

THE IMPACT OF ARTIFICIAL INTELLIGENCE AND TECHNOLOGICAL TRANSFORMATIONS ON ECONOMIC PROCESSES

DOI: <https://doi.org/10.53486/dri2026.27>

UDC: 004.8:338.31

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Abstract: *This paper examines how the spread of artificial intelligence (AI) and related technological transformations influence economic processes. Although AI is hailed as a driver of productivity and innovation, empirical evidence so far shows limited near-term effects on aggregate productivity or employment. We review recent research and reports on AI adoption, productivity impacts, labor market outcomes, and industry changes. Using a qualitative literature review and synthesis of key findings, we show that AI investments have surged and can boost output in principle, but actual adoption remains concentrated in a few sectors. Labor-market effects have been modest to date: surveys find ~90% of firms reporting no employment or productivity impact from AI so far, and macro data show little change attributable to AI. On the other hand, AI is already enabling higher outputs in some tasks (e.g. code generation or R&D) and may increase total factor productivity if widely deployed. Conclusions highlight that AI's long-term effect depends on factors like worker skills, firm adaptation, and public policy. We discuss implications for economic growth, inequality, and future research, noting that careful policy will be needed to harness AI's benefits while managing disruptions. In addition, the paper highlights the implications of artificial intelligence for professional training and human resource development, particularly in the accounting field, emphasizing the need for new competencies and personalized learning approaches.*

Keywords: *Artificial Intelligence; Technological Change; Productivity; Labor Market; Innovation.*

JEL: O33; O34; J24; L86

Introduction

Artificial intelligence (AI) and related digital technologies are often described as ushering in a new industrial revolution capable of transforming how economies and organizations function. AI refers to software and systems capable of performing tasks that traditionally required human cognitive abilities, such as learning, perception, and decision-making. Its applications are rapidly expanding across multiple sectors, from manufacturing to services, including finance, accounting, and human resource management. Policymakers and analysts argue that AI has the potential to enhance efficiency, stimulate economic growth, and create new markets and industries. At the same time, concerns have been raised regarding its potential to disrupt labor markets, widen inequalities, and contribute to the emergence of dominant "super-firms."

In this context, organizations are increasingly required to adapt to technological change by rethinking their internal processes, particularly those related to professional training and human resource development. In knowledge-intensive domains such as accounting, technological transformations are redefining traditional practices and increasing the demand for new competencies and continuous learning. However, traditional approaches to professional training, often based on standardized content, are becoming insufficient to address the dynamic and individualized needs of employees.

The integration of artificial intelligence into training processes represents a promising solution to these challenges. AI enables the development of personalized learning pathways based on data analysis and real-time performance monitoring, allowing organizations to tailor training programs to individual needs. This shift contributes to more effective learning outcomes and has a direct impact on human resource development, leading to improved skill acquisition, increased employee engagement, and enhanced organizational performance.

At the same time, it is important to consider the gap between theoretical expectations and empirically observed outcomes of technological change. The historical "productivity paradox" illustrates how technological advancements do not always immediately translate into measurable productivity gains. Similarly, despite significant investment and widespread attention, recent evidence suggests that the impact of AI on productivity and employment remains uneven and, in some cases, limited. Surveys conducted in recent years indicate that many organizations have not yet experienced significant improvements in productivity or labor outcomes as a result of AI adoption. These observations highlight the need for a more nuanced understanding of how AI is effectively integrated into organizational processes.

The aim of this paper is to analyze the integration of artificial intelligence in professional training and to examine its impact on human resource development, with a particular focus on the accounting field. The research is based on a qualitative methodology, involving the analysis and synthesis of recent scientific literature, reports, and empirical studies related to AI adoption, training processes, and labor market transformations. By adopting a multidisciplinary perspective, the paper seeks to provide a comprehensive understanding of the role of artificial intelligence in supporting the development of human capital and proposes a conceptual framework that highlights the relationship between AI, training personalization, and the development of employee competencies

Methodology

This study employs a qualitative research approach based on a structured literature review. The aim is to analyze and synthesize recent findings regarding the integration of artificial intelligence into professional training processes and its impact on human resource development, particularly in the accounting field.

