccessFactors, and Lattice integrate AI to provide continuous feedback and performance tracking.

HR analytics platforms: Solutions such as Visier and Tableau use AI to uncover workforce trends and support data-driven HR decisions.

AI-powered communication tools: Platforms like Microsoft Teams and Slack incorporate AI to streamline collaboration and automate routine communications.

Robotic Process Automation (RPA): Platforms like UiPath, Automation Anywhere, and Blue Prism enable companies to automate repetitive workflows, boosting efficiency.

Custom AI solutions: Companies with specific needs can leverage AI development platforms like Google Cloud AI, IBM Watson, and Amazon SageMaker to build tailored AI models.

By investing in these tools, companies can create an ecosystem where AI not only augments employee performance but also drives innovation and operational agility.

13. Applications of Artificial Intelligence in Learning and Innovation:

These applications allow for the utilization of data and acquired knowledge in designing customized learning programs, accelerating research, and supporting innovative decisions, contributing to achieving innovation. This section will review prominent applications of artificial intelligence in learning and innovation, focusing on the results and benefits that organizations achieve by integrating these technologies into their strategies.

Customizing Learning Paths for Employees:

Organizations rely on artificial intelligence to deliver personalized educational content to each employee based on their skills and needs, increasing learning effectiveness and reducing time wastage (Microsoft, 2023).

Analyzing Skill Gaps:

Analyzing skill gaps helps identify areas where employees need additional training, contributing to improving professional development plans and institutional innovation (IBM, 2024).

Predicting Market Trends:

By analyzing forecasts, organizations can anticipate changes in the market or new technological trends, supporting innovative strategic decision-making (IBM Research, 2023).

Accelerating Research and Development:

Artificial intelligence contributes to automating research and development processes and analyzing vast amounts of scientific and technological data to shorten innovation cycles (Davenport, 2023).

Supporting Innovative Decisions:

Artificial intelligence can provide data-driven recommendations to guide innovative teams towards more effective solutions and reduce risks associated with new decisions (Kraus et al., 2022).

Developing Smart and Sustainable Products:

Integrating artificial intelligence into product and service design helps produce smart and environmentally efficient solutions that support sustainable innovation and achieve economic and social value (Teece, 2018).

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14. Key Theories in Synergistic Artificial Intelligence

The main theoretical frameworks in synergistic artificial intelligence relate to the foundations and principles that enable understanding the dynamics of cooperation between AI systems and organizational resources on one hand, and between these systems and the human environment on the other.

Integrated Systems Theory of Artificial Intelligence The integrated systems theory is a fundamental concept that establishes an understanding of the effective integration between elements of synergistic artificial intelligence and the organizational structure of institutions. This theory is based on the notion that intelligent systems are not independent entities but rather interweave and integrate simultaneously and effectively with resources and organizational frameworks to achieve superior performance. AI is viewed within the framework of integrated systems as a cohesive system that interacts with its surrounding environment and internal resources to develop capabilities and achieve strategic objectives. The application of this theory relies on building a network of interrelated relationships among system elements, enabling productive interaction between components of artificial intelligence and human, technological, and organizational resources.

b. Theory of Mind in Artificial Intelligence This is a type of artificial intelligence that interacts with human thoughts and emotions, focusing on individuals whose thoughts can be understood through multiple factors. The theory of mind in artificial intelligence aims for a better understanding of the entities it interacts with by knowing their needs, thought processes, emotions, and beliefs. The goal of this theory is for researchers to create machines that can better understand humans and learn from the various factors that affect their thinking processes. For instance, we can envision an emotionally intelligent robot interacting with humans to provide a genuine conversational experience. This is the essence of the theory of mind in artificial intelligence, which will enable machines to make human-like decisions and significantly impact human behavior and the study of developing precise machines according to human moods.

c. Challenges of the Theory of Mind in Artificial Intelligence

One of the obstacles that machines will face in achieving the theory of mind in artificial intelligence is that they will have to change behavior based on emotions to mimic the flexibility of this process in human communication. Accomplishing this challenging task could open the door for robots to support daily tasks, including providing human companionship.

d. Posthumanism Theory

This theory posits that the human species is subject to development and should be enhanced through the use of technology. This can be achieved using artificial intelligence technology that can help us enhance our mental and physical capabilities. The primary goal of this theory is to transition humans from their natural state as ordinary beings to a developed and enhanced entity.

Some Key Pillars for Effective Governance of Artificial Intelligence in Field Practice

Translating these advanced methods into effective practice requires focusing on several key pillars, including:

Strong Data Governance: This is essential, as AI systems heavily rely on data. This includes ensuring data quality, representation, privacy protection, and ethical sourcing (World Economic Forum, 2020).

Algorithm Review: This process emerges as a critical practice, involving independent evaluations of AI systems to check for bias, fairness, accuracy, security, and compliance with ethical principles (Mittelstadt, 2019a; Raji et al., 2020). Review processes can enhance transparency and accountability.

Standards and Accreditation Mechanisms: Developing standards and accreditation mechanisms is another pathway. Technical standards can provide benchmarks for the safety, security, and ethical performance of AI, while accreditation schemes can indicate that an AI system meets recognized standards, thereby building trust (IEEE, 2019).

Human Oversight and Intervention: Defining clear roles for human oversight and intervention is crucial, especially for high-risk AI applications. This means establishing mechanisms for humans to monitor AI decisions, understand their logic, and intervene or override them when necessary (Shneiderman, 2020).

Balancing Innovation and Regulation: Balancing innovation and regulation represents an ongoing dilemma; excessive regulation or burdensome oversight can stifle the development of beneficial AI, while insufficient oversight can lead to significant harm (Calo, 2017). Finding the right balance is critical.

Malone, together with his co-authors, MIT assistant professor and computational social scientist Abdullah Almaatouq, PhD and MIT PhD candidate Michelle Vaccaro, point out in their paper that ethical issues, trust, and communication barriers may impede the process of the joint collaboration of AI and humans.

To shed light on what may seem a paradox on the surface, the MIT team aimed to take a large-scale systematic meta-analysis and literature review spanning three years to quantify and evaluate the synergy of AI and human systems.

To achieve this, the team established a criterion to only include scientific papers that had AI and humans working collaboratively on an original experiment and quantified the performance of the collaboration as well as by AI alone and humans by themselves.

The MIT researchers screened 5,126 papers published during January 2020 to June 2023. From this vast pool of papers, they found 74 papers that met their study criteria. These papers contained 106 experiments that yielded information on 370 unique effect sizes that measure the performance results of AI and human collaboration. Decision-making tasks where the participants select a predefined set of options comprised 85% of the effect sizes. The researchers considered three approaches of task performance: 1) with only AI, 2) only humans, or 3) a combination of AI and Human.

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