

BALANCING PROGRESS AND CHALLENGES: THE ROLE OF GENERATIVE AI IN IT

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ABSTRACT

This study investigates the advantages and disadvantages of generative AI-based tools in the information technology sector. Earlier research has provided insights into the journal effect of AI and has shed light on the effects but a small amount of attention has been paid to the drawbacks of generative AI. To fill this gap a quantitative study was conducted on IT professionals and educators with a sample size of 100 respondents. The finding of this research has given the perspective for AI tools, with advantages in productivity, efficiency, and innovation along with this this process has concerns about job replacement and ethical issues. This study contributes to empirical research evidence on AI adoption in IT, providing instruction for future research and giving ways to real-world applications in the industry.

Keywords: Generative AI, Artificial Intelligence, IT Automation, Cybersecurity, Job Displacement, Algorithmic Bias, Data Privacy, Software Development, AI Ethics, Workforce Reskilling

INTRODUCTION

of The integration Generative Artificial Intelligence (AI) in the Information Technology (IT) sector has significantly reshaped work processes, organizational efficiency, and cybersecurity measures. Al-driven automation is increasingly adopted across various IT domains, including software development, cybersecurity, and network administration, promising enhanced productivity and reduced operational costs. However, while AI adoption introduces numerous benefits, it also brings challenges such as job displacement, ethical concerns regarding algorithmic bias, and increased data security risks. This research investigates the dual impact of Generative AI in IT, assessing both its advantages and limitations. By adopting a quantitative research approach, the study aims to provide empirical insights into the implications of AI adoption in IT operations, offering valuable perspectives for businesses, policymakers, and researchers. This study investigated the potential positive and negative impacts of Generative Intelligence (AI) tools Artificial in the Technology (IT) sector. While Information previous studies have provided valuable insights into the overall impacts of AI in IT, little attention has been given to exploring the pros and cons of generative AI tools separately. To bridge this gap, a



quantitative approach was used to assess the perceived impact of Generative AI tools in the IT industry.

2.LITERATURE REVIEW AND HYPOTHESIS:

2.1. Advantages and Impact of Artificial Intelligence in Information Technology: has enhanced efficiency and innovation through this here in this we will look at bright side of Artificial intelligence adoption in information technology.

2.2 Automation and Productivity Gains: By applying AI- driven automation in operations has given immense scope for automatic repetitive and time-consuming task in IT operations. Thus, just due to the automation of the process has given free space to human resource that allows IT workers to look into critical matters of complex, strategic, focus on the innovative solutions for solving problems.

2.2 Automation and Productivity Gains: Streamlining Operations AI-driven automation has immense scope for automating repetitive and time-consuming tasks in IT operations. This type of automation frees up human resources that allows IT staff to focus on more complex, strategic, and innovative problem-solving. The resulting productivity improvement is converted into cost benefits for organizations and improved efficiency in delivering services. This part will measure the effect of AI automation through examination of statistics from pertinent studies on levels of automation, task length, and cost savings obtained through AI deployment. The sturdy will investigate in multiple areas of information technology operations, such as system upgrade, management of networks, development of software and in the field of cyber security. The results will be shown in confidence intervals that will allow to study the use of artificial intelligence in terms of size to measure the impact on productivity and efficiency across various areas in information technology operations (Mata, 2018). To conduct this research, data and findings of different studies with related to the use of AI in engineering process(Venkatasubramanian, 2018) establishment of strategic supporting and structure for artificial intelligence in marketing and other areas of business environment (Huang, 2020) Will be applied to this study, with modified methodology which needed to fits in the

operation of information technology. This study also focuses on the use of AI to enhance human performance and productivity rather than to replacing human workers.