The research methodology is based on the analysis and synthesis of existing scientific literature on artificial intelligence, professional training, and human resource development. Special attention is given to the role of AI in transforming training processes and supporting the development of employee competencies in knowledge-intensive domains such as accounting.

The data used in this research consist of academic articles, institutional reports, and policy papers published between 2020 and 2026. The sources were selected from internationally recognized databases such as Web of Science and Scopus, as well as reports issued by international organizations, central banks, and consulting firms.

The selection criteria included: (i) relevance to artificial intelligence and its application in training and human resource development; (ii) publication in English; and (iii) focus on key dimensions such as technological adoption, skills development, labor market transformation, and organizational performance. Irrelevant or duplicate sources were excluded following a screening of titles, abstracts, and keywords.

The analysis follows a thematic synthesis approach, identifying and grouping key findings into major categories: the integration of AI in training processes, the personalization of learning, the impact on human resource development, and the implications for accounting-related activities. This method allows for a comprehensive and multidisciplinary understanding of the role of artificial intelligence in organizational contexts.

Although this approach provides a broad overview of current research, it is limited by the availability of recent empirical data and the rapid evolution of AI technologies. Therefore, the conclusions should be interpreted as indicative of current trends rather than definitive long-term outcomes.

Basic Content

Adoption and Sectoral Patterns

Investment in AI technologies has indeed grown rapidly. A McKinsey Global Institute report notes that worldwide investment in AI tripled in 2016 versus the prior year, and by 2017 was at a high rate. Venture capital and corporate R&D spending have poured tens of billions into AI development. However, adoption by incumbent firms has lagged: as of 2017, McKinsey observed that "adoption in 2017 remains low" despite high investment. AI deployment tends to be concentrated in highly digitalized sectors: large tech firms, financial services, and industrial manufacturing showed higher uptake of AI-based analytics and automation. Many traditional sectors – agriculture, construction, basic services – currently use little AI. Experts at Stanford's economic policy forum remark that "[AI's] adoption [in the workplace] is actually pretty low and it's very concentrated in tech, in professional services, and in finance. Lots of sectors are doing very little with AI". This uneven diffusion implies that any economic impact will be initially limited to certain segments.

Corporations are cautious. Surveys of executives reveal that most use AI sparingly; in one study only two-thirds of large-firm executives reported any AI usage, and typically only a few hours per week. Moreover, a 2026 Fortune/NBER study found that 90% of firms reported no change in productivity or employment from AI so far. In practice, many companies are still in pilot or "experimenter" mode. As one CEO commented, "The technology is not the hard part. It's the changing-the-company part that's hard". Thus, while investment budgets have expanded, the translation into broad adoption and process change remains gradual.

The process through which artificial intelligence influences economic outcomes is complex, gradual, and mediated by multiple interdependent factors. Although investments in AI technologies have increased significantly in recent years, their impact on macroeconomic indicators such as productivity and economic growth is neither immediate nor uniform across sectors. This discrepancy can be explained by the fact that AI-driven transformations require not only technological adoption, but also substantial organizational adjustments, workforce reskilling, and institutional support.

At the firm level, the integration of AI systems involves changes in business processes, decision-making structures, and operational strategies. These transformations generate productivity gains primarily at the task level, which are then gradually translated into improvements in firm performance. However, the aggregation of these micro-level effects into measurable macroeconomic outcomes depends on the speed of diffusion, the absorptive capacity of firms, and the broader economic environment.

Therefore, the relationship between AI investment and economic growth can be understood as a multi-stage transmission mechanism, characterized by a time lag between initial adoption and observable large-scale effects. This conceptual process is illustrated in Figure 1.

This perspective is consistent with the broader literature on general-purpose technologies, which emphasizes delayed but transformative economic effects.

