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Workplace Change and Emerging Skills in Post-Pandemic Training Needs Assessment: Evidence from Bangladesh's Public Sector

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Abstract: This study aims to figure out how workplace changes and new skills affect the training needs assessment of public sector officials in Bangladesh at the time of the post-pandemic era. A total of 408 valid responses were obtained from public officials in Bangladesh. Researchers measured the training needs of Bangladeshi public sector officials in the post-pandemic era by examining workplace changes and new knowledge and skills. Stakeholders will have the opportunity to assess their training needs and gain insight into the evolving workplace and emerging skills required for the post-COVID period, which is crucial for public-sector employees in Bangladesh. An SEM (Structural Equation Model) model was formulated for EFA (Exploratory Factor Analysis), where post pandemic training needs assessment is evaluated by using two independent variables that are workplace change and emerging skills to support the robustness of the findings by ensuring the validity and reliability of the research model. The research results indicate that workplace changes and new knowledge and skills have a significant impact on the training needs assessment of Bangladesh's public sector. Furthermore, the research provides insight into the critical need to include training programs that focus on these essential competencies to ensure a successful transition to the post-pandemic era.

Keywords: training needs assessment; knowledge; skills; adaptability skills; future skills; reskilling; post-pandemic era; post-Covid-19.

Introduction

Training Needs Assessment (TNA) in the post-pandemic era, specifically after COVID-19, has gained a new level of significance. The pandemic has brought about substantial changes in the way businesses and organizations operate, requiring a thorough reassessment of their training needs to align with the evolving landscape. The highly contagious coronavirus illness 2019 (COVID-19) has severely impacted numerous institutions, including higher education and the public and private school systems worldwide. The ongoing epidemic has significantly impacted the education sector, resulting in increased burdens on teachers and staff, and the closure or reduced operation of several colleges, universities, and schools to mitigate the risk of infection (Singh et al., 2021). Consequently, training needs analysis (TNA) must be viewed and carried out in the context of existing systems to be consistent with the needs of employees and relevant to the ever-changing demands of organizations. As the United States progresses further into the complex and dynamic new world of a high-technology, service-based economy, proactive managers are becoming more aware of the critical role that human resource management performs (Miles & Snow, 1984). By turning knowledge into action, the TNA tool efficiently solves the knowledge gap in global human health resources (Markaki et al., 2021). TNA has been shown to minimize response bias and provide reliable information about current performance levels, skill areas most in need of further development, and how best to achieve optimal results. Overall, evidence demonstrates the widespread use of the TNA survey as a clinical practice and educational quality improvement tool across

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continents. Translation, cultural adaptation, and psychometric testing in a variety of settings, populations, and countries frequently reveal training gaps and results of targeted continuous professional development. Additionally, it facilitates the prioritization and allocation of limited resources for education based on identified training needs (Markaki et al., 2021). The pandemic had a significant but diverse impact on the demand for skills, as did the containment and mitigation measures taken to stop its spread (OECD Policy Responses to Coronavirus, 2021).

Government officials in Bangladesh play a crucial role in promoting national development, with public service tasked with delivering efficient services while ensuring transparency and accountability. However, several critical issues arise during operations that necessitate adaptive administrative practices, particularly in response to health crises, remote service delivery, and emerging governance challenges. Additionally, various initiatives have led to significant advancements in the rapid digitization of government services in Bangladesh. According to the World Bank, "to succeed in the 21st-century labor market, one needs a comprehensive skill set" composed of cognitive skills, socio-emotional skills, technical skills, and digital skills, "all of which can contribute to structural transformation and economic growth by enhancing employability and labor productivity and helping countries to become more competitive (AIIB Blog, 2022). The shift in focus towards 21st-century skills that learners need in the post-pandemic world. These skills include problem-solving, digital proficiency, collaboration, critical thinking, and self-direction. However, measuring these skills is challenging because they are intangible and subjective.

The main objective of this study is to measure training needs assessment based on the impact of changes in the workplace and new knowledge and skills in the public sector in the post-pandemic era. The specific objectives include the following:
1. To investigate the impact of changes in the workplace on the assessment of training needs in the public sector of Bangladesh in the post-pandemic era;
2. To examine the influence of new knowledge and skills on the assessment of training needs in the post-pandemic era for job holders in public services in the country.

As derived from the above research objectives, two major hypotheses are inferred, that is:
H1: There is a significant relationship between changes in the workplace and the training needs assessment of public sector officials in the post-pandemic era of Bangladesh;
H2: There is a significant relationship between new knowledge and skills and the training needs assessment of public sector officials in the post pandemic era of Bangladesh.

Overall, this study aims to examine how workplace transformations and the acquisition of new knowledge and skills impact Training Needs Assessment (TNA) within the post-pandemic context of the Bangladeshi public sector. The article formulates hypotheses and evaluates theories that connect workplace transformation, the necessary knowledge, and training requirements. The findings are expected to offer helpful suggestions for effective training schemes that can enhance employee performance and adaptability in a rapidly changing environment. Ultimately, this research intends to contribute to the development of a more responsive and skilled workforce in the public sector.

