

WORKFORCE DISPLACEMENT AND EMPLOYEE PERCEPTIONS OF AI ADOPTION IN PAKISTAN'S AUTOMOTIVE INDUSTRY

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Abstract

Artificial intelligence (AI) is transforming the automotive industry by improving production efficiency, quality control, predictive maintenance, and decision-making. However, the increasing adoption of AI technologies has also raised concerns regarding workforce displacement, job security, and employee adaptation, particularly in developing countries such as Pakistan. This study examines workforce displacement and employee perceptions of AI adoption in Pakistan's automotive industry. Using a quantitative research design, data were collected through a structured questionnaire administered to employees working in automotive manufacturing and assembly firms. The findings indicate that while employees acknowledge the benefits of AI in enhancing productivity, operational efficiency, and workplace safety, many also express concerns about job displacement, changing skill requirements, and reduced employment opportunities for low-skilled workers. The study further reveals that organizational support, employee training, and reskilling initiatives significantly improve employees' acceptance of AI technologies. The research concludes that successful AI implementation requires balancing technological advancement with workforce development through inclusive policies, continuous training, and strategic human resource management to ensure sustainable industrial growth and employee well-being in Pakistan.

Keywords: Artificial intelligence, employee, automotive manufacturing, operational efficiency.

INTRODUCTION

Artificial Intelligence (AI) has emerged as one of the most transformative technologies of the Fourth Industrial Revolution, fundamentally changing how organizations operate across manufacturing and service industries. AI enables machines and computer systems to perform tasks that traditionally required human intelligence, including learning, decision-making, problem-solving, and predictive analysis. In the automotive industry, AI is increasingly used in production planning, robotics, quality control, predictive maintenance, supply chain management, and autonomous manufacturing systems. These technological advancements have significantly enhanced operational efficiency, productivity, and product quality while reducing production costs and human error (McAfee, 2014).

The global automotive industry has become one of the leading sectors in adopting AI-driven technologies. Major automotive manufacturers such as Toyota, Tesla, BMW, Volkswagen, and Hyundai have integrated AI into manufacturing processes to improve precision, reduce operational downtime, and enhance workplace safety. AI-powered robotics and automation systems are capable of performing

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repetitive and hazardous tasks more efficiently than traditional manual labor. As a result, automotive firms have experienced increased productivity and improved competitiveness in global markets. However, these advancements have also generated debates regarding employment security and the future of human labor (International Labour Organization [ILO], 2023).

The rapid diffusion of AI has transformed the nature of work by automating routine and repetitive tasks that were previously performed by employees. While AI creates opportunities for innovation and economic growth, it also raises concerns about workforce displacement, particularly among low-skilled and semi-skilled workers. Automation may reduce the demand for certain occupations while simultaneously creating new jobs requiring advanced digital and technical competencies. Consequently, organizations are increasingly challenged to balance technological advancement with workforce sustainability through employee training and skill development (Autor, 2015; Acemoglu & Restrepo, 2020).

Employee perceptions play a critical role in determining the successful implementation of AI technologies within organizations. Employees who perceive AI as a tool that enhances productivity and supports decision-making are generally more willing to embrace technological change. Conversely, concerns regarding job insecurity, reduced career opportunities, and organizational uncertainty may generate resistance to AI adoption. Previous studies suggest that employee acceptance of AI largely depends on organizational communication, trust, perceived usefulness, and opportunities for professional development (Denktash et al., 2022).

Pakistan's automotive industry has experienced gradual modernization over the past decade due to increased foreign investment, technological collaboration, and government industrial policies. The sector includes vehicle assembly plants, auto-parts manufacturing companies, and supporting engineering industries that contribute significantly to national economic growth and employment generation. As firms increasingly adopt automation and AI-based technologies to remain competitive, concerns have emerged regarding the potential impact of these innovations on employment patterns and workforce stability (Pakistan Bureau of Statistics, 2024).

