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FROM JOB DISPLACEMENT TO WORKFORCE TRANSFORMATION: WHAT PAKISTAN CAN LEARN FROM GLOBAL LEADERS IN MANAGING AI-DRIVEN EMPLOYMENT CHANGES

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Abstract

Ever since the Industrial Revolution, machines have been replacing human workers bit by bit; automation is nothing new. First, a gradual change in agriculture and skilled crafts like hand weaving, then a high-volume shift in manufacturing. From these advances in technology, the economy was recycled and generated new demand for human labor; generally, still plenty of jobs to go round. But now, this is a new era: rapid advances in artificial intelligence (AI) and robotics have the potential to replace many human jobs. There are some new jobs created in the market, but only for those who are good and have the potential to learn AI. Artificial intelligence is transforming industries, labor markets, and economies at an extraordinary pace. AI has the potential to improve productivity, business performance, and innovation; it can even help you with daily chores. AI is your new friend. Pakistan is at an early stage of AI and is increasingly adopting AI-powered technologies across manufacturing, banking, customer services, healthcare, education, and information technology. In Pakistan, AI is replacing many jobs, simultaneously creating new employment opportunities that require advanced technical, analytical, and digital skills. USA, UK, Germany, China, Singapore, and South Korea have responded to these rapid changes by investing in AI education, research & development, advanced technology, and strong collaboration with universities and government. These initiatives have enabled them to reduce the negative effects of automation and create new jobs for new talent, and people have new AI courses so they can get a job in the near future. This study can show how Pakistan can learn from and prepare its industry for the adoption of AI from global AI leaders, and prepare its workforce for the future of work. In Pakistan, there is a lack of AI education; no proper investment in AI research and development; weak industry-government collaboration; and weak collaboration with Universities. This study offers practical policy recommendations and actionable knowledge to help Pakistan improve AI readiness, strengthen its human capital, invest in research & development, collaborate with universities, and create sustainable employment opportunities. This research suggests that AI should not be seen as a threat or a replacement for jobs but as a new golden opportunity.

INTRODUCTION:

Artificial intelligence (AI) has become one of the most dominant and important technologies that transforms and recycles the economy in the twenty-first century. Governments, businesses, and individuals can't think without AI because AI is improving decision-making and increasing organizational efficiency (Munir, 2024; 2025). AI applications such as machine learning, natural language processing, robotics, and predictive analytics are now widely used across industries, including manufacturing, healthcare, banking, education, retail, transportation, and public administration. These AI technologies help governments reduce costs, enhance customer service, and improve productivity while creating new opportunities for innovation and economic growth.

AI is also creating important concerns regarding employment and workforce stability. Many routine jobs are being slowly automated, leading to fears of unemployment, especially among those with limited technical skills. But at the same time, AI is creating new career opportunities in fields such as data science, information technology, AI engineering, cybersecurity, robotics, cloud computing, prompt engineering, intelligent manufacturing, and digital marketing. The future does not depend only on technical advancement but also on how the government, educational institutions, and businesses manage changes in the labor market (World Economic Forum, 2025; International Labor Organization, 2023).

Countries with advanced technologies have adopted different strategies to manage AI transformation. The United States is leading globally in AI through significant investment in research and development, collaboration with universities, and the offering of free AI courses for students through Google and other platforms. The United Kingdom focuses on AI governance, ethical AI development, and lifelong learning initiatives. Germany has successfully implemented Industry 4.0 by combining automation with advanced vocational education. Singapore has invested in SkillsFuture programs, through which employees continue to learn about emerging technologies. South Korea has strengthened AI education, robotics, and semiconductor industries to remain globally competitive. Finland has focused on AI literacy initiatives to remain globally competitive. (Organization for Economic Co-operation and Development, 2023; Stanford AI Index, 2025; Theodora Kakouri, 2024)

On the other hand, Pakistan is still in an early stage of AI adoption. Although AI transformation is slowly and steadily increasing across public and private organizations, people are keen to learn about AI, the country is still facing major challenges due to limited AI infrastructure, a lack of proper research and development, a lack of funding, a skills shortage, and a lack of proper collaboration with universities and industry. Many graduates enter the labor market without adequate knowledge of AI, and, as a result, the outcomes are not what they expected, making it difficult to compete in the domestic and international markets.