Literature review

Changes in workplace

The pandemic is fast-moving, accelerating rapid changes that lead to new challenges and impact organizations. The workplace will not only change its design but also the way in which work will be planned, organized, performed and controlled (Barath & Schmidt, 2022). The pandemic taught us that many people can be as or even more productive working from home because of tools like Zoom, Microsoft Teams, and Slack, which improve remote communication (Mehra, 2022). The Organization for Economic Co-

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operation and Development (2021) uses online job vacancy data to examine COVID-19's influence on employment and skills demand. The study indicates that the pandemic created simultaneous shocks to supply and demand in the labor market, reorganizing it. The crisis response ought to improve public health and economic growth. The crisis has affected people with different educational levels differently across the countries analyzed and shows that many firms have already announced plans to increase productivity by investing in automation technologies and accelerating technology megatrends, which will make workers even more vulnerable. Technical (medical) and transversal abilities are most desired (OECD, 2022).

The COVID-19 epidemic has changed workplace priorities and behaviors, compelling company executives to direct people through hybrid working without a blueprint. Best practice is too early to create, and each organization must find its own success. The crisis caused a drastic shift to home working, yet traditional assumptions and traditions have been abandoned. Companies trust their workers to work hard without them, and they like it (Souza & De, 2022).

Before the COVID-19 epidemic, workspace design lowered workstation panels, densified seating, and increased spontaneous connection to create amenity spaces and community cooperation. The year-long social experiment of working from home shaped the future. It revealed what employees seek in office design (Middleton et al., 2022). New hybrid workplaces (office in corporate establishing, private offices, and third office venues) complicate the issues since studies disagree on the concept of workplaces. Discussion of the quantitative data from novel low-cost biosensors, such as carbon dioxide concentration distribution, that show employees' presence and attention and their behavior in a workplace. It also suggests new research avenues for using a connected network of IoT devices and ambient biosensor technologies (Zeiner et al., 2022).

Given the influence of COVID-19 on our socio-economic and environmental systems, multi-faceted sustainability approaches are required for the present and post-pandemic years of age. Human and workplace spatial involvement in urban environments is influenced by the built environment. New post-pandemic concepts that mix the built environment and sustainability practices may improve sustainability integration. Bazazzadeh et al. (2022) recommend utilizing circular economy in the adaptive reuse of industrial legacy to build circular workplaces post-pandemic (Bazazzadeh et al., 2022).

Xu and Juan (2021) summarize the four dimensions and 26 design strategies of MURBs in China during the post-pandemic era. These strategies are further extracted into 6 highly attractive, 5 high-value-added and 4 critical quality attributes. Males demand more social space, while elderly need less office space and separate master bedroom baths. Due to the pandemic, more educated individuals must work at home, and the need for home working environments is stronger (Xu & Juan, 2021).

Tahsiri (2023) depicts a post-digital hybrid space of practice that prioritizes humanistic principles and holistically meets the needs of the socio-cultural environment of the workplace, wherever work occurs. To design for the post-digital hybrid workplace, one must first understand the future workplace needs that are relevant to post-digitality and hybridity in the academic realm. Through a thematic analysis of the final 37 studies, the following seven requirements were identified: 1) embodied, intuitive and multimodal experiences, 2) a balance between privacy and interaction, 3) environmental comfort, 4) disconnection, 5) a culture that empowers the individual, 6) social territories and collective synergies, and 7) heterogeneity. Therefore, as the ecosystem of work develops and adapts to hybridity, meanings, perceptions, and behaviors connected to these needs should be examined to better support design and management strategies. It also recognizes the inherent juxtapositions of competing expectations and requirements in a flexible workplace and highlights the behavioral, temporal, and connectivity dimensions of rivalling concerns in a post-digital hybrid workplace (Tahsiri, 2023).

Zhang et al. (2023) analyses the design factors and design strategies of urban park seating from four aspects based on the current situation of the post-pandemic social environment. However, aesthetics, materials, and safety cannot be ignored. In addition, people are more concerned about seat safety in the post-pandemic period (Zhang et al., 2023). Therefore, it can be applied to the area of change in workplace of an organization. COVID-19 accelerated digital technology adoption. Most theoreticians agree that pandemic alterations will not occur again in the next several years or decades. The pandemic has affected practically every corporate process, from customer relations to sales to supply chain. It caused a permanent change in several business sectors and led to a large number of firms integrating digital and pre-pandemic methods. COVID-19 has transformed the workplace and work style. Employees and firms have embraced digital or hybrid work styles, embracing agile and flexible procedures and norms (Mićić & Mastilo, 2022).

