Artificial Intelligence Adoption impact on job security and job performance: Innovative Behavior as a missing linchpin to connect the dots.

Abstract

Building upon the sociotechnical system theory, the present study examines the relationship between AI adoption, employees' innovative behaviour on employee performance and job security. The primary data is collected from 260 employees from firms located in the industrial hub of a developing economy using a simple random technique, and data is analyzed using Smart-PLS 4 from the manufacturing sector.The study evidences that employees' adoption and utilization of AI technologies positively influence their innovative behaviour, job performance and security. Moreover, the study finds a mediating role of innovative behaviour to connect the dots. Organizations can prioritize using AI-driven training programmes so employees can use AI tools efficiently. Study findings also encourage employees to engage in innovative work behaviours like investigating novel concepts and experimenting with AI technologies to improve job performance. This study offers value by exploring and testing mediating roles of innovative workplace behaviour and expands the literature on sociotechnical system theory. In addition, the present research invalidates that AI will replace employees at the workplace, as we can safely conclude that AI adoption enhances job performance and job security.

Keywords: Sociotechnical system theory; Artificial Intelligence; Job Security; Job Performance; Innovative Behaviour

Introduction

The likelihood that employees will keep their employment and continue earning a living is known as job security (Probst, 2023). Artificial Intelligence (AI) might boost or hurt job security (Eshiett et al., 2024; Yu et al., 2023) and has the potential to both positively and negatively impact job security. AI may automate monotonous jobs, improve efficiency, and allow workers to focus on more complicated and creative work, creating new job prospects and security. Productivity and job satisfaction may increase. While on the other hand, AI could also disrupt some jobs and sectors. AI technology may automate various chores and jobs, reducing the need for human workers. Automation can displace workers and reduce job security (Eshiett et al., 2024; Probst et al., 2021).

AI is changing the workplace, affecting innovation, task efficiency, and employee performance. Empirical evidence suggests that AI adoption improves job security and performance, especially among younger workers who embrace new technologies (Probst, 2023). Job insecurity is emerging among older workforce segments that may be less likely to adopt new technology (Probst et al., 2020; 2021). Despite these insights, academic discourse still lacks understanding of how innovative behaviour, job performance, and job security interact and change in response to AI adoption across employee demographics (Yu et al., 2023).

AI's impact on job security is complex and can vary depending on industry, job type, and organisational implementation. AI can automate routine tasks that require human labour, displacing workers in manufacturing, data entry, and customer service (Eshiett et al., 2024; Probst et al., 2021). This automation can cost jobs if workers aren't trained for AI-enhanced roles. Advances in machine learning and robotics are allowing machines to perform complex tasks, including decision-making that previously required human insight (Lawal, 2024). AI can also drive innovation and create new industries, creating new roles that require specialised skills and training and opening up career paths. Businesses and governments must take proactive steps to make AI more job-secure (Lawal, 2024; Eshiett et al., 2024). These include reskilling the workforce through education and training, designing AI technologies that complement human skills, and establishing ethical AI development and deployment policies (Eshiett et al., 2024; Yu et al., 2023).

AI is being recognised for its potential to boost innovation and performance in proactive and skilled workers. This recognition has prompted research into how AI disrupts traditional work paradigms (Desouza et al., 2020). The sociotechnical system theory, which integrates technology, human interaction, language, and environmental context, can be used to study how AI affects workplace outcomes. This theory illuminates the complex interdependencies between the workplace's

technological and social systems (Ehn, 1988). The current research uses this theoretical framework to examine how AI affects job security and performance, informing workplace AI integration strategies.

Although there has been a lot of research on how artificial intelligence (AI) is used in workplaces, there is still a lack of understanding about the specific ways in which adopting AI affects job performance and security (Eshiett et al., 2024; Prentice et al., 2023). The current body of research has primarily concentrated on the immediate effects of AI implementation, such as increased efficiency and the automation of repetitive tasks. However, there is a lack of empirical studies that investigate the intermediary role of innovative work behaviour in this particular context (Islam et al., 2024). The ability of employees to generate, promote, and implement new ideas, known as innovative work behaviour, is crucial for fully utilising AI technologies to improve job performance and security (Lawal, 2024). Though the sociotechnical system theory has been extensively studied in science, innovation, and technology, its application in business and human resource management has gotten little attention (Wilkens, 2020; Prentice et al., 2020).

This study aims to address this deficiency by examining the intricate mechanisms through which the adoption of AI promotes innovative work behaviour, subsequently influencing job performance and job security. The current body of knowledge frequently neglects this intermediate process, potentially leading to an incomplete understanding of the intricate dynamics of AI's influence on employee outcomes. The present research is based on sociotechnical system theory, which suggests that organizational outcomes are determined by the interaction between an organization's social and technical subsystems (Wilkens, 2020). This framework offers a strong perspective for examining the effects of technological integrations on human actors within the organizational environment. The variables chosen for this study—AI adoption, employees' innovative behaviour, job performance, and security—are carefully selected to align with the fundamental principles of this theory. The theory aims to clarify and optimise the interactions between human and technological factors. Organisations that embrace technology must analyse how AI adoption, innovative behaviour, job performance, and security change daily work practices, employee engagement, and job security perceptions for operational and strategic decision-making.

The primary objective is to investigate how employees' adoption and utilization of AI technologies influence their job performance and security, specifically focusing on the mediating role of innovative work behaviour. By delving into the mechanisms through which AI adoption impacts job performance and security, mainly through innovative work behaviour, this study aims to offer valuable insights for organizations seeking to leverage AI technologies while enhancing employee performance effectively.

Theoretical Background and Literature Review

The concept of the socio-technical system was initially introduced by Trist and Bamforth in the 1950s, with the goal of improving work system performance by effectively addressing technological difficulties and uncertainties faced by employees (Trist & Bamforth, 1951). The socio-technical system aimed to create a "win-win" situation where employees were more productive and committed, technology was successfully adapted, and organisations achieved better overall performance. In the 1970s, Davis and Cherns (1975) introduced the socio-technical system to various organisations, promoting "Quality of Work life" to create meaningful work for employees. In recent years, with the rise of digitisation, and artificial intelligence (AI), the interaction between employees and technologies in the work system has significantly changed, making the socio-technical system more relevant than ever (Pasmore et al., 2019). Sirianni and Zuboff (1989) argued that in the era of smart machines, individuals would face the challenge of becoming masters of technology or being enslaved by it. Thus, there is a need to design work systems that can accommodate both situations. The socio-technical system hopes organisations achieve joint optimisation by integrating technological development and human aspirations.

