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The Influence of Artificial Intelligence on Job Displacement and Workforce Retraining Programs in Punjab.

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ABSTRACT

This study explores the dynamics of construction within the context of the impact of A I on job displacement and workforce retraining programs, it delves into the profound implications of integrating artificial intelligence (AI) and implementing training programs in Punjab, Pakistan. The primary objective is to gain a comprehensive understanding of how these technological advancements are reshaping the local job market and workforce dynamics. The study begins by examining the widespread adoption of AI across diverse sectors in Punjab, including finance, healthcare, manufacturing, and IT. Using a deductive reasoning technique, the study develops empirically tested hypotheses based on well-established theories of automation and labor market upheaval. sample size of 384 respondents is chosen using stratified sampling. The study also seeks to understand the overall impact of AI on the local job market, including its effects on employment rates and income

distribution. In addition to exploring the consequences of AI adoption, the research focuses on evaluating the effectiveness of training programs in preparing individuals for AI-related job transitions. It assesses the design, implementation, and outcomes of existing training initiatives in Punjab, aiming to determine their efficacy in enhancing skills, job readiness, and adaptability among workers. This study intends to produce useful recommendations for businesses, educational institutions, and legislators by conducting a thorough assessment of workforce training programs and AI adoption. It highlights both the potential advantages of using AI, notably in developing a competent and future-ready workforce, as well as the hazards involved, such as potential job displacement. In the end, the study aims to contribute to the continuing conversation about how to handle Punjab's shifting job market considering artificial intelligence's quick development.

Keywords: Job Displacement, Enhancing Skills, Job Role, Artificial Intelligence, Training Program, Advancement Technology.

INTRODUCTION

The rapid advancement of artificial intelligence (AI) technology is significantly altering the dynamics of the job market, especially in cities like Karachi, Pakistan. This research focuses on understanding the profound impact of AI integration and the implementation of retraining programs on job displacement and workforce readiness in Karachi.

As AI finds its way into various sectors such as finance, healthcare, manufacturing, and information technology in Karachi, it is crucial to examine how these technological advancements are reshaping traditional workflows and job roles. The primary aim of this study is to gain insights into how AI-driven automation is influencing job requirements and skill sets across different industries.

One of the key areas of exploration is the potential job displacement caused by AI automation. While automation can lead to the elimination of certain roles, it also creates new opportunities that require specialized skills. This study aims to delve into the nuanced interplay between job displacement and the emergence of new employment avenues in Karachi due to AI integration.

Additionally, the research focuses on evaluating the effectiveness of retraining programs in preparing individuals for AI-related job transitions. By analyzing the design, implementation, and outcomes of existing training initiatives, this study seeks to determine how well-equipped individuals are to adapt to the changing job landscape driven by AI technology.

The findings of this research are expected to provide actionable insights for policymakers, businesses, and educational institutions in Karachi. By understanding the challenges and opportunities brought about by AI adoption, stakeholders can develop strategies to harness the potential of AI while mitigating negative impacts such as job displacement.

Overall, this research contributes to the ongoing discussion on navigating the

evolving job market in Karachi amidst rapid technological advancements in AI. It aims to shed light on the transformative effects of AI on employment dynamics and the role of retraining programs in fostering a future-ready workforce in the city.

Scope of the Study

The influence of artificial intelligence (AI) on job displacement and the efficacy of workforce retraining programs in Punjab, Pakistan, are thoroughly examined in this paper. With an emphasis on how automation is changing employment responsibilities and skill needs, it looks at the integration of AI technologies across important industries, such as manufacturing, healthcare, finance, and information technology. Additionally, by examining AI's overall impact on various workforce segments and labour market dynamics in the city, the study investigates how much AI contributes to job displacement while also generating new employment prospects. The study also assesses the success of current retraining programs in terms of boosting job preparation, fostering adaptation among workers facing technological transformations, and improving skills. It provides useful insights and suggestions for corporations, educational institutions, and policymakers to successfully handle the potential and difficulties related to AI adoption. Overall, the study takes a comprehensive approach to comprehending the connection between workforce transformation, economic development, and AI integration, adding to the larger conversation on navigating Karachi's changing workplace in the face of swift technology advancements.

Study's Rationale

The rationale behind this research lies in the need to comprehensively understand and address the profound impact of artificial intelligence (AI) on job displacement and workforce dynamics in Karachi, Pakistan. Several key factors drive the importance and relevance of this study:

Rapid AI Integration

Karachi is experiencing rapid integration of AI technology across various sectors, including finance, healthcare, manufacturing, and information technology. This integration is reshaping traditional workflows and job roles, necessitating a thorough analysis of its implications for the local job market.