A cutting-edge analysis of digital organizational behavior in the post-pandemic workplace is presented in Managing the Digital Workplace in the Post-Pandemic, which draws on a wide spectrum of knowledge from around the world. Additionally, it teaches students and practitioners through current best practices, laboratory procedures, regulations, and protocols throughout fast workplace changes (Hıdıroğlu & Oğlu, 2022). When compared to before the pandemic, the perceived work-life balance improved, but the physical separation of work and home life was reduced. Workplace flexibility, home environment, and organizational support improve productivity, work-life balance, and happiness during the pandemic (Yang et al., 2021). Many companies feature flexible and mobile work arrangements. Generalized hybrid work has given knowledge workers more freedom to choose when and where to work. After the pandemic, companies will reassess their workplace solutions (Inka, 2022).

Office technology has increased efficiency and changed the nature of office employment. Office technology utilizes electronic gadgets to boost workplace efficiency, yet developing office systems poses several difficulties for the company. Modern office technology can cause dramatic changes in a company, which, if not handled correctly, might impact its goals. Organizational change should be gradual and office staff should be trained and retrained to utilize sophisticated office equipment to adapt to workplace technology (Abiola et al., 2022). After the COVID-19 pandemic, a new normal is being established in many nations. Under certain conditions, people can return to office in this era. One of the requirements that must be met by every employee in the office is the application of health protocols. Another necessity is to distinguish work environment prerequisites to manage a pandemic (Sari & Budiyanti, 2020).

In the COVID-19 pandemic, workplace ergonomics must be considered to help employees keep productive. The ergonomic office design improves productivity. By minimizing the physical strain and workload of the worker, facilitating task execution, ensuring effortless information, exchange with the environment, minimization of physical constraints, etc., and making workplace elements easy to use. Other workplace enhancements include touch-free door handles and garbage. One-way sidewalks to avoid crashes, cleaning furniture using vinyl, plastic, imitation leather, and other non-porous materials using translucent partitions (Sari & Budiyanti, 2020).

New knowledge and skills

To redefine basic work skill sets, offer components required by employees in emerging market economies (EMEs), analyze selection techniques for enterprises and explain consequences for the labor process theory of work. Top and HR managers across sectors believe that emerging market economies (EMEs) workers need eight critical job skill sets and 42 skills for growth. They also firmly agree that their organizations utilize talent selection technologies, notably behavioral-based interviews, to recruit highly skilled workers. In particular, managers should internally train and develop their employees/workers to possess the eight essential skill sets: (1) ideation and system thinking, (2) information and digital literacy, (3) social skills with appreciation for

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diversity and inclusion, (4) communication and language, (5) creativity and innovation, (6) EQ for self-management and development, (7) growth/outward mindset and (8) cognitive skills for the specific job role so that their employees/workers can survive and thrive in the era of the brittleness, anxiety, non-linearity and incomprehensibility of the business world under pandemic conditions (Weerasombat et al., 2023).

Omeluzor et al. (2023) showed that technology is an important tool for recovery and growth in post-COVID-19 era that will enhance communication, collaboration, teaching and research of academics and findings indicated that among the challenging factors affecting recovery and growth in post-COVID-19 era are inadequate support from the Federal Government, unpreparedness of stakeholders, lack of palliative for lecturers, inadequate ICT facilities for distance and online learning among others (Omeluzor et al., 2023).

Recently, there has been an increase in publications that focus on the so-called "skills gap" and "future skills" which examine up-skill and re-skill needs in companies (Knispel, 2022). In the wake of COVID-19, the conventional norms and practices of knowledge work have suddenly shifted toward digitally conducted work. We may be observing the dawn of a new era of knowledge work (Wang et al., 2020). Some key skills everyone needed in a post-covid world, which are Resilience, Tech savviness, Data literacy, Innovation and Digital leadership (RMIT Online, 2021). On the other hand, skills required to succeed in a post-covid world for skilling the employees are Technical And Digital Skills, Communication And Social Skills, Leadership And Management Skills, Finance Management, Critical Thinking And Creative Problem Solving and Learning, Unlearning, And Relearning (*7 skills you need to master to succeed in a post-covid world - vit chennai* 2022). In business world some skills are required for efficient development for post pandemic era which are Leadership, Flexibility and adaptability, Critical thinking, Tech savvy, Communication and emotional intelligence and Creativity and innovation (Lukins, 2023). But to build a new world we need a new mindset to be taught to younger generations in order to fulfil the mission of education itself which is to improve 'futures literacy' for all, to build hope to create change, to embrace fraternity for the collective good (Pozzi, 2022).

Knispel (2022) describes why a skill-based organization is necessary and why knowing your "future skills" is vital for the survival of today's companies. The starting point is recent studies on the changing requirements in the professional world and its jobs, and the related skill gap in companies. Two different approaches for consulting companies to build skill-driven organizations were described. This section is followed by a short practical report that outlines what the first steps toward a skill-based organization can look like and names some problem areas. Examples from different companies complement various skill-driven approaches (Knispel, 2022).

