

AI and the Restructuring of Human Jobs and Coding

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ABSTRACT

Artificial Intelligence (AI) has begun to change global employment patterns through its impact on coding and software development fields. The implementation of AI technology transforms work processes because it takes care of repetitive tasks while enabling employees to handle their more difficult work. The research paper examines how artificial intelligence creates changes to work functions and required skills and establishes new work processes in technology-based business sectors. The research shows that developers should work together with artificial intelligence systems because both developers and AI systems need to work together with developers to achieve their tasks. The study results show that organizations have shifted their work requirements toward advanced skills which include system design and analytical thinking and human–AI interaction abilities. The study proves through its analysis of academic literature and industry information that artificial intelligence technology now transforms the work environment without removing employment opportunities. Organizations need to establish ongoing training programs and flexible educational models and government policies which protect employees' future employment prospects.

Keywords—Artificial Intelligence (AI), Machine Learning, Large Language Models (LLMs), Task Automation, Labor Market Polarization, Skill-Biased Technological Change, Human–Machine Interaction, AI-Augmented Programming, Workforce Digitization, Economic Restructuring.

1.INTRODUCTION

Artificial Intelligence (AI) has developed into a technology that businesses can use to create new economic systems and change how they hire and organize their workforce and conduct their work. Researchers who studied early computerization found that many jobs faced high danger from intelligent systems because they could automate tasks in their work [1]. The first studies established basic economic research about how automation affects work and productivity through digital technology [2] [3]. Research investigated how technology developments create new job functions which stay constant throughout workplace automation processes [4] [5]. Researchers conducted studies across OECD nations to investigate how routine job functions face technological replacement through task automation which occurs at the level of specific job functions [6]. AI has disrupted the software development field which now requires new skills because code-based work functions have changed. AI development tools such as machine learning code generators and large language models have changed existing programming methods through their ability to automate repetitive tasks while increasing developer output. AI adoption creates different effects on employment because companies need new skills which lead them to adopt systems that combine human workers with machines [7] [8]. The current labour market changes result in workforce polarization and task shifts which mark a fundamental transformation of work processes [9] [10]. The worldwide workforce

studies show that companies need to continuously reskill their employees while adapting their systems to AI technology for inclusive economic growth [11] [12].

2.LITERATURE REVIEW

Artificial Intelligence (AI) has emerged as one of the most influential technological developments of the modern era, often described as a general-purpose technology due to its wide-ranging applications across industries. The industry has experienced extensive changes because of technological progress which transformed both its economic structure and its workforce and professional activities. The initial studies about automation through computerization showed that intelligent systems which developed to use automation methods would endanger numerous jobs because of their ability to complete standard tasks. The initial estimates created worries about major technological unemployment which would lead to workers losing their jobs. The study showed that technology affects employment different from what previous research showed. The studies conducted by Brynjolfsson and McAfee and Autor demonstrated that technological advancements lead to new job requirements which change how workers perform their tasks. The task-based approach shows that some jobs can be performed by machines but tasks which need creative thinking and decision-making and advanced problem-solving skills must be done by humans. The research conducted in multiple OECD countries established that automation affects particular job tasks instead of impacting complete job roles. The current understanding of AI's effects on weather systems requires researchers to study specific work activities instead of studying complete job functions. The software development and coding fields show clear proof of how AI technology changes traditional work processes. The AI tools which include machine learning code generators and intelligent debugging systems and large language models, create major changes. The coding automation tools perform multiple tasks through their ability to create syntax and fix errors which enables developers to work on system design and implementation and strategic problem solving tasks. Industry and policy reports indicate that the adoption of AI is not uniformly reducing employment but is instead reshaping skill requirements and encouraging hybrid human–AI collaboration models [7], [8]. The changes in this study demonstrate that labour market trends show workforce polarization because employers now prefer to hire highly skilled workers while they eliminate positions that require basic skills [9], [10]. Continuous worker retraining and institutional organizational changes become essential for achieving long-term economic development through artificial intelligence development according to assessment studies of global workforce requirements which support this need [11], [12]. Digital technology advancements are changing coding practices by shifting developers away from writing code manually toward designing systems through system-level thinking. The research paper examines how artificial intelligence changes job patterns and the way programming works through a combination of academic research and economic principles and business practices. The study aims to find out whether artificial intelligence will lead to job losses or create new professional paths which involve advanced human-machine collaboration in digital workplaces.

3. RESEARCH OBJECTIVES

The research aims to investigate how Artificial Intelligence (AI) affects job markets and coding standards across different digital industrial sectors which are currently undergoing rapid transformation. The current speed of technological development requires people to comprehend two factors which include the new

employment patterns and their effects on entire economic systems together with professional networks. The study starts its investigation with the examination of workforce changes which take place during periods of technological advancement.