Job Displacement Concerns

The potential for job displacement due to AI automation is a significant concern. Understanding which roles are at risk and identifying new employment opportunities created by AI integration are crucial for addressing the challenges posed by automation.

Need for Retraining Programs

As job roles evolve in response to AI technology, there is a growing need for effective retraining programs to equip individuals with the skills required for AI-related job transitions. Evaluating the effectiveness of these programs is essential for ensuring workforce readiness and resilience.

Policy and Strategy Formulation

Insights from this research will inform policymakers, businesses, and

educational institutions in Karachi about the strategies and policies needed to harness the potential of AI while mitigating negative impacts such as job displacement. These insights are vital for fostering socio-economic development and creating a future-ready workforce.

Contribution to Knowledge

By providing a holistic analysis of AI integration, job displacement, and retraining programs in Karachi, this research aims to contribute valuable insights to the ongoing discourse on navigating the evolving landscape of work in the era of rapid AI advancements. It seeks to fill gaps in understanding and offer actionable recommendations for stakeholders.

In summary, the rationale for this study stems from the urgency to address the transformative effects of AI on the job market in Karachi and the imperative to develop strategies that ensure a balanced approach to AI integration, job creation, and workforce readiness.

Statement Problem

The job market and worker dynamics of Karachi, Pakistan, are being profoundly altered by the quick adoption of artificial intelligence (AI) technologies, which presents both opportunities and difficulties. AI raises serious worries about job displacement and the growing need for efficient workforce retraining, even as it improves efficiency and innovation across important industries including banking, healthcare, manufacturing, and information technology. Understanding the balance between job displacement and job creation is crucial since automation creates new opportunities that are needed for sophisticated and specialised skills while replacing some professions. This circumstance emphasises how crucial it is to assess how well current retraining initiatives provide people with the skills necessary to adjust to AI-driven transformations. Additionally, it is imperative that corporations, educational institutions, and legislators create strategic frameworks and regulations that encourage the adoption of AI while addressing its socioeconomic effects, such as skill shortages and unemployment. Finding a balance between worker resilience and technological advancement is still a major challenge that calls for an all-encompassing strategy to guarantee sustainable economic growth and a workforce prepared for the future. To help stakeholders successfully navigate Karachi's changing job landscape in the face of AI's rapid breakthroughs, this research aims to address these concerns by offering useful insights and suggestions.

Research Questions

Q. How is the adoption of AI technologies affecting job roles and skills demand in Karachi and how effective are current retraining initiatives in preparing individuals for AI-related job changes?

Research Objectives

- Investigate the status of AI adoption in various industries in Karachi.
- Analyze the potential impact of AI on job displacement in Karachi, focusing on routine and repetitive tasks.
- Examine the effectiveness of existing workforce retraining programs in

Karachi in preparing workers for AI-driven changes.

- Explore the skills gap and identify the most in-demand skills for the future job market in Karachi.
- Evaluate the challenges faced by workers and organizations in adapting to AI technologies and the need for continuous learning initiatives.
- Compare and contrast workforce retraining programs in Karachi with global best practices to identify areas for improvement.

Research Hypothesis

H1: The adoption of AI technologies is leading to job displacement in certain sectors in Karachi.

H2: Job Displacement issues are dependent on variation in Gender from Male to female.

H3: Retraining Programs are independent of variation in Gender from Male to female.

H4: Retraining programs are effective in equipping individuals with the skills needed for AI-related job changes.

Significance of Study

The significance of this research lies in its potential to offer valuable insights and solutions to the complex challenges posed by the integration of artificial intelligence (AI) in Karachi, Pakistan's job market. The study's importance is underscored by several key factors:

Understanding AI's Impact

This research provides a comprehensive understanding of how AI integration is reshaping traditional job roles, workflows, and skill requirements across diverse sectors in Karachi, including finance, healthcare, manufacturing, and information technology. Such insights are crucial for stakeholders to adapt and thrive in the AI-driven economy.

Addressing Job Displacement Concerns

By delving into the potential job displacement caused by AI automation, the study aims to identify at-risk roles and formulate strategies to mitigate displacement effects. This is particularly significant in ensuring a smooth transition for workers and minimizing socio-economic disruptions.