As organisations embrace AI to enhance outcomes, they encounter challenges in aligning their social systems with the pace of technological advancements. They face difficulties attracting high-calibre talent, engaging the workforce, designing effective work processes, and enhancing organisational capabilities (Pasmore et al., 2019). The theory emphasises achieving a good fit between the social and technical subsystems to maximise desired individual and organisational outcomes through AI adoption and application. From the socio-technical system perspective, the present study focuses on the effective implementation of AI in organisations that require an integrated approach that considers social and technical developments (Yu et al., 2023). This theory encompasses the personnel subsystem, which focuses on social and people-related factors and the technical subsystem, which considers technology-related factors (Yu et al., 2023; Hoyland et al., 2019).

Artificial Intelligence (AI):

AI encompasses the ability of computers to learn from experience and perform complex tasks resembling human capabilities, such as rational decision-making (Zirar, 2023; Pomerol, 1997). The common thread in AI definitions is that machines can execute intricate human-like tasks through algorithms and data in various contexts, including the workplace and society. AI aims to simulate human cognitive functions like perception, learning, reasoning, and decision-making (Holford, 2019; Wang, 2019). However, the performance of intelligent systems relies on the data provided to them

(Farrow, 2019; Zirar, 2023). Intelligent systems cannot obtain missing data, making data consistency and quantity significant concerns for AI applications in the workplace. Human intervention is crucial to support AI by identifying missing components and categorizing appropriate data for AI systems (Zirar, 2023). Human involvement is also necessary to override or interpret the outputs generated by these systems (Yam et al., 2020).

One of the central issues for workers concerning AI in the workplace is the potential loss of employment (Braganza et al., 2020). Many workers are at risk of job displacement due to the implementation of AI applications (Zirar, 2023). Consequently, the work performed by AI may no longer require the involvement of human workers, leaving them uneasy about how AI applications help or affect them (Holford, 2019; Wright & Schultz, 2018).

A potential strategy to address this concern is enabling workers to recognize how technological advancements stimulate innovative behaviour (Braganza et al., 2020). However, the reality often contrasts with this notion (Zirar, 2023; Gligor et al., 2021). In this technological landscape, the inner workings of AI systems typically remain unknown to workers (Gligor et al., 2021), leaving it up to workers to upskill and reskill themselves to engage in innovative behaviour and coexist with AI systems (Zirar, 2023).

Scholarly research on innovative behaviour encompasses the process of generating and implementing new and original ideas, including idea conception, development, and completion (Baer, 2012; Scott & Bruce, 1994; Somech & Drach-Zahavy, 2013). This behaviour is evident in creating and implementing novel goods, services, or work methods (Baer, 2012; Perry-Smith & Mannucci, 2017).

AI technologies aim to enhance and support individuals' creativity in problem-solving, serving as a creative tool in their own right (Anantrasirichai & Bull, 2021). In management literature, innovative work behaviour is more commonly observed in reactive activities, such as devising workarounds to address limitations (Alter, 2014). Idea generation, elaboration, promotion, and implementation are integral to developing workarounds (Perry-Smith & Mannucci, 2017). Within this perspective, innovative work behaviour serves as a means to compensate for AI limitations. Innovative behaviour is manifested through identifying issues and the generation, initiation, and implementation of new and original ideas, rather than a dramatic shift in an individual's perspective (Alter, 2014; Perry-Smith et al., 2017).

Innovative work behaviour:

Innovative work behaviour requires deliberate intervention by workers in the workplace (Perry-Smith & Mannucci, 2017). It encompasses identifying issues, generating new ideas, initiating actions, and implementing them to enhance personal and business performance (Zirar, 2023). The behavioural aspect is crucial, as the mere conception of ideas without active engagement with others does not fully demonstrate innovative work behaviour (Perry-Smith & Mannucci, 2017). Collaboration with others is necessary for driving new ideas and assessing their feasibility (Zirar, 2023). However, when workers engage with others as part of innovative work behaviour, groupthink may prematurely suppress an idea (Moorhead & Montanari, 1986). Additionally, innovative work behaviour is influenced by organizational contexts, meaning that ideation and collaboration with others reflect the specific organizational setting (Zirar, 2023; Saether, 2019).

While workers identify potential problems and engage in behaviours that facilitate knowledge and insight sharing, innovative work behaviour is expected to yield innovative outputs (Farrow, 2019). Therefore, it is reasonable to suggest that innovative work behaviour involves deliberate actions by workers to generate and adopt new ideas, goods, processes, and procedures within their tasks, units, departments, or organizations (Saether, 2019). Examples of innovative work behaviour in relation to AI include supporting the design, implementation, introduction, and utilization of AI applications in the workplace (Desouza et al., 2020), implementing AI-related technologies (Zirar, 2023), and proposing ways to achieve goals and execute work tasks using AI technologies. However, this list is not exhaustive, as any behaviour within an organization that demonstrates an innovative element can fall under the category of innovative work behaviour (Desouza et al., 2020).

Adoption of AI and innovative work behaviour

Due to the adoption of AI technologies, employees may use cutting-edge tools and skills to analyse data, automate activities, and discover new insights (Yu et al., 2023; Anantrasirichai & Bull, 2021). These AI-driven skills increase innovative work behaviour by encouraging employees' curiosity, creativity, and problem-solving mindset (Zirar, 2023). Furthermore, AI systems can assist decision-making by offering data-driven insights and predictive analytics. Employees with access to such AI-enabled decision support systems may be better equipped to make informed decisions that promote innovation, which may lead to more inventive work behaviour (Saether, 2019). Automating tedious and repetitive work is another common AI adoption practice that frees up employees' time and cognitive resources. This improved capacity enables workers to concentrate on more valuable, imaginative, and inventive tasks, fostering an organisational culture of innovative work behaviour (Zirar, 2023).