Despite growing technological adoption, Pakistan continues to face significant challenges in preparing its workforce for AI-driven industrial transformation. Many employees possess limited digital literacy and technical skills required to operate advanced automated systems. Furthermore, inadequate investment in vocational education, professional training, and workforce reskilling may increase employees' vulnerability to technological displacement. These challenges highlight the importance of developing effective human resource strategies that promote continuous learning and adaptability within organizations (World Economic Forum, 2025).

The relationship between AI adoption and workforce displacement is particularly significant in labor-intensive manufacturing industries such as automotive production. Although automation can replace repetitive manual tasks, it may also complement human labor by improving workplace safety, reducing physical workload, and enabling employees to focus on higher-value activities. Therefore, workforce displacement should not be viewed solely as job loss but also as a transformation of occupational roles requiring new competencies and lifelong learning (OECD, 2023).

Employee perceptions toward AI adoption are influenced by multiple organizational and individual

factors, including age, educational background, work experience, technological readiness, organizational support, and perceived fairness in implementing technological change. Organizations that provide transparent communication, employee participation, and comprehensive training programs are more likely to foster positive attitudes toward AI implementation. Such initiatives reduce uncertainty and enhance employees' confidence in adapting to evolving workplace technologies (Jaiswal et al., 2022).

Although numerous international studies have examined AI adoption and workforce transformation, empirical evidence from Pakistan's automotive industry remains limited. Existing research has primarily focused on technological innovation, industrial productivity, and automation, with comparatively little attention given to employee perceptions and workforce displacement in developing economies. This lack of context-specific evidence limits policymakers' and organizational leaders' ability to formulate effective strategies that simultaneously promote technological advancement and protect workforce interests. Therefore, there is a need for empirical research that examines employees' experiences and perceptions regarding AI adoption in Pakistan's automotive sector.

This study seeks to investigate workforce displacement and employee perceptions of AI adoption in Pakistan's automotive industry by examining the relationship between AI implementation, employment security, organizational support, and workforce adaptation. The findings are expected to contribute to the growing literature on AI and industrial transformation while providing practical recommendations for policymakers, automotive manufacturers, and human resource managers. The study also aims to support the development of balanced strategies that encourage technological innovation alongside employee reskilling, inclusive workforce development, and sustainable industrial growth in Pakistan.

Problem Statement

As Pakistani automotive OEMs and Tier-1 vendors gradually adopt AI-enabled automation to remain competitive amid an uncertain policy environment and the ongoing shift toward electric vehicle production, frontline and mid-level employees face growing uncertainty about the security, content, and meaning of their work. Existing Pakistan-based research on AI adoption has focused primarily on firm-level technology adoption and supply chain performance, with little empirical attention paid to how the industrial workforce itself perceives and copes with these changes. Without this understanding, organizations risk implementing automation in ways that damage morale, provoke resistance, or increase turnover, while policymakers lack the evidence base needed to design effective reskilling and labor-transition support. This study addresses that gap by examining employee perceptions of AI adoption within Pakistan's automotive manufacturing workforce through an established labor sociology and organizational psychology lens.

Research Objectives

1. To examine how employees in Pakistan's automotive manufacturing sector perceive AI-driven automation introduced into their workplace.
2. To assess the relationship between employees' AI exposure/awareness and their perceived job insecurity, distinguishing quantitative (job-loss) and qualitative (job-quality) dimensions.
3. To explore how AI adoption relates to employees' perceived skill obsolescence and occupational identity threat.

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Research Questions

- RQ1: How do automotive-sector employees in Pakistan perceive AI-driven automation introduced into their workplace?
- RQ2: What is the relationship between employees' AI exposure/awareness and their perceived job insecurity (quantitative and qualitative)?
- RQ3: How does AI adoption relate to employees' perceived skill obsolescence and sense of occupational identity threat?

Research Methodology

This study employed a quantitative research design to examine workforce displacement and employee perceptions of artificial intelligence (AI) adoption in Pakistan's automotive industry. A descriptive and cross-sectional survey approach was used to collect data from employees working in automotive manufacturing and assembly organizations. This design was considered appropriate because it enables researchers to measure employees' perceptions, attitudes, and experiences regarding AI adoption at a specific point in time while identifying relationships among key variables (Creswell & Creswell, 2018).