2.3 High-End Security and Threat Recognition: Hardening Defences: The optimal application of AI is in detecting and reacting to cyberattacks, which significantly enhances the security of IT infrastructure. AI security technologies are much more effective than alternative methods in detecting patterns and anomalies that indicate malicious behaviour as they can process huge volumes of information in real-time. Both the probability of successful attacks and the intensity of security violations are lowered by this preemptive method of threat detection. The performance of AI in malware detection, intrusion prevention, risk mitigation, and incident response will be evaluated statistically in this section. Due the use of this proactively procedure for thread identification and the intensity of security violations are reduced. In this section, study will examine the usefulness of AI performance in malware detection, intrusion prevention, risk reduction and incident response. The major indicator will be the reduction in the number and intensity of security incidents along with that decrease in response time to security issues and overall improvement in the rate of detecting threats. The most important and key strategy will be reducing the frequency and magnitude of security breaches, improving threat detection rates, and fasten the response time to security incidents. The research will focus on how AI can enhance different security controls, including malware analysis, vulnerability management, incident response, and intrusion detection systems. Analysis of data in studies on AI use in cybersecurity will be applied to evaluate the role of technology in enhancing cybersecurity (Chan, 2019). The role of AI potential to eliminate intrinsic threats related to AI-based systems (Vinuesa, 2020) in the case of cybersecurity will be examined as well. The review will also address research evidence on AI safety and cybersecurity, such as studies on AI failure and developing mitigation strategies (Yampolskiy, 2016).

2.4 Fast-tracked Innovation and Growth: Forging Ahead AI heavily accelerates software



development, testing, and rollout processes, translating into shorter cycles of innovation as well as smaller time-to-market for new IT products. Software powered by AI can automate sections of coding, identify and resolve bugs, improve software performance, and even aid in software testing. The net result of this is improved quality of software, lower costs for development, as well as faster technological progress. Facts and statistics on the effect of AI in software development time, bug detection rates, and total cost of development are elaborated here. The research will consider various stages of the software development life cycle, from requirements gathering to deployment and maintenance. The results will be reported with confidence intervals to enable the positive effect of AI on software development efficiency and innovativeness to be easily quantified. The discourse will combine research examining AI advancements in other domains (Venkatasubramanian, 2018), including studies on AI applications in the construction industry (Abioye, 2021) and translational medicine (Toh, 2019), extrapolating the insights to the IT software development domain. The review will also examine the degree to which AI is being employed in a support capacity by human developers, rather than as a direct substitute.

3.Weaknesses And impacts of AI In IT:

Ethical Issues and Job Displacement In this section, the possible negative impacts of the adoption of AI in IT, i.e., ethical issues and job displacement, are analysed quantitatively.

3.1 Job Displacement and Transition: Managing the Change AI-powered automation, while enhancing productivity, can lead to job displacement in some IT positions. This calls for cautious planning for workforce transition programs to help buffer the adverse impacts on the impacted workers. In this case, we will cover statistics of IT job displacements caused by AI adoption, the nature of jobs most impacted, and the skills gaps that the transition to AI-based systems generates. The paper will discuss the quantitative dimension of job displacement, comparing the results of studies that have analysed the effects of AI on the labour market (Ernst, 2019) and the influence of large IT investments (Bessen, 2019). The argument will also consider the future and work automation

research claims that the net job loss story is exaggerated (Willcocks, 2020), but assuming the potential for extensive skills disruption.

3.2 Algorithmic Bias and Fairness: Guaranteeing Equitable Outcomes AI algorithms learn from data, and if the data harbor prevailing social biases, then the resulting algorithms will tend to reflect and even amplify such biases, producing biased or discriminatory results. The next section will review evidence regarding the prevalence of algorithmic bias in IT systems, the approaches employed to detect and reduce bias, and their impact. The study will investigate different forms of bias, including gender bias, racial bias, and socioeconomic bias, and discuss how they affect different aspects of IT systems, including hiring, loan processing, and criminal justice risk assessment. The results will be reported with confidence intervals such that the size of algorithmic bias and the performance of biasreducing techniques are accurately estimated. Literature on the social impacts of AI systems (Raji, 2020) will inform analysis, with specific attention to addressing the issue of detecting and opposing adverse implications of AI algorithms in deployment. Morality in AI development and deployment (Galaz, 2021), along with possible allocative harms and differential access to benefits, will be taken into account. It will also utilize research findings on AI ethical concern studies in healthcare (Stahl, 2021), applying the learnings to an IT setting.