The researchers study how AI adoption affects employment patterns through their research on job displacement and creation and their research on occupational movement between different jobs. The study uses global industry reports together with economic analysis [13] and [14] to examine how automation and digital transformation affect labour market dynamics.

The research examines worldwide labour patterns together with the regulatory systems which control how workforces develop throughout different regions. The research assess how institutional support systems and educational frameworks and economic development plans work together to create sustainable jobs which can adapt to AI-powered workplace environments [15] [16][17].

The research emphasizes how software development methods undergo change through market expansion. The study investigates the adoption of advanced AI technologies which consists of machine learning systems and automated programming solutions in software development operations. The research investigates system performance impacts through empirical data which includes direct industry evidence from [18] [19] [20] sources. The study investigates how digital economies have created new opportunities for freelance workers and platform-based work through their research. The study investigates how AI technologies affect gig workers through two main areas which are their job access and their ability to compete for job opportunities and their financial outcomes. The research examines international labour mobility together with the expansion of digital freelance work markets according to [21] and [22] sources. The research investigates how AI implementation affects economic development through productivity improvements and operational efficiency gains and job creation in specific regions. The research uses empirical studies about automation and labour market development to determine how technological advantages and workforce difficulties interact with each other [23][24].

The study investigates policy responses which government bodies use to manage AI system implementation. The study investigates how international organizations and consulting firms create regulatory frameworks and governance systems and develop strategic plans to handle technological disruptions [25], [26].

The main goal of this research is to discover new technological developments which affect both skill requirements and job availability. The research studies how artificial intelligence innovations change job functions while creating greater need for interdisciplinary and analytical skills [27], [28].

The research uses developer community data and professional survey data to examine how programming methods and professional skills have developed over time [29], [30]. The system demonstrates how artificial intelligence technology impacts actual programming environments.

The research combines insights from automation theory and labour economics and technological innovation to create a complete framework for understanding how artificial intelligence changes employment patterns [35], [36], [37]. The study uses multiple research approaches to build a comprehensive framework which demonstrates how artificial intelligence modifies workplace environments and transforms programming methodologies.

4.BACKGROUND AND PRELIMINARIES

Artificial Intelligence (AI) describes computer systems which complete tasks that need human intellect for learning, reasoning, decision-making and solving problems. The last ten years have seen AI systems make substantial progress because of advances in machine learning deep learning and large language models which have expanded their various domain capabilities. Artificial Intelligence functions as a general-purpose technology because it applies to multiple industries while impacting fields such as healthcare and finance and manufacturing and information technology. The system functions as a critical economic driver because it processes extensive data sets which enable businesses to develop predictive insights that help them transform their digital operations [38][39].

Human history demonstrates that people have always connected their worries about how automation will affect their jobs to the progress of technology. The early theoretical frameworks examined how automation of basic tasks would create hazards because it would allow machine systems to replace human workers on a mass scale. The latest research now concentrates on work activities because it demonstrates that jobs contain elements which machines can handle and tasks which require human effort [40][41].

The fundamental principle of task reallocation shows that technological progress enables workers to perform their current job functions through technological progress instead of creating new employment opportunities. The theory of skill-biased technological change demonstrates how technological advancements create greater need for skilled workers while decreasing dependence on standard work activities [42].

The introduction of AI-driven tools in software development has created fundamental transformations to programming methods. The current development environments of today now provide developers with automated code generation and intelligent debugging and predictive text completion and system optimization capabilities. The tools enable developers to complete repetitive tasks more quickly while they can devote their time to essential work which includes system design and integration activities [43].

The software engineering field has observed that AI adoption does not eliminate human jobs but instead boosts efficiency and changes work patterns [44]. The need for developers to collaborate with AI systems has led to the development of hybrid human–AI collaboration models.

The economic impact of AI implementation leads to changes in the labour market which create specialized skill requirements. The demand for high-skill positions continues to grow while the significance of routine and repetitive work decreases [45]. This shift has significant implications for education, training, and workforce development.

The study needs several important concepts to define its main analytical elements. Task automation refers to the replacement of specific human-performed activities by AI systems. Job augmentation describes the enhancement of human productivity through AI-assisted tools. Technological progress creates a rising need for highly qualified personnel through skill-biased technological change. The human–AI collaboration model establishes a working framework which enables humans and intelligent systems to execute tasks together. The present digital economy shows how artificial intelligence transforms work patterns and coding methods through these fundamental concepts.