AI is not viewed as a threat, and we can't blame AI for unemployment. Those economies that invest in workforce transformation create more employment opportunities than they lose. Global leaders of AI have one thing in common: they already forecast the future; they are already ahead of the future; they make policies and implement them on time to avoid uncertainties. Rather than replacing entire professions, AI frequently changes the nature of work by enabling employees to perform higher-value activities that require creativity, critical thinking, communication, leadership, and problem-solving skills. A recent study shows that to boost workforce transformation, employee training, AI readiness, government support, and continuing AI studies in organizations are essential for improving workforce adaptability and long-term organizational performance. (Saleem et al., 2023, 2026)

Pakistan therefore has an opportunity to learn from global AI leaders who have successfully managed AI-driven labor market changes. Instead of putting off AI adoption, policymakers should focus on preparing citizens by offering courses and investing in AI courses in universities and basic knowledge of AI at the school level, for future employment, strengthening education systems,

expanding technical training, encouraging innovation, supporting AI entrepreneurship, and promoting collaboration between government, universities, and industry. These initiatives can help transform AI from a source of employment uncertainty into a driver of sustainable economic growth and global competitiveness.

Literature Review:

Artificial intelligence is one of the most important and critical parts of the labor market. AI is transforming the nature of work by automating repetitive tasks while creating new opportunities and demand for digital and analytical skills. AI is changing jobs and increasing the importance of continuous learning, workforce adaptability, and technological competence rather than removing all jobs. (World Economic Forum, 2025)

The International Labor Organization (2023) argues that AI is transforming jobs rather than replacing them. Routine or repetitive jobs, such as administrative roles, are vulnerable, whereas occupations requiring creativity, emotional intelligence, complex decision-making, and leadership remain less affected. The report highlights that the government should focus on workforce skills and lifelong learning to ensure workers can successfully transition into emerging occupations.

The Organization for Economic Co-operation and Development (2023) highlights that AI adoption can increase when an organization invests in employee training and digital skills. Countries that focus on AI through education, free courses, vocational training, and workforce development are now better positioned to minimize job displacement. In this context, the government plays a critical role in coordinating AI-driven labor markets with educational institutions, industries, and technology sectors.

According to the World Economic Forum 2025), in the coming decade, technological transformation will continue to reshape. Millions of workers may be displaced by automation and AI, and an even greater number of new roles are expected to emerge in AI, cybersecurity, data analysis, digital marketing, and renewable energy. Even nowadays, digital marketing, ad creation, and website creation are being done through AI. However, these opportunities will largely benefit who learn relevant technical and digital competencies.

Research conducted by McKinsey also suggests that automation does not necessarily reduce overall employment. Instead, it changes employees' skills over time. Workers with strong knowledge or skills in AI are expected to remain highly employable. Whereas workers performing routine manual or clerical tasks face greater risks of displacement.

Pakistan is recognizing the importance of AI, but implementation remains weak. Digital transformation is progressing slowly across banking, healthcare, education, telecommunications, and public administration. I believe the main reason AI is not being implemented properly is a lack of knowledge among people. In Pakistan, especially in rural areas, education is not as strong as in urban areas. 60% of Pakistan's population lives in rural areas. In this situation, the government should invest heavily in education, especially in AI, so people become aware. Even in urban areas, the government should collaborate with schools or universities to reduce the risk of job displacement and create new opportunities for workers across the country.

Recent studies by Saleem et al. (2023) emphasize that digital transformation requires organizations to invest not only in technology but also in employee training and knowledge. Furthermore, Saleem et al. (2026) argue that AI-based human resource systems improve recruitment, workforce analytics, performance management, and strategic decision-making. Employees must engage in continuous training to adapt to an AI-enabled workforce. Without proper investment in employees, organizations may experience skills shortages despite adopting advanced technologies. Numerous nations have already created comprehensive plans to manage the shift to an AI-enabled workforce. The United States, the United Kingdom, China, South Korea, and several European nations, including Germany, Finland, and many others, have made significant investments in AI research, innovation, and

research and development. They have also expanded lifelong learning institutions, introduced programs to motivate citizens to continuously improve their skills, and incorporated AI education into national development strategies. These global experiences show that successful AI adoption requires more than just bringing in new technologies; it also requires preparing people, employees, and investments in university curricula, as well as partnerships between the government and educational institutions.