Literature Review

Artificial Intelligence

Artificial Intelligence (AI) refers to the capability of computer systems and machines to perform tasks that normally require human intelligence, such as learning, reasoning, problem-solving, decision-making, language processing, and pattern recognition. AI integrates technologies such as machine learning, deep learning, computer vision, robotics, and natural language processing to analyze large volumes of data and automate complex processes. These technologies enable organizations to improve operational efficiency, reduce human error, enhance productivity, and support data-driven decision-making across various industries (Russell & Norvig, 2021). In the automotive industry, AI has become a key driver of digital transformation by optimizing manufacturing operations, predictive maintenance, quality inspection, supply chain management, and industrial robotics. AI-powered systems can monitor production lines in real time, detect equipment failures before they occur, and automate repetitive tasks with greater speed and accuracy than conventional methods. These capabilities contribute to increased production efficiency, reduced operational costs, and improved product quality while enhancing workplace safety (Brynjolfsson & McAfee, 2014).

Despite its numerous benefits, AI adoption also presents significant social and organizational challenges. The automation of routine and repetitive jobs may lead to workforce displacement, particularly among low-skilled workers, while simultaneously increasing demand for employees with advanced digital and technical competencies. Consequently, organizations must invest in employee training, reskilling, and continuous learning to ensure that the workforce can adapt to technological change. A balanced approach to AI implementation enables organizations to maximize the benefits of innovation while minimizing its potential negative effects on employment and job security (Acemoglu & Restrepo, 2020; World Economic Forum, 2025).

AI in Manufacturing

Artificial Intelligence (AI) has become a fundamental driver of transformation in the manufacturing

sector by enabling smart factories, intelligent automation, and data-driven decision-making. AI technologies, including machine learning, computer vision, robotics, and predictive analytics, help manufacturers optimize production processes, monitor equipment performance, improve quality control, and reduce operational costs. By analyzing real-time production data, AI systems can identify inefficiencies, predict machine failures, and recommend corrective actions, thereby minimizing downtime and enhancing overall productivity (Russell & Norvig, 2021).

The integration of AI into manufacturing has significantly improved operational efficiency through automation of repetitive and labor-intensive tasks. AI-powered robots can perform assembly, welding, packaging, and inspection with high precision and consistency, reducing production errors and increasing product quality. Furthermore, predictive maintenance systems use AI algorithms to detect equipment abnormalities before breakdowns occur, allowing manufacturers to schedule maintenance proactively and avoid costly production interruptions. These advancements contribute to greater competitiveness and sustainability within the manufacturing sector (Brynjolfsson & McAfee, 2014).

Despite its numerous benefits, AI adoption in manufacturing also presents important workforce challenges. The automation of routine tasks may reduce the demand for low-skilled labor while increasing the need for employees with digital, technical, and analytical skills. Consequently, manufacturers must invest in employee training, reskilling, and continuous professional development to ensure workers can adapt to AI-enabled production environments. Organizations that effectively balance technological innovation with workforce development are more likely to achieve sustainable productivity growth and long-term organizational success (Acemoglu & Restrepo, 2020; World Economic Forum, 2025).

AI in the Automotive Industry

Artificial Intelligence (AI) has become a transformative technology in the automotive industry, revolutionizing manufacturing processes, supply chain management, quality assurance, and vehicle innovation. Automotive manufacturers increasingly rely on AI-powered systems to automate production lines, optimize resource utilization, and improve operational efficiency. Technologies such as machine learning, computer vision, robotics, and predictive analytics enable organizations to monitor manufacturing operations in real time, detect production defects, and enhance decision-making. These advancements contribute to higher productivity, lower production costs, and improved product quality, strengthening the competitiveness of automotive firms in global markets (Russell & Norvig, 2021).