5. ANALYSIS OF CURRENT FREELANCE INTERMEDIARIES

Digital freelance intermediaries have become essential to modern labour markets because these platforms operate as vital components of technology-based industries. The platforms enable independent professionals to connect with clients who are situated in different geographical areas while the system decreases operational expenses and permits workers to have flexible employment options [9][10]. The platform market is experiencing rapid growth because it represents the current digitalization trends and remote work trends and technological progress which creates task-based employment systems. The research shows that platform-based employment has expanded because of better digital infrastructure and improved communication technologies and collaborative tools which support better work operations. Freelance work has become more accessible for people from different parts of the world enabling them to work in international job markets [11]. The increased accessibility of work opportunities has created greater competitive challenges for workers especially in software development and coding.

The digital freelance platforms operate through their unique system which assigns work tasks through algorithms instead of using conventional hiring methods. The platforms use AI matching algorithms which help them match workers with clients to achieve better results in their job distribution process. The system provides quick and easy access to its features but it creates problems which affect fairness and visibility and competition between freelancers.

Freelance coding has become the leading service market for software development work according to current industry trends. The development of AI-powered programming tools through automated code generation and intelligent debugging and predictive coding systems has resulted in a fundamental change to how freelance developers execute their work [12] [13]. The tools provide quick execution capabilities which enable programmers to complete their coding tasks more efficiently.

Automation of repetitive work processes has reduced the need for entry-level freelance positions which require basic skills. Human workers needed to execute basic coding tasks but now organizations can use automated systems to perform these tasks which leads to fewer job possibilities for entry-level workers [14]. The job market now demands high-level competencies which include system architecture creation and AI system implementation and solving difficult technical issues [15].

Research on labour market dynamics shows that digital freelance platforms maintain existing patterns of skill-biased technological change because technology improvements benefit high-skilled workers more than other employees [16], [17]. The labour market divides into two segments which separate high-skill high-income positions from low-skill roles that require intense competition.

AI-powered productivity increases have led clients to expect faster delivery times combined with higher product quality and improved operational efficiency. Presently, freelancers must deliver projects within shorter timeframes while sustaining high-quality results which require them to utilize AI technologies for competitive advantage.

Digital freelance intermediaries function in an environment where artificial intelligence technologies develop rapidly and automation creates new market entrances while employee expectations and coding

needs shift. The modifications demonstrate that professionals working in freelance markets require two key abilities for success, which includes learning new skills and mastering important skills for their work..

Table 7.1

Comparative Analysis of Current Freelance Intermediaries in AI-Driven Labor Markets [16]–[24]

FACTOR	TRADITIONAL FREELANCING MODEL	AI INTERGRATED FREELANCE PLATFORM	IMAPACT ON CODING PROFFESIONALS
JOB MATCHING	MANUAL SEARCH AND CLIENT SELECTION	AI BASED ALGORITHMIC JOB MATCHING	FASTER MATCHING BUT INCREASE COMPETITION
TASK EXECUTION	FULLY HUMAN	AI ASSISTED CODING	INCREASE PRODUCTIVITY AND REDUCE ROUTINE WORK LOAD
SKILL REQUIREMENT	CORE PROGRAMMING KNOWLEDGE	ADVANCE PROGRAM	HIGHER DEMAND FOR AI LITERACY AND SYSTEM DESIGN
WORK SPEED	DEPEND ON INDIVIDUAL CAPACITY	ACCELERTEO THROUGH AI ASSISTANCE	HIGHER CLIENT EXPECTATIONS FOR DELIVERY TIME

6. CHALLENGE IN REAL WORLD IMPLEMENTATION

The implementation of Artificial Intelligence (AI) in freelance work and professional employment systems creates various structural problems and economic issues and ethical dilemmas which counteract its productivity benefits. The use of AI tools for efficiency improvements and automatic work handling of repetitive activities results in technological changes which create new job market patterns and operational work distribution imbalances according to research findings [21] [22].

The most important obstacle for workers exists because they face dual challenges which include unpredictable earnings and an oversaturated job market. Digital freelance platforms have significantly lowered entry barriers, enabling a large number of individuals to participate in global labour markets. The system allows users to work with greater freedom but it creates more competition between workers. Research on labour market patterns shows that highly skilled professionals benefit more from AI technology than their counterparts who perform routine tasks since their wages decrease and job options decrease [23] [24]. AI-powered tools in coding-related freelance markets have reached a point where they can complete fundamental programming assignments which results in decreased entry-level job needs and heightened market competition [25].