3.3 Risks to Privacy and Data Security: Protecting Sensitive Information Increased reliance on AI systems in IT also raises issues of data privacy and security. AI systems are likely to handle large amounts of sensitive personal information, and therefore they are potential targets for cyberattacks. This chapter will discuss statistics concerning AI data breaches. vulnerabilities, and measures that have been undertaken to render data more secure. The discussion will take into consideration different aspects of data security, including data encryption, access control, and intrusion detection, and these countermeasures have been whether effective in safeguarding sensitive information from unauthorized use and exploitation. The results will be given in confidence intervals so that there is a clear measure of risks involved in AI



adoption and mitigation strategy effectiveness. The study will be informed by research investigating consumer acceptance of AI chatbots for online shopping (Marjerison, 2022) based on the function of privacy issues in AI technology adoption. It will also integrate findings from research on the attitudes of professionals toward AI tools within the tourism sector (Demir, 2023), citing data security threat concerns. In addition, the study will integrate research findings on AI and authoritarian governance in China (Zeng, 2020), covering the implications of AI adoption in an environment with heterogeneous privacy laws.

Hypothesis: The adoption of AI-powered automation in IT operations significantly improves system efficiency but increases the risk of job displacement among entry-level IT professionals."

4. METHODOLOGY

4.1 Research Design & Data Collection

This study proposed to examine the potential benefits and drawbacks of using Generative AI in IT workflows. A quantitative method was used to determine variables association was examined and data collected online through surveys and nonprobability sampling was used along with that random questionnaire submitted to college and university instructors or working professionals in the field of Information Technology who are employed in organizations of Pakistan. Researchers Ortinau and Bush (Hair, Bush, & Ortinau, 2003), in (Iqbal et al., 2024) stated that a target population is defined as a "specific group of individuals or object to whom the finding and observations can be developed for required data in information" (Hair, Bush, & Ortinau, 2003). Furthermore, the study of Roscoe (Roscoe, 1975) in (Iqbal et al., 2024) suggested that a sample size

greater than thirty and less than six hundred is appropriate for such a study. For this reason, a random questionnaire was utilized among diverse people and eighty questionnaires were returned from participants. Furthermore, a questionnaire was adopted from previous research and literature reviews; the questionnaire was designed on two sections that include: demographic information is the first section and the second section was related to the variable of positive and negative impacts of generative IA tools. A total of 10 questions each using a 5-point Likert scale from "strongly agree" to "strongly disagree." The designed questionnaire was reviewed by university professors, experts in AI, and individuals who had previously worked or taught in the information technology field to check the validity of the contents. Necessary modification and correction were made on the basis of comments provided by professors and individuals & AI specialists to serve the purpose of study.

4.2 Data Analysis

To ensure the quality of our data collection, we conducted a thorough review of the collected questionnaires, removing incomplete responses and addressing any inconsistencies. After this screening process, we analysed a total of 100 valid responses using Pearson correlation in SPSS. This method is particularly recommended for testing complex and less established theories. It was employed to construct a theoretical framework to visualize our variables and hypotheses. The results, including a descriptive statistical analysis of the sample data, are presented in the following section.

4.3 Details & Description of Participant's Demographics: The details and description of research participants are displayed in Table: A

Variables	Proportion
Sex/Gender	
Male	65%
Female	35%
Age Group	
22-24	15%
35-35	55%
36-50	30%
Education Level	
Bachelors	70%

Table: A participant's Demographics

Masters	25%
PhD or higher	5%
Work Experience	
1-5 years	40%
6-10 years	35%
More than 10 years	25%
IT Domain	
Software development	40%
cybersecurity	20%
Network Administration	15%
AI & Data Analytics	15%
IT Support	10%
Organization Size	
Large Firms	60%
Medium-Sized Firms	30%
Small Businesses/Startups	10%

4.4 Participant's Demographics Description:

The research polled 100 IT professionals with different backgrounds to examine the effect of AI implementation in IT operations. Out of the respondents, 65% were male and 35% were female, a representation of the gender composition in the IT industry. The age of the respondents varied from 22 to 50 years, with most (55%) between 25-35 years, showing a labour force dominated by young professionals. About academic qualifications, 70% were bachelor's degree holders, 25% master's degree holders, and 5% had a Ph.D. or other higher qualifications. In terms of experience, 40% of the respondents had

1-5 years of experience, 35% had 6-10 years, and 25% had more than 10 years of experience in ITrelated positions. Members operated in various IT domains, such as software development (40%), cybersecurity (20%), network administration (15%), AI and data analytics (15%), and IT support (10%). Organizational size was also included in the study, with 60% of the respondents working in large firms, 30% in medium-sized firms, and 10% in small businesses or startups. This representative sample guarantees a thorough analysis of AI uptake and impact by experience levels, organizational function, and industry sector.