Ensuring the adaptability of employees' skills and roles to the evolving ways of working in the post pandemic era will be essential for establishing a resilient operating model. Despite initial concerns about the potential strain, it is evident that this new approach to work could serve as a blueprint for the long term. In order to emerge stronger from the COVID-19 crisis, it is imperative for organizations to prioritize the reskilling of their workforce. According to a 2017 report by the McKinsey Global Institute, approximately 375 million workers, equivalent to 14 percent of the global workforce, may need to transition to new occupations or acquire additional skills by 2030 due to automation and artificial intelligence (Agrawal et al., 2020). A recent McKinsey Global Survey revealed that 87 percent of executives reported experiencing skill gaps in their workforce or anticipated them in the near future. To tackle this challenge, companies should develop a talent strategy that focuses on enhancing employees' critical digital and cognitive capabilities, as well as their social and emotional skills, adaptability, and resilience. This is an opportune moment for organizations to allocate more resources to learning and commit to reskilling initiatives. By cultivating this capability, companies will also fortify themselves against future disruptions.

Rob (2020) identified some Essential post-pandemic skills, which are regardless of age, experience, functional skills or job titles must now demonstrate a core set of skills if they wish to remain employable. For skill development some efforts are needed like Collaboration, Digital proficiency, Emotional regulation, Career self-management and Flexibility towards economic, social and technological consequences of the Covid-19 pandemic (Rob, 2020).

No doubt that in the post-covid period skill requirement for employment will be under a stricter scanner in view of the many changes that have significantly reshaped ways of doing things, especially in respect of businesses. It has been a compulsive push towards digitization in many areas of our daily activities for nearly two years. Developing skills is an open-ended issue. Although it is initially the job market at home and abroad that comes to mind, the idea of skill development is integral to the making of existent human resources that besides taking care of itself can contribute to the economy in myriad forms and shapes (Wasi, 2023).

Training need assessment

The TNA instrument is a validated tool used for training needs analysis and evaluation of professional continuing education programs across the workforce. It allows for triangulation of assessment, needs, and training (Markaki et al., 2021). Brown (2002) lists various criteria that may suggest employee training or development needs for new abilities, including obtaining data to identify needs, evaluating data to discover causes of issues, prioritizing training needs, and planning and executing a training program. Additionally, the article suggests several factors that might indicate training or development needs of employees for new skills, such as new employees, new supervisors, managerial competency assessments, reassignments, promotions, and reduction in force (RIF) placements and concludes that a clear understanding of needs is fundamental to the success of a training program, and that programs developed and carried out that meet those needs can lead to a performance improvement oriented training program and better results from training (Brown, 2002).

Ferreira et al. (2013) discusses the importance of Training Needs Assessment (TNA) processes in identifying skill deficiencies and determining the profile of future trainees. The authors define training needs as identified differences between the employees' current performance and the performance that the organization expects of them and also suggests that TNA has a strategic role in providing clear guidelines for improving individuals' skills and knowledge (Ferreira & Abbad, 2013). Once training needs are identified, it is necessary to determine the areas of need. There are some challenges in determining the training need which are the lack of proper communication and coordination (Bin Othayman et al., 2022). Cai (2020) emphasizes the need for organizations to focus on learning and development to navigate the Fourth Industrial Revolution. The author highlights six cultural skills that are crucial for success in the new landscape, including risk acceptance or mitigation, data-driven decision-making, flexibility, prioritization, measurement and monitoring, and talent management as well as to align and be congruent with empathy, values, and purpose. Finally, the need for organizations to build different skills and capabilities, including the ability to take risks, stay open-minded and agile, learn from experiment and from each other, and learn from failures (Cai, 2020).

There are four essential elements to cover in a training needs diagnosis which leads to the implementation of a training strategy. These four steps include running a gap analysis, identifying the reasons behind problems, their consequences and background, identifying the validity of training activities and hierarchy of their importance for the organization, and identifying the scope and topics of training and possible organizational solutions. There mentions an effective analysis of training needs covers two parallel processes: identifying training expectations among key stakeholders in the local government sector and conducting an analysis of the legal and institutional context of operation for local

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administration (Trutkowski, 2016). Training gaps are crucial not only for enhancing workforce efficiency but also for strengthening the sector's contribution, such as Light Engineering, to national industrial growth. Thus, targeted training programs aligned with emerging skill demands can transform the specific sector into a more competitive and sustainable engine of the economy (Rahman et al., 2022). The training and development field is evolving, and adaptation is necessary for survival. Remote and virtual training will likely become more common in a post-COVID-19 environment, and training professionals will need technological skills. To engage participants, trainers should use question-and-answer sessions, compelling visual aids, movies, polls, and breakout sessions. Regular pauses and reducing worker, client, and consumer contact are also crucial (Thilagaraj et al., 2021).