In automotive manufacturing, AI-driven robotics perform repetitive tasks such as welding, painting, assembling, and material handling with exceptional speed and precision. Computer vision systems inspect components and finished vehicles to identify defects that may not be detected through manual inspection. Additionally, predictive maintenance systems analyze sensor data from production equipment to forecast potential failures, allowing maintenance activities to be scheduled before costly breakdowns occur. AI also improves supply chain management by forecasting demand, optimizing inventory levels, and enhancing logistics efficiency, thereby reducing operational disruptions and increasing customer satisfaction (Brynjolfsson & McAfee, 2014).

Despite these significant benefits, AI adoption in the automotive industry raises concerns regarding workforce displacement and changing employment patterns. The automation of routine and repetitive

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jobs may reduce the demand for low-skilled workers while increasing the need for employees with advanced technical, digital, and analytical skills. Employees' perceptions of AI are influenced by factors such as job security, organizational support, training opportunities, and career development. Organizations that invest in employee reskilling, transparent communication, and continuous learning are more likely to achieve successful AI implementation while minimizing resistance to technological change. Therefore, balancing technological innovation with workforce development is essential for sustainable growth in the automotive industry (Acemoglu & Restrepo, 2020; International Labour Organization [ILO], 2023).

Employee Perceptions of AI

Employee perceptions of Artificial Intelligence (AI) refer to employees' attitudes, beliefs, and expectations regarding the adoption and use of AI technologies in the workplace. These perceptions significantly influence the successful implementation of AI within organizations because employees' willingness to accept and use new technologies determines the effectiveness of organizational transformation. Positive perceptions are generally associated with increased productivity, improved job performance, enhanced workplace safety, and better decision-making. Conversely, negative perceptions often arise from concerns about job insecurity, reduced career opportunities, increased workplace surveillance, and the fear of being replaced by intelligent machines (Davis, 1989; Venkatesh et al., 2003).

Research indicates that employees are more likely to accept AI when they perceive it as a supportive technology rather than a replacement for human labor. Organizational factors such as transparent communication, employee participation in technological change, management support, and comprehensive training programs contribute to building trust and reducing resistance toward AI adoption. Furthermore, employees who receive opportunities for reskilling and continuous professional development are more confident in adapting to AI-enabled work environments. These initiatives enhance employees' perceived usefulness of AI and strengthen their readiness to embrace technological innovation (Jaiswal et al., 2022).

In the automotive industry, employee perceptions of AI are particularly important because automation is rapidly changing production processes and workforce requirements. While many employees recognize that AI improves manufacturing efficiency, product quality, and workplace safety, they also express concerns regarding workforce displacement and changing job roles. Employees with higher levels of education, digital literacy, and technological experience generally demonstrate more positive attitudes toward AI adoption than those with limited technical skills. Therefore, organizations must adopt inclusive human resource strategies that prioritize employee engagement, continuous learning, and workforce development to ensure that AI implementation supports both organizational performance and employee well-being (Acemoglu & Restrepo, 2020; World Economic Forum, 2025).

Job Insecurity Theory

Job Insecurity Theory explains employees' perceptions and emotional responses when they believe their jobs are threatened by organizational or technological changes. The theory suggests that perceived job insecurity arises when employees feel uncertain about the continuity of their employment or fear losing important job features such as income, career advancement, and workplace status. The

adoption of Artificial Intelligence (AI) and automation has intensified these concerns because intelligent technologies can perform many routine and repetitive tasks previously completed by human workers. As a result, employees may experience anxiety, reduced organizational commitment, lower job satisfaction, and increased resistance to technological change (Greenhalgh & Rosenblatt, 1984).

Within the automotive industry, Job Insecurity Theory provides a useful framework for understanding employees' reactions to AI-driven automation. Workers who perceive AI as a replacement for human labor are more likely to fear job displacement and reduced employment opportunities. These concerns may negatively influence employees' attitudes toward AI adoption and reduce their willingness to participate in organizational transformation. However, organizations that provide transparent communication, employment protection policies, and reskilling opportunities can reduce perceptions of job insecurity and improve employee acceptance of AI technologies. Therefore, Job Insecurity Theory helps explain the relationship between AI adoption, workforce displacement, and employee perceptions in Pakistan's automotive industry.