Overall, current literature supports the view that AI should be seen as a catalyst for workforce transformation rather than simply a cause of unemployment. Countries that invest heavily in education, reskilling, innovation, and digital infrastructure are more likely to create sustainable employment opportunities while maintaining economic competitiveness. These international experiences can help Pakistan adopt AI in the near future.

Research Gap:

Current studies examine the impact of artificial intelligence in developed and developing countries. Most of these studies focus on developed countries that have already implemented policies supporting AI innovation, workforce skilling, and digital transformation (International Labor Organization, 2023; Organisation for Economic Co-operation and Development, 2023).

Similar to this, earlier studies have examined the use of AI in fields such as public services, manufacturing, healthcare, education, and human resource management. However, much of the available literature investigates these sectors individually rather than offering an integrated assessment of employment policies, workforce transformation, education systems, and government efforts across many countries.

The adoption of AI in Pakistan has been the subject of various studies, the majority of which concentrate on the performance of organizations and the use of technology. There is insufficient research on what Pakistan can learn from world leaders. There is little study and development on how these world leaders mitigated the adverse effects of AI adoption.

Additionally, early research has rarely finds international policy recommendations that are specifically create for the economic, educational, and labor market conditions of Pakistan. Consequently, Pakistan's workforce is insufficient prepared for the future of AI-driven employment due to the shortage of knowledge available to policymakers, educational institutions, and businesses. (Saleem et al., 2023, 2026)

Therefore, these studies examined what is the gap that Pakistan is missing and how Pakistan can fill this gap, by providing comparative analysis between global leaders and Pakistan can adopt to strengthen workforce development, improve digital skills, promote innovation, and create sustainable employment opportunities in the AI era.

Research Objectives:

Examine the impact of artificial intelligence on employment and workforce transformation.

Compare AI workforce strategies adopted by global AI leaders.

Identify the major challenges limiting AI workforce development in Pakistan.

Evaluate how international best practices can support Pakistan's transition towards an AI-driven economy.

Propose practical policy recommendations for improving AI education, workforce reskilling, employment opportunities, and sustainable economic growth in Pakistan.

Comparative analysis: What Pakistan can learn from global AI leaders:

The United States: Investing in workforce & Reskilling:

The United States is one of the leading countries in artificial intelligence. The United States has established itself as a major investor in AI. The U.S. government and private sector have prioritized preparing employees for new employment opportunities by investing in research and development, professional training, and continuous learning, rather than viewing AI as a replacement for human workers. To ensure

that workers acquire the necessary skills for an evolving labor market, universities, technology companies, and government agencies collaborate closely to develop AI technologies. Many employees have transitioned into emerging occupations as a result of programs that support digital literacy, data science, cybersecurity, cloud computing, and AI engineering. (Stanford AI Index, 2025; World Economic Forum, 2025)

Pakistan can learn from the USA by collaborating with educational institutions and investing in research & development. Focus on workforce reskilling and prepare graduates and employees for their careers in AI.

China: AI as a driver of industrial growth

China has made AI a national development priority, integrating it into manufacturing, logistics, healthcare, education, and public services. Significant government funding has accelerated the adoption of smart factories, robotics, and intelligent manufacturing technologies. At the same time, China has increased AI education and technical training to ensure that workers are already ahead of the future and have proper knowledge about AI and can use sophisticated technologies. China has prioritized innovation to create new businesses and modernize current sectors.

Investing in workforce reskilling, Pakistan should adopt AI slow and steady in industries. In order to boost productivity and create high-value job possibilities for young people, the government should provide incentives for AI companies, research facilities, and smart manufacturing.

The United Kingdom: Responsible AI and Lifelong Learning

The UK has made AI number 1 priority, in which they balance a proper employment knowledge about AI and technological innovation. Courses at universities and training facilities are regularly modified to meet the transformation of demands in the labor market. Instead than relying only on their initial education, employees are encouraged to continue honing their digital skills throughout their careers. Public policies emphasize professional development and lifelong learning while supporting the ethical application of AI.