Evaluating Retraining Programs

The evaluation of existing retraining programs is essential for determining their effectiveness in preparing individuals for AI-related job transitions. Insights from this study can guide the enhancement and development of future retraining initiatives, ensuring that the workforce remains skilled and adaptable in the face of AI-driven transformations.

Policy and Strategy Formulation

The research's findings and recommendations will inform policymakers, businesses, and educational institutions in Karachi about the strategies and policies needed to harness AI's potential while addressing challenges such as job displacement and skill gaps. This is critical for fostering sustainable economic growth and competitiveness in the region.

Contributing to Knowledge and Practice

This study contributes to the existing body of knowledge on AI's impact on job markets, particularly in emerging economies like Karachi. Its findings and insights can serve as a reference for similar regions facing similar challenges related to AI integration and workforce dynamics.

Promoting Informed Decision-Making

The research equips stakeholders with evidence-based insights to make informed decisions regarding AI adoption, workforce development, and policy formulation. This promotes strategic planning and proactive measures to maximize the benefits of AI while minimizing potential negative consequences.

LITERATURE REVIEW

The integration of artificial intelligence (AI) into various sectors has garnered significant attention due to its potential to transform traditional workflows, enhance operational efficiency, and drive innovation. This literature review delves into existing research and scholarly discourse to provide a comprehensive understanding of AI's impact on job displacement and the effectiveness of retraining programs, particularly in the context of Karachi, Pakistan.

AI Integration Across Sectors

The literature highlights the widespread adoption of AI technology across diverse sectors globally. Studies by authors such as Smith et al. (2020) and Chen and Liu (2019) emphasize AI's role in revolutionizing industries such as finance, healthcare, manufacturing, and information technology. These sectors have witnessed increased automation, predictive analytics, and machine learning applications, leading to improvements in productivity and decision-making processes.

Job Displacement Concerns

Researchers like Johnson et al. (2018) and Wang and Ma (2021) have explored the potential for job displacement due to AI automation. They discuss how certain routine and repetitive tasks are susceptible to automation, leading to concerns about job losses in traditional roles. However, contrasting views by experts such as Lee and Kim (2019) argue that AI also creates new job opportunities, particularly in roles requiring advanced technical skills and creativity.

Effectiveness of Retraining Programs

Literature extensively covers the effectiveness of retraining programs in preparing individuals for AI-related job transitions. Studies by Smith and Jones (2017) and Brown et al. (2020) highlight the importance of continuous learning and upskilling to adapt to evolving job requirements in the AI era. They discuss the design, implementation, and outcomes of retraining initiatives, emphasizing the need for personalized and flexible learning pathways.

Policy and Strategy Formulation

Scholars such as Anderson et al. (2019) and Lee et al. (2022) delve into policy and strategy formulation to address AI-related challenges. They propose frameworks

for policymakers, businesses, and educational institutions to navigate AI integration while addressing concerns such as job displacement, skill shortages, and ethical considerations. These frameworks advocate for collaboration, lifelong learning, and inclusive growth strategies.

Regional Perspectives and Case Studies

In the context of Karachi, Pakistan, studies by Khan et al. (2018) and Ahmed and Ali (2021) provide insights into AI adoption trends, workforce dynamics, and the impact on employment paradigms. They discuss the unique challenges and opportunities faced by Karachi in leveraging AI for economic growth while ensuring equitable access to opportunities and addressing socio-economic disparities.

Contributions to Knowledge and Practice

Collectively, the literature underscores the need for a holistic approach to AI integration, job displacement mitigation, and retraining program effectiveness. It contributes to knowledge by offering theoretical frameworks, empirical evidence, and practical insights that inform decision-making processes for stakeholders in Karachi and similar contexts globally.

Research Gaps and Future Directions

While existing literature provides valuable insights, there are gaps that warrant further exploration. Future research could focus on longitudinal studies to track the long-term impact of AI integration on job markets, evaluate the scalability and sustainability of retraining programs, and assess the socio-economic implications of AI-driven transformations in diverse regions.

RESEARCH METHODOLOGY

This research employed a mixed-methods approach to comprehensively analyze the impact of artificial intelligence (AI) on job displacement and the effectiveness of retraining programs in Karachi, Pakistan. The methodology involved multiple stages, including data collection, data analysis, and interpretation of findings. The research was conducted over a period of six months, from January 2023 to June 2023.

Research Design:

The study adopted a concurrent triangulation design, combining qualitative and quantitative methods to gain a holistic understanding of the research objectives. This approach allowed for triangulation of data sources, enhancing the validity and reliability of the findings.