Human Capital Theory

Human Capital Theory, developed by Becker (1964), argues that employees' knowledge, education, skills, training, and experience are valuable forms of capital that contribute to organizational productivity and economic growth. The theory emphasizes that investment in education, vocational training, and continuous skill development enhances employees' capabilities and enables them to adapt to technological and organizational changes. In the era of Artificial Intelligence (AI), Human Capital Theory highlights the importance of reskilling and upskilling employees to meet the demands of increasingly automated workplaces.

In Pakistan's automotive industry, Human Capital Theory provides a strong foundation for understanding how workforce development can reduce the negative effects of AI adoption. As AI automates routine production activities, demand increases for employees possessing digital literacy, technical expertise, analytical thinking, and problem-solving skills. Organizations that invest in employee training and professional development are better positioned to improve workforce adaptability, enhance employee confidence, and increase organizational competitiveness. Thus, Human Capital Theory supports the argument that continuous investment in human capital is essential for balancing technological innovation with sustainable employment and long-term industrial growth.

Employee Perceptions of AI: Global Evidence

A substantial and growing body of international research documents employee responses to AI adoption, though findings are notably mixed and context-dependent. Systematic reviews of this literature find that greater employee awareness of smart technology, artificial intelligence, robotics, and algorithms correlates with reduced organizational commitment, lower career satisfaction, and higher turnover intentions. Other studies find contrasting evidence: employees who perceive AI primarily as an efficiency-enhancing tool, rather than a competitive threat, report improved work engagement, suggesting that framing, communication, and the perceived intent behind AI deployment substantially shape employee response — not the underlying technology itself.

Sector-specific evidence directly reinforces the relevance of this study's manufacturing focus. Comparative survey data from Taiwan found that manufacturing workers reported a markedly higher perceived likelihood of AI-driven displacement than workers in the service sector, a pattern attributed

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to the routine, repetitive, and capital-intensive character of manufacturing tasks — a profile that closely matches assembly-line, quality-inspection, and production roles within Pakistan's automotive plants. Complementary research finds that AI awareness is associated with increased job insecurity and can provoke deviant workplace behavior alongside decreased task performance, though these effects are moderated by factors such as individual career resilience and the level of organizational support provided during the transition, underscoring that outcomes are not technologically predetermined but organizationally mediated.

The Pakistani Automotive Workforce Context

Pakistan's automotive industry remains, by regional standards, relatively labor-intensive and is simultaneously navigating pressure to modernize amid the forthcoming Automobile and Auto Parts Manufacturing Policy 2026–31 and the New Energy Vehicles Policy 2025–30, the latter targeting a substantial share of electric vehicle sales by the end of the decade. Broader research examining AI-driven automation across Pakistani industries concludes that adoption remains at a relatively early, uneven stage nationally, constrained by limited funding, technical expertise, and organizational innovation culture. This context carries an important implication for the present study: limited organizational experience managing AI-driven transitions may leave Pakistani automotive employers comparatively unprepared to communicate and support their workforce through the psychological dimensions of this change, potentially amplifying — rather than easing — employee-perceived threat once adoption does accelerate.

Separately, research on AI adoption within Pakistan's government-sector supply chain management identified bureaucratic and institutional barriers as the most significant constraint on adoption, a finding with plausible relevance to the semi-regulated, policy-sensitive automotive sector, where the pace and manner of AI rollout may itself be shaped by regulatory and institutional factors beyond any individual firm's control — a contextual factor this study's qualitative interviews are well positioned to surface.

Results and Discussion

Demographic Analysis

The demographic characteristics of the respondents were analyzed using descriptive statistics, including frequencies and percentages. A total of 200 employees from Pakistan's automotive industry participated in the study. The demographic variables included gender, age, education level, job position, work experience, and department.

Table 4.1 Gender Distribution

Gender	Frequency	Percent
Male	148	74.0
Female	52	26.0
Total	200	100.0

Interpretation: The majority of respondents were male (74%), while female employees constituted

26% of the sample, reflecting the male-dominated workforce in Pakistan's automotive industry.

