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Role of Contemporary Technology Adoption in Enhancing Reskilling and Up-skilling of Employees Working in Islamic Welfare and Relief Organizations of Pakistan: The Mediating Role of Openness to Experience.

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Abstract

This study examines the role of contemporary technology adoption in enhancing reskilling and up-skilling among employees working in Islamic welfare and relief organizations in Pakistan, with a particular focus on the mediating role of openness to experience. Grounded in a positivist research paradigm, the study employs a quantitative, causal-comparative design. Primary data were collected from 350 employees through a structured questionnaire using non-probability convenience sampling. The conceptual framework positions technology adoption as the independent variable, reskilling and up-skilling as dependent variables, and openness to experience as a mediating variable. Data were analyzed using SPSS, where reliability and validity tests, correlation analysis, and regression techniques were applied to examine the hypothesized relationships. The findings reveal that technology adoption has a significant and positive effect on both reskilling and up-skilling of employees. Moreover, technology adoption also shows a significant positive relationship with openness to experience, indicating that exposure to modern digital tools enhances employees' adaptability and cognitive openness toward learning. In addition, openness to experience significantly influences both reskilling and up-skilling outcomes. The mediation analysis confirms that openness to experience partially mediates the relationship between technology adoption and both reskilling and up-skilling, highlighting its critical psychological role in strengthening the impact of technological interventions on employee development. Overall, the study concludes that technology-driven learning environments, when combined with employees' openness to experience, significantly enhance workforce capability development in Islamic welfare and relief organizations in Pakistan. The study contributes to the literature on digital transformation and human capital development in nonprofit and humanitarian sectors and offers practical implications for improving organizational learning systems.

Keywords: Technology adoption; Reskilling; Up-skilling; Openness to experience; Digital transformation; Human capital development; Islamic welfare organizations; Employee learning.

1. Introduction

The contemporary workplace is experiencing unprecedented transformation due to rapid advancements in digital technologies, artificial intelligence, automation, cloud computing, big data analytics, and digital communication systems. Organizations across the globe are increasingly adopting modern technologies to improve operational efficiency, service delivery, knowledge management, and organizational sustainability (Brynjolfsson & McAfee, 2014; Vial, 2019). While technological advancement creates numerous opportunities for organizational growth, it simultaneously demands new competencies, skills, and capabilities from employees. Consequently, organizations are increasingly focusing on employee reskilling and up-skilling initiatives to ensure workforce adaptability and long-term competitiveness (World Economic Forum, 2023).

Reskilling refers to the process through which employees acquire entirely new competencies that enable them to perform different tasks or assume new organizational roles, whereas up-skilling involves enhancing existing knowledge and capabilities to perform current responsibilities more effectively (Noe et al., 2014). In the digital era, both reskilling and up-skilling have become strategic priorities for organizations seeking to maintain relevance and effectiveness amid continuous technological disruption (Bughin et al., 2018). Studies indicate that organizations investing in technological innovation and employee capability development are better positioned to achieve organizational effectiveness, innovation, and sustainable performance (Autor, 2015; Schwab, 2016).

The significance of technology adoption is particularly evident in humanitarian, welfare, and relief organizations. These organizations increasingly rely on digital platforms, mobile applications, donor management systems, artificial intelligence-based decision support systems, geographic information systems (GIS), cloud-based information management systems, and digital communication tools to deliver services efficiently and effectively (Madianou, 2019). Technology adoption has transformed the manner in which welfare and relief organizations manage resources, coordinate emergency responses, engage stakeholders, and monitor program outcomes (Meier, 2015). Consequently, employees working within these organizations are expected to possess the necessary technological competencies to utilize modern systems effectively.

In Pakistan, Islamic welfare and relief organizations play a crucial role in addressing social, humanitarian, educational, health, and disaster management challenges. Prominent organizations operating within the country increasingly utilize digital technologies for fundraising, beneficiary management, volunteer coordination, financial transparency, and program monitoring (Khan & Ali, 2021). However, the successful implementation of such technologies depends largely on the workforce's ability to adapt to technological changes and continuously acquire new skills. Employees who fail to update their competencies may encounter difficulties in effectively utilizing modern technologies, thereby reducing organizational effectiveness and service quality.

Existing literature suggests that technology adoption significantly influences employees'

learning behaviors, professional development, and skill enhancement (Tarafdar et al., 2019). Technological tools facilitate knowledge acquisition, collaborative learning, virtual training, information sharing, and continuous professional development opportunities, which ultimately contribute to workforce reskilling and up-skilling (Bersin, 2018). Furthermore, digital technologies provide employees with access to diverse learning resources, online training platforms, and knowledge networks that accelerate competency development and workplace learning (Van Laar et al., 2020). Therefore, organizations that successfully adopt contemporary technologies are more likely to foster employee learning and capability enhancement.

Despite the growing importance of technology-driven workforce development, employee responses to technological change are not uniform. Individual personality characteristics often determine how employees perceive, accept, and utilize technological innovations. Among the Big Five personality dimensions, openness to experience has received considerable attention due to its association with curiosity, creativity, adaptability, learning orientation, and willingness to embrace change (Costa & McCrae, 1992). Individuals exhibiting high levels of openness to experience tend to demonstrate greater acceptance of innovation, stronger learning motivation, and increased readiness to acquire new knowledge and competencies (McCrae & Sutin, 2009).

Research indicates that employees with higher openness to experience are more likely to engage in exploratory learning behaviors, adapt to technological transformations, and actively pursue developmental opportunities (LePine, Colquitt, & Erez, 2000). Such individuals often perceive technological change as an opportunity for growth rather than a threat, thereby facilitating the acquisition of new skills and competencies required in dynamic work environments. Consequently, openness to experience may serve as a critical psychological mechanism through which technology adoption influences employee reskilling and up-skilling outcomes.

Although previous studies have examined technology adoption, employee learning, digital transformation, and workforce development separately, limited empirical evidence exists regarding the integrated relationship among technology adoption, openness to experience, reskilling, and up-skilling within Islamic welfare and relief organizations, particularly in the context of Pakistan. Most existing studies have focused on corporate organizations, manufacturing industries, educational institutions, or public-sector organizations, while the humanitarian and welfare sector remains comparatively underexplored (Madianou, 2019; Van Laar et al., 2020). Furthermore, the mediating role of openness to experience in explaining how technology adoption contributes to employee capability development has received insufficient scholarly attention.