Productivity and Economic Growth

If and when AI spreads, what might it do to productivity and growth? The theoretical consensus is that AI, as a general-purpose technology, can raise output per worker over time. For instance, a Congressional Budget Office analysis notes that by enabling businesses to provide goods and services differently, AI "could affect economic growth, employment and wages, and the distribution of income". Many economists project a moderate boost to productivity growth as AI matures. A Dallas Fed study suggests a plausible scenario is that AI raises U.S. productivity growth by ~0.3 percentage points per year over a decade. Goldman Sachs estimates global job exposure figures (25% of U.S. work hours) implying significant potential efficiency gains. BIS analysts note that micro-level studies find generative AI can improve productivity in specific tasks by 10–65%, especially in coding, writing, and consulting tasks. These gains tend to be larger for less experienced workers, suggesting a "democratization of expertise" within firms.

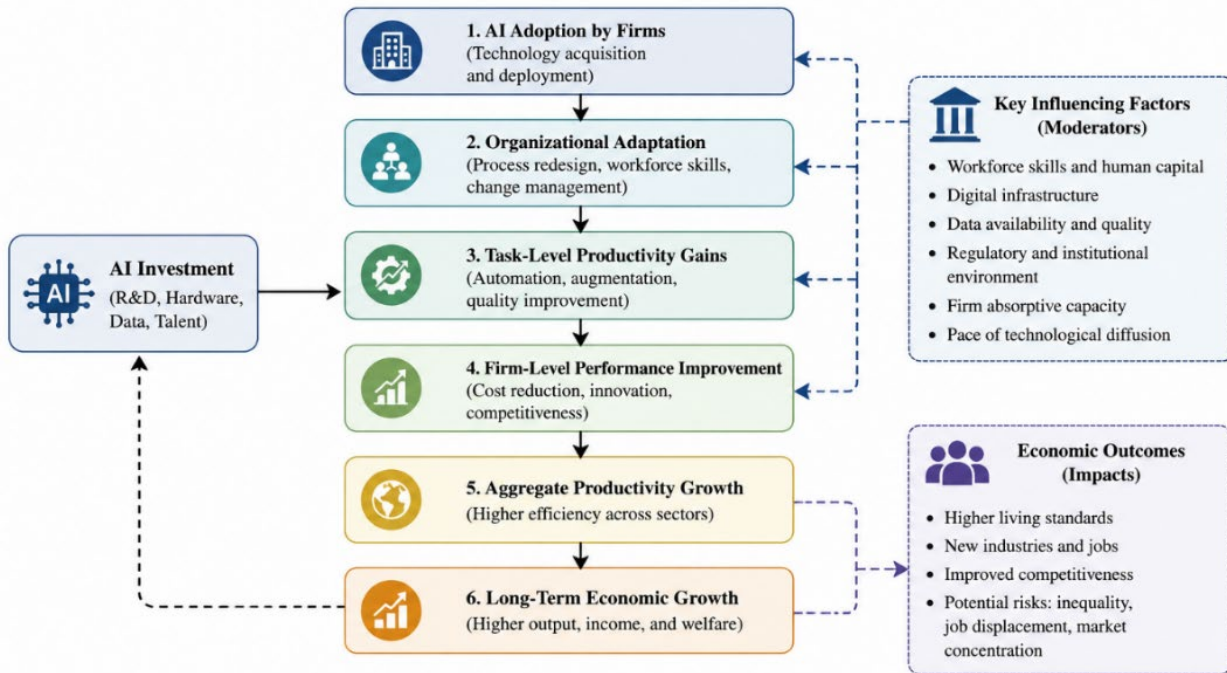


Figure 1. Conceptual framework of AI adoption and its impact on economic processes

Source: Author's conceptualization.

However, measured aggregate effects remain small so far. Recent data show no major jump in macro productivity. One report observed only a 0.5% projected productivity gain over the next decade due to AI in a best-case scenario. The Dallas Fed also notes that - even if AI delivers on optimistic forecasts - the implied increase in living standards by 2050 would be non-trivial but not earth-shattering. There are understandable lags: historically, revolutionary technologies took years or decades to affect GDP statistics. As one expert remarks, even the computer revolution of the late 20th century did not show up in data until the 1990s. Early analyses suggest we may be in the “early innings of a long game”.

It is also possible that AI’s impact will be uneven. Models of “task automation” predict that by 2030 a significant share of routine cognitive tasks could be automated. In the short run, AI’s productivity gains may be offset if displaced workers move to less-automatable activities (a Baumol effect). Some studies caution that if AI primarily augments high-skilled tasks, it could widen wage or sectoral gaps unless complemented by training and adaptation. On the positive side, if AI-driven innovation leads to new goods and services, it could boost demand. The net macro outcome thus depends on factors like skill levels, business adaptation, and policy responses.