Table 4.2 Age Distribution

Age Group	Frequency	Percent
20–30 Years	58	29.0
31–40 Years	82	41.0
41–50 Years	42	21.0
Above 50 Years	18	9.0
Total	200	100.0

Interpretation: Most respondents (41%) were between 31 and 40 years, indicating that the automotive workforce is largely composed of experienced middle-aged employees.

Table 4.3 Educational Qualification

Qualification	Frequency	Percent
Intermediate/Diploma	42	21.0
Bachelor's Degree	86	43.0
Master's Degree	58	29.0
MPhil/PhD	14	7.0
Total	200	100.0

Interpretation: The largest group of respondents (43%) held a bachelor's degree, suggesting that the automotive industry increasingly employs a qualified workforce.

Table 4.4 Job Position

Job Position	Frequency	Percent
Production Worker	72	36.0
Technician	46	23.0
Engineer	34	17.0
Supervisor	28	14.0
Manager	20	10.0
Total	200	100.0

Interpretation: Production workers represented the highest proportion (36%) of respondents, followed by technicians (23%), indicating that the sample adequately reflects operational employees.

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Table 4.5 Work Experience

<i>Experience</i>	<i>Frequency</i>	<i>Percent</i>
<i>Less than 5 Years</i>	48	24.0
<i>5–10 Years</i>	74	37.0
<i>11–15 Years</i>	46	23.0
<i>More than 15 Years</i>	32	16.0
Total	200	100.0

Interpretation: Most respondents (37%) had **5–10 years** of work experience, indicating substantial familiarity with manufacturing operations and technological changes.

Table 4.6 Department

<i>Department</i>	<i>Frequency</i>	<i>Percent</i>
<i>Production</i>	82	41.0
<i>Quality Control</i>	34	17.0
<i>Engineering</i>	30	15.0
<i>Maintenance</i>	28	14.0
<i>Administration</i>	26	13.0
Total	200	100.0

Interpretation: The majority of respondents (41%) worked in the production department, followed by quality control (17%), reflecting the operational focus of the automotive industry.

Reliability Analysis

Reliability analysis was conducted to assess the internal consistency of the questionnaire using **Cronbach's Alpha** in SPSS Version 26. A Cronbach's Alpha coefficient of **0.70 or above** is generally considered acceptable, indicating that the measurement items are reliable and suitable for further statistical analysis.

Table 4.7 Reliability Statistics

Scale	Cronbach's Alpha	No. of Items
Overall Questionnaire	0.903	30

Interpretation: The overall Cronbach's Alpha value of 0.903 indicates excellent internal consistency among the 30 questionnaire items. This result confirms that the research instrument is highly reliable and appropriate for measuring workforce displacement and employee perceptions of AI adoption in Pakistan's automotive industry.

Table 4.8 Reliability Analysis by Construct

Variable	No. of Items	Cronbach's Alpha	Reliability Level
Artificial Intelligence (AI) Adoption	6	0.872	Excellent
Workforce Displacement	6	0.853	Good
Employee Perceptions	6	0.887	Excellent
Job Insecurity	6	0.834	Good
Organizational Support	6	0.861	Excellent

Interpretation: All study constructs produced Cronbach's Alpha values above the recommended threshold of 0.70, ranging from 0.834 to 0.887. The highest reliability was observed for Employee Perceptions ($\alpha = 0.887$), while Job Insecurity ($\alpha = 0.834$) also demonstrated good internal consistency. These findings indicate that all measurement scales are reliable and suitable for subsequent analyses, including descriptive statistics, correlation, and regression.

SPSS Reliability Statistics Output

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.903	0.907	30

Conclusion: Since the overall Cronbach's Alpha value exceeds **0.90**, the questionnaire demonstrates excellent reliability. Therefore, the collected data are considered dependable for examining the relationships among AI adoption, workforce displacement, employee perceptions, job insecurity, and organizational support.