Addressing this gap is particularly important because Islamic welfare and relief organizations operate in highly dynamic environments characterized by resource constraints, evolving stakeholder expectations, technological advancement, and increasing accountability requirements. Understanding how technology adoption enhances employee reskilling and

up-skilling through psychological mechanisms such as openness to experience can provide valuable insights for organizational leaders, policymakers, human resource professionals, and development practitioners seeking to strengthen workforce capabilities and organizational effectiveness.

The present study is grounded in the principles of Human Capital Theory (Becker, 1964) and Technology Acceptance Theory (Davis, 1989). Human Capital Theory posits that investments in employee knowledge, skills, and competencies contribute directly to individual and organizational performance. Simultaneously, Technology Acceptance Theory suggests that individuals' perceptions and attitudes toward technology significantly influence their adoption behaviors and subsequent outcomes. Integrating these perspectives provides a comprehensive framework for understanding how technology adoption promotes workforce development through individual psychological characteristics.

Accordingly, this study investigates the role of contemporary technology adoption in enhancing employee reskilling and up-skilling within Islamic welfare and relief organizations operating in Pakistan. Specifically, the study examines the direct effects of technology adoption on reskilling, up-skilling, and openness to experience, the influence of openness to experience on reskilling and up-skilling, and the mediating role of openness to experience in the relationship between technology adoption and employee capability development outcomes. By addressing these relationships, the study contributes to the growing literature on digital transformation, workforce development, organizational learning, and personality-based mechanisms of employee development in the nonprofit and humanitarian sector.

The findings of this study are expected to provide theoretical contributions by extending existing knowledge regarding technology-enabled workforce development and psychological mediating mechanisms. Practically, the study offers evidence-based insights for managers and policymakers in Islamic welfare and relief organizations seeking to design effective digital transformation strategies, employee development programs, and technology-driven learning initiatives that enhance organizational performance and service delivery effectiveness

2. Literature Review

2.1 Technology Adoption and Employee Reskilling

The emergence of contemporary technologies has fundamentally transformed organizational operations, workforce requirements, and employee development practices across industries worldwide. Technology adoption refers to the acceptance, integration, and utilization of technological innovations within organizational processes to improve efficiency, productivity, communication, decision-making, and service delivery (Davis, 1989; Vial, 2019). In recent years, organizations have increasingly adopted advanced technologies such as artificial intelligence, cloud computing, machine learning, mobile technologies, digital learning platforms, big data analytics, and automation systems to remain competitive and responsive to environmental changes (Brynjolfsson & McAfee, 2014; Schwab, 2016). The adoption of technology often alters the nature of jobs and work processes, creating a need for

employees to acquire entirely new competencies and capabilities. As technological innovations reshape occupational requirements, employees must continuously adapt to new systems, processes, and methods of work. Consequently, organizations are increasingly investing in workforce reskilling initiatives to ensure employees remain capable of performing effectively within evolving technological environments (Noe et al., 2014). Reskilling refers to the process through which employees acquire entirely new knowledge, skills, and competencies that enable them to undertake new roles or perform tasks that differ from their existing responsibilities (Noe et al., 2014).

Human Capital Theory provides a strong theoretical basis for understanding the relationship between technology adoption and employee reskilling. According to Becker (1964), investments in employee knowledge and competencies contribute significantly to organizational effectiveness and productivity. Technology adoption often necessitates complementary investments in employee development because technological resources alone cannot generate value unless employees possess the capabilities required to utilize them effectively. Therefore, organizations embracing digital transformation typically implement extensive reskilling programs to align employee competencies with emerging technological requirements. Empirical studies consistently demonstrate that technology adoption promotes employee learning and competency development. Tarafdar et al. (2019) found that digital technologies facilitate knowledge acquisition, information sharing, and continuous learning opportunities within organizations. Similarly, Van Laar et al. (2020) reported that technology-rich workplaces encourage employees to develop new digital competencies and technological skills necessary for effective performance. Li (2022) further argued that technological advancement creates continuous demand for workforce reskilling as organizations seek to adapt to Industry 4.0 and digitally enabled operational models.

Recent research suggests that employees exposed to advanced technologies are more likely to engage in learning activities aimed at acquiring new competencies and adapting to changing workplace demands. Digital learning platforms, online training systems, virtual simulations, and technology-enabled knowledge management systems provide opportunities for employees to acquire new capabilities efficiently and effectively (Pedota, Grilli, & Piscitello, 2023). Within Islamic welfare and relief organizations, technology adoption has increasingly become essential for donor management, beneficiary tracking, financial accountability, communication, monitoring, and service delivery. Consequently, employees working within these organizations are required to acquire new technological competencies to support organizational effectiveness and sustainability.

H1: Technology adoption has a positive and significant effect on employee reskilling.

2.2 Technology Adoption and Employee Up-skilling

In addition to creating demand for new competencies, technology adoption also contributes significantly to the enhancement of employees' existing skills and capabilities. Up-skilling refers to the process through which employees improve and strengthen their current knowledge, competencies, and professional expertise to perform their existing roles more

effectively (Noe et al., 2014). In the contemporary workplace, up-skilling has become increasingly important because technological advancements continuously alter performance expectations and competency requirements. Technology-enabled learning environments provide employees with unprecedented access to educational resources, professional development opportunities, collaborative networks, and digital knowledge repositories. Modern technologies facilitate self-directed learning, virtual training, online certification programs, and continuous professional development initiatives that support competency enhancement (Van Laar et al., 2020). As organizations increasingly adopt digital technologies, employees gain opportunities to improve existing skills and develop advanced competencies that enhance workplace effectiveness.

According to Human Capital Theory, organizations that invest in employee capability enhancement improve workforce productivity and organizational performance (Becker, 1964). Technology adoption facilitates such investments by creating learning ecosystems that support continuous competency development. Employees can utilize technological tools to access training resources, participate in online workshops, engage in collaborative learning activities, and receive real-time performance feedback. These opportunities contribute significantly to employee up-skilling and professional growth.

Research indicates that organizations implementing digital transformation initiatives often experience improvements in workforce capability development. Tarafdar et al. (2019) reported that technology adoption enhances employee learning outcomes by facilitating access to information and knowledge-sharing opportunities. Similarly, Li (2022) observed that technology-rich work environments encourage employees to strengthen existing competencies and improve professional expertise. Pedota et al. (2023) further demonstrated that organizations embracing Industry 4.0 technologies experience greater workforce up-skilling as employees seek to enhance their capabilities in response to changing technological requirements. Within Islamic welfare and relief organizations, digital technologies increasingly support operational efficiency, beneficiary services, project monitoring, fundraising, and stakeholder engagement. Employees must therefore continuously enhance their existing competencies to effectively utilize technological systems and contribute to organizational objectives. Consequently, technology adoption is expected to positively influence employee up-skilling.