The second main problem involves algorithmic management which lacks transparent operational systems. The majority of freelance platforms use AI-based systems for their ranking functions and recommendation features and task allocation processes. The systems control worker access to job opportunities but they function with insufficient operational transparency. Research on digital platform governance shows that these systems create bias patterns which restrict worker control over their work while creating problems for fair access to work opportunities [26], [27].

AI-integrated systems create an extra obstacle through skill obsolescence. The rise of automation throughout the coding field leads to decreasing demand for basic coding skills while increasing need for system design expertise and AI system integration and advanced analytic abilities. Workers who fail to adapt to these evolving requirements risk becoming obsolete in rapidly changing technological environments. Workforce analyses consistently emphasize the importance of continuous reskilling and upskilling to maintain employability [28], [29].

Ethical and legal concerns also play a significant role in the real-world implementation of AI systems. AI systems create outputs that result in security vulnerabilities which affect data protection and intellectual

property rights and responsibility determination. The legal system faces challenges when it needs to establish who owns AI-generated code and who must resolve errors that automated systems create. The presence of biases within AI algorithms produces outcomes that lead to unfair results which create additional ethical challenges [30].

Another important issue is the digital divide. People who do not have equal access to technology and infrastructure and educational opportunities will find it difficult to enter AI-based job markets. The existing socio-economic system already benefits from this situation because it creates barriers that prevent specific groups from accessing work opportunities.

AI systems provide two benefits through their ability to enhance workplace productivity and create new job opportunities in digital work environments. The introduction of AI technology into workplaces will create several difficulties which organizations must address through effective management strategies. The solution to these problems needs three elements which include clear governance frameworks and effective regulatory systems plus continuous funding for educational programs and skills training initiatives.

7. QUANTITATIVE COMPARATIVE ANALYSIS (2015–2026)

The freelance and professional labour markets experience structural and economic and ethical challenges from Artificial Intelligence (AI) which provides productivity benefits. The technological shift through AI-assisted tools creates efficiency improvements which automate repetitive tasks yet research studies demonstrate that this transformation leads to changes in the labour market and creates imbalanced work opportunities [21][22].

The primary obstacle for workers arises from income instability and market saturation. Digital freelance platforms have significantly lowered entry barriers, enabling a large number of individuals to participate in global labour markets. The accessibility improvements result in increased competition between workers. Studies on labour market dynamics suggest that highly skilled professionals tend to benefit disproportionately from AI adoption, while workers performing routine tasks experience downward pressure on wages and reduced job opportunities [23][24]. The freelance coding market uses AI-driven tools to automate basic programming tasks which decreases the need for entry-level services and heightens competition between workers [25].

The second main problem exists because algorithmic management systems operate without transparent processes. Freelance platforms use artificial intelligence systems to create their ranking and recommendation and task distribution systems. The systems control which work opportunities employees can see and which ones they can access but they run without providing any operational transparency. Digital platform governance studies show that such systems introduce bias while they restrict worker independence which creates treatment issues for workers and their ability to access job opportunities [26], [27].

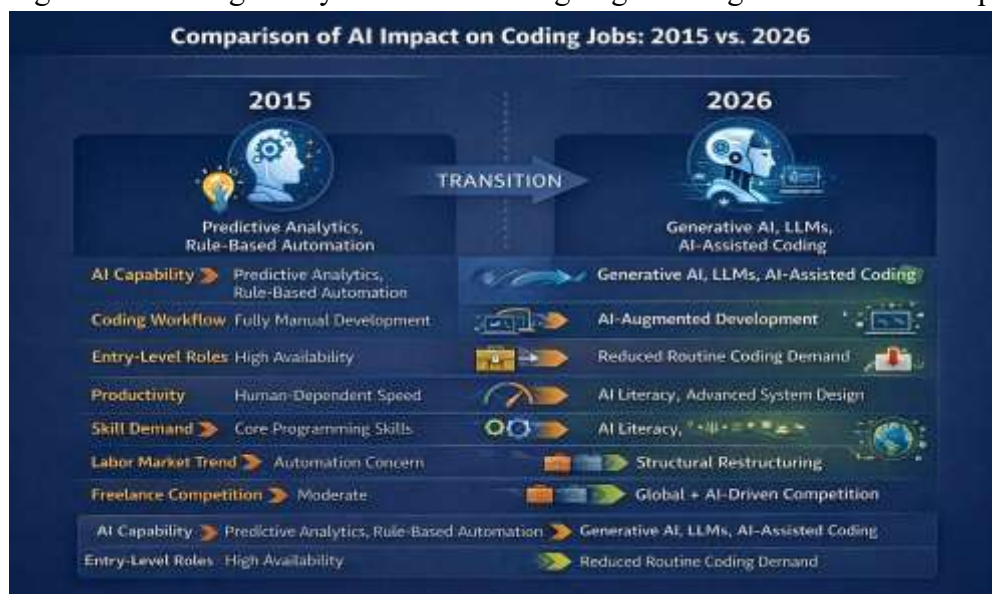
The presence of AI systems creates a new obstacle because employees need to maintain their job skills. Current job requirements now demand advanced skills in system development and AI system