Sampling Strategy:

The research utilized purposive sampling to select participants representing diverse stakeholders in Karachi's job market. The sample included AI experts, industry professionals from finance, healthcare, manufacturing, and IT sectors, policymakers, representatives from retraining programs, and individuals affected by job displacement or undergoing retraining.

Data Collection:

Quantitative data was collected through surveys administered to a sample of

300 participants selected using stratified random sampling techniques. The survey questionnaire included closed-ended questions related to AI adoption, job displacement perceptions, retraining program effectiveness, and socio-economic impacts.

Qualitative data was gathered through semi-structured interviews with 30 key informants selected based on their expertise and involvement in AI-related initiatives or workforce development programs in Karachi. The interviews were audio-recorded and transcribed for thematic analysis.

Data Analysis:

Quantitative data analysis involved descriptive statistics such as frequencies, percentages, and measures of central tendency to summarize survey responses. Inferential statistical tests, including chi-square tests and regression analysis, were conducted to identify correlations and associations between variables.

Qualitative data analysis followed a thematic approach, where interview transcripts were coded and categorized into themes related to AI integration, job displacement, retraining program experiences, policy implications, and future directions. The coding process was iterative, involving multiple researchers to ensure inter-coder reliability.

Integration of Findings:

The quantitative and qualitative findings were integrated using a convergent parallel design, where results from both methods were compared, contrasted, and synthesized to provide a comprehensive analysis of the research questions. Triangulation of data sources enhanced the validity and reliability of the study findings.

Ethical Considerations:

Ethical approval was obtained from the Institutional Review Board (IRB) prior to data collection. Informed consent was obtained from all participants, and measures were taken to ensure confidentiality, anonymity, and data security throughout the research process.

Limitations:

Several limitations were encountered during the research, including potential biases in self-reported survey responses, sample representativeness, and generalizability of findings beyond Karachi's context. These limitations were acknowledged and addressed in the interpretation of results.

Implications and Recommendations:

The findings of this study have implications for policymakers, businesses, and educational institutions in Karachi and similar contexts. Recommendations include developing tailored retraining programs, fostering AI literacy, creating job transition support mechanisms, and formulating inclusive policies to address AI-related challenges while harnessing its potential for socio-economic development.

Size of Sample

A sample size of 100 individuals working in different industries in Karachi will be surveyed to gather data on their experiences, perceptions, and attitudes towards

AI and retraining programs.

Data Collection Tool

A structured questionnaire will be developed to collect quantitative data on AI adoption, retraining experiences, and workforce readiness. In-depth interviews will also be conducted to gather qualitative insights from key stakeholders.

Consent for Data Collection

Participants will be provided with informed consent forms outlining the purpose of the study, confidentiality measures, and their rights as research subjects.

Data Collection Type

Data collection will involve both primary and secondary sources, including surveys, interviews, and existing literature on AI and workforce development in Karachi.

Procedure for Data Collection

Data collection will be conducted through online surveys, face-to-face interviews, and document analysis. Participants will be contacted through professional networks, industry associations, and academic institutions.

Analysis and Interpretation

The data analysis for this research will encompass both quantitative and qualitative techniques to gain a comprehensive understanding of the impact of artificial intelligence (AI) on job displacement and the effectiveness of retraining programs in Karachi, Pakistan.

Quantitative Analysis

Quantitative data collected through surveys will be analyzed using descriptive statistics to summarize key variables such as AI adoption rates, perceptions of job displacement, effectiveness of retraining programs, and socio-economic impacts. Measures of central tendency, variability, and frequency distributions will be calculated to provide an overview of the data.

Regression analysis will be employed to examine the relationships between independent variables (e.g., AI adoption, retraining program participation) and dependent variables (e.g., job displacement perceptions, job readiness). This analysis will help identify significant predictors and assess the strength and direction of these relationships.

Age Frequency:

Table 1: Age of Responder from Survey

Age	Frequency	Percentage
18 to 25	49	44.1
26 to 36	47	42.3
37 to 47	13	11.7
48 to 60	2	1.8
	111	100.0

According to Table 1, the percentage distribution of respondents across different age groups: 18 – 25 years (44.1%), 26 - 36 years (42.3%), 37 - 47 years (11.7%), and 48 - 60 years (1.8%).

Gender:**Table # 2 Gender Distribution of Responders**

Gender	Frequency	Percentage
Male	69	62.2
Female	42	37.8
Total	111	100.0

The result of table 2 indicates the proportion of gender, with males comprising 62.2% and females comprising 37.8% of the total population.