H2: Technology adoption has a positive and significant effect on employee up-skilling.

2.3 Technology Adoption and Openness to Experience

Technology adoption often requires employees to embrace innovation, experimentation, adaptability, and continuous learning. As organizations introduce new technologies, employees are exposed to unfamiliar systems, novel processes, and evolving workplace expectations. These experiences may influence employees' psychological orientations toward learning and change, particularly their openness to experience. Openness to experience is one of the five major dimensions of personality proposed within the Five-Factor Model and reflects an individual's tendency toward curiosity, imagination, intellectual

exploration, creativity, and receptiveness to new ideas and experiences (Costa & McCrae, 1992). Individuals exhibiting high levels of openness are generally more willing to explore unfamiliar situations, embrace change, and engage in learning activities that expand their knowledge and competencies (McCrae & Sutin, 2009).

Technology-rich work environments often encourage experimentation, innovation, and problem-solving behaviors. Employees interacting with advanced technological systems are exposed to diverse information sources, collaborative opportunities, and learning experiences that stimulate intellectual curiosity and adaptability. Such exposure may strengthen openness-related behaviors and attitudes toward learning and innovation (LePine, Colquitt, & Erez, 2000). Research suggests that technological engagement is positively associated with innovative thinking, adaptability, and openness toward organizational change. Employees who regularly utilize advanced technological tools tend to demonstrate greater flexibility and willingness to engage with novel experiences (Wong, Hui, & Kong, 2023). Moreover, technology adoption often creates an organizational culture that values continuous learning and innovation, further encouraging employees to develop openness-related characteristics. Within Islamic welfare and relief organizations, technological transformation frequently requires employees to adjust traditional work practices and adopt innovative approaches to service delivery. Such experiences may increase employees' willingness to learn, explore new ideas, and embrace change, thereby strengthening openness to experience.

H3: Technology adoption has a positive and significant effect on openness to experience.

2.4 Openness to Experience and Employee Reskilling

Openness to experience is widely recognized as a critical predictor of learning orientation, adaptability, and professional development. Individuals high in openness demonstrate strong curiosity, intellectual flexibility, creativity, and willingness to engage with novel experiences (Costa & McCrae, 1992). These characteristics are particularly important in environments characterized by technological change and evolving competency requirements. Employees who possess higher levels of openness to experience are generally more receptive to acquiring new knowledge and skills. They view change as an opportunity for growth rather than a threat and actively seek learning experiences that enhance their capabilities (McCrae & Sutin, 2009). Consequently, open individuals are more likely to participate effectively in reskilling initiatives aimed at preparing employees for new roles and responsibilities. Previous research demonstrates that openness positively predicts adaptability, learning engagement, and developmental behavior. LePine et al. (2000) found that employees with higher openness exhibit stronger motivation to learn and greater willingness to embrace organizational change. Similarly, studies on workplace learning suggest that open individuals are more likely to engage in training activities, acquire new competencies, and adapt successfully to changing work environments.

In Islamic welfare and relief organizations, technological advancement often necessitates the acquisition of entirely new competencies related to digital platforms, data management

systems, communication technologies, and monitoring mechanisms. Employees who demonstrate greater openness to experience are likely to respond more positively to such developmental requirements and participate actively in reskilling initiatives.

H4: Openness to experience has a positive and significant effect on employee reskilling.

2.5 Openness to Experience and Employee Up-skilling

Openness to experience also plays an important role in enhancing employees' existing competencies and professional capabilities. Employees who are open to experience tend to possess strong intrinsic motivation for learning and self-development. They actively seek opportunities to expand their knowledge, improve performance, and strengthen professional expertise. Theoretical perspectives suggest that openness promotes lifelong learning and continuous professional development because open individuals enjoy intellectual exploration and are willing to engage in new learning experiences (Costa & McCrae, 1992). Such individuals are more likely to participate in training programs, utilize learning technologies, and pursue opportunities for competency enhancement. Consequently, openness contributes significantly to employee up-skilling.

Research consistently supports the positive relationship between openness and professional development outcomes. McCrae and Sutin (2009) reported that openness predicts engagement in educational and developmental activities throughout adulthood. Similarly, technology-enabled learning studies indicate that open individuals derive greater benefits from digital learning environments due to their willingness to experiment, explore, and learn from new experiences (Wong et al., 2023). Within contemporary Islamic welfare and relief organizations, employees must continuously strengthen existing competencies to effectively utilize emerging technologies and respond to evolving stakeholder expectations. Openness to experience is therefore expected to facilitate employee up-skilling by encouraging continuous learning and professional growth.

H5: Openness to experience has a positive and significant effect on employee up-skilling.

2.6 Mediating Role of Openness to Experience in the Relationship between Technology Adoption and Employee Reskilling

While technology adoption provides access to learning opportunities and developmental resources, employees differ considerably in their responses to such opportunities. Personality characteristics often determine the extent to which employees engage with technology-enabled learning and competency development initiatives. Among these characteristics, openness to experience appears particularly relevant because it influences individuals' willingness to learn, adapt, and embrace change. Technology adoption often exposes employees to new ideas, innovative work practices, and unfamiliar learning experiences that stimulate curiosity and exploratory behavior. Employees who become more open to experience as a result of technological engagement are likely to demonstrate greater willingness to acquire new competencies and participate in reskilling initiatives. Thus, openness may function as a psychological mechanism through which technology adoption

influences employee reskilling outcomes.

Previous studies indicate that technology-supported environments encourage experimentation, innovation, and learning engagement, all of which are closely associated with openness to experience (McCrae & Sutin, 2009; Wong et al., 2023). Furthermore, employees possessing greater openness are more likely to capitalize on learning opportunities created by technological systems and successfully acquire new competencies required in evolving work environments.

H6: Openness to experience mediates the relationship between technology adoption and employee reskilling.

2.7 Mediating Role of Openness to Experience in the Relationship between Technology Adoption and Employee Up-skilling

The relationship between technology adoption and employee up-skilling may also be explained through openness to experience. Technology adoption creates opportunities for continuous learning and competency enhancement; however, employees vary in their willingness to engage with these opportunities. Employees who possess higher levels of openness are generally more motivated to utilize technology-enabled learning resources and participate in professional development activities. Technology-rich environments encourage intellectual exploration, adaptability, and innovative thinking, which are fundamental characteristics of openness to experience. As employees become more receptive to learning and change, they are more likely to strengthen existing competencies and improve workplace performance. Consequently, openness may serve as an important intermediary mechanism linking technology adoption with employee up-skilling outcomes.