Hence, Adopting AI can therefore help organisations collaborate and share knowledge. Employee collaboration, idea sharing, and utilisation of collective intellect can all be made possible by AI-powered tools and platforms. Such collaborative settings encourage an inventive culture, which raises the bar for new work practices (Alter, 2014).

Socio-technical system theory recognizes the importance of social interactions and dynamics within organizations. Adopting AI technologies can influence the social environment by promoting collaboration, knowledge sharing, and learning (Yu et al., 2023; Zirar, 2023). AI adoption can create opportunities for cross-functional teams, interdisciplinary collaboration, and diverse perspectives, fostering innovative work behaviour among employees. Employees who feel supported and empowered by AI technologies are likelier to engage in innovative thinking and take risks to develop novel solutions (Holford, 2019; Wang, 2019). Hence, based on these arguments:

H1: Adopting AI (artificial intelligence) positively influences innovative work behaviour.

Job performance

According to Rich et al. (2010), performance refers to a group's collective organisational actions in which members, directly and indirectly, help the organisation achieve its objectives. So, rather than being an activity, work performance results from behaviours connected to the job (Aung et al., 2023; Ajzen, 2011). Performance on the job is ultimately a result of these behaviours. Task performance and contextual performance are two variables that can be used to classify the key characteristics of job performance. According to Bergman et al. (2008), these are the main domains used to assess how well construction workers perform. Task performance refers to the actions necessary to run and maintain an organization's essential technology operations. Contrarily, contextual performance measures how well a system's wider organisational, social, and psychological contexts support its technological core functions (Aung et al., 2023; Cheng et al., 2007; Bergman et al., 2008). Employee underperformance has a negative impact on project results and reduces the profitability of construction companies (Cheng et al., 2007). The decline in profitability is mostly attributed to the unfavourable actions taken by low-performing workers, such as increasing absenteeism, frequent tardiness, high turnover, resistance to supervision, and a lack of willingness to work with coworkers (Aung et al., 2023). Therefore, it is crucial for the success of construction organisations to understand the aspects that affect job performance.

Adoption of AI and Job Performance

AI has the ability to automate repetitive jobs, streamline workflows, and improve operational effectiveness. The time and effort needed for employees' job are reduced when they can use AI tools to execute tasks more quickly (Yu et al., 2023; Wang, 2019). Employee productivity might grow as a result of this enhanced efficiency because it allows them to complete more work in less time. Additionally, AI systems can offer predictive analytics, decision-support tools, and data-driven insights (Zirar, 2023). Employee performance can be improved by utilising these AI capabilities to help them make more informed and precise decisions. Employees may use AI tools to analyse complex data, spot patterns, and suggest the best next steps, improving outcomes (Yu et al., 2023; Aung et al., 2023).

Employee skill and competency development linked to working with AI technologies is frequently required as companies implement AI technology (Kirkpatrick, 2017; Prentice et al., 2020). Employees' knowledge base can be improved, their talents can be increased, and their organisational value can be raised through this upskilling and reskilling process. Higher job performance results from people having superior skills since they are better equipped to carry out their duties (Matsunaga, 2022; Yu et al., 2023).

Based on socio-technical system theory, the study emphasizes the crucial interplay between technological and social aspects. AI adoption requires employees to interact with AI systems, leveraging their capabilities while integrating their expertise, knowledge, and creativity (Matsunaga, 2022). A positive interaction between humans and AI can improve job performance by capitalizing on the strengths of both components (Ajzen, 2011; Alter, 2014). Employees may perform better on the job and achieve higher customer satisfaction when they have access to AI-powered solutions that help them better cater products or services to specific client needs (Matsunaga, 2022). Hence, based on these arguments:

H2: AI adoption positively influences job performance.

Job Security

Job security is typically defined as a legal employment contract that assures employees of continued employment (Greenhalgh & Rosenblatt, 1984). Job security is defined as the perceived stability and continuity of one's job as they currently understand it (Probst, 2003). While asserting that job security is essentially a global concept, this definition acknowledges that an individual's perception of job security can be influenced by both the continuation of their job and the stability of desired job features (Probst et al., 2021). Job insecurity is not limited to situations where an individual believes their job's future is unstable and reacts negatively. Instead, it proposes that job insecurity exists when an individual perceives their job's future as unstable or at risk. Therefore, the construct solely

encompasses job stability and continuity (Hur, 2022; Probst, 2003; Probst et al., 2020). By focusing on perceptions of job security, researchers can investigate the factors regarding individuals' perception of job insecurity and their evaluative and emotional responses. Job security is an individual's cognitive evaluation of their job's future in terms of perceived stability and continuity, and it evaluates satisfaction with job security (Probst et al., 2020; Probst et al., 2021).

Greenhalgh and Rosenblatt (1984) defined job insecurity as the feeling of powerlessness to maintain desired continuity in a potentially threatened job situation (Hur, 2022). According to their model, an individual's perception of job insecurity is influenced by their subjective assessment of the immediate work environment. This perception of job insecurity, in turn, can impact various organizational behaviours such as productivity, turnover, and resistance to change (Klandermans et al., 2010). Therefore, Greenhalgh and Rosenblatt's (1984) research suggests that subjective job security ('job insecurity' in their model) is influenced by objective job security and can affect various work attitudes and behaviours. This perception of greater job security among employees can lead to more positive work attitudes due to their higher expectations of employment continuity (Hur, 2022; Klandermans et al., 2010).

Adoption of AI and Job Security

AI adoption introduces advanced technologies that can automate tasks, optimize processes, and enhance operational efficiency. These technological advancements can contribute to job security by improving productivity and creating new opportunities within the organization. AI-powered systems can help employees develop new skills, adapt to changing job requirements, and remain relevant in an evolving technological landscape (Bhargava et al., 2021; Vasunandan & Annamalai, 2023; Ili & Lichtenthaler, 2017).

Based on socio-technical system theory, the current study emphasizes the importance of social interactions and organizational support. The successful adoption of AI requires effective collaboration, communication, and integration between employees and AI technologies. Building supportive social systems around AI adoption can enhance job security by promoting employee engagement, providing training and upskilling opportunities, and fostering a positive work environment (Bhargava et al., 2021; Yu et al., 2023). Davenport and Ronanki (2018) claimed that AI adoption often necessitates employees to acquire new skills and adapt to technological changes. Organizations that invest in employee training and development programs in the context of AI adoption can enhance job security by equipping employees with the necessary skills to work alongside AI technologies. Employees with

relevant AI skills are more likely to be valued and have increased job security (Bhargava et al., 2021; Ili & Lichtenthaler, 2017).