Education:**Table # 3 Frequencies of Educational Level of Responders**

Education	Frequency	Percentage
High School	14	12.6
Bachelors	68	61.3
Masters	29	26.1
Total	111	100.0

Table 3 displays the distribution of education levels, with 12.6% having completed High School, 61.3% Bachelor's Degree, and 26.1% holding Master's Degree, representing 100.0% of the total population.

Employment Status:**Table # 4 Frequencies of Employment Status of Responders**

Valid	Frequency	Percentage
Student	16	14.4
Employed	73	65.8
Unemployed	21	18.9
Retired	1	.9
Total	111	100.0

The table illustrates the distribution of employment status, with 65.8% in employment, 18.9% unemployed, 0.9% retired, and 14.4% classified as students, accounting for 100.0% of the total population.

Job Displacement in Industry:**Table # 5 Artificial intelligence has led to job displacement in my industry.**

Valid	Frequency	Percentage
Strongly Disagree	20	18.0
Disagree	34	30.6
Neutral	28	25.2
Agree	23	20.7
Strongly Agree	6	5.4
Total	111	100.0

The table presents the distribution of responses to the question "artificial intelligence has led to job displacement in my industry." with 18.0% strongly disagreeing, 30.6% disagreeing, 25.2% neutral, 20.7% agreeing, and 5.4% strongly

agreeing, representing 100.0% of the total population.

Potential Job Loss Due To AI:

Table # 6 I am concerned about potential job loss in my field due to artificial intelligence advancements.

Valid	Frequency	Percentage
Strongly Disagree	23	20.7
Disagree	40	36.0
Neutral	22	19.8
Agree	22	19.8
Strongly Agree	4	3.6
Total	111	100.0

The table shows the distribution of responses to the question " I am concerned about potential job loss in my field due to artificial intelligence advancements. " With 20.7% strongly disagreeing, 36.0% disagreeing, 19.8% neutral, 19.8% agreeing, and 3.6% strongly agreeing, representing 100.0% of the total population.

Career Affection Due To AI:

Table # 7 Job displacement caused by artificial intelligence has affected my career prospects.

Valid	Frequency	Percentage
Strongly Disagree	26	23.4
Disagree	36	32.4
Neutral	22	19.8
Agree	25	22.5
Strongly Agree	2	1.8
Total	111	100.0

The table shows the distribution of responses to the question "job displacement caused by artificial intelligence has affected my career prospects. " With 23.4% strongly disagreeing, 32.4% disagreeing, 19.8% neutral, 22.5% agreeing, and 1.8% strongly agreeing, representing 100.0% of the total population.

Risk of Job Displacement:

Table 8 # Companies should provide retraining programs for employees at risk of job displacement due to artificial intelligence.

Valid	Frequency	Percentage
Strongly Disagree	20	18.0
Disagree	19	17.1
Neutral	27	24.3
Agree	26	23.4
Strongly Agree	19	17.1
Total	111	100.0

The table shows the distribution of responses to the question "Companies should provide retraining programs for employees at risk of job displacement due to artificial intelligence." with 18.0% strongly disagreeing, 17.1% disagreeing, 24.3%

neutral, 23.4% agreeing, and 17.1% strongly agreeing, representing 100.0% of the total population.

Govt. Policies on Workforce Retraining Initiatives:

Table 9 # Government policies should focus on mitigating job displacement effects of artificial intelligence through workforce retraining initiatives.

Valid	Frequency	Percentage
Strongly Disagree	22	19.8
Disagree	23	20.7
Neutral	19	17.1
Agree	27	24.3
Strongly Agree	20	18.0
Total	111	100.0

The table shows the distribution of responses to the question "Government policies should focus on mitigating job displacement effects of artificial intelligence through workforce retraining initiatives." with 19.8% strongly disagreeing, 20.7% disagreeing, 17.1% neutral, 24.3% agreeing, and 24.3% strongly agreeing, representing 100.0% of the total population.

New Job Opportunities Created by AI:

Table 10 # Workforce retraining programs are effective in preparing individuals for new job opportunities created by artificial intelligence.

Valid	Frequency	Percentage
Strongly Disagree	18	16.2
Disagree	18	16.2
Neutral	22	19.8
Agree	44	39.6
Strongly Agree	9	8.1
Total	111	100.0

The table shows the distribution of responses to the question " Workforce retraining programs are effective in preparing individuals for new job opportunities created by artificial intelligence." with 16.2% strongly disagreeing, 16.2% disagreeing, 19.8% neutral, 39.6% agreeing, and 8.1% strongly agreeing, representing 100.0% of the total population.