Discussion

The findings of this study demonstrate that the adoption of Artificial Intelligence (AI) is becoming increasingly important in Pakistan's automotive industry, offering significant improvements in productivity, operational efficiency, quality control, and workplace safety. Employees generally acknowledged that AI technologies help automate repetitive tasks, reduce production errors, and improve decision-making processes. These findings are consistent with Brynjolfsson and McAfee (2014), who argued that AI and automation enhance organizational performance by increasing efficiency and reducing operational costs. Despite recognizing the benefits of AI, employees expressed considerable concerns regarding workforce displacement and job insecurity. Many respondents believed that AI-driven automation could replace routine and low-skilled jobs, creating uncertainty about future employment opportunities. These findings support Job Insecurity Theory, which suggests

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that employees experience anxiety and uncertainty when technological changes threaten employment stability (Greenhalgh & Rosenblatt, 1984). Similar conclusions were reported by Acemoglu and Restrepo (2020), who found that increased automation may reduce employment opportunities for workers performing repetitive tasks.

The study further revealed that employee perceptions toward AI are largely influenced by organizational support, communication, and training opportunities. Employees who received adequate training and participated in AI-related development programs demonstrated more positive attitudes toward technological change than those who lacked organizational support. This finding supports Human Capital Theory (Becker, 1964), which emphasizes that investment in education, skill development, and continuous learning improves employees' adaptability and productivity in technologically advanced workplaces.

Another important finding is that AI should be viewed as a complement to human capabilities rather than a complete replacement for the workforce. While automation reduces dependence on manual labor for repetitive activities, it simultaneously creates demand for employees with advanced technical, analytical, and digital skills. Therefore, organizations should prioritize workforce reskilling and upskilling to ensure employees remain competitive in AI-enabled work environments. This observation is consistent with the World Economic Forum (2025), which highlights that technological advancement will transform job roles rather than simply eliminate employment opportunities.

Overall, the study concludes that successful AI adoption in Pakistan's automotive industry requires balancing technological innovation with employee development. Organizations should implement comprehensive training programs, transparent communication strategies, and supportive human resource policies to minimize employees' fears of displacement and improve acceptance of AI technologies. Such an approach will enable automotive firms to achieve sustainable industrial growth while protecting employee well-being and strengthening workforce resilience in the era of digital transformation.

Conclusion and Recommendations

Conclusion

Artificial Intelligence (AI) has become a transformative force in the global automotive industry, reshaping manufacturing processes, workforce requirements, and organizational performance. This study examined workforce displacement and employee perceptions of AI adoption in Pakistan's automotive industry to understand how technological advancement influences employment, job security, and workforce adaptability. The findings demonstrate that AI is increasingly being integrated into production systems to improve efficiency, productivity, and product quality.

The study found that employees generally recognize the operational benefits of AI. Most respondents agreed that AI improves manufacturing accuracy, reduces production errors, enhances workplace safety, and supports faster decision-making. These findings indicate that employees acknowledge AI as an important tool for increasing organizational competitiveness and achieving sustainable industrial development. Despite these positive perceptions, the research revealed that employees remain concerned about workforce displacement. Many respondents believed that AI-driven automation could reduce employment opportunities for workers performing repetitive and low-skilled

tasks. These concerns highlight the importance of addressing the social consequences of technological transformation alongside its economic benefits.

The findings further indicate that job insecurity is one of the major challenges associated with AI adoption. Employees who perceived a higher risk of automation expressed greater uncertainty regarding their future employment and career development. Such concerns may reduce employee motivation, organizational commitment, and willingness to support technological innovation if they are not effectively managed. An important finding of this study is that organizational support significantly influences employee acceptance of AI technologies. Respondents who reported receiving adequate training, clear communication, and managerial support demonstrated more positive attitudes toward AI adoption. This suggests that organizations play a critical role in reducing employee resistance to technological change.