4.5 Reliability Test:

Table: B Construct Reliability and Validity - Overview

Construct	Cronbach's Alpha	Reliability Level
AI Adoption	0.84	High
System Efficiency	0.81	High
Job Displacement	0.78	Acceptable

The internal consistency of the constructs of the study was measured using Cronbach's Alpha. The findings show that all constructs have acceptable reliability. AI Adoption had a Cronbach's Alpha of 0.84, which reflects high internal consistency among its items. Likewise, System Efficiency had a score of 0.81, reflecting high reliability. The Job Displacement construct had an alpha value of 0.78, which is acceptable for research.

As all the values are greater than the generally accepted 0.70, the reliability test ensures that the measuring items in each construct are reliable and consistent for further statistical computations. These findings imply that the survey tool in the study is well-constructed and can effectively measure participants' perception of AI adoption, system efficiency, and job displacement within the IT industry.



Tuble: C T cursoff Correlation				
Variables	AI Adoption	System Efficiency	Job Displacement	
AI Adoption	1	0.72**	-0.65**	
System Efficiency	0.72**	1	0.58**	
Job displacement	-0.65**	-0.58**	1	

4.6 Testing Hypothesis Table: C Pearson Correlation

Table. C T carson correlation			
Variables	AI Adoption	System Effic	
AI Adoption	1	0.72**	

Using SPSS software, correlation analysis was carried out to assess the study's hypotheses. The relationship between two variables is tested via correlation, which varies from -1 to +1. Zero denotes the absence of any correlation. The two variables' relationship is a perfect correlation is one of +1; between 0.70 and 0.90 indicates strength, 0.4 to 0.69 indicates moderateness, and between 0.39 is weak, while 0.1 is weak. Table 3 illustrates Pearson correlation analysis was used to investigate the correlations among the adoption of AI, system efficiency, and job displacement in the IT industry. The findings reveal a significant positive relationship (r = 0.72, p < 0.01) between AI adoption and system efficiency, whereby with increasing adoption of AI, IT system performance and operational efficiency improve significantly. On the other hand, a very high negative correlation (r = -0.65, p < 0.01) was discovered between employment displacement and AI adoption, which implies that greater dependence

on AI can decrease the need for novice IT positions. There was also a moderate negative correlation (r = -0.58, p < 0.01) between job displacement and system efficiency, which suggests that although AI increases efficiency, it does so at the expense of reducing the workforce. These results validate the assumption that AI implementation enhances IT performance but generates apprehension regarding employment underlining both the security, sector's opportunities and threats from AI automation. A strong positive correlation (r = 0.72, p < 0.01) exists between AI adoption and system efficiency, suggesting that AI usage improves IT efficiency. A strong negative correlation (r = -0.65, p < 0.01) between AI adoption and job displacement indicates that higher AI usage may reduce IT job opportunities. A moderate negative correlation (r = -0.58, p < 0.01) between system efficiency and job displacement suggests that while efficiency improves, fewer human resources may be required

Items	Factor 1 (AI Adoption)	Factor 2 (System Efficiency)	Factor 3 (Job Displacement)
AI1	0.82		
AI2	0.79		
SE1		0.85	
SE2		0.80	
JD1			0.77
JD2			0.75

Table: D Validity Test (Factor Loadings from Exploratory Factor Analysis - EFA)

Construct validity of the study constructs was tested with Exploratory Factor Analysis (EFA) based on factor loadings. The findings show that all the measurement items loaded significantly onto their corresponding constructs, with factor loadings above the threshold of 0.70. The AI Adoption items loaded between 0.79 and 0.82, thus ensuring that the items truly reflect the AI adoption construct. In the same vein, the System Efficiency items had robust loadings of 0.80 to 0.85, validating their efficiency improvement measurement. The Job Displacement items also



had good factor loadings of 0.75 to 0.77, confirming their contribution to the construct. These findings affirm that the survey tool captures the intended dimensions of AI adoption, system efficiency, and job displacement effectively, and hence strong construct validity for subsequent statistical analysis. The Pearson correlation analysis supports the hypothesis by showing that AI significantly enhances system efficiency but also contributes to job displacement. These findings highlight both the benefits (improved efficiency) and challenges (job reductions) of AI adoption in the IT sector.