Research methodology

An inductive research approach is used where quantitative methods (the survey method) and statistics are applied for the analysis of data. The population for the study will be 5,505 participants. Out of the population, (1899 + 308) = 2,207 short course participants for the years 2021–2022. (1595 + 433) = 2,028 short course participants for the years 2020–2021 and 1,270 short course participants for the years 2019–2020 are treated as the total population during the pandemic situation. From the population, public servants (public officials of Bangladesh) have been selected who have participated in the training programs provided by the Bangladesh Institute of Management (BIM) over the last three years, from July 2019 to June 2022 (Bangladesh Institute of Management, 2022). The study selected a total of 408 participants from a population of 5,505. The population was stratified according to financial years (FY 2021-2022, FY 2020-2021, FY 2019-2020, and others) in chronological order. From each stratum, 160, 150, 90, and 8 participants were selected, respectively. This stratification ensured appropriate representation from each financial year.

After selecting the sample, primary data are collected from the desired participants by using structured and semi-structured questionnaires. In the first phase, data are collected from face-to-face interviews to pretest the questionnaire. After confirmation of the questionnaire, data is collected using a Google Form by emailing the link to the selected respondent. In this special case, a printed questionnaire is used for collecting primary data from the respondent by the data enumerator.

For explanatory factor analysis, a 5-point Likert scale is used, where 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5=strongly agree. For theoretical and literature support, different published articles, newspapers, reliable websites and published reports are used, and for the identification of the sample respondents, the annual report of BIM and Short Course Information Management Systems of BIM are used. Both descriptive and inferential statistics are used by using different statistical software, which are SPSS and SmartPLS. For referencing Zotero, online citation generation software and Google Scholar are used for organizing the references for the study.

Data analysis and presentation

Demographic information

According to the sample size, demographic information is stated below for an overview. Table 1 demonstrates that 85.29% were male and 14.71% were female. The age distribution shown in this table indicates that 40.69% of participants were aged 30-39 years, 13.48% were over 50 years, 15.93% were under 30 years, and 29.90% were aged 40-49 years. Here, 1.47% were Ph.D. holders, 57.60% had completed their masters, 27.45% had completed their graduation, and others were below HSC. Regarding work

experience, 32.84% of participants worked for 11–20 years, 17.89% worked for 5–10 years, 28.68% worked for less than 5 years, and 20.59% worked for more than 20 years.

Table 1. Demographic profile of respondents

Variables	Categories	Frequency	Percentage
Gender	Male	348	85.29
	Female	60	14.71
Age	Less than 29	65	15.93
	30 – 39	166	40.69
	40 – 49	122	29.90
	Greater than 50	55	13.48
Educational background	Ph.D.	6	1.47
	Masters	235	57.60
	Honors	112	27.45
	HSC	14	3.43
	Below HSC	41	10.04
Experience	Less than 5 years	117	28.68
	05 – 10	73	17.89
	11 – 20	134	32.84
	More than 20 years	84	20.59

Source: own processing

Conceptual model

The goal of this research is to find out how the changes in the workplace and new knowledge and skills affect the training needs assessment of public sector officials in Bangladesh in the post-pandemic era. Figure 1 shows the relationship with the variable in a diagram.

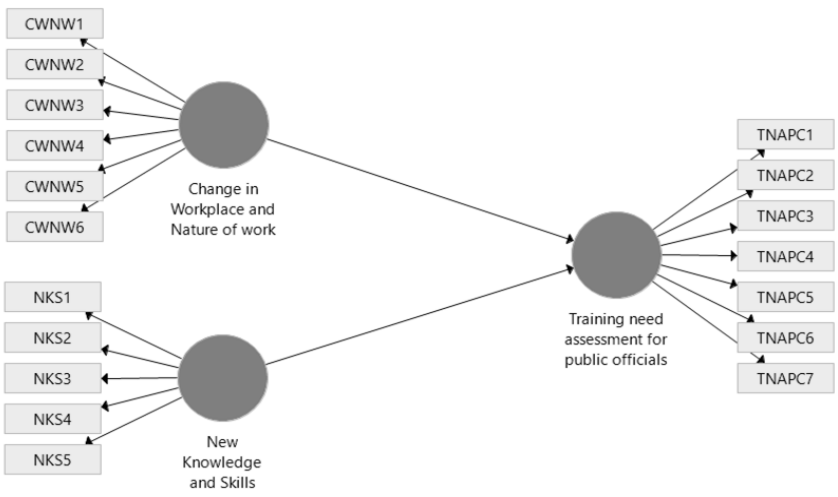

Figure 1. Conceptual framework of the workplace changes and training needs in Bangladesh's public sector

Source: own processing

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Findings

Exploratory factor analysis

In social science, EFA is a commonly used and widely implemented statistical technique. This section looked at a total of 408 respondents, where below 2018-2019 FY=99, 2019-20 FY=54, 2020-21 FY=70, 2021-22 FY=117, and 2022-23 FY=68 valid survey replies from the public officials of Bangladesh. Even though there are 322 respondents who receive their training once, the number of participants who receive more than one training is 72, and the number of non-training participants is 14. By examining the changes in the workplace and new knowledge and skills, the training needs assessment of the public sector officials of Bangladesh in the post-pandemic era is measured. The rotated factor matrix was used to get the three factors. In the following paragraph, we'll go through those factors in more detail.