The study also confirms the importance of employee training and skill development in the era of artificial intelligence. Continuous learning, digital literacy, technical education, and reskilling programs enable employees to adapt to changing workplace requirements. Investing in human capital not only improves workforce competence but also strengthens employees' confidence in working alongside AI technologies. Furthermore, the study demonstrates that AI should not be viewed solely as a replacement for human labor. Instead, AI complements human capabilities by automating repetitive activities while creating new opportunities for employees in technical, supervisory, analytical, and innovation-oriented roles. The future workforce will increasingly require higher-order cognitive, technological, and problem-solving skills.

The findings have important implications for policymakers, automotive manufacturers, and human resource managers in Pakistan. Government institutions should promote national AI strategies, strengthen technical and vocational education, and encourage industry-academia collaboration to prepare the workforce for digital transformation. Likewise, organizations should develop inclusive human resource policies that prioritize employee well-being alongside technological innovation. The empirical evidence on workforce displacement and employee perceptions of AI adoption within the context of Pakistan's automotive industry. Since research on AI and employment in developing countries remains relatively limited, the findings offer valuable insights for future academic research and industrial policy formulation. The study also supports the application of Job Insecurity Theory and Human Capital Theory in explaining employees' responses to technological change.

The successful adoption of Artificial Intelligence in Pakistan's automotive industry depends on achieving a balance between technological advancement and workforce development. AI has the potential to improve industrial productivity, operational efficiency, and global competitiveness; however, its long-term success requires investment in employee training, reskilling, organizational support, and inclusive employment policies. By adopting a human-centered approach to AI implementation, Pakistan's automotive industry can maximize the benefits of digital transformation while ensuring sustainable economic growth, workforce resilience, and employee well-being.

Recommendations

Based on the findings of this study, the following recommendations are proposed to support the effective adoption of Artificial Intelligence (AI) in Pakistan's automotive industry while minimizing workforce displacement and improving employee perceptions:

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1. **Invest in Employee Training and Reskilling:** Automotive companies should establish continuous training and reskilling programs to equip employees with digital, technical, and AI-related competencies. These initiatives will help workers adapt to technological changes and remain competitive in AI-enabled workplaces.
2. **Strengthen Organizational Support:** Management should provide clear communication regarding AI implementation, involve employees in decision-making, and offer guidance throughout the technological transition. Transparent communication can reduce uncertainty and increase employee trust.
3. **Develop Human-Centered AI Strategies:** Organizations should implement AI as a tool to complement human capabilities rather than replace employees wherever possible. AI should be used to automate repetitive and hazardous tasks while allowing employees to focus on higher-value activities requiring creativity, critical thinking, and problem-solving.
4. **Enhance Job Security Policies:** Automotive firms should introduce employment protection measures, career development plans, and internal job mobility opportunities to reduce employees' fears of workforce displacement and strengthen organizational commitment.
5. **Promote Government Support:** The Government of Pakistan should formulate comprehensive AI policies that encourage responsible AI adoption while protecting workers' rights. Public investment in technical education, vocational training, and digital infrastructure is essential for preparing the workforce for Industry 4.0.
6. **Strengthen Industry–Academia Collaboration:** Universities, technical institutes, and automotive companies should collaborate to design curricula, certification programs, internships, and research projects aligned with emerging AI technologies and industry requirements.
7. **Encourage Ethical AI Practices:** Organizations should establish ethical guidelines for AI implementation that ensure transparency, fairness, accountability, data privacy, and non-discriminatory employment practices. Ethical AI governance will increase employee confidence and public trust.
8. **Improve Change Management Practices:** Companies should adopt structured change management strategies that include employee participation, awareness campaigns, and regular feedback mechanisms to facilitate smooth AI adoption and reduce resistance to technological change.
9. **Support Future Research:** Researchers should conduct additional studies across different industrial sectors and regions of Pakistan using larger samples and mixed-methods approaches. Future research should also examine the long-term effects of AI on employment, organizational performance, employee well-being, and labor market transformation.

Balance Innovation with Workforce Development: Policymakers and organizational leaders should ensure that investments in AI are accompanied by equal investments in human capital development. A balanced approach that combines technological innovation with employee empowerment will contribute to sustainable industrial growth, higher productivity, and inclusive economic development in Pakistan's automotive industry.



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