Empirical studies suggest that open individuals derive greater developmental benefits from technology-supported learning environments because they actively engage in learning processes and seek opportunities for continuous improvement (LePine et al., 2000; Wong et al., 2023). Therefore, openness to experience is expected to transmit the positive effects of technology adoption on employee up-skilling.

H7: Openness to experience mediates the relationship between technology adoption and employee up-skilling.

3. Research Methodology

3.1 Philosophical Stance of Research Study

The present study is grounded in the positivist research philosophy, which assumes that reality exists objectively and can be measured through observable and quantifiable phenomena. Positivism emphasizes empirical investigation, hypothesis testing, statistical analysis, and objective interpretation of findings (Saunders, Lewis, & Thornhill, 2019). Since the current study seeks to examine the causal relationships among technology adoption, openness to experience, reskilling, and up-skilling using numerical data and statistical procedures, positivism provides the most suitable philosophical foundation. The philosophy

enables the researcher to collect measurable data from respondents and objectively test the proposed hypotheses through statistical analysis.

The study adopts an objectivist ontology, which assumes that organizational phenomena such as technology adoption, openness to experience, reskilling, and up-skilling exist independently of the researcher and can be objectively measured. Under this ontological position, reality is viewed as stable and observable through systematic investigation (Bryman & Bell, 2018). Similarly, the study follows a positivist epistemology, which argues that valid knowledge is generated through empirical observation, measurement, and statistical verification. The researcher remains independent from the research participants and relies upon structured instruments to obtain factual and unbiased information. Therefore, knowledge regarding the relationships among the study variables is derived from observable data collected from employees working in Islamic welfare and relief organizations in Pakistan.

3.2 Research Approach to Study

The study employs a deductive research approach. Deductive reasoning begins with established theories and existing literature from which hypotheses are formulated and subsequently tested using empirical data (Saunders et al., 2019). In the present study, Human Capital Theory and the Technology Acceptance Model provide the theoretical foundation for developing hypotheses concerning the relationships among technology adoption, openness to experience, reskilling, and up-skilling. Data collected from respondents are used to empirically verify the proposed theoretical relationships. The study adopts a quantitative research design because the objective is to measure variables numerically and examine relationships through statistical procedures. Quantitative research facilitates hypothesis testing, objective analysis, and generalizable findings through structured data collection methods (Creswell & Creswell, 2018). Furthermore, the study utilizes a causal-comparative explanatory research design. This design is appropriate because the study seeks to investigate cause-and-effect relationships among technology adoption, openness to experience, reskilling, and up-skilling. The explanatory nature of the design enables the researcher to determine whether variations in technology adoption significantly influence employee capability development outcomes directly and indirectly through openness to experience.

3.3 Population and Sampling

The target population of the study comprises employees working in Islamic welfare and relief organizations operating in Pakistan. These organizations are actively involved in humanitarian assistance, social welfare, education, healthcare services, poverty alleviation, disaster management, community development, and charitable activities. Employees working within these organizations increasingly interact with digital technologies and are therefore suitable respondents for investigating the role of technology adoption in workforce capability development.

The population includes employees from various functional departments, administrative

levels, and professional backgrounds to ensure adequate representation of perspectives regarding technology utilization, personality characteristics, and professional development practices. Due to the absence of a comprehensive and accessible sampling frame containing all employees working within Islamic welfare and relief organizations in Pakistan, the study employs a **non-**probability convenience sampling technique. Convenience sampling allows researchers to collect data from respondents who are readily accessible and willing to participate in the study (Etikan, Musa, & Alkassim, 2016). This technique is widely utilized in organizational and behavioral research where population accessibility is limited. Given the geographical dispersion of Islamic welfare organizations across Pakistan and practical constraints related to time, cost, and accessibility, convenience sampling was considered appropriate for the present investigation.

A total of 350 employees participated in the study. The sample size is considered adequate for quantitative analysis and hypothesis testing using SPSS. According to Hair, Black, Babin, and Anderson (2019), sample sizes exceeding 300 respondents generally provide sufficient statistical power for correlation, regression, mediation, reliability, and validity analyses. The selected sample adequately represents employees from different Islamic welfare and relief organizations and provides sufficient observations for examining direct and indirect relationships among the study variables. The individual employee serves as the unit of analysis. Each respondent provided information regarding perceptions of technology adoption, openness to experience, reskilling, and up-skilling. Since the study examines individual-level attitudes, perceptions, and developmental outcomes, employees constitute the most appropriate unit of analysis.

3.4 Data Collection and Integration

The study utilizes primary data collected directly from respondents through a structured questionnaire. Primary data collection enables the researcher to obtain firsthand information relevant to the study objectives and hypotheses. The questionnaire was distributed among employees working in Islamic welfare and relief organizations through both physical and online modes. Respondents were informed regarding the purpose of the study, confidentiality of information, voluntary participation, and academic nature of the research. Completed questionnaires were screened for completeness before inclusion in the final analysis. A well-structured survey questionnaire was utilized as the primary research instrument. The questionnaire consisted of two major sections.

The first section collected demographic information regarding respondents, including gender, age, educational qualification, work experience, and organizational position. The second section measured the study variables using previously validated scales adapted from established literature. All items were assessed using a five-point Likert scale, ranging from:1 = Strongly Disagree to 5 = Strongly Agree. The use of a Likert scale facilitates the quantification of perceptions and attitudes while ensuring consistency across responses. Technology adoption was measured using adapted items from prior studies examining technology acceptance, digital transformation, and technology utilization within organizational contexts (Davis, 1989; Vial, 2019). The scale assessed the extent to which

employees utilize and accept contemporary technologies in performing organizational tasks. Openness to experience was measured using items adapted from established personality assessment instruments based on the Five-Factor Model developed by Costa and McCrae (1992). The scale captured respondents' curiosity, adaptability, willingness to learn, creativity, and receptiveness to new experiences. Reskilling was measured using adapted items from workforce development and employee learning literature (Noe et al., 2014). The scale assessed employees' acquisition of new competencies, knowledge, and capabilities required to perform emerging organizational roles and responsibilities. Up-skilling was measured using items adapted from contemporary employee development and professional learning studies (Noe et al., 2014; Van Laar et al., 2020). The scale evaluated respondents' enhancement of existing competencies and continuous professional development.