implementation and advanced evaluation procedures because automation has changed the coding field. Workers need to learn these new skills because technology uses for different purposes create new requirements that businesses need to adopt. Workforce research studies show that organizations need to implement ongoing employee training programs which include both skill development and new skill acquisition to help workers stay employable in their jobs [28], [29].

The actual use of AI systems depends on both ethical considerations and legal requirements. AI outputs create security issues which affect both data protection and intellectual property rights and responsibility for outcomes. The legal system faces extreme difficulties when determining who owns AI-generated code and when automated systems produce mistakes which must be corrected. AI algorithms contain embedded biases which result in discriminatory outcomes that make ethical decision-making more difficult [30].

The digital divide represents another major problem that needs resolution. People who lack access to technology and infrastructure and educational resources cannot participate in AI-based work markets. The existing social and economic inequalities will become stronger because this practice restricts access to opportunities for specific groups of people.

AI systems boost productivity while creating new work opportunities in digital labour markets. However, organizations need to take care of multiple operational challenges which stem from their AI system implementation. The resolution of these problems requires governance systems which operate openly together with regulatory control and ongoing funding for educational programs and skills training.



8.RESULT ANALYSIS

The research findings show that employment patterns and coding practices experienced significant structural transformations during the period from 2015 to 2026 because organizations adopted Artificial

Intelligence (AI) systems. Evidence drawn from industry reports, workforce studies, and technological analyses

consistently demonstrates that AI adoption has accelerated digital transformation across multiple sectors, particularly within software development environments. The research findings show that employment patterns and coding practices experienced significant structural transformations during the period from 2015 to 2026 because organizations adopted Artificial Intelligence (AI) systems.

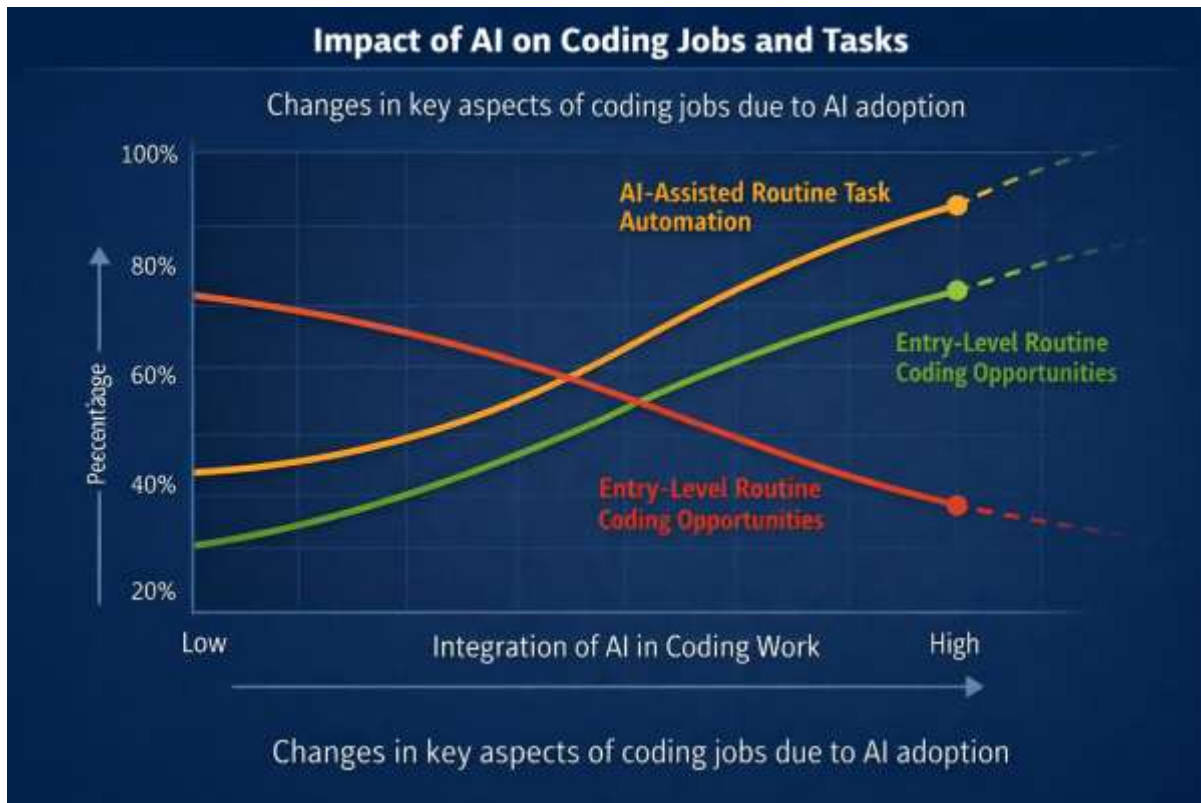
The first key observation relates to automation exposure. The research outcomes demonstrate that complete job loss remains uncommon while work functions undergo their most substantial changes. In coding environments, AI-assisted tools now provide support for routine tasks which include syntax generation and code completion and debugging and testing procedures. The AI system demonstrates its capability to automate repetitive tasks which follow established procedures instead of taking over complete job positions. Developers maintain their essential functions in software development work even though their job functions have changed.