Bhargava and fellow researchers (2021) suggested that technology and humans will complement each other as future systems will leverage human and machine intelligence. Technology and humans will only be able to work effectively with the support of each other. While anyone with the necessary technical expertise can develop and operate a program, individuals who understand the "human context" during implementation will be in higher demand (Davenport et al., 2018). AI adoption can lead to redesigning job roles and reallocating tasks between employees and AI systems. When implemented strategically, AI technologies can automate routine and repetitive tasks, allowing employees to focus on more complex and value-added work. This job redesign can contribute to job security by ensuring employees are engaged in meaningful and intellectually challenging tasks (Davenport et al., 2018; Ili & Lichtenthaler, 2017). Hence, based on these arguments:

H3: AI adoption positively influences job security.

Innovative work behaviour and Job performance

Based on socio-technical system theory, technological advancements like AI can provide employees with tools and capabilities to foster innovative work behaviour (Yu et al., 2023). AI can automate tasks, analyze data, and generate insights that contribute to developing novel ideas and solutions. The integration of these technological advancements can enhance job performance by enabling employees to work more efficiently, make data-driven decisions, and create innovative outcomes (Mariani et al., 2022; Musiolik et al., 2020).

Socio-technical system theory recognizes the significance of social interactions and dynamics in organizations. Integrating innovative work behaviour within this framework involves fostering a culture of collaboration, knowledge sharing, and learning (Yu et al., 2023; Hoyland et al., 2019). Organizations can facilitate employee exchange of ideas, experimentation, and creativity by encouraging open communication, diverse perspectives, and supportive relationships. These positive social dynamics contribute to higher levels of innovative work behaviour and enhance job performance (Kirkpatrick, 2017; Prentice et al., 2020).

Integrating innovative work behaviour within a socio-technical system promotes knowledge creation and exchange. Employees who engage in innovative practices generate new knowledge, insights, and expertise (Yu et al., 2023). This knowledge creation and exchange contribute to organizational learning, continuous improvement, and enhanced job performance. Integrating innovative work

behaviour within a socio-technical system fosters adaptability and agility in response to dynamic environments and changing market conditions (Kirkpatrick, 2017). Innovative employees are more likely to embrace change, explore new possibilities, and adapt their approaches to meet evolving challenges. This adaptability and agility positively impact job performance by enabling employees to stay ahead of the curve, identify opportunities, and effectively respond to organizational needs (Mariani et al., 2022; Musiolik et al., 2020). Hence, based on these arguments:

H4: Innovative work behaviour positively influences job performance.

Innovative work behaviour and Job security

Based on socio-technical system theory, integrating innovative work behaviour promotes adaptability to changing circumstances and market dynamics. Employees who exhibit innovative work behaviour are more likely to embrace new technologies, explore new ideas, and adapt their skills to meet evolving job requirements (Yu et al., 2023; Chen et al., 2022; Butali et al., 2016). This adaptability enhances job security by making employees more resilient to changes and increasing their organizational value (Chen et al., 2022).

Further, innovative work behaviour requires a culture of continuous learning and skill development. Employees who engage in innovative work behaviour are encouraged to acquire new knowledge, stay updated with emerging trends, and develop relevant skills (Bysted, 2013; Chen et al., 2022). This focus on continuous learning enhances job security by equipping employees with the capabilities needed to navigate technological advancements and market shifts (Butali et al., 2016).

Therefore, innovative work behaviour contributes to value creation within the organization. Employees generate new ideas, solutions, and improvements by enhancing the organization's competitiveness, market position, and performance (Butali et al., 2016; Cheng et al., 2007). This positive impact on organizational performance directly influences job security by ensuring stability and growth, providing employees with more secure employment prospects. Organizations that foster a culture of innovation provide employees with the necessary resources, encouragement, and autonomy to explore new ideas and take calculated risks (Bysted, 2013; Cheng et al., 2007). This supportive environment increases employee engagement, job satisfaction, and commitment, ultimately enhancing job security. Hence, based on these arguments:

H5: Innovative work behaviour positively influences job security.

Mediating Role of Innovative workplace behaviour

The role of innovative work behaviour in influencing the connection between the adoption of artificial intelligence (AI) and job performance is of utmost significance (Bhargava et al., 2021). Employees who demonstrate a proclivity for innovative work behaviour are instrumental in facilitating the successful implementation and utilization of AI technologies within organizations (Yu et al., 2023; Anantrasirichai & Bull, 2021). Their eagerness to explore and experiment with AI tools empowers them to uncover fresh applications and optimize the utilization of AI systems, resulting in improved job performance outcomes (Yu et al., 2023; Aung et al., 2023). Furthermore, innovative work behaviour fosters the acquisition of new skills and competencies essential for effectively leveraging the capabilities of AI. By cultivating a mindset inclined towards creativity and problem-solving, employees engage in critical thinking and generate innovative ideas to harness AI technologies, ultimately positively impacting job performance (Alter, 2014). Additionally, innovative work behaviour facilitates adaptive responses to AI by encouraging employees to embrace change, proactively adapt work processes, and find inventive solutions to challenges encountered during AI integration. The continuous learning and improvement associated with innovative work behaviour also contribute to long-term enhancements in job performance (Matsunaga, 2022; Yu et al., 2023). However, it is crucial to acknowledge that the influence of innovative work behaviour on the relationship between AI and job performance may vary across individuals and organizational contexts, highlighting the need for further comprehensive empirical research in this area (Aung et al., 2023).