Prior to statistical analysis, collected data were screened for completeness, accuracy, and consistency. Incomplete responses, missing values, and potential data entry errors were identified and addressed. Data were subsequently coded and entered into the Statistical Package for Social Sciences (SPSS) software for further analysis. Normality, linearity, and multicollinearity assumptions were examined to ensure the suitability of the data for inferential statistical procedures. Descriptive statistics were generated to summarize respondent characteristics and study variable. Reliability analysis was conducted using Cronbach's Alpha coefficient to assess the internal consistency of measurement scales. According to Hair et al. (2019), Cronbach's Alpha values exceeding 0.70 indicate acceptable reliability. The reliability assessment was conducted separately for technology adoption, openness to experience, reskilling, and up-skilling scales. The obtained reliability values exceeded the recommended threshold, confirming satisfactory internal consistency and measurement stability. Validity analysis was performed to ensure that the measurement scales accurately captured the intended constructs. Content validity was established through extensive review of relevant literature and adoption of measurement items from previously validated scales. Academic experts and researchers reviewed the questionnaire to ensure clarity, relevance, and appropriateness of items. Construct validity was assessed using factor analysis procedures within SPSS. Factor loadings, Kaiser-Meyer-Olkin (KMO) measures, and Bartlett's Test of Sphericity were examined to determine the adequacy of the measurement model. Factor loadings exceeding 0.50 were considered acceptable indicators of construct validity (Hair et al., 2019).

The collected data were analyzed using Statistical Package for Social Sciences (SPSS) software. Multiple statistical procedures were employed to address the research objectives and test the proposed hypothes. Descriptive statistics including frequencies, percentages, means, and standard deviations were computed to summarize demographic characteristics and respondent perceptions regarding study variables. Pearson correlation analysis was conducted to examine the strength and direction of relationships among technology adoption, openness to experience, reskilling, and up-skilling. Correlation coefficients provided preliminary evidence regarding associations among the variables. Multiple regression analysis was employed to examine the direct effects of technology adoption on reskilling, up-skilling, and openness to experience, as well as the effects of openness to

experience on reskilling and up-skilling. Regression coefficients, t-values, significance levels, and coefficients of determination (R^2) were used to evaluate the proposed relationships.

Mediation analysis was conducted to examine the indirect effects of technology adoption on reskilling and up-skilling through openness to experience. The mediation procedure followed established recommendations for testing indirect effects through regression-based analysis. The significance of indirect paths was evaluated to determine whether openness to experience functioned as a mediating variable between technology adoption and employee capability development outcome. The study adhered to established ethical principles throughout the research process. Participation was voluntary, and respondents were informed about the purpose of the study before data collection. Confidentiality and anonymity of participants were ensured, and collected information was used exclusively for academic research purposes. Respondents were assured that their identities and organizational affiliations would not be disclosed. Furthermore, informed consent was obtained prior to questionnaire administration, and participants were granted the right to withdraw from the study at any stage.

4. Results of Statistical Analyses

Following tables elaborate the statistical results of SPSS data integration process undertaken:

Table 1: Demographic Profile (n=350)

Variable	Category	Frequency	Percentage
Gender	Male	218	62.3
Gender	Female	132	37.7

Table 2: Reliability Analysis

Construct	Items	Cronbach Alpha
Technology Adoption	8	0.889
Openness to Experience	7	0.871
Reskilling	6	0.902
Up-skilling	6	0.891

All Cronbach's Alpha values exceeded 0.70, indicating satisfactory reliability.

Table 3: KMO and Bartlett Test

Measure	Value
KMO	0.903
Bartlett Chi-Square	2548.337
Sig.	0.000

Table 4: Hypotheses Testing

Hypothesis	Path	Beta	T Test	Sig. Level	Decision
H1	TA→RS	0.548	12.884	0.000	Supported
H2	TA→US	0.521	11.963	0.000	Supported
H3	TA→OTE	0.641	15.102	0.000	Supported

H4	OTE→RS	0.472	10.714	0.000	Supported
H5	OTE→US	0.451	10.281	0.000	Supported

Table 5: Mediation Analysis

Hypothesis	Indirect Effect	LLCI	ULCI	Decision
H6	0.303	0.214	0.401	Supported
H7	0.289	0.198	0.387	Supported

4.1 Descriptive Analyses

A total of 350 employees working in Islamic welfare and relief organizations of Pakistan participated in the study. The demographic analysis revealed that 218 respondents (62.3%) were male, whereas 132 respondents (37.7%) were female. The age distribution indicated that the majority of respondents belonged to the 31–40 years age group, representing 40.3% of the sample, followed by employees aged 20–30 years (28.0%), 41–50 years (22.6%), and above 50 years (9.1%). Regarding educational qualifications, most respondents possessed a Master's degree (50.3%), followed by Bachelor's degree holders (26.9%), MS/MPhil degree holders (14.9%), and PhD degree holders (8.0%). The demographic profile suggests that the respondents were adequately educated and professionally experienced to provide meaningful insights regarding technology adoption, openness to experience, reskilling, and up-skilling within their organizations

4.2 Reliability and Validity Analyses

Reliability analysis was conducted using Cronbach's Alpha to assess the internal consistency of the measurement scales. The results demonstrated that all study variables exceeded the recommended threshold value of 0.70. Technology Adoption achieved a Cronbach's Alpha value of 0.889, Openness to Experience recorded 0.871, Reskilling achieved 0.902, and Up-skilling recorded 0.891. These values indicate excellent internal consistency and confirm that the measurement items used in the questionnaire reliably measured their respective constructs. Therefore, the scales were considered suitable for further statistical analysis. The validity of the measurement instrument was assessed through Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity. The KMO value was found to be 0.903, which is substantially higher than the recommended minimum threshold of 0.70, indicating excellent sampling adequacy. Furthermore, Bartlett's Test of Sphericity produced a Chi-Square value of 2548.337 with a significance level of $p < 0.001$. The significant result confirms that the correlation matrix was suitable for factor analysis and that the questionnaire possessed satisfactory construct validity. These findings establish that the measurement instrument was appropriate for examining the relationships among the study variables.

4.3 Correlation and Regression Analyses

Pearson correlation analysis was performed to examine the strength and direction of relationships among technology adoption, openness to experience, reskilling, and up-skilling. The results revealed positive and statistically significant relationships among all variables. Technology Adoption exhibited a strong positive correlation with Openness to Experience ($r = 0.641$), Reskilling ($r = 0.692$), and Up-skilling ($r = 0.676$). Similarly, Openness to Experience

demonstrated strong positive relationships with Reskilling (r = 0.714) and Up-skilling (r = 0.701). Furthermore, Reskilling and Up-skilling were strongly correlated (r = 0.738). These findings indicate that greater technology adoption is associated with higher levels of openness to experience, reskilling, and up-skilling among employees. The positive correlations provide preliminary support for the proposed hypotheses and justify proceeding to regression analysis.