The second major outcome concerns productivity improvements. AI-assisted programming environments provide empirical evidence which demonstrates that users achieve greater efficiency through their use. Developers achieve faster task completion while decreasing errors and enhancing their workflow through intelligent coding tools. The improvements hold particular importance for large-scale projects because automation decreases development time while it improves project delivery efficiency. Developers now benefit from Coding processes which use AI because these processes create a more efficient development environment.

The third important finding demonstrates that skill requirements have undergone a complete transformation. The labour market indicators demonstrate an upward trend which shows that employers need more advanced technical abilities and cognitive capabilities. The demand for routine programming positions has decreased, while companies seek professionals who can design systems and integrate artificial intelligence and solve difficult challenges. The trend shows how people develop their skills because they will grow into high-skilled jobs while the importance of low-skilled repetitive work will decrease. The development of generative artificial intelligence technologies has created more complex coding requirements which require higher performance from programmers.

The current workforce transformation trends demonstrate that organizations now deem continuous learning and adaptability skills as essential competencies. The majority of professionals work in AI-integrated environments which require them to acquire new skills for their job responsibilities. The program requires students to develop both technical competencies and essential interdisciplinary skills which include analytical thinking and collaboration and adaptability. Modern labour market research shows that organizations now require employees who possess learning abilities and skills to adapt to new technological developments.

The findings demonstrate that AI technology prompts businesses to undergo structural changes instead of eliminating employment opportunities. The combination of task automation and productivity improvements together with new skill requirements leads to the emergence of a work model which combines human workers with artificial intelligence systems.



9. DICUSSIONS

The research results in this study support the viewpoint that organizations must understand Artificial Intelligence (AI) as a technology that will transform their labor market operations and professional work methods instead of regarding it as a process that will eliminate their workforce. The combination of research from worker studies and digital labor platforms and technological assessments demonstrates that artificial intelligence (AI) is transforming work because it changes both job performance methods and the evaluation of employee skills.

The analysis reveals its main theme through the process of changing from job-based systems toward task-based systems. The process of AI implementation in companies results in selected automation of specific job functions instead of complete job elimination. Workers now spend their time on advanced work activities which include resolving issues and developing systems and making choices. The software development process has undergone fundamental changes because developers now manage AI-based systems instead of performing manual coding tasks.

Another important aspect of the discussion is the role of human–AI collaboration. Intelligent systems now integrate into professional workflows which create new ways for humans to interact with machines. Developers have shifted their work methods because they now partner with AI tools which help them create and fix code and improve its performance. The collaborative system boosts productivity for teams but also introduces a need for new skills which include the ability to work with and guide AI systems.

The analysis shows which advanced skills have become essential for various functions. The demand for higher cognitive skills has increased because most routine tasks now operate through automated processes.

Professionals who work in AI-driven environments must develop analytical reasoning skills and system thinking abilities and interdisciplinary knowledge. The shift requires educational institutions and workforce development programs to adopt new training methods which will meet current industry requirements.

The study recognizes that these transformations present various difficulties which need to be addressed. The main population of workers continues to face problems because of labour market polarization and income inequality and skill shortages. The advantages of AI adoption create an uneven distribution which benefits highly trained workers more than it benefits employees who perform standard work. This situation creates essential issues which investigate whether people from different backgrounds can access job opportunities in artificial intelligence-based economic systems.

The conversation demonstrates how institutional policies and policy actions determine artificial intelligence research progress and its long-term results. Government bodies and educational institutions and organizations need to collaborate for developing workforce adaptation strategies which include reskilling programs and regulation systems and policies for economic inclusion.