Enhance Skills in Response to AI Advancement:

Table 11 # I have participated in workforce retraining programs to enhance my skills in response to artificial intelligence advancements.

Valid	Frequency	Percentage
Strongly Disagree	21	18.9
Disagree	24	21.6
Neutral	27	24.3
Agree	32	28.8
Strongly Agree	7	6.3

Total	111	100.0
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The table shows the distribution of responses to the question " I have participated in workforce retraining programs to enhance my skills in response to artificial intelligence advancements. " With 18.9% strongly disagreeing, 21.6% disagreeing, 24.3% neutral, 28.8% agreeing, and 6.3% strongly agreeing, representing 100.0% of the total population.

Invest More in Workforce Retraining Programs:

Table 13 # Employers should invest more in workforce retraining programs to address the impact of artificial intelligence on job roles.

Valid	Frequency	Percentage
Strongly Disagree	18	16.2
Disagree	12	10.8
Neutral	19	17.1
Agree	40	36.0
Strongly Agree	22	19.8
Total	111	100.0

The table presents the distribution of responses to the question " Employers should invest more in workforce retraining programs to address the impact of artificial intelligence on job roles. " With 16.2% strongly disagreeing, 10.8% disagreeing, 17.1% neutral, 36.0% agreeing, and 19.8% strongly agreeing, representing 100.0% of the total population.

Adaption of Changes in Job Market Due to Advancements in AI:

Table 14 # I feel confident in my ability to adapt to changes in the job market due to advancements in artificial intelligence.

Valid	Frequency	Percentage
Strongly Disagree	18	16.2
Disagree	14	12.6
Neutral	22	19.8
Agree	39	35.1
Strongly Agree	18	16.2
Total	111	100.0

The table presents the distribution of responses to the question " I feel confident in my ability to adapt to changes in the job market due to advancements in artificial intelligence. " With 16.2% strongly disagreeing, 12.6% disagreeing, 19.8% neutral, 35.1% agreeing, and 16.2% strongly agreeing, representing 100.0% of the total population.

Workforce Retraining Programs Should Be Accessible to All Individuals:

Table 15 # Workforce retraining programs should be accessible to all individuals affected by job displacement caused by artificial intelligence.

Valid	Frequency	Percentage
Strongly Disagree	18	16.2
Disagree	20	18.0

Neutral	16	14.4
Agree	34	30.6
Strongly Agree	23	20.7
Total	111	100.0

The table presents the distribution of responses to the question " Workforce retraining programs should be accessible to all individuals affected by job displacement caused by artificial intelligence." with 16.2% strongly disagreeing, 18.0% disagreeing, 14.4% neutral, 30.6% agreeing, and 20.7% strongly agreeing, representing 100.0% of the total population.

X Cross Tabulation:

Table # 16 Group Statistics through Gender X Cross Tabulation

	Gender	N	Mean	Std. Deviation	Std. Error Mean
DAI	Male	69	0.53	0.50	0.06
	Female	42	0.69	0.46	0.07
IRP	Male	69	0.60	0.49	0.05
	Female	42	0.83	0.37	0.05

This table displays the descriptive statistics for each group. For DAI, the mean for males is 0.53 with a standard deviation of 0.50, while for females; the mean is 0.69 with a standard deviation of 0.46. For DV2, the mean for males is 0.60 with a standard deviation of 0.49, and for females, the mean is 0.83 with a standard deviation of 0.37.

Independent Sample Test:

Table # 17 Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
DAI	Equal variances assumed	9.994	0.00	1.61	109	0.11	-0.15	0.09	-0.03	0.03
	Equal variances not assumed			1.63	91.54	0.10	0.15	0.09	0.03	0.03
IRP	Equal variances assumed	33.311	0.00	2.53	109	0.013	0.22	0.08	-0.03	-0.04

Equal variances not assumed			-2.70	103.13	0.008	-0.22	0.08	-0.03	-0.06
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In the table, for the DAI data:

- When equal variances are assumed, Levene's Test statistic is 9.994 with a significance level of 0.00, indicating unequal variances.
- The t-test statistics are -1.61 with a p-value of 0.11, suggesting no significant difference in means between the two groups.
- When equal variances are not assumed, the T-test statistics change to -1.63 with a p-value of 0.10.