The differences between the short-term and long-term effects of artificial intelligence on economic processes can be summarized as follows

Table 1. Short-term vs Long-term Economic Effects of Artificial Intelligence

Economic Dimension	Short-term Effects	Long-term Potential Effects
Productivity	Limited measurable impact; slow diffusion across firms	Significant productivity gains through automation and innovation
Employment	Minimal aggregate changes; task-level adjustments	Job transformation, creation of new roles, potential displacement of routine jobs
Innovation	Incremental improvements in processes and services	Emergence of new industries, business models, and markets
Firm Performance	Uneven gains; concentrated in early adopters	Broad efficiency improvements across sectors

Economic Dimension	Short-term Effects	Long-term Potential Effects
Economic Growth	Weak impact in macroeconomic data	Potential acceleration of long-term economic growth
Inequality	Limited visible effects so far	Risk of widening income and skill gaps if adaptation is uneven

Source: Author’s synthesis based on recent literature.

As shown in Table 1, the current economic impact of AI remains limited in aggregate terms, while its long-term potential is considerably more significant, depending on the pace of adoption and structural adjustments.

Labor Market and Employment Effects

A core economic concern is labor. AI could displace some jobs while creating others. So far, evidence suggests the net effect has been modest. The Yale Budget Lab finds that as of early 2026, statistical measures of AI exposure show no significant change in employment or unemployment trends beyond what is already explained by pre-AI trends. In other words, the ongoing shifts in jobs seem consistent with historical dynamics, without a sudden AI-driven disturbance. Similarly, Goldman Sachs reports that while tech and creative sectors are seeing some displacement, there has been “no significant AI-led changes in the employment mix” in aggregate labor data to date. This aligns with surveys: executives generally do not yet see layoffs from AI; in fact, many expect a temporary *increase* in jobs related to AI infrastructure (building data centers, etc.).

On the other hand, AI is affecting the nature of work in certain roles. AI applications in customer service or programming can make some tasks more efficient. Studies at specific firms find that AI “helps workers with lower technical skills contribute to the innovation process”, and junior software developers report large gains in coding productivity. AI tools in fields like agriculture, health, or education are starting to augment workers’ capabilities (e.g., AI “avatars” in training electricians). These augmentations can raise aggregate productivity even if they do not immediately shrink headcounts.

Nevertheless, there are risks. AI may accentuate inequality: high-skill workers and firms that leverage AI effectively could capture most gains, while others fall behind. Some forecasting suggests up to ~25–50% of certain AI-exposed tasks might be automated in the next decade, potentially reducing entry-level job opportunities if not offset by new roles. Education and training will be critical: the consensus is that policy should focus on reskilling and education to prepare workers for evolving roles. Several reports (CBO, BIS) highlight that “AI preparedness” – having digital infrastructure and skills in place – is a key determinant of a country’s gains.

Sectoral and Functional Impacts

Beyond labor and macro, AI and tech transformations are remapping industries. In finance and accounting, AI tools automate data analysis and risk assessment; some studies report that AI adoption correlates with higher firm sales or valuations, though direct productivity measures are ambiguous. In logistics and supply chain, AI-driven optimization and predictive analytics are improving inventory management and routing. Manufacturing is seeing “smart factories” with IoT sensors and robotics driven by AI, which can enhance quality and yield. In services like tourism and health, AI-driven personalization (chatbots, diagnostic algorithms) is generating new business models.

It is important to note examples of positive change. For example, Land O’Lakes and Microsoft are using AI to help farmers increase crop yields and lower costs. Companies like Google report large productivity improvements from AI-assisted research and development, e.g., rapid drug discovery and protein folding breakthroughs. These domain-specific gains suggest that AI could yield “spectacular” productivity boosts at the microeconomic level. However, not every sector will benefit

equally. Any broad conclusion must consider complementarities: AI yields more when firms change their processes and workers learn new skills.