The discussion demonstrates that artificial intelligence functions as a fundamental transformation which changes how work operates in contemporary society. The modern economy experiences transformations which shape work systems through AI because its benefits go beyond productivity enhancements.

10. CONCLUSION

The research investigates how Artificial Intelligence (AI) affects employment structures and coding practices from 2015 until 2026. The research examines task automation together with productivity measurement systems and workforce development patterns to show how artificial intelligence technology is changing both employment systems and workplace environments.

The research results show that organizations do not mostly experience job losses when they implement artificial intelligence systems. The main impact of AI systems results in companies redistributing tasks among their existing job positions. The industry moves toward automation of basic coding tasks while employees dedicate their efforts to advanced duties which involve creative thought and decision making and solving difficult issues.

The research demonstrates that software development processes achieved major productivity and efficiency gains through its findings. AI-powered tools deliver benefits through their ability to execute tasks at higher speed while they enhance code quality and streamline operational activities. The advantages of the system come with new skill needs which demand employees to develop higher levels of technical and cognitive skills.

The study reached another main finding which shows that labor markets have started to experience polarization. The demand for entry-level and routine jobs has decreased while high-skilled positions show continuous growth. People must develop their skills through learning and adaptability to maintain their job security within AI-based work environments. Research findings show that AI technologies do not eliminate coding jobs but instead create new requirements for those positions. The long-term effects of these modifications will depend on how well people and organizations and institutions can handle technological progress. The development of effective reskilling methods needs policies that support workforce inclusion to help distribute AI advantages throughout society.

11. FUTURE SCOPE

The research study examines how artificial intelligence technology impacts employment patterns in a thorough manner yet needs additional examination to uncover which aspects affect long-term employment patterns in the labor market. The research requires longitudinal studies which need to investigate how artificial intelligence systems impact wage distribution and job stability and work conditions across extended time periods. The existing studies present estimates about automation and productivity advancements yet they fail to show how these advancements impact income distribution patterns and people mobility across different socioeconomic classes throughout time. Researchers need to create sophisticated econometric models which will enable them to measure how productivity enhancements from artificial intelligence impact employment market trends. The existing studies demonstrate that productivity improvements range from 20 percent to 55 percent yet researchers have not yet determined how these improvements affect wage rates and workforce numbers and creation of new positions.

The current state of research needs to investigate how algorithmic governance functions within digital labor platforms. The AI-based systems which control job matching and performance evaluation and worker visibility determine which employment opportunities become accessible to workers. The existing research needs to conduct systematic studies which will address transparency problems and bias issues and fairness matters that remain unaddressed.

Fourth, ethical and regulatory considerations associated with AI integration should be further examined. The increasing use of AI systems for hiring decisions and task allocation, and performance assessments needs governance frameworks which will provide accountability and fairness and protect data. The development of future studies should create policy guidelines which achieve a balance between technological innovation and social protection efforts.

The study of specific sectors needs to be conducted because it will reveal how artificial intelligence affects various industries. The effects of AI adoption will differ among various sectors because healthcare and finance and education and manufacturing require different work tasks and employee skills.

The research needs to investigate sustainable education and reskilling methods which help workers develop skills to adjust to fast-changing economic conditions. The education system should incorporate interdisciplinary learning and continuous professional development and AI literacy into its curriculum.

The long-term development of AI technology in labor markets needs both technological progress and institutional capabilities together with social progress. A multidisciplinary research approach which combines economics with computer science and public policy will enable researchers to comprehend and control AI-driven transformations which require their studies.

12. REFERENCES

[1] C. B. Frey and M. A. Osborne, "The Future of Employment: How Susceptible Are Jobs to Computerization?," *Technological Forecasting and Social Change*, vol. 114, pp. 254–280, 2017.