Innovative work behaviour influences the relationship between AI adoption and job performance through various other mechanisms as well (Ajzen, 2011). It fosters knowledge creation and sharing within organizations, enabling employees to actively pursue and generate new knowledge related to AI technologies (Kirkpatrick, 2017; Prentice et al., 2020). This knowledge exchange facilitates the effective utilization of AI systems, yielding improved job performance outcomes. Moreover, innovative work behaviour enhances employees' adaptive capacity by nurturing a mindset that embraces change and encourages the modification of work processes and roles to align with AI integration (Zirar, 2023; Saether, 2019). Employees displaying high levels of innovative work behaviour are more adaptable, open to change, and proactive in acquiring the skills necessary to work alongside AI technologies, ultimately leading to enhanced job performance (Prentice et al., 2020). Additionally, innovative work behaviour stimulates creativity and idea generation, empowering employees to think innovatively, explore alternative solutions, and generate inventive ideas for leveraging AI. Organizations encourage employees to experiment, learn from failures, and continuously refine AI-related processes and practices by cultivating an environment that promotes innovation (Yu et al., 2023; Wang, 2019). This continuous learning and adaptation bolster the

organization's ability to capitalize on the benefits of AI, positively impacting job performance at both individual and organizational levels (Anantrasirichai & Bull, 2021). The engagement and motivation resulting from fostering innovative work behaviour within the context of AI adoption further contribute to improved job performance outcomes. Considering these additional factors together expands our comprehension of how innovative work behaviour shapes the relationship between AI adoption and job performance (Yu et al., 2023). Hence, based on these arguments:

H6: Innovative work behaviour mediates the relationship between AI adoption and job performance. The role of innovative work behaviour in shaping the connection between artificial intelligence (AI) and job security is substantial. Employees who display innovative work behaviour demonstrate adaptability to technological advancements, perceiving AI as an opportunity rather than a threat (Yu et al., 2023; Chen et al., 2022; Butali et al., 2016). Their proactive approach involves acquiring relevant skills that align with the evolving requirements of the AI-driven workplace, thereby enhancing their employability and job security (Bysted, 2013). Additionally, innovative work behaviour fosters a problem-solving mindset and emphasizes value creation, empowering employees to utilize AI in solving intricate problems and contributing to organizational success (Ili & Lichtenthaler, 2017). Continuous learning and reskilling are inherent aspects of innovative work behaviour, enabling employees to navigate new AI-related challenges and uphold their job security amidst the swiftly changing landscape. Moreover, organizations that cultivate a culture of innovative work behaviour are more likely to exhibit organizational agility by proactively embracing AI disruptions and mitigating potential job security risks (Bysted, 2013; Chen et al., 2022). While the positive influence of innovative work behaviour on job security in the context of AI adoption is evident, it is crucial to acknowledge the significance of additional factors such as organizational support and proactive management practices. Further comprehensive research is warranted to fully comprehend the precise mechanisms through which innovative work behaviour shapes job security in the era of AI (Ili & Lichtenthaler, 2017). Hence, based on these arguments:

H7: Innovative work behaviour mediates the relationship between AI Adoption and job security.

The research framework of this study is depicted in Figure 1, which indicates the relationship among AI, innovative work behaviour, job performance and job satisfaction. The model proposed a direct relationship between AI and job performance and job security; Between innovative work behaviour and job performance and job security; and between AI and innovative work behaviour. In addition, this study hypothesized the mediating role of innovative work behaviour in the relationship between AI and job performance and AI and job security.

Insert Figure 1 here

Methodology

The present study is cross-sectional because data is collected from the different population segments simultaneously (Saunders et al., 2009, p. 155). Cross-sectional studies are usually engaged with the survey approach, are time-saving and have a limited time to complete the study (Levin, 2006). The target population for this study consists of manufacturing organizations located in Lahore, Pakistan, the country's second-largest populated provincial capital. The unit of analysis is the employees of manufacturing organizations. The manufacturing industry is an ideal setting for this study due to its prominent role in applying and adopting AI technology. AI is widely used in manufacturing processes, from labour planning to product design, leading to increased productivity, higher product quality, and increased worker safety.

Moreover, the manufacturing industry, Pakistan's most significant sector, plays a crucial role in generating export revenue and employment opportunities. These industries are highly developed in terms of organisational structures and employment patterns, making them an ideal context for studying the effects of AI technologies on job performance and security (Poba-Nzaou et al., 2021). However, the electrical and IT sectors in Pakistan, although experiencing rapid growth, have not yet reached the same level of scale and economic influence and is still in its early stages of development. This lack of stability may hinder a comprehensive study of the interactions between AI adoption and employee dynamics (Rashid et al., 2024).

Thus, by concentrating on the manufacturing sectors, we can investigate the impact of AI adoption, innovative work behaviour, and their effects on job performance and security in a more controlled and consistent manner, while also considering the economic significance of these industries. This approach improves the practicality and significance of the research results, providing useful insights that are specifically customized for the sectors that are essential to Pakistan's economy.

We established specific criteria for selecting our sample. Before taking the survey, respondents underwent screening based on three inclusion criteria. Firstly, they had to be full-time employees. Secondly, they needed to work in organizations implementing AI technology. During the screening process, respondents were provided with a definition of AI and presented with various examples of AI applications, such as automated anomaly detection, analysis of market data to generate summary reports of key performance indices, and utilization of chatbot technologies for customer inquiries while

analyzing text data to identify unmet needs. Respondents were asked if they were aware of any similar technologies being used in their workplace, and only those who responded affirmatively to this screening question were included in the sample. Lastly, we chose organizations operating in industries with a high innovation rate.

Data for the study were collected through questionnaires administered by the lead author. The survey included a cover letter on the first page outlining the study's objective, assured strict confidentiality of findings, and emphasized voluntary participation. Respondents were informed that their personal information would be kept separate from the main data file. Random sampling ensured equal representation across manufacturing subsectors. Pakistan has textiles, food processing, chemicals, cement, engineering, and auto industries. A complete list of manufacturing companies was compiled. Our initial survey found that AI technology is being adopted in two large-scale manufacturing sectors, i.e. Auto and Textiles, out of the 23 groups mentioned by the Economic Survey of Pakistan 2022, mostly dominated by family firms with 50% or more share with family owners (Saleem et al., 2020). Finally, a list of about 851 firms was identified, and the sample size of 260 was enough as per most of the statistical formulas available online. The researchers employed simple random sampling to collect data, distributing 500 surveys with the manufacturing sector contributing 12.4 per cent to GDP. Of these, 260 surveys were considered fully usable, resulting in a response rate of 52 per cent. The sample consisted of employees from diverse backgrounds and management levels, ranging from upper to lower management. The sample size of 260 respondents was determined based on the rule of thumb proposed by Hair et al. (2017), which suggests that there should be a minimum of ten respondents per item, ensuring an appropriate sample for data analysis.