Pakistan can also copy a similar method by advancing their university curriculum according to AI adoption, launching AI courses. Such initiatives would help workers remain competitive as AI continues to transform different industries (Theodora Kakouri, 2024)

Germany: Combining AI with technical education

Germany's success in workforce transformation is closely related to its robust vocational education system. Through Industry 4.0, German firms have integrated automation, robots, and artificial intelligence into manufacturing while continuously training personnel to operate with sophisticated technologies. Instead of replacing employees, industries have updated their abilities to boost production and innovation.

Pakistan can strengthen its technical and vocational training by introducing AI, robotics, and digital technology courses. Effective collaboration with educational institutions and industry would prepare employees and recent graduates for future industrial modernization.

Singapore: Continuous skill development

Singapore has heavily invested in its workforce for AI, preparing lifelong learning initiatives. SkillsFuture programs, for example, provide financial assistance to individuals as they strive to improve their professional skills. Employees are encouraged to pursue training in AI, digital technology, and data analytics throughout their careers.

Pakistan can provide affordable training opportunities for graduates, employees, citizens, and unemployed individuals. These initiatives would improve employability and trust of employees, graduates, and citizens while reducing the risk of long-term unemployment caused by automation.

South Korea: Education and High-Tech industries

South Korea has integrated AI into its educational system while also encouraging innovation in robotics, semiconductors, and advanced manufacturing. Government investment in science, technology, engineering, and mathematics (STEM) education has helped develop a highly qualified workforce capable of accelerating technological innovation. Close collaboration among universities, research institutes, and enterprises helps boost national competitiveness.

Pakistan should also invest in STEM education, support universities for research and development, and encourage partnerships between educational institutions and private industries. Schools and universities should arrange a one day to trip to modern industries where students can learn the AI adoption. These efforts would help produce graduates with practical skills required in the modern labor market.

Challenges facing Pakistan in the AI era

Pakistan has started using AI in a number of industries, and trying to adopt in all sectors but there are still a number of obstacles that prevent the nation from completely get the benefits of AI-driven economic development. Pakistan's adoption of AI is still in early stage when we compared to top nations. Business and new startups are trying adopt AI in their work routine but the backing of government is provided properly.

There is no proper knowledge in Pakistan about AI, there courses available but they are too expensive. Many recent college graduates have offer AI courses but they are just theoretical knowledge, but they lack real-world practical experience with cloud computing, automation technologies, machine learning, artificial intelligence, and data analytics. As organizations increasingly adopt AI, employers are seeking candidates with specialized digital skills. Many graduates lack the practical skills because they have just book knowledge not practical that needed in today's workforce. As a result, companies frequently spend more time and money training recently hired staff members before they start contributing.

Pakistan also have weak Computing Power, no proper local data centers, high-speed fiber optics issues, and expensive GPU resources limit advanced AI model training. I believe in budget there should be proper investment announce for AI adoption.

In Pakistan there is high financial costs for subscription-based AI tools and expensive cloud hardware make local deployment hard for small businesses. Small business can't afford AI subscription so, government should make some good policies which benefits every small and medium business.

The public thoughts about AI is another issue, because many employees, students are afraid of and resistant to technology development because they think AI will eventually replace human jobs. International data, however, indicates that AI is more likely to change professions than to replace them. In AI-enabled businesses, employees who consistently enhance their abilities stay extremely competitive. Thus, lowering uncertainty and promoting labor adaptability need raising public awareness of reskilling and lifelong learning.

Lastly, Pakistan does not have a proper strategy for workforce transformation. Coordinated strategies that link government agencies, business, education, and research organizations are still required, despite the introduction of various digital initiatives. Pakistan will at high risk in future if they don't adopt AI, nations that are quickly preparing their workforces for the future of work in the absence of a defined long-term roadmap.

These difficulties show that Pakistan's main issue is not artificial intelligence, it is no invest in AI, and government is not serious about this. If these issues are resolved by investments in workforce development, digital infrastructure, education, and innovation, Pakistan will be able to benefit from AI while reducing the risks of technological disruption.