- [2] E. Brynjolfsson and A. McAfee, *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*. New York, NY, USA: W. W. Norton, 2014.
- [3] E. Brynjolfsson and A. McAfee, “Artificial Intelligence, Automation, and the Economy,” NBER Working Paper No. 24449, 2018.
- [4] D. Autor, “Why Are There Still So Many Jobs? The History and Future of Workplace Automation,” *Journal of Economic Perspectives*, vol. 29, no. 3, pp. 3–30, 2015.
- [5] D. H. Autor, F. Levy, and R. J. Murnane, “The Skill Content of Recent Technological Change,” *Quarterly Journal of Economics*, vol. 118, no. 4, pp. 1279–1333, 2003.
- [6] M. Arntz, T. Gregory, and U. Zierahn, “The Risk of Automation for Jobs in OECD Countries,” *OECD Social, Employment and Migration Working Papers*, no. 189, 2016.
- [7] World Economic Forum, *The Future of Jobs Report 2020*. Geneva, Switzerland, 2020.
- [8] World Economic Forum, *The Future of Jobs Report 2023*. Geneva, Switzerland, 2023.
- [9] McKinsey Global Institute, *Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation*, 2017.
- [10] McKinsey Global Institute, *The Future of Work After COVID-19*, 2021.
- [11] International Labor Organization, *World Employment and Social Outlook: Trends 2022*. Geneva, Switzerland, 2022.
- [12] OECD, *Employment Outlook 2023: Artificial Intelligence and the Labor Market*. Paris, France, 2023.
- [13] OpenAI, “GPT-4 Technical Report,” 2023.

- [14] GitHub, “The State of AI in Software Development,” 2023.
- [15] M. Zhou et al., “The Impact of AI Pair Programming on Productivity,” arXiv preprint, 2023.
- [16] Upwork Research Institute, Freelance Forward 2023, 2023.
- [17] Pioneer, Global Gig Economy Index 2022, 2022.
- [18] World Bank, World Development Report 2019: The Changing Nature of Work. Washington, DC, USA, 2019.
- [19] D. Acemoglu and P. Restrepo, “Robots and Jobs: Evidence from US Labor Markets,” Journal of Political Economy, vol. 128, no. 6, pp. 2188–2244, 2020.
- [20] D. Acemoglu and P. Restrepo, “Artificial Intelligence, Automation, and Work,” NBER Working Paper No. 24196, 2018.
- [21] European Commission, Artificial Intelligence and the Future of Work, 2022.
- [22] PwC, Will Robots Really Steal Our Jobs?, 2018.
- [23] Gartner, Top Strategic Technology Trends 2024, 2024.
- [24] LinkedIn Economic Graph, Jobs on the Rise 2024, 2024.
- [25] Stack Overflow, Developer Survey 2015.
- [26] Stack Overflow, Developer Survey 2023.
- [27] GitHub, Octo verse Report 2022.

- [28] Harvard Business Review, “How AI Is Changing Software Development,” 2023.
- [29] N. Peng et al., “Productivity Effects of AI Coding Assistants,” arrive preprint, 2023.
- [30] MIT Technology Review, “The Real Impact of AI on Jobs,” 2023.
- [31] OECD, “Automation, Skills Use and Training,” 2022.
- [32] D. Autor and A. Salomons, “Is Automation Labor-Displacing? Productivity Growth and Employment,” Brookings Papers on Economic Activity, 2018.
- [33] E. Brynjolfsson, “Future of Jobs Report 2023: Skill Disruption Analysis,” 2023.
- [34] Oxford Internet Institute, Online Labor Index Report, 2022.
- [35] Stanford HAI, AI Index Report 2024. Stanford University, 2024.
- [36] McKinsey Global Institute, The Economic Potential of Generative AI, 2023.
- [37] J. Dargan and N. Gupta, “Integration of Blockchain for IoT Communication,” in Adaptive Power Quality for Power Management Using Smart Technologies. CRC Press, 2024, pp. 319–343.
- [38] IMF, AI and the Future of Work, 2024.
- [39] World Economic Forum, Future of Jobs Report: Technology Trends Analysis, 2024.
- [40] J. Dargan, N. Gupta, and L. Singh, “Blockchain-Based Energy Management System: A Proposed Model,” in Proc. Int. Conf. Technological Advancements and Innovations (ICTAI), 2021, pp. 510–514.

- [41] S. Dewan, L. Duhan, and N. Gupta, “Secure Electronic Voting System Based on Mobile App and Blockchain,” *Recent Advances in Computer Science and Communications*, vol. 14, no. 9, 2021.
- [42] J. Kaur and N. Gupta, “Artificial Neural Network: A Review,” *Int. J. Technical Research & Science*, pp. 1–4.
- [43] J. Kaur and N. Gupta, “Constructive Neural Network: A Framework,” *Int. J. Engineering and Advanced Technology*, vol. 9, no. 2, 2019.
- [44] J. Kaur and N. Gupta, “Bipolar Sigmoid Algorithm for Designing Constructive Neural Network,” *Int. J. Emerging Technologies*, vol. 11, no. 2, pp. 991–996, 2020.
- [45] J. Kaur and N. Gupta, “Extended Bipolar Sigmoid Algorithm for Enhancing Performance of Constructive Neural Network,” *Int. J. Emerging Technologies*, vol. 11, no. 2, pp. 1034–1038, 2020.