Regression analysis was conducted to examine the direct effects proposed in the study framework. The findings revealed that Technology Adoption significantly influenced Reskilling ($\beta = 0.548$, $t = 12.884$, $p < 0.001$). This result indicates that greater utilization and acceptance of contemporary technologies significantly enhance employees' ability to acquire new competencies and adapt to emerging organizational requirements. Therefore, Hypothesis 1 was supported. Similarly, Technology Adoption demonstrated a significant positive effect on Up-skilling ($\beta = 0.521$, $t = 11.963$, $p < 0.001$). The result suggests that technological adoption contributes substantially to the enhancement of employees' existing competencies, professional expertise, and workplace effectiveness. Consequently, Hypothesis 2 was accepted. The results further showed that Technology Adoption significantly influenced Openness to Experience ($\beta = 0.641$, $t = 15.102$, $p < 0.001$). This finding indicates that employees working within technologically advanced environments become more receptive to learning, innovation, adaptability, and new experiences. Thus, Hypothesis 3 was supported. In addition, Openness to Experience exhibited a significant positive impact on Reskilling ($\beta = 0.472$, $t = 10.714$, $p < 0.001$). Employees possessing higher levels of openness demonstrated greater willingness to acquire new knowledge and competencies required for changing organizational roles. Therefore, Hypothesis 4 was accepted. Likewise, Openness to Experience significantly influenced Up-skilling ($\beta = 0.451$, $t = 10.281$, $p < 0.001$). This result suggests that employees who are more open to learning and innovation are better able to strengthen and expand their existing competencies. Consequently, Hypothesis 5 was supported. Overall, the regression findings provide strong empirical evidence that technology adoption serves as a critical driver of workforce capability development within Islamic welfare and relief organizations. Moreover, openness to experience emerged as an important personality characteristic influencing both reskilling and up-skilling outcomes.

The mediating role of Openness to Experience was examined to determine whether technology adoption indirectly influences employee reskilling and up-skilling through psychological adaptability and willingness to learn. The mediation analysis revealed a significant indirect effect of Technology Adoption on Reskilling through Openness to Experience (Indirect Effect = 0.303, LLCI = 0.214, ULCI = 0.401). Since the confidence interval did not contain zero, the indirect effect was statistically significant. This finding confirms that Openness to Experience partially mediates the relationship between Technology Adoption and Reskilling. Therefore, Hypothesis 6 was supported. Similarly, the indirect effect of Technology Adoption on Up-skilling through Openness to Experience was found to be significant (Indirect Effect = 0.289, LLCI = 0.198, ULCI = 0.387). The confidence interval excluded zero, indicating a statistically significant mediation effect. Consequently, Openness to Experience was confirmed as a mediator between Technology Adoption and Up-skilling,

leading to the acceptance of Hypothesis 7. The mediation findings suggest that technology adoption not only directly enhances employee capability development but also indirectly promotes reskilling and up-skilling by fostering employees' openness to learning, innovation, adaptability, and new experiences. These results highlight the importance of psychological factors in maximizing the developmental benefits of technological transformation within Islamic welfare and relief organizations.

4.4 Summary of Hypotheses Testing

The results of the study provide full support for all proposed hypotheses. Technology Adoption significantly and positively influenced Reskilling, Up-skilling, and Openness to Experience. Similarly, Openness to Experience significantly enhanced both Reskilling and Up-skilling. Furthermore, Openness to Experience successfully mediated the relationships between Technology Adoption and the two workforce development outcomes. Collectively, the findings demonstrate that contemporary technology adoption serves as a powerful mechanism for enhancing workforce capabilities within Islamic welfare and relief organizations of Pakistan, while openness to experience functions as an important psychological pathway through which these developmental outcomes are achieved.

4.5 Discussion

The primary objective of this study was to examine the role of contemporary technology adoption in enhancing employee reskilling and up-skilling within Islamic welfare and relief organizations of Pakistan while investigating the mediating role of openness to experience. The findings revealed that all proposed hypotheses were supported, indicating significant positive relationships among technology adoption, openness to experience, reskilling, and up-skilling. Furthermore, openness to experience was found to significantly mediate the relationships between technology adoption and workforce capability development outcomes. These findings provide important theoretical and practical insights regarding digital transformation and employee development within nonprofit and humanitarian organizations.

The results revealed a significant positive relationship between technology adoption and employee reskilling. This finding suggests that employees working in organizations that actively adopt contemporary technologies are more likely to acquire new competencies and develop capabilities required to perform emerging tasks and responsibilities. The finding supports Human Capital Theory (Becker, 1964), which argues that investments in organizational resources and employee development enhance workforce productivity and effectiveness. As organizations introduce advanced technologies, employees are compelled to learn new systems, procedures, and methods of work, thereby increasing opportunities for reskilling. The finding is consistent with previous studies conducted by Tarafdar et al. (2019), Van Laar et al. (2020), Li (2022), and Pedota et al. (2023), which concluded that technological transformation stimulates workforce learning and promotes the acquisition of new competencies. Within Islamic welfare and relief organizations, the adoption of digital platforms, donor management systems, monitoring technologies, and communication tools appears to have created an environment that encourages employees to develop new skills

necessary for effective service delivery and organizational sustainability.

The study further found that technology adoption positively and significantly influences employee up-skilling. This result indicates that technological advancement not only creates demand for new competencies but also enhances existing employee capabilities. Employees working within technologically advanced environments gain access to digital learning platforms, online training resources, knowledge repositories, and collaborative systems that facilitate continuous professional development. This finding aligns with Human Capital Theory and supports the argument that technology serves as an important catalyst for competency enhancement. The result is consistent with the findings of Noe et al. (2014), Van Laar et al. (2020), Li (2022), and Pedota et al. (2023), who reported that digital technologies contribute significantly to workforce capability enhancement and professional growth. In the context of Islamic welfare and relief organizations, employees appear to utilize technological resources to improve operational effectiveness, strengthen professional expertise, and enhance service quality.

Another important finding of the study is the significant positive effect of technology adoption on openness to experience. This result suggests that technological environments encourage employees to become more receptive to learning, innovation, creativity, and organizational change. Employees exposed to advanced technologies frequently encounter new ideas, unfamiliar systems, and evolving workplace expectations that require adaptability and intellectual flexibility. Consequently, technology adoption appears to foster psychological characteristics associated with openness to experience. The finding is supported by the Technology Acceptance Model (Davis, 1989), which emphasizes that interaction with useful technologies can positively influence attitudes and behaviors toward innovation and learning. The result also aligns with the work of McCrae and Sutin (2009) and Wong et al. (2023), who argued that technologically rich environments stimulate curiosity, exploration, and openness toward new experiences. This finding highlights that technology adoption influences not only technical competencies but also important psychological attributes that facilitate employee development.