The study mentioned selecting organizations in industries with a high innovation rate. So, for clarity and justification, these were the organizations in the manufacturing industry themselves that had a high innovation rate. Additionally, the explanation regarding why organizations or industries with a high innovation rate were chosen is because AI adoption was possible in such firms in any developing economy like Pakistan. The same was observed in our pilot study.

Measurement of the constructs

This study measured four constructs: AI, innovative work behaviour, job performance and Job security.

AI Adoption is our key independent variable. This variable is measured with seven items developed by Wamba-Taguimdje et al. (2020). The measurement of AI adoption using items adapted from previous research assessed attitudes toward AI adoption rather than the actual adoption of AI.

Participants were to choose on a five-point Likert scale ranging from strongly disagree to strongly agree and, recently tested by Saleem et al. (2023b) for German family firms. Sample item includes, "*AI adoption is more cost-effective than other technologies*".

Innovative behaviour is a mediating variable to connect the dots and is measured with six items developed by Scott et al. (1994:pp.606-607). Participants were asked to choose on a five-point Likert scale ranging from "Never =1, Rarely =2, Sometimes=3, Very Often =4," to "Always=5". The opening statement for the scale that a respondent reads before rating the scale was, "*Innovation is a process involving both the generation and implementation of ideas. As such, it requires a wide variety of specific behaviors on the part of individuals. While some people might be expected to exhibit all the behaviors involved in innovation, others may exhibit only one or a few types of behaviour. Please rate each of your subordinates on the extent to which he or she:*". This opening statement, also considered an operational definition for innovative behaviour, was then followed by six mini statements of items. The sample item included, *"Searches out new technologies, processes, techniques, and/or product ideas"*.

Dependent variables: Job performance (JP) and job security (JS) are our outcome variables: The JP and JS were measured with five and ten items adopted by Groen et al. (2017) and Oldham et al. (1986), respectively. Sample items *include "always meets all formal performance requirements of the job"* and *"I am confident that I will be able to work for this organization as long as I wish"*, respectively. Participants were asked to choose on a five-point Likert scale ranging from strongly disagree to agree strongly.

Control variables: Based on prior literature, we controlled variables that can deliver alternative explanations of the main variables used in our hypothesized model variables (Bell & Bryman, 2022). Hence, we controlled gender, length of service and designation (managerial/non-managerial) as they may significantly affect study variables (Odugbesan et al., 2023; Yu et al., 2023). Factors like age, tenure, managerial level, and education level can impact job performance, influencing employee innovative behaviour. So, these individual-level factors have been controlled as guided by previous studies (Yu et al., 2023). The study has used control to address the potential selection bias and could have significantly confounded the results because innovative behaviours were one of the focal variables.

Data Analysis

SEM, or Structural Equation Modelling, is a multivariate technique that combines multiple regression and factor analysis. PLS-SEM is considered an effective method for examining the relationships

between constructs and generating results that accurately reflect the complexities of real-life situations, as suggested by Moguluwa et al. (2021).

Table 1 describes the descriptive statistics and correlation of all study variables. Data should be normal for statistical analysis (Hair et al., 2017). On the contrary, PLS-SEM is non-parametric statistical software where normal data for analysis is not essential. Although the assumption of using PLS-SEM is non-normal data, it is necessary to check the normality of data at the univariate level because data should not be extremely non-normal (Hair, 2007).

We checked the normality assumption at the univariate level by checking its skewness and kurtosis values. Skewness should be less than 2, and kurtosis should be less than 7 (Curran et al., 1996). Absolute values of skewness and kurtosis of our research variables are in the acceptable range, as shown in Table 1. Multivariate skewness and kurtosis were checked, as suggested by Mardia (1970)[1]. Test results revealed that our research data was multivariate normal (p< 0.001). For non-normal data, the best technique to be used is PLS-SEM.

Insert Table 1 here

During our study, we simultaneously measured both dependent and independent variables, which could have caused common method bias to impact the data. Common method bias refers to variations caused by the instruments rather than the respondents' actual behaviour (Podsakoff et al., 2003). We followed the guidelines of Podsakoff et al. (2003) to mitigate common method bias through various measures. Firstly, we deliberately surveyed the constructs in a different order than the model's sequence and emphasized the confidentiality of respondents' answers, reducing the likelihood of systematic bias. Additionally, each survey page focused solely on items about the same construct, enhancing data quality by aiding respondents' comprehension of the items. Lastly, statistically, we conducted Harmen's one-factor test (Harman, 1967), which revealed that a single factor only accounted for 30% of the variances. As a result, we can conclude that common method bias did not significantly affect our study. The respondents ranged from 27 to 60 and were 65% male. Most respondents are aged 31 to 40 and spend between 6 and 10 years in an organization. The study's demographics are shown in Table 2.

Insert Table 2 here

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[1] https://webpower.psycstat.org/models/kurtosis/

Measurement model assessment

The measurement model helped examine our statistical model's validity and reliability, i.e., factors loadings, average variance extracted (AVE), composite reliability (CR), and Cronbach's alpha values of our dependent and independent variables.

Factor loading is used to determine the validity and reliability of the items. The factor loadings indicate that all items are loaded highly to measure the considering construct. Table 3 shows the factor loadings of the study variables. The outer load values for all the items assessing each construct were close to or greater than 0.7, satisfying the criterion set by Hair et al. (2017). Table 3 describes the measurement model values of our study variables, which include factor loadings, AVE, CR and Cronbach alpha values. All values are within the range of standard threshold values. The recommended threshold value for AVE is 0.50, and our all-study variables' AVE is above 0.52. Similarly, Cronbach alpha values are 0.7 or above, the recommended criteria, and our construct's alpha values are between 0.80 to 0.91. The Composite reliability value is acceptable when it is 0.70 and above. The current study constructs also have appropriate values for CR; their range is above 0.90. Hence, our variables adequately measure internal consistency (Hair et al., 2017).