Policy and Future Directions

Given the breadth of effects, public policy plays a crucial role. Experts at Stanford emphasized that governments should manage AI's risks while maximizing benefits. This means investing in education, modernizing regulations (e.g., data, privacy, competition), and ensuring labor market support. Multidisciplinary cooperation is needed: finance regulators, labor agencies, and industry leaders must coordinate. The European Parliament briefing argues that with the right strategy, the EU can "direct AI onto a path that benefits its economy and citizens". Key policy areas include R&D funding, digital infrastructure, and safety nets for displaced workers.

It is also clear that continued research is needed. Most analysts note that we have seen only the early effects of current AI technologies, and much remains uncertain. Future empirical work should track sectoral output, productivity, wages, and inequality as more data becomes available. Interdisciplinary studies (combining economics, data science, management) will help unpack how exactly AI integrations change firm behavior. In summary, technology is rapidly evolving; the "headline" scenario of AI singularity is speculative, but the more measured scenario of gradual productivity gains appears plausible. Our article contributes to this by mapping the current evidence and highlighting avenues for monitoring AI's impact on economic processes.

Artificial Intelligence in Accounting and Implications for Training

Building on the general economic and sectoral impacts of artificial intelligence discussed above, it is essential to examine its implications at the organizational level, particularly in knowledge-intensive domains such as accounting.

The accounting field has been significantly influenced by technological transformations, particularly through the integration of artificial intelligence and automation tools. AI-based systems are increasingly used in financial data processing, auditing, forecasting, and decision support, leading to improved accuracy and efficiency.

These changes require a redefinition of the competencies needed by accounting professionals, shifting the focus from routine tasks to analytical thinking, digital skills, and strategic decision-making. As a result, professional training programs must adapt to these new requirements, incorporating digital tools and AI-based learning solutions.

The integration of artificial intelligence into training processes enables the personalization of learning experiences, allowing employees in accounting roles to develop relevant skills based on their individual needs and performance levels. This contributes to a more effective and sustainable approach to human resource development.

Based on the analysis conducted, a conceptual model can be proposed, highlighting the relationship between artificial intelligence, professional training, and human resource development. Artificial intelligence enables data-driven analysis of employee performance, which supports the design of personalized training programs. These programs contribute to the development of relevant competencies, ultimately leading to improved individual and organizational performance. This conceptual model contributes to the literature by integrating technological, educational, and human resource perspectives into a unified analytical framework.

Conclusions

Artificial intelligence and technological innovation have the potential to significantly reshape economic processes, but the magnitude and timing of these effects remain uncertain. The literature shows that, so far, AI has mainly generated hype: investments are up and some sectors have adopted AI, but measurable macroeconomic changes are minimal. In this article, we have reviewed evidence that AI can improve productivity in specific tasks and help democratize expertise among workers, yet

aggregate productivity growth and employment trends have barely budged. The discrepancy between expectations and outcomes echoes past technological waves (Solow's paradox).

Looking ahead, the potential impact of AI hinges on broader transformations: will firms reorganize, will workers acquire new skills, will policies adapt? The optimistic view is that AI, by automating routine tasks and enabling innovation, will boost output and create new industries (much as past technologies did). The cautious view warns that without addressing skill gaps and inequality, AI could exacerbate social problems. We find that most experts advocate neither fatalism nor blind faith. Rather, the consensus is to monitor developments closely and to proactively govern AI.

In conclusion, our research underscores that AI and technological change are double-edged for economic processes. They offer real opportunities to enhance efficiency and growth, but these gains will likely materialize gradually and unevenly. Policymakers and businesses should work together to strengthen infrastructure and education (so-called AI preparedness), to support workers in transition, and to foster innovation responsibly. Future research should track AI's diffusion using high-frequency data and explore sector-specific outcomes. By staying attuned to both the promises and pitfalls identified in the literature, stakeholders can contribute to more resilient and inclusive economic development as AI continues to evolve.

Furthermore, the study emphasizes that the effective integration of artificial intelligence into professional training systems is essential for supporting human resource development. In fields such as accounting, where technological transformations are rapidly evolving, the adoption of AI-driven and personalized learning solutions becomes a key factor in ensuring workforce adaptability and long-term organizational performance.

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