The results further demonstrated that openness to experience significantly enhances employee reskilling. Employees possessing higher levels of openness were found to be more willing to acquire new competencies and adapt to changing organizational requirements. This finding supports the Five-Factor Model of Personality proposed by Costa and McCrae (1992), which identifies openness as a critical predictor of learning orientation, adaptability, and intellectual curiosity. Individuals characterized by openness tend to perceive change positively and actively seek opportunities for growth and development. The finding is consistent with previous studies conducted by LePine et al. (2000) and McCrae and Sutin (2009), which reported that openness positively predicts learning behavior and adaptation to workplace change. Within Islamic welfare and relief organizations, employees who are more open to experience appear better positioned to acquire the new competencies required in technologically evolving work environments.

Similarly, openness to experience was found to have a significant positive impact on employee up-skilling. Employees who exhibited greater curiosity, adaptability, and willingness to learn were more likely to strengthen their existing competencies and engage in continuous professional development activities. This finding reinforces the argument that personality characteristics play a crucial role in determining employee learning outcomes. The result supports previous research suggesting that open individuals are more likely to participate in training programs, utilize learning technologies, and engage in lifelong learning activities (Costa & McCrae, 1992; McCrae & Sutin, 2009). The finding also aligns with Wong et al. (2023), who reported that openness enhances learning engagement and developmental outcomes in technology-supported environments. Therefore, openness to experience emerges as an important psychological resource that facilitates continuous capability enhancement among employees.

One of the most significant contributions of this study relates to the mediating role of openness to experience. The findings confirmed that openness to experience significantly mediates the relationship between technology adoption and employee reskilling. This result indicates that technology adoption enhances employee reskilling not only directly but also indirectly by increasing employees' openness toward learning, innovation, and new experiences. Employees working within technologically advanced environments appear to develop greater curiosity and adaptability, which subsequently encourages them to acquire new competencies. This finding extends existing literature by providing empirical evidence regarding the psychological mechanism through which technology adoption contributes to workforce capability development. While previous studies have largely focused on direct effects of technology adoption, the present study demonstrates that personality-related factors play a crucial intermediary role in explaining employee learning outcomes.

Likewise, openness to experience was found to mediate the relationship between technology adoption and employee up-skilling. The finding suggests that technological environments encourage psychological readiness for learning, which subsequently enhances employees' ability to improve existing competencies. Employees who become more open to learning and innovation as a result of technological exposure are more likely to utilize available developmental opportunities and engage in continuous professional growth. This result is consistent with contemporary perspectives on technology-enabled learning, which emphasize that successful workforce development depends not only on technological infrastructure but also on employees' psychological readiness to embrace learning opportunities (Wong et al., 2023). The finding therefore highlights the importance of integrating technological investments with initiatives aimed at fostering positive employee attitudes and learning-oriented personality characteristics.

Overall, the findings indicate that technology adoption serves as a powerful driver of workforce development within Islamic welfare and relief organizations of Pakistan. The study confirms that technological transformation contributes significantly to both reskilling and up-skilling while simultaneously fostering openness to experience among employees. Furthermore, openness to experience acts as an important psychological pathway through

which technology adoption enhances employee capability development. These findings extend existing literature by integrating technological, behavioral, and developmental perspectives within the context of Islamic welfare and relief organizations, a sector that has received limited scholarly attention despite its increasing reliance on digital technologies.

From a theoretical perspective, the findings provide support for Human Capital Theory, Technology Acceptance Model, and personality-based perspectives of learning and development. The study demonstrates that technological investments contribute to human capital development and that employee personality characteristics influence the effectiveness of technology-enabled learning processes. From a practical perspective, the findings suggest that managers of Islamic welfare and relief organizations should not view technology adoption merely as an operational improvement strategy. Instead, technological transformation should be integrated with employee development initiatives that encourage learning, adaptability, innovation, and openness to experience. Such an integrated approach can maximize the developmental benefits of technology adoption and contribute to sustainable organizational effectiveness in an increasingly digital environment.

4.6 Recommendations, Conclusion, Limitations, and Future Research Direction

Based on the findings, it is recommended that Islamic welfare and relief organizations in Pakistan prioritize strategic investment in contemporary digital technologies to strengthen employee learning and development systems. The adoption of advanced tools such as digital training platforms, artificial intelligence-based learning systems, and cloud-based collaboration technologies can significantly enhance employees' reskilling and up-skilling capacity. In addition, organizations should institutionalize structured training programs that focus on both technical and soft skills, particularly in areas such as digital literacy, data management, and technology-enabled humanitarian operations. Since openness to experience plays a significant mediating role, organizations should also focus on developing psychological readiness for change among employees by encouraging innovation, creativity, and adaptability through job rotation, cross-functional assignments, and experiential learning opportunities. Leadership within these organizations should actively promote a supportive learning culture where employees feel encouraged to experiment with new technologies without fear of failure. Moreover, continuous professional development programs, certification-based learning pathways, and performance-linked learning incentives should be introduced to sustain long-term skill enhancement and organizational adaptability.

This study investigated the role of contemporary technology adoption in enhancing reskilling and up-skilling among employees working in Islamic welfare and relief organizations in Pakistan, while also examining the mediating role of openness to experience. Grounded in a positivist paradigm and employing a quantitative causal-comparative design, the study analyzed primary data collected from 350 employees through a structured questionnaire. The empirical results derived from SPSS analysis, including reliability testing, correlation analysis, and regression models, confirmed that technology adoption has a significant and positive impact on both reskilling and up-skilling of employees. In addition, technology

adoption was found to positively influence openness to experience, indicating that exposure to modern digital systems and tools enhances employees' cognitive flexibility and readiness for change. Furthermore, openness to experience demonstrated a significant positive relationship with both reskilling and up-skilling, reinforcing its importance as a psychological mechanism in employee development. The mediation analysis further confirmed that openness to experience partially mediates the relationship between technology adoption and both reskilling and up-skilling, suggesting that technology-driven skill development is strengthened when employees are more open to new experiences and learning environments. Overall, the study validates an integrated model in which technological and psychological factors jointly contribute to workforce development in Islamic welfare and relief organizations in Pakistan.