<center>**Insert Table 3 here**</center>

The discriminant validity was measured by using the Hetrotrait-Monotrait (HTMT) ratio. Table 4 shows the HTMT ratio values. All the values are lower than 0.90, which ensures discriminant validity. Figure 2 shows the measurement model of our research.

<center>**Insert Table 4 here**</center>

<center>**Insert Figure 2 here**</center>

Model Analysis

Table 5 shows a Chi-square value of 698.231 with a significance probability of 0.321, indicating a satisfactory model fit to the data since the p-value is greater than 0.05. The Chi-square/degrees of freedom ratio is 2.054, which is within the acceptable range (less than 3), suggesting a good fit. The RMSEA value is slightly high at 0.098, marginally exceeding the preferred threshold of 0.06. However, the Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI) values are excellent at 0.913 and 0.984, respectively, both well above the recommended threshold of 0.9. The Normed Fit

<center>18</center>

Index (NFI), Tucker-Lewis Index (TLI), and Comparative Fit Index (CFI) are also above 0.9, indicating a strong model fit. Overall, these results suggest that the SEM model is a reasonably good representation of the data, with some areas for improvement, particularly in reducing the RMSEA value.

Insert Table 5 here

Hypotheses Testing

Table 6 shows the results of direct and mediated hypotheses testing. The study used bootstrapping at 1000 to test mediation. The results of our study revealed that AI positively influenced innovative work behaviour. The relationship was significant, having values (β=0.469, t=10.42, p<0.01). Hence, H1 is supported. Moreover, the study showed that AI positively influenced job performance with values (β=0.657, t=20.32, p<0.05), which supported H2. Furthermore, the study revealed that H3 is supported. AI adoption positively influenced job security with values (β=0.345, t=5.831, p<0.01). In addition, the study revealed that innovative work behaviour has a positive association with job performance and job security with values (β=0.037, t=02.32, p<0.05) and (β=0.277, t=05.74, p<0.01) respectively. Therefore, H4 and H5 are supported. The mediating role of innovative work behaviour in the relationship between AI and job performance and AI and job security was positively significant with values (β=0.017, t=2.161, p<0.05) and (β=0.130, t=4.6504, p<0.01) respectively. Thus, H6 and H7 are supported. The coefficient of determination (R^2) is an essential criterion for measuring dependent variables (Hair et al., 2017). The R square for innovative work behaviour is 0.220. Job performance is 0.358, and job security is 0.445, which is considered substantial.

Insert Table 6 here

Insert Figure 3 here

Discussion

This study enhanced our comprehension of the interactions among employees' innovative behaviour, technology adoption, job performance, and job security. Furthermore, by expanding the existing literature on sociotechnical system theory within business management, this article contributes to understanding the relationship between AI and innovative behaviour. It examines the mediating role of innovative work behaviour in the relationship between AI adoption, job performance, and job security.

This study confirmed the relationship between AI and innovative work behaviour. This finding is consistent with other research showing that Implementing AI technologies allows employees to utilize advanced tools and abilities to analyze data, automate tasks, and uncover new insights (Yu et al., 2023; Anantrasirichai & Bull, 2021). Similarly, AI adoption positively influences job performance. Our results are consistent with the findings of similar studies (see, e.g., Matsunaga, 2022; Ajzen, 2011). The reason is that improved efficiency can increase employee productivity by accomplishing more work within a shorter timeframe. Moreover, AI systems provide predictive analytics, decision-support tools, and data-driven insights (Zirar, 2023), further enhancing productivity. By leveraging AI capabilities, employees can enhance their performance through the assistance of informed and accurate decision-making (Yu et al., 2023). The study suggests that AI adoption often necessitates employees to acquire new skills and adapt to technological changes. Organizations that invest in employee training and development programs in the context of AI adoption can enhance job security by equipping employees with the necessary skills to work alongside AI technologies (Davenport & Ronanki, 2018; Bhargava et al., 2021; Ili & Lichtenthaler, 2017). The study's findings also suggested that employees who actively participate in innovative practices are responsible for generating fresh knowledge, insights, and expertise (Yu et al., 2023). This knowledge creation and exchange process plays a significant role in organizational learning, facilitating continuous improvement and boosting job performance (Kirkpatrick, 2017). The study finds that employees who demonstrate innovative work behaviour are inclined to embrace emerging technologies, explain novel concepts, and adjust their skills to meet evolving job demands (Yu et al., 2023; Butali et al., 2016). This adaptability strengthens job security and enhances employees' resilience in the face of changes, thereby increasing their value within the organization (Chen et al., 2022).

One of our study's crucial contributions was explaining and testing the mediating relationships. The study suggests that employees with a propensity for innovative work behaviour play a crucial role in facilitating the effective implementation and utilization of AI technologies in organizations (Yu et al., 2023; Anantrasirichai & Bull, 2021). Their willingness to investigate and experiment with AI tools empowers them to discover new applications and maximize the use of AI systems, ultimately leading to enhanced job performance outcomes (Yu et al., 2023; Aung et al., 2023). Finally, we postulated that innovative work behaviour positively mediates the relationship between AI and job security. Employees who exhibit innovative work behaviour showcase their ability to adapt to technological advancements and view AI as a chance for growth rather than a source of concern (Yu et al., 2023; Butali et al., 2016). Their proactive mindset involves actively acquiring relevant skills that align with the evolving demands of the AI-driven workplace, thus augmenting their employability and job security (Bysted, 2013). Hence, the study evidences that employees' adoption and utilization of AI

technologies positively influence their innovative behaviour, job performance and security. Similarly provides evidence that innovative work behaviour has a significant and positive relationship with job performance and security. Moreover, the study finds a significant mediating role of innovative work behaviour in the relationship between job performance and security.

Theoretical contribution

The study makes a substantial contribution to the sociotechnical systems theory by incorporating the notion of innovative work behaviour as a mediator in the connection between AI adoption and employee outcomes. By doing this, it provides a sophisticated comprehension of the interaction between technology and the social elements of organisations within the framework of contemporary technological progress (Yu et al., 2023). In addition, this research fills a significant void in the current body of knowledge by clarifying the intermediate function of innovative work behaviour, thus expanding the conversation beyond the direct effects of AI on organisational productivity and efficiency (Zirar, 2023). This enhanced theoretical understanding offers a strong foundation for future investigations into the dynamics of technology adoption and its consequences within organisations, especially in the changing field of artificial intelligence. The current study aims to offer insightful advice to businesses using AI technologies to boost worker productivity and job security.