Factor-01 (changes in the work place): This includes six observed variables (which are denoted in the model as CWNW1 to CWNW6), such as virtual communication culture, which is crucial for the post-pandemic era; A long-term reform of the workplace is needed to secure work-life balance and professional aspects in the post-pandemic era; in the aftershock of the Corona pandemic, there is a need to coordinate staff density, staff safety, and office efficiency; the pandemic has helped workers adapt and create job opportunities to match their talents and skills; in the post-pandemic period, considering the type and nature of work, remote work opportunities increase, the spread of knowledge becomes easier, and time is saved; and it is important to formulate guidelines for the proper protection of occupational health, physical illness, and vulnerable workers in the post-corona epidemic period.

Factor-02 (New Knowledge and Skills): This component includes five latent variables, denoted as NKS1 to NKS5. Future training should be provided for all employees, considering both hard and soft skills. Any changes in the workplace and the nature of work require employees to possess hope and tolerance for change management. Being tech-savvy is essential for every employee in the post-pandemic era, while data literacy is a key skill that will aid us during the fourth industrial revolution. Additionally, acquiring innovative skills is crucial for effectively managing any crisis related to New Knowledge and Skills.

Factor-03 (Training need assessment for public officials): There are seven variables (assigned as TNAPC1 to TNAPC7) that can be used to evaluate the training needs assessment for the public official after the pandemic era, which are post-pandemic training needs that need to be identified, taking into account skills, knowledge, abilities, productivity, social, psychological, and physical safety, and workplace changes; Tailoring training based on post-pandemic skill need assessment requires the cooperation of managers; post-pandemic training requires a cost-benefit analysis of the training of new and existing employees with future changes; New technologies, tools, organizational goals, objectives, and legislative changes that emerged during the pandemic need to be designed to support training in the post-pandemic era; there needs to be some sort of career enhancement plan that helps in the post-pandemic era; for the post-pandemic era, training needs must be assessed taking into account workforce changes (more female workers, immigrants, or older workers); and training needs need to be assessed in light of changing legislation as a result of the overall pandemic period.

The measurement model

The table labelled Validity and Reliability (Table 2) presents data regarding the convergent validity of the research model. The table indicates that all latent variables or model constructs possess Average Variance Extracted (AVE) values exceeding 0.50. The AVE values for change in workplace and nature of work, new knowledge and skills, and training needs assessment for public officials are 0.618, 0.597, and 0.559, respectively.

These values indicate that all constructs meet the acceptable threshold of 0.50 for AVE values. Cronbach's alpha was used to assess the internal reliability of the model structures. The results of Cronbach's alpha, presented in Table 2, as 0.749, 0.748, and 0.792, are all acceptable as they are greater than or equal to 0.70. These findings indicate a strong relationship among the indicators of the model constructs (see Table 2). Table 2 assesses the convergence validity of the model's constructs by examining the loading values. Sarstedt et al. (2017) suggest that the factor loading values for each indicator of the latent variable should exceed 0.70 (Sarstedt et al., 2017).

The analysis eliminated all items of factor loading values that do not fall within the range of 0.60 to 0.70 except CWNW3. The structural model was analyzed to identify the influential factors contributing to the training needs assessment for public officials. These findings support the convergence validity of the research model, indicating a strong correlation among all construct indicators, as evidenced in Table 2.

Table 2. Exploratory factor analysis with indicator reliability and model fitting information

Variables	Details	Factor Loading (λi)	SM	SD	T Statistics	CR*	CA	AVE
Change in Workplace and Nature of work	CWNW3 <- Change in Workplace and Nature of work	0.541	0.514	0.232	2.329	0.75	0.749	0.618
	CWNW6 <- Change in Workplace and Nature of work	0.971	0.930	0.143	6.790			
New Knowledge and Skills	NKS1 <- New Knowledge and Skills	0.744	0.712	0.202	3.691	0.75	0.748	0.597
	NKS2 <- New Knowledge and Skills	0.800	0.771	0.169	4.741			
Training needs assessment for public officials	TNAPC5 <- Training needs assessment for public officials	0.769	0.752	0.106	7.241	0.79	0.792	0.559
	TNAPC6 <- Training needs assessment for public officials	0.727	0.711	0.110	6.633			
	TNAPC7 <- Training needs assessment for public officials	0.747	0.741	0.105	7.117			

* $CR=\{(\sum\lambda i)^2/(\sum\lambda i)^2+\sum(1-\lambda i^2)\}$; where λi=Factor Loading

Source: own processing

The CR value of Change in Workplace and Nature of Work is 0.75, New Knowledge and Skills is 0.75, and Training Needs Assessment for Public Officials is 0.79. Composite reliability values greater than 0.70 indicate internal consistency, while values between 0.75 and 0.80 are considered good (Hair et al., 2019; Fornell & Larcker, 1981).

Table 3. Reliability indexes and criteria

Reliability Indexes	Criteria	Reference
AVE	>0.50	Hair et al. (2012), Ringle et al. (2012), Sarstedt et al. (2017)
Composite Reliability (CR)	>0.70	Hair et al. (1998)
Alpha	>0.70	Chin et al. (2008), Henseler and Sarstedt (2013)
Indicator Reliability	IR≥0.40	Hulland (1999).

Note. AVE=average variance extracted; α=Cronbach's alpha; ILV=Indicator Loading Value and CR=Composite Reliability

Source: own processing

Table 2 also indicates that all T-statistic values were above 1.96 at a 5% level of significance, providing substantial evidence of the high significance of the outer model loadings. Therefore, based on this evidence, our structural equation modeling (SEM) can be deemed valid. In path modeling, a global goodness-of-fit (GoF) measure can be utilized, which is calculated as the geometric mean of average commonality and average R^2, particularly for endogenous variables (Chin, 2009).

The formula for calculating GoF is: GoF=√ (AVE×R^2). In this study, the GoF value was found to be 0.39 (R^2=0.263, average AVE=0.5686). As observed, the GoF value exceeded

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the largest cutoff value of 0.36, indicating that the proposed model in this study exhibited a stronger explanatory power compared to the recommended values for GoF, such as GoF small=0.1, GoF medium=0.25, and GoF large=0.36 (Wetzels et al. 2009).

Discriminant validity

To evaluate the discriminant validity of the model's constructs using the Fornell-Larker criterion, the researchers compared the square root of the Average Variance Extracted (AVE) for each latent variable to its correlations with all other latent variables. According to the criterion, the square root of the AVE coefficients should exceed the correlations. Examining both the correlation matrix and the diagonal elements is necessary to verify this condition (Hair et al., 2012). Table 4 presents the results of the discriminant validity analysis, demonstrating that the square root of the AVE values exceeds the correlations with any other constructs or latent variables in the model. This finding confirms that the model's constructs possess discriminant validity (see Table 4).

Table 4. Discriminant validity

Variables	**1**	**2**	**3**
1. Change in Workplace and Nature of work	**0.786**		
2. New Knowledge and Skills	0.236	**0.773**	
3. Training needs assessment for public officials	0.215	0.231	**0.748**

Source: own processing

There is no discrimination amongst factors, and the association between one factor and another is smaller than 0.85. As a result of the analysis presented below, it is clear that the value of any other factor's relationship to it is less than 0.85. As a result, we may conclude that there are factors that are distinct from others, as determined by the correlation metrics shown in Table 5.

Table 5. HTMT Test

Variables	1	2	3
1. Change in Workplace and Nature of work			
2. New Knowledge and Skills	0.518		
3. Training needs assessment for public officials	0.349	0.511	

Source: own processing

Common method bias test

The Variance Inflation Factors (VIFs) provide insights into the extent of inflation in the variance of each coefficient, with a range of 1 to 10 and above. VIF helps us understand the degree of inflated variance for each coefficient. Interpreting the VIF values, a value of 1 indicates no correlation, 1–5 suggests a moderate correlation, and a value greater than 5 indicates a high correlation (Hair et al., 1998). To examine the presence of multicollinearity among the variables, we calculated the VIFs and found that all value was 1.059 (refer to Table 6). This value falls within the acceptable range recommended by Hair et al. (1998), indicating the absence of multicollinearity issues among the factors. A VIF greater than 3.3 is regarded as an indication of pathological collinearity and potential common method bias in a model. However, in our model (refer to Table 6), all VIF values are equal to or lower than 3.3, indicating the absence of common method bias (Kock, 2015).

Structural model assessment

Hypotheses were tested (both H1 and H2) to identify the direct effects of independent variables on dependent variables. Independent variables denote changes in the workplace, the nature of work, and new knowledge and skills, whereas the dependent variable is training needs assessment by public officials. A variance-based structural equation model using SmartPLS software version 3.2.9 was performed to test the direct effects of H1 and H2 and the model had fit statistics, as shown at the bottom of Table 6. The VIF value of the model was below the cut-off value of 5.0, indicating the absence of multicollinearity in it. The results of the test are summarized in Table 6.

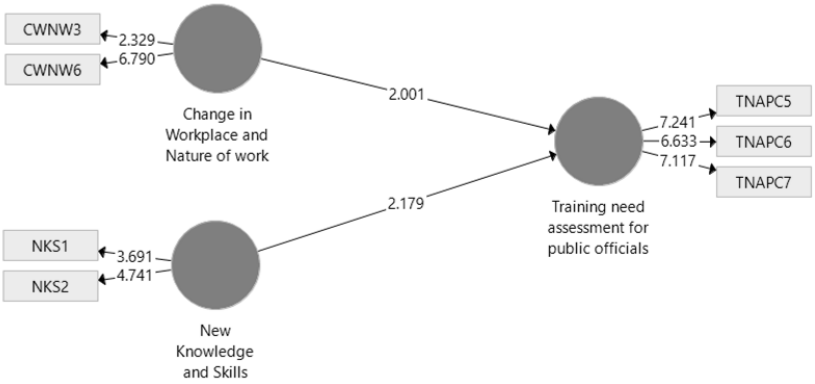

Figure 2. Value of Path model
Source: own processing

The results in Table 6 show a significant positive relationship between change in the workplace and the training needs assessment for public officials after the pandemic era (β=0.17, t=2.001, p <0.05). Consequently, our hypothesis H1 is supported. Accordingly, the direct effects showed that new knowledge and skills also have a positive relationship with training needs assessment for public officials (β=0.191, t=2.179, p <0.05). Therefore, hypothesis H2 was supported.