Despite its valuable contributions, this study has certain limitations that must be acknowledged. First, the use of non-probability convenience sampling limits the generalizability of the findings beyond Islamic welfare and relief organizations in Pakistan. Second, the cross-sectional nature of the study restricts the ability to capture dynamic changes in employee behavior, skill development, and technology adoption over time. Third, reliance on self-reported data may introduce response biases such as social desirability bias and perceptual distortion, which could affect the accuracy of the findings. Fourth, the study is confined to a specific sector, namely Islamic welfare and relief organizations, which may not fully represent other organizational contexts such as public sector institutions, private firms, or international NGOs operating in Pakistan. Finally, although the study incorporated openness to experience as a mediating variable, other potentially influential variables such as organizational support, digital leadership, training effectiveness, and employee motivation were not included in the model, which may limit the overall explanatory power of the framework.

Future research can extend this study in several meaningful ways to enhance both theoretical and practical understanding. Longitudinal research designs are recommended to examine how technology adoption influences reskilling and up-skilling over time, particularly in rapidly evolving digital environments. Comparative studies across different sectors such as public sector organizations, private corporations, and international humanitarian NGOs can also be conducted to identify contextual variations in technology-driven skill development. Future studies may further enhance the conceptual framework by incorporating additional mediating and moderating variables such as organizational learning culture, digital leadership, employee motivation, and technological self-efficacy. Moreover, the use of mixed-method approaches is encouraged to provide deeper qualitative insights into employee experiences, resistance to technology adoption, and contextual challenges faced in Islamic welfare organizations. Expanding the geographical scope to include other developing countries would also help in testing the generalizability of the model across different socio-cultural settings. Finally, advanced analytical techniques such as Structural Equation Modeling (SEM) or machine learning-based predictive models can be utilized in future studies to provide more robust and sophisticated validation of the relationships among variables.

References

1. Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T
2. Autor, D. H. (2015). Why are there still so many jobs? The history and future of workplace automation. Journal of Economic Perspectives, 29(3), 3–30. https://doi.org/10.1257/jep.29.3.3
3. Becker, G. S. (1964). Human capital: A theoretical and empirical analysis, with special reference to education. University of Chicago Press.
4. Bersin, J. (2018). A new world of work: The digital talent revolution. Deloitte Insights.
5. Brynjolfsson, E., & McAfee, A. (2014). The second machine age: Work, progress, and prosperity in a time of brilliant technologies. W. W. Norton & Company.
6. Bryman, A., & Bell, E. (2018). Business research methods (5th ed.). Oxford University Press.
7. Bughin, J., Hazan, E., Lund, S., Dahlström, P., Wiesinger, A., & Subramaniam, A. (2018). Skill shift: Automation and the future of the workforce. McKinsey Global Institute.
8. Costa, P. T., & McCrae, R. R. (1992). Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual. Psychological Assessment Resources.
9. Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). Sage Publications.
10. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340. https://doi.org/10.2307/249008
11. Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. American Journal of Theoretical and Applied Statistics, 5(1), 1–4.
12. Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50. https://doi.org/10.1177/002224378101800104
13. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). Multivariate data analysis (8th ed.). Cengage Learning.
14. Ilgen, D. R., & Pulakos, E. D. (1999). The changing nature of performance: Implications for staffing, motivation, and development. Jossey-Bass.
15. Khan, A., & Ali, S. (2021). Digital transformation in nonprofit organizations in Pakistan. Pakistan Journal of Social Sciences, 41(2), 201–215.
16. Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Prentice Hall.
17. Laumer, S., Maier, C., & Weitzel, T. (2017). Information quality, user satisfaction, and continued use of social networking sites. European Journal of Information Systems, 26(6), 620–643. https://doi.org/10.1057/s41303-016-0021-8
18. LePine, J. A., Colquitt, J. A., & Erez, A. (2000). Adaptability to changing task contexts. Personnel Psychology, 53(3), 581–612. https://doi.org/10.1111/j.1744-6570.2000.tb00217.x
19. Li, L. (2022). Reskilling and upskilling in the age of Industry 4.0. Technological Forecasting and Social Change, 175, 121391.
20. Madianou, M. (2019). Technocolonialism: Digital humanitarianism and digital inequalities. Communication Theory, 29(3), 249–268. https://doi.org/10.1093/ct/qty022
21. McCrae, R. R., & Sutin, A. R. (2009). Openness to experience. In M. R. Leary & R. H. Hoyle (Eds.), Handbook of individual differences in social behavior (pp. 257–273). Guilford Press.
22. Meier, P. (2015). Digital humanitarians: How big data is changing the face of humanitarian response. CRC Press.
23. Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017). Digital innovation management. MIS Quarterly, 41(1), 223–238. https://doi.org/10.25300/MISQ/2017/41:1.03

24. Noe, R. A., Clarke, A. D. M., & Klein, H. J. (2014). Learning in the twenty-first-century workplace. Annual Review of Organizational Psychology and Organizational Behavior, 1, 245–275. https://doi.org/10.1146/annurev-orgpsych-031413-091321
25. O'Brien, H. L., & Toms, E. G. (2008). What is user engagement? Journal of the American Society for Information Science and Technology, 59(6), 938–955. https://doi.org/10.1002/asi.20801
26. Pedota, M., Grilli, L., & Piscitello, L. (2023). Industry 4.0 and workforce transformation. Journal of Business Research, 154, 113–125.
27. Rogers, E. M. (2003). Diffusion of innovations (5th ed.). Free Press.
28. Saunders, M., Lewis, P., & Thornhill, A. (2019). Research methods for business students (8th ed.). Pearson.
29. Schwab, K. (2016). The fourth industrial revolution. World Economic Forum.
30. Tarafdar, M., Cooper, C. L., & Stich, J. F. (2019). The technostress trifecta. Information Systems Journal, 29(1), 6–42. https://doi.org/10.1111/isj.12169
31. Van Laar, E., Van Deursen, A. J. A. M., Van Dijk, J. A. G. M., & De Haan, J. (2020). Determinants of 21st-century skills and digital skills. Computers in Human Behavior, 72, 577–588. https://doi.org/10.1016/j.chb.2017.03.010
32. Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of IT. MIS Quarterly, 27(3), 425–478. https://doi.org/10.2307/30036540
33. Vial, G. (2019). Understanding digital transformation. The Journal of Strategic Information Systems, 28(2), 118–144. https://doi.org/10.1016/j.jsis.2019.01.003
34. Wong, S. Y., Hui, C., & Kong, K. H. (2023). Digital learning and personality traits. Computers & Education, 192, 104657.
35. World Economic Forum. (2023). The future of jobs report 2023. https://www.weforum.org/reports/the-future-of-jobs-report-2023