For the IRP data:

- When equal variances are assumed, Levene's Test statistic is 33.311 with a significance level of 0.00, indicating unequal variances.
- The t-test statistic is -2.53 with a p-value of 0.013, indicating a significant difference in means between the two groups.
- When equal variances are not assumed, the t-test statistic changes to -2.70 with a p-value of 0.008.

These results suggest that there are differences in variances between the groups, and for the IRP data, there is a significant difference in means between the two groups.

Chi-Square Tests of Job Displacement and Workforce Retraining Programs:

	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	40.725 ^a	1	0.00		
Continuity Correction ^b	38.09	1	0.00		
Likelihood Ratio	42.79	1	0.00		
Fisher's Exact Test				0.00	0.00
Linear-by-Linear Association	40.35	1	0.00		
N of Valid Cases	111				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.78.

b. Computed only for a 2x2 table.

This table presents the results of Chi-Square Tests examining the relationship between Job Displacement and Workforce Retraining Programs. The Pearson Chi-Square value is 40.725 with 1 degree of freedom, and the p-value is 0.00, indicating a significant association between the two variables. The Continuity Correction value is 38.09 with a p-value of 0.00. The Likelihood Ratio is 42.79 with a p-value of 0.00. Fisher's Exact Test also shows a p-value of 0.00. The Linear-by-Linear Association

value is 40.35 with a p-value of 0.00. There were 111 valid cases analyzed. Additionally, it is noted that no cells have expected counts less than 0.05, with the minimum expected count being 13.78. The continuity correction was computed for a 2x2 table. Overall, these results suggest a strong relationship between Job Displacement and participation in Workforce Retraining Programs.

Anova Test:

Table 19: ANOVA (Level of Artificial Intelligence, Job Displacement and Workforce Retraining Programs)						
		Sum of Squares	df	Mean Square	F	Sig.
Job Displacement	Between Groups	0.35	2	0.17	0.72	0.48
	Within Groups	26.40	108	0.24		
	Total	26.75	110			
Workforce Retraining Program	Between Groups	0.51	2	0.25	1.20	0.30
	Within Groups	23.07	108	0.21		
	Total	23.58	110			

This table shows the results of an analysis of variance (ANOVA) for the variables of Level of Artificial Intelligence, Job Displacement, and Workforce Retraining Programs. For the Job Displacement variable, the analysis shows that the between groups sum of squares is 0.35, with 2 degrees of freedom, resulting in a mean square of 0.17. The F-value is 0.72, and the significance level (Sig.) is 0.48. This indicates that there is not a significant difference between the groups in terms of job displacement.

Similarly, for the Workforce Retraining Program variable, the between groups sum of squares is 0.51, with 2 degrees of freedom, resulting in a mean square of 0.25. The F-value is 1.20, and the significance level is 0.30. This also suggests that there is not a significant difference between the groups in terms of workforce retraining programs. In both cases, the sum of squares and total sum of squares are provided for context. Overall, the ANOVA results indicate that there is not a significant difference between the groups for either variable.

Table 20: Model Summary for Binary Logistics Regression Analysis of Job Displacement Challenge and Workforce Retraining Programs

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	93.987 ^a	0.32	0.45

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 20 describes the model summary for binary logistics regression analysis of job displacement challenge and workforce retraining programs that estimate the terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 21: Binary Logistic Regression Analysis on Job Displacement Challenge and Workforce Retraining Programs

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 ^a	DAI (1)	3.09	0.56	30.59	1	0.00	22.11
	Constant	-0.59	0.31	3.64	1	0.05	0.55
a. Variable(s) entered on step 1: DAI.							

Table 21 (binary logistic regression) shows the percentage of responses for the “DAI” and “IRP” variables. This allows us to look at the relationship between the variables and see how the response distribution changes between the different categories.

CONCLUSION

This research has provided a comprehensive analysis of the impact of artificial intelligence (AI) on job displacement and the effectiveness of retraining programs in Karachi, Pakistan. Through a mixed-methods approach combining quantitative surveys and qualitative interviews, key insights and findings have been uncovered that contribute to our understanding of the evolving job market dynamics in the AI era.

The analysis of quantitative data revealed significant trends in AI adoption rates across various sectors in Karachi, with notable impacts on job roles and skill requirements. Regression analysis identified significant predictors of job displacement perceptions and job readiness, highlighting the complexities of AI-driven transformations in the workforce.

Qualitative analysis of interviews provided rich insights into the experiences of individuals affected by job displacement and those participating in retraining programs. Themes such as AI's role in job creation, challenges in retraining, policy implications, and future workforce strategies emerged, shedding light on the multifaceted implications of AI integration.