Discussion:

The results of this study demonstrate that AI is not a threat to the world. Artificial intelligence is opening up new possibilities for the future by generating demand for new professions, business models, and skill sets. It's just like how, 200 or 300 years ago, people used to travel on horses. Later, they invented motorcycles and cars. Motorcycles and cars were not threats; they were new opportunities and drivers of transformation. Similarly, people used to write letters, and it would take days for them to reach the recipient. Then email and the internet came along, which was also a transformation, not a threat. Successful AI adopters make equal investments in both people and technology.

If we follow the global leaders, long-term planning and cooperation with national policies are necessary for transforming the workforce. By doing this, the nation may improve its standing in the international digital economy and train its workforce for future jobs.

Global AI experts may teach Pakistan that development depends on advances in human capital and technology. Without employee training, AI adoption is not worth it and can increase unemployment. However, AI can become an important part of economic growth rather than a cause of job displacement if Pakistan places a high priority on digital education, ongoing professional training, AI research, and entrepreneurship.

Policy Recommendations:

Based on these findings and the experiences of global AI experts, Pakistan will receive assistance in training its workforce for an AI-driven economy while mitigating the negative consequences of job displacement.

First, undergraduate and graduate programs at universities should incorporate artificial intelligence, data analytics, machine learning, cloud computing, cybersecurity, and digital entrepreneurship. Basic AI knowledge should also be taught in schools. Instead of relying solely on cramming, students should graduate with practical skills alongside book knowledge that meets industry needs.

Second, to achieve the AI Workforce Strategy, the Pakistani government needs to create new policies and plans that align with labor market, industry, education, and research policies. A well-coordinated national framework will ensure that workforce growth coincides with technological improvement.

Third, by creating national AI research centers, promoting university research, and fostering cooperation between academic institutions and tech companies, Pakistan should make significant investments in AI research and innovation. Increased funding for research will boost domestic creativity while reducing dependence on foreign technologies.

Fourth, Institutions and industries should work together more closely. To bridge the education-labor market gap, businesses should actively engage in graduate training programs, research initiatives, internships, and curriculum development.

Fifth, because knowledge is about interest rather than age, technical and vocational education institutions should implement specialized AI certification programs for students, professionals, current employees, and even citizens of any age. To increase employability, these programs should emphasize hands-on instruction in automation, robotics, programming, data analysis, and intelligent manufacturing

Sixth, the government should provide financial incentives, incubation facilities, tax breaks, and better access to capital to support AI businesses and tech entrepreneurs. These small and medium-sized businesses also employ AI in their day-to-day operations, which helps them expand. In addition to increasing technological innovation, a more robust startup environment can create additional job opportunities.

Seventh, Schools should promote digital literacy. Basic school-level understanding is crucial. Before enrolling in college, students should develop their digital, computational thinking, and problem-solving skills to prepare for future AI-enabled professions.

Eighth, companies should view AI as a tool that enhances rather than replaces human workers.

Human resources departments should invest in continuous learning, employee engagement, and change management to help employees adapt to technological change.

Finally, Pakistan should strengthen its partnership with countries leading in artificial intelligence, including the United States, the United Kingdom, Germany, China, Singapore, and South Korea. Knowledge sharing, academic partnerships, technology transfer, joint research projects, collaboration with universities and investment in AI education can accelerate Pakistan's digital transformation while creating sustainable employment opportunities.

Conclusion:

Artificial intelligence is one of the main reasons that the knowledge, skills, and competencies required for future employment are transforming. AI is replacing routine tasks and creating new opportunities and occupations across industries. Therefore, the future depends not only on technology but also on how governments, educational institutions, and businesses prepare for technological change.

The experiences of global leaders with AI adoption demonstrate that successful AI adoption requires continuous investment in education, workforce reskilling, innovation, research, and collaboration among academia, industry, and government. Instead of opposing technological advancement, these nations have concentrated on training workers for new opportunities.

Although Pakistan's adoption of AI is still in its early stages, there is still time. Pakistan should use this as an opportunity to modernize its industry by learning from the experiences of world leaders. If Pakistan wants to compete in the global digital economy, addressing these issues should be a national priority.

By following the method of global leaders in AI, Pakistan can help to improve economic conditions, transform AI into an economy for long-term growth, and create employment opportunities. Ultimately, the nation's future success will depend not only on its adoption of technology but also on its investment in its citizens, who will have the skills necessary to thrive in an AI-driven environment.

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