Table 6. Path model

Hypotheses		**Beta**	**SM**	**SD**	**LL**	**UL**	**T Statistics**	**P Values**	**Comment**	**VIF**
H1	Change in Workplace and Nature of work -> Training needs assessment for public officials	0.170	0.186	0.085	0.013	0.318	2.001	0.045	Supported	1.059
H2	New Knowledge and Skills -> Training needs assessment for public officials	0.191	0.209	0.088	0.005	0.344	2.179	0.029	Supported	1.059
Endogenous Construct										
R-squire value						**0.263**				
Model Fit	SRMR					**0.062**				
	Q^2 value					**0.148**				

Source: own processing

The model shows good explanatory power for the endogenous construct of training needs assessment for public officials, with an R^2 value of 0.263. The predictors in this model have 26.3% explainable capabilities, indicating a moderate level of explanatory strength in the context. The SRMR value is 0.062, denoting that the model has a good fit and that the discrepancy between the observed and predicted correlations is low where the threshold is 0.80. The value of Q^2 shows 0.148, which is above zero, confirming that the model has predictive relevance.

Based on the research objectives and hypotheses, some recommendations are needed to conclude the research work. Which are stated below based on sequences. Firstly, H1 is

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supported by the fact that there is a positive relationship between the changes in the workplace and the training needs assessment of the public sector officials in the post-pandemic era of Bangladesh, which shows the value of the findings that there is a significant positive relationship between the changes in the workplace and the training needs assessment for public officials after the pandemic era β=0.17, t=2.001, p 0.05 (P value=0.045), which supports the hypothesis H1. Accordingly, H2 demonstrated that new knowledge and skills positively relate to the training needs assessment for public officials in the post-COVID-19 era, with β=191, t=2.179, p<0.05 (P value=0.029), thereby supporting hypothesis H2. So, it can be recommended that new knowledge and skills are crucial determinants for the training needs assessment in the post-pandemic era of Bangladesh.

The study must be useful to both the public and private sector officials in Bangladesh. The effects of COVID-19 pandemic are not yet over, so the post-pandemic workplace is still largely a forecast (Mehra, 2022).

Conclusions and recommendations

Changes in the workplace can have a profound impact on the Training Needs Assessment (TNA) process. As the work environment evolves, TNA must adapt to ensure that training programs address the emerging challenges and requirements. In the context of Training Needs Assessment (TNA), knowledge and skills play a crucial role in determining the gaps and requirements within an organization. In light of the COVID-19 pandemic, a drastic change has been experienced in how office work is conducted and managed. In a short time, most knowledge workers had to learn to work from home, as well as collaborate and socialize with colleagues remotely (Waizenegger et al., 2020; Yang et al., 2023).

Many conventions of work were quickly thrown into debate, such as working hours, managing work-life balance at home, the suitability of home spaces for work, etc., propelling many organizations to hypothesize about the future of work. In the post-pandemic era, corporations are looking for an innovative solution that would help them seamlessly combine office work efficiency with the safety and convenience of their resilient workforce.

Overall, it can be said that changes in the workplace and nature of work and new knowledge and skills have a significant impact on training needs assessment for public officials in the post-pandemic era of Bangladesh. The workplace requires necessary changes, including the office environment, hygiene factors, technology development, digitalization, and flexible office hours and also the formulation of a new national training policy and post-COVID HRD programs. Therefore, public officials in Bangladesh should develop new knowledge and skills to ensure efficiency, effectiveness, awareness, and knowledge of specific software in the post-pandemic era.

Bangladesh has limited literature on post-COVID-19 HRD and TNA, with much of the review relying on studies from other countries and sectors. This gap points to the need for localized research to better understand the unique challenges and opportunities facing human resource development in Bangladesh's post-pandemic landscape. Future studies should focus on tailoring training needs assessments to address the specific skills and competencies required for recovery and growth in the region.

Moreover, the value of R-squared represents 26.3% explainable capabilities, indicating a moderate level of explanatory strength in the context. At this point further research is needed to improve the value of R-squared. Enhancing the explanatory power of R-squared could offer more details about the factors influencing training needs assessment. By employing more comprehensive data sets and advanced analytical techniques, researchers can uncover critical trends that will inform effective strategies for workforce revitalization.

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