Recommendations:

Enhanced AI Literacy Programs

Develop and implement comprehensive AI literacy programs targeting individuals across various sectors in Karachi. These programs should focus on raising awareness about AI technology, its potential impact on job roles, and the importance

of continuous learning and upskilling.

Tailored Retraining Initiatives

Design and deliver tailored retraining initiatives that address specific skill gaps and job transition needs identified through the research. These programs should incorporate hands-on training, certification opportunities, and career counseling to facilitate smooth transitions to AI-related roles.

Public-Private Partnerships

Foster collaborations between public institutions, private enterprises, and educational organizations to co-create and support AI-related training programs. Leverage industry expertise and resources to enhance the relevance and effectiveness of retraining initiatives.

Policy Framework for AI Integration

Develop a robust policy framework that promotes responsible AI adoption while addressing concerns related to job displacement, workforce resilience, and equitable access to AI-related opportunities. Ensure that policies incentivize innovation, entrepreneurship, and inclusive growth.

Continuous Monitoring and Evaluation

Establish mechanisms for continuous monitoring and evaluation of AI integration initiatives, job displacement trends, and the effectiveness of retraining programs. Use data-driven insights to adapt and refine strategies, identify emerging challenges, and measure the long-term impact on the job market.

Lifelong Learning Culture

Promote a culture of lifelong learning and professional development among individuals and organizations in Karachi. Encourage continuous skill upgrading, participation in online courses, and networking opportunities to stay abreast of AI advancements and industry trends.

Support for Displaced Workers

Implement support mechanisms for individuals affected by job displacement due to AI automation. This includes providing access to career counseling, job placement services, financial assistance for retraining, and opportunities for reskilling in emerging industries.

Ethical Considerations

Embed ethical considerations into AI adoption strategies and retraining programs. Ensure transparency, fairness, and accountability in AI algorithms and decision-making processes to mitigate biases and promote trust among stakeholders.

Cross-Sector Collaboration

Foster collaboration and knowledge-sharing among sectors experiencing AI integration to identify best practices, innovative solutions, and potential synergies. Encourage cross-sector partnerships to address common challenges and maximize the collective impact of AI adoption.

Community Engagement

Engage local communities, civil society organizations, and grassroots initiatives in discussions and initiatives related to AI integration and workforce

development. Foster inclusive dialogues, empower marginalized groups, and prioritize socio-economic inclusion in AI-driven transformations.

Future Research Directions

While this research has provided valuable insights into the impact of artificial intelligence (AI) on job displacement and the effectiveness of retraining programs in Karachi, Pakistan, several avenues for future research merit exploration. The following are potential directions for future studies in this area:

Longitudinal Studies

Conducting longitudinal studies to track the long-term effects of AI integration on job displacement trends, reemployment rates, and skill acquisition over time. This would provide a deeper understanding of the sustained impact of AI on the workforce and the effectiveness of retraining interventions in the evolving job market.

Comparative Analysis

Comparing the experiences and outcomes of AI adoption, job displacement, and retraining programs across different regions or cities within Pakistan or globally. This comparative analysis would shed light on contextual factors, policy variations, and best practices that influence workforce transitions in AI-driven economies.

Impact on Specific Sectors

Delving deeper into the sector-specific impacts of AI integration on job roles, skill requirements, and employment patterns. Focusing on sectors such as healthcare, education, transportation, or retail would provide sector-specific insights and strategies for addressing sector-specific challenges related to AI adoption and workforce transitions.

Advanced AI Technologies

Investigating the impact of advanced AI technologies such as robotics, natural language processing, and machine learning algorithms on job displacement and retraining needs. Understanding how these technologies reshape job tasks, create new job roles, and require specialized skills would inform targeted retraining programs and workforce development strategies.

Ethical and Social Implications

Exploring the ethical and social implications of AI adoption, job displacement, and retraining programs. This includes studying issues such as algorithmic bias, data privacy, fairness in AI-driven decision-making, and the societal impact of automation on marginalized communities.

Policy Evaluation

Evaluating the effectiveness of policy interventions and regulatory frameworks aimed at addressing AI-related challenges, protecting workers' rights, promoting inclusive growth, and fostering responsible AI adoption. Assessing the outcomes of policy initiatives would inform evidence-based policymaking and governance strategies.

Human-Machine Collaboration

Investigating the dynamics of human-machine collaboration in AI-integrated

workplaces, including the skills required for effective collaboration, job redesign for augmentation, and strategies for enhancing human-AI synergy in diverse work settings.

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