The research shows that innovative work behaviour is crucial for successfully implementing and achieving positive outcomes with AI technologies in the workplace, which supports existing theories. This discovery expands the sociotechnical systems theory by highlighting the importance of the human factor, particularly employee innovation, in balancing the interaction between the technical and social components of an organisation (Yu et al., 2023). The study emphasises the significance of creating a work environment that promotes creativity and adaptability among employees when they engage with new technologies, by incorporating innovative work behaviour into the model.

Furthermore, this study enhances the existing knowledge by providing concrete evidence on the mechanisms by which the adoption of artificial intelligence affects important employee outcomes. This fills a significant void in the current literature. Prior research has primarily concentrated on the immediate effects, such as improvements in productivity and efficiency, frequently overlooking the underlying behavioural and psychological mechanisms at play (Verma et al., 2022). This research explores the impact of innovative behaviour on the enhancement of both performance and job security through the use of AI technologies. It provides a more comprehensive understanding of the implications of AI technologies.

To summarise, this research enhances our comprehension of the mechanisms by which technology influences organisational outcomes, providing clear and extensive theoretical implications. It offers a detailed viewpoint that connects technological progress with strategies that prioritise human needs, thereby improving the theoretical and practical implementation of sociotechnical systems in modern organisational environments. This study not only enhances theoretical understanding but also establishes a precedent for future research to investigate additional mediating factors that may impact the correlation between technology adoption and different aspects of job performance and security.

Practical Implications

The results of this study have important practical implications for integrating AI technologies into the workplace, specifically in Pakistan's auto and textile industries. These findings can provide valuable strategic insights for effectively implementing AI in these industries (Rashid et al., 2024). Organisations can improve the design of AI-related initiatives by comprehending the mediating function of innovative work behaviour. This understanding allows them to not only promote the adoption of technology but also develop a culture of innovation within the organisation. As a result, job performance and security are enhanced. These insights are crucial for business leaders and policymakers to develop strategies that utilise AI to achieve economic benefits. Moreover, the study's results can provide valuable insights for formulating policies at both the industrial and national levels. These policies can be designed to encourage the sustainable adoption of AI and facilitate the necessary adjustments in the workforce to cope with the fast-paced technological advancements (Verma et al., 2022).

Furthermore, organizations should prioritize encouraging the use of AI technology and offering thorough training programs to give staff members the skills they need to use AI tools efficiently. This might increase job stability and result in better work performance. Also, encouraging employees to engage in innovative work behaviours like investigating novel concepts and experimenting with AI technologies can improve job performance. Lastly, recognizing the mediating role of innovative work behaviour underscores the significance of creating an environment that supports and encourages innovation, empowering employees to contribute innovative ideas and approaches, thereby enhancing job performance and security (Yu et al., 2023). By considering these practical implications, organizations can effectively embrace AI technologies, drive job performance, and promote job security in the rapidly evolving technological landscape.

Managerial Implications

In order to meet the requirement for more comprehensive managerial recommendations derived from the study's results, managers should contemplate various practical strategies to amplify the advantages of AI implementation by fostering innovative work behaviour. Firstly, it is essential to cultivate a culture that incentivizes innovation and the willingness to take risks, achieved through a combination of structured initiatives such as innovation labs and informal methods. It is necessary to create thorough training programmes that prioritise the development of both technical expertise and innovation in AI technologies. Open and clear communication regarding AI initiatives and actively involving employees in decision-making processes can clarify the technology and ensure that employee efforts are in line with organisational objectives. By aligning AI adoption objectives with individual performance metrics, it is possible to establish a direct connection between technology involvement and career advancement (Zirar, 2023). Additionally, the implementation of support systems such as mentorship programmes and cross-departmental teams can promote the exchange of knowledge and encourage creative utilisation of AI. Ultimately, incorporating AI in successive stages while receiving consistent input from employees will guarantee a more seamless integration of technology and ongoing adjustment to meet the requirements of the workforce and organisation. Implementing these strategies will not only optimise operational efficiencies but also bolster employee engagement, job performance, and security, thereby cultivating a lasting competitive advantage (Bhargava et al., 2021).

Limitations and Directions for Future Research

First, This study's population targeted consisted of manufacturing organizations located in Lahore, Pakistan. However, it is acknowledged that the findings may not be generalizable to other industries and contexts; thus, the limitations associated with this geographical and industry focus need further research.

This research study is also limited because it is cross-sectional, which could lead to common method bias. However, we have taken steps to address this concern by applying a statistical test. We suggest adopting a time-lagged or longitudinal study to overcome the issue in future studies. It would be insightful to look at the long-term effects of AI adoption on job performance and security. Researchers can also examine the impact of cultural elements on workers' views towards AI and their tendency for innovative work behaviour by conducting cross-cultural studies (Bhargava et al., 2021). This research methodology sheds light on how cultural nuances impact employees' perceptions and attitudes linked to AI adoption and innovation in the workplace, offering valuable insights for organizations operating in varied environments. Researchers can better understand the contextual dynamics involved in the relationship between AI adoption, innovative work behaviour, job performance, and job security by considering the impact of organizational factors, such as leadership styles and strategies for managing

change (Shal et al., 2024). This method enables a more thorough understanding of how organizational factors influence the outcomes of AI implementation and offers insightful information about the precise mechanisms by which leadership and change management techniques can affect the overall impact of AI on job performance and job security.

Conclusion

The research's conclusions have essential ramifications for businesses looking to use AI technologies wisely and benefit their workers. The current study has shown that implementing AI technology can significantly impact how well employees do their jobs. Employers may improve employee performance by embracing AI and utilizing its potential to help employees make more informed and precise decisions. Additionally, automating repetitive operations with AI frees workers to focus on more complex and value-added work, improving their ability to execute their jobs. Employees with a favourable view of AI are more adaptable to change and can better match their skill sets to the changing demands of AI-driven workplaces, which promotes job stability.

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