5. DISCUSSION

The results of this study highlight both the transformative benefits and critical challenges of Generative AI in IT operations. The primary positive impact is the significant enhancement of efficiency and innovation. AI-driven automation reduces tedious work, allowing IT professionals to focus on high-level and creative problem-solving. As per studies presented by Mata (2018), Al-driven automation significantly reduces the time it takes to complete tasks and operation costs. AI also results in top-of-the-line cybersecurity, in which Al-driven threat detection systems outclass traditional techniques in identifying and neutralizing cyber-attacks (Chan, 2019). These technologies enable organizations to further strengthen security controls, reducing response time to security intrusions and improving the rate of threat detection. AI also plays an important role in accelerating innovation in software development. Automated coding and bug detection improve the quality of software while reducing development cycles. Studies by Venkatasubramanian (2018) and Abioye (2021) assert that the deployment of AI solutions has led to significant IT software development advancements, facilitating faster entry into the market for new offerings. However, studies also document some important issues. Among the nottoo-minor challenges is job displacement. Through taking over repetitive IT tasks, there are chances of increased entry-level job losses. Correlation analysis in this study confirms a highly significant negative correlation (r = -0.65, p < 0.01) between AI adoption and employment, in line with earlier studies by Bessen (2019) and Ernst (2019). While some researchers hypothesize that AI will create new jobs (Willcocks, 2020), its implementation requires enormous upskilling of the labour force. The second major concern is algorithmic bias and fairness. AI systems based on biased data have the potential to reinforce social imbalances, affecting hiring, loan approval, and security risk analysis (Raji, 2020). Unbiasing such biases requires high-level ethical AI development practices to ensure fair results (Galaz, 2021). Besides, AI application enhances data privacy and security threats. Increased reliance on AI systems exposes sensitive information to hacking and misuse. Studies on AI-driven privacy threats (Zeng, 2020) show that companies must implement strong data protection measures, such as advanced encryption and access controls, to deal with such threats. In summary, while Generative AI guarantees enormous IT efficiency benefits and innovations, its weaknesses necessitate strategic solutions. Companies should focus on ethical AI employee reskilling, design, and more cybersecurity measures to make effective AI integration into IT operations. Long-term AI impact trends should be investigated by future research and frameworks for lowering job displacement and AI-related ethical risk must be developed.

6. CONCLUSION

To conclude, this research focusing that the adoption of generative AI based tool in information technology is increasing the efficiency, productivity, and innovation to the great extent. Operations streamlined by AI-driven automation has minimized human work load, along with that it has enhance privacy from cybersecurity threats. Therefore, it is making the field of information technology more secure and efficient. The development of software's and innovation in coding, debugging, and testing are also boots by AI. However, this research has also unfolded the important challenges such as loss of job and ethical concerns due to biases in algorithms by in enhancing the risk of data security and privacy. The study substantiates a strong positive relationship between system efficiency and AI adoption but also suggests a negative effect on job security, especially for beginner IT workers.

7. RECOMMENDATIONS

1. Workforce Reskilling & Upskilling: organizations should focus to invest in training programs to upskill employees for



the particular roles that requires AI, that minimize the detrimental consequences of job loss.

- 2. Fair AI Development: IT companies should apply the policies that must be based on fairness and biased free within the AI models so that results remains fair among various demographic groups.
- 3. Improved Cybersecurity Measures: To overcome the issue of cyber threats and maintain data confidentiality firms should

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deploy AI-based security measures to combat this threat.

- 4. Regulatory Compliance & Governance: Governments and organizations must implement AI governance structures to monitor the ethical use of AI, privacy issues, and workforce transition strategies.
- 5. Human-AI Collaboration: Rather than total automation, AI can be utilized as an aid for human productivity improvement instead of replacing